

GCSE Maths Foundation worksheets

222 sides of golden Maths questions for GCSE Foundation new syllabus

There will be mistakes

Some of the answers to the 'progress test' questions have errors (usually copying)

Print and work before you use

Download from <http://k58.uk/handouts.pdf>

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Worksheet 1

Answer these questions on separate paper! All non-calculator!

Arithmetic with whole numbers

Use any non calculator method you know.

- 1) Work out 23×49
- 2) Work out 183×94
- 3) Work out $3104 \div 8$
- 4) Work out $8412 \div 7$
- 5) Work out $2107 - 892$

BIDMAS skill and puzzle questions

- 1) Work out $3 + 7 \times 6$
- 2) Add a pair of brackets to the expression below to make it true
 $22 - 10 \div 3 = 4$
- 3) Work out $25 - (30 - 18)$
- 4) Work out the value of $5 \times 6 - 4 \times 7$
- 5) Calculate the value of $30 \div 6 - 64 \div 16$
- 6) Add a pair of brackets to the expression below to make it true
 $24 \div 20 - 14 = 4$
- 7) Work out $\frac{3 \times 6}{95 - 86}$
- 8) Work out $\frac{40 - 5 \times 6}{6 \times 7 - 4 \times 8}$
- 9) Work out $4(20 - 18) + 3(10 - 2 \times 3)$
- 10) Work out $8^2 - 7 \times (100 - 94)$

Check your answers with a scientific calculator (phone app will do).

Negative number arithmetic

- 1) Work out $15 \div -5$
- 2) Write down the value of $-7 - 8$
- 3) What is the difference between -9 and $+7$?
Hint: use a number line
- 4) Write down the value of $5 - 17$
- 5) Write down the value of $-17 + 5$
- 6) Work out the value of -7×5
- 7) Write down the value of $-4 - -9$
- 8) The temperature early one crisp September morning was -3°C .
The temperature increased by 8°C
What is the new temperature?
- 9) Work out the value of -6×-8
- 10) Freda has £350 in her bank account on Thursday morning. She pays the gas bill, £96.50, and then the electricity bill, £47.89. Then she does the weekly shop, £87.50 and buys a Network pass for a month, £109. Finally Freda pays in £30 to the credit union and buys a pair of shoes for £14.99.
Is Freda in overdraft by the time all these charges are applied to her account?
- 11) Work out the value of $-6 \times 8 - 3 \times -7$
- 12) Work out the value of $(-12)^2 - 180 \div (-17 + 19)$
Hint: BIDMAS still applies!
- 13) $? \times 4 = -60$. What number is represented by the ?
- 14) $3 \times ? + 14 = -1$
What value must ? have?
- 15) Work out $(30 \div -15 + 6 \times 7) \div (100 - (9^2 - 1))$
Hint: work out the inside bracket first!

Symbols and inequalities

Tick the boxes as appropriate – don't copy this table out, we'll mark it on the whiteboard in class.

Statement	TRUE	FALSE
" $8 < 7$ "		
" $4 \geq -8$ "		
" $x = 3$ satisfies the inequality $-3 < x < 5$ "		
" $0.301 < 0.3 < 0.45 < 3.01$ "		
" $4.\bar{9} \leq 5.0$ "		
" $4.\bar{9} < 5.0$ "		
" $h = 325$ is in the range $300 < h \leq 325$ "		
" $749.75 < 750$ "		
" $93.045 > 93.05$ "		
" $x = \sqrt{64}$ lies in the range $-10 < x < -7$ "		

Now try these questions on separate paper

- 1) Write down a number that is larger than 3 and smaller than 10
- 2) Algernon says "Widgets cost £3.99 each for quantities from 10 up to 100, and then they cost £2.99 from 100 up to 500".
Can you write an inequality that represents what Algernon means by the phrase "from 10 up to 100"?
- 3) The variable x satisfies the inequality $-3 < x \leq 2$.
Write down all the integer values that x can take.
- 4) The variable x satisfies the inequality $0 \leq x < 6$
The variable y satisfies the inequality $0 < y \leq 6$
Write a list of integers that can satisfy *both* inequalities.
- 5) "z is at least 12 and less than 47"
Write an inequality for z .

Context questions

Try these without a calculator. Show the method that you used.

- 1) Five oranges cost £1.20.
How much should you pay for three oranges at the same rate?
- 2) Algernon is packing small metal parts.
He puts 12 metal parts in a packet.
He puts 36 packets in a box.
He completes 50 boxes one day.
How many small metal parts did Algernon pack that day?
- 3) Asif has a food stall in a market.
He keeps a record of the meals he sells for one session...

Meal	Price each	Number sold
Ful maddamas and pitta	£3.00	12
Homous and pitta	£2.50	15
Falafel and pitta with salad	£4.50	8
Pitta with salad and mint dressing	£1.50	18

Calculate the total value of the meals sold in that session.

- 4) How many 200ml cups of cola can you pour from a 2.5 litre bottle of cola?
Hint: 1000 ml in 1 litre (have a look at the labels on jars and cans)
- 5) Anita has a 120 metre roll of cloth.
She cuts lengths of 12 metres, 45 metres and 37 metres.
How many metres are left on the roll?
- 6) Aaron is drilling holes in a length of wood.
He drills 19 holes in a straight line.
The centres of the holes are 34mm apart.
Calculate the distance from the centre of the first hole to the centre of the 19th hole. (Hint: sketch a picture and label the lengths).

Worksheet 2

Try these questions on separate paper. Show methods where needed.

Factors and multiples

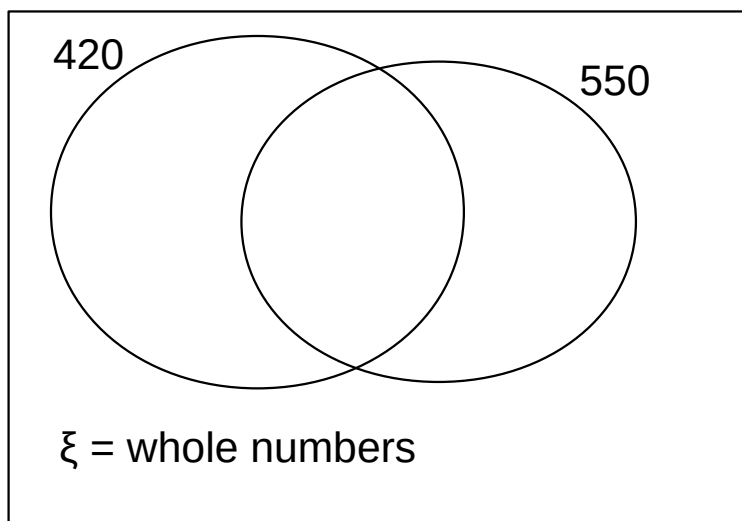
- 1) Find all the factors of 48
How many different factors does 48 have?
- 2) Find all the factors of 36
How many different factors does 36 have?
- 3) Write down all the factors of 16. Write down all the factors of 20.
Write down all the factors of 25. Write down all the factors of 12.
- 4) Write a sentence about what is special with numbers with an odd number of factors.
- 5) Write down a number larger than 100 that has 12 as a factor
- 6) Write down a number between 50 and 60 that has 17 as a factor
Hint: 17 is an old math teacher's favourite
- 7) Write down the first six multiples of 12 starting with 12
- 8) Write down the first five multiples of 15 starting with 15
- 9) Write down a number larger than 100 that has both 12 and 15 as a factor
- 10) The sum of two numbers is 13 and the product of the same two numbers is 42. Find the numbers.
- 11) A rectangle has an area of 12 cm^2 and a perimeter of 14 cm.
Find the length and width of the rectangle.
- 12) Look at this list of numbers: 3, 4, 12, 15, 20, 25, 75, 100
 - a) Write down all the multiples of 5 in the list
 - b) The product of two numbers in the list is equal to a third.
Find the numbers

HCF and LCM

- 1) Find all the factors of 72
- 2) Write down all the factors of 60
- 3) What is the highest common factor of 72 and 60?
- 4) Write down the highest common factor of 15 and 20
- 5) Find the highest common factor of 35 and 21
- 6) Write down the highest common factor of 8 and 12
- 7) Find the highest common factor of 200 and 250
- 8) Write down the first 6 multiples of 15
- 9) Write down the first 5 multiples of 25
- 10) Find the lowest common multiple of 15 and 25
- 11) Write down the lowest common multiple of 12 and 18
- 12) Write down the lowest common multiple of 8 and 12
- 13) The X51 bus leaves the bus stop every 12 minutes.
The 33 bus leaves the same bus stop every 18 minutes
Both buses leave together at 10:30 am one morning.
At what time will they leave together again?
- 14) Lighthouse A flashes every 90 seconds
Lighthouse B flashes every 100 seconds
A sailor in a fishing boat sees both lighthouses flash at 22:33:00
When will the sailor see both lighthouses flash together again?
- 15) Algernon says “you can find the LCM of two numbers A and B by multiplying them together and dividing by the HCF”
Does Algernon's recipe work?
Try finding the LCM of 48 and 36 using Algernon's method.
- 16) A pair of numbers have an LCM 108 and an HCF of 3.
What were the numbers?

Prime numbers and prime factors

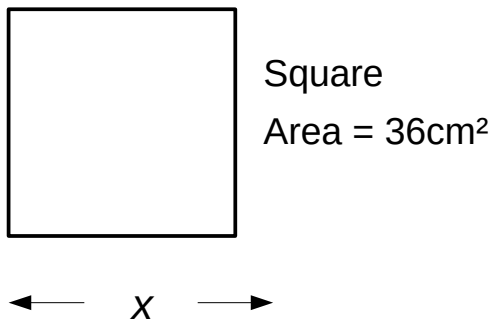
- 1) List all the prime numbers under 30
- 2) Write down two prime numbers that lie between 50 and 60
- 3) Find two prime numbers add to give 16.
- 4) Find two prime numbers that add to give 32
- 5) Find the prime factors of 24 using the factor tree or repeated division method
- 6) Write 72 as a product of its prime factors.
Write your answer in index form for any repeated prime factors
- 7) Find the prime factors of 420 and write them in a list
- 8) Find the prime factors of 550 and write them in a list
- 9) Copy and complete the Venn diagram below to show the prime factors of 420 and 550. Use the completed diagram to calculate the highest common factor and the lowest common multiple of 420 and 550.



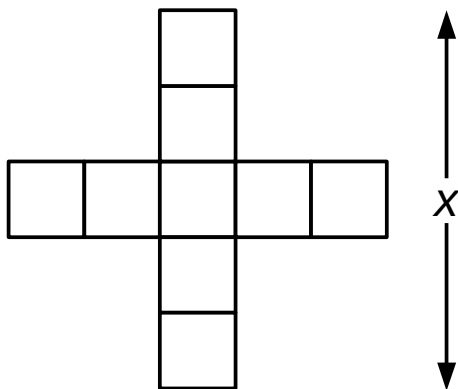
- 10) Puzzle: A number has exactly four prime factors, all different. The prime factors add up to 25. Find the number.
Hint: the number is larger than 500

Powers and roots

- 1) Write down the value of 4^2 and the value of 5^3
- 2) Write down the value of $\sqrt{25}$
- 3) Write down the value of $\sqrt[3]{27}$
- 4) The square below has an area of 36cm^2 .
Find the perimeter of the square.



- 5) Each of the squares in the diagram below has an area of 4 cm^2 .
Work out the value of the length x .



- 6) Work out $5^6 \times 5^7$ and write your answer as a power of 5.
- 7) Work out $3^7 \div 3^5$ and write your answer as a power of 3.
- 8) Work out the value of $4^2 + 5^3$
Hint: you just have to work each power out and then add them!
- 9) Work out $\frac{2^{10} \times 2^6}{2^{12}}$ and write your answer as a power of 2.

Worksheet 3

Some of the questions can be written on the worksheet. Other questions might need separate paper.

Rounding to the nearest whole, 10, 100, 1000

Complete the table below... Cells that make no sense have been blocked out.

	Round the numbers to nearest...			
Number	Whole	10	100	1000
2 965 031.59				
27.56				
57 789.45				
951.05				
456 023				
14.75				
0.49975				
0.50031				
47.067				

Try these questions

- 1) Use a calculator to find $\sqrt{4700}$ and round your answer to the nearest whole number
- 2) The population of England in 2015 was found to be 54 786 327. Round this to the nearest hundred thousand.
- 3) The population of Scotland in 2015 was listed as 5 373 000 to the nearest thousand. What is the smallest population consistent with this figure?
- 4) Wales had a population of 3 099 086. Round this to the nearest hundred thousand.

Decimal places and significant figures

Fill in the table below

	Round to		
Number	3 d.p.	2 d.p.	1 d.p.
3.1415926536			
1.4142135624			
137.035999139			
0.0582139642			
0.0490239887			
$\sqrt{(30)} \approx 5.4772255751$			
$\frac{1 + \sqrt{(5)}}{2} \approx 1.6180339887$			
4.669201609103			
97.995231367			

Fill in the table below

	Round to		
Number	3 s.f.	2 s.f.	1 s.f.
20 173			
451 803			
197.35			
12.56792			
18.27098			
0.71692356			
0.0004513098			
0.052956821			
0.0705239817			

Standard form

- 1) Write 47 000 as a number in standard form
- 2) Convert 4.2×10^6 from standard form
- 3) Write 3 210 as a number in standard form
- 4) Convert 7.25×10^4 from standard form
- 5) Work out $2 \times 10^3 \times 4 \times 10^6$ and write the answer in standard form
- 6) Write 0.0056 as a number in standard form
- 7) Convert 3.1×10^{-4} from standard form
- 8) Write 0.000045 as a number in standard form
- 9) Convert 8.25×10^{-1} from standard form
- 10) Work out $3 \times 10^{-4} \times 9 \times 10^3$ and write the answer in standard form.

Comparing decimals

- 1) Find half way between 3.5 and 3.6
- 2) Write these numbers in order of size starting with the smallest
0.301, 3.01, 0.31, 0.031, 0.03
- 3) Calculate half way between 14.7 and 14.75
Hint fill in with zeros so both numbers have 2 d.p.
- 4) Put these numbers in ascending order
7, 7.05, 7.5, 0.075, 0.705
- 5) Calculate half way between 67.05 and 67.8
Hint: fill in with zeros up to 3 d.p.
- 6) Put these numbers in order of size starting with the smallest
175, 17.5, 17.05, 1.75, 0.175
- 7) Calculate half way between 23.7 and 36.25
Hint: fill in with zeros to 3 d.p.

Find the value of a fraction

Non-calculator and show working as usual!

- 1) Find $\frac{3}{4}$ of £700
- 2) Find $\frac{2}{3}$ of £17.16
- 3) In a survey, two-thirds of those asked agreed with the proposal to plant more trees in the Centre gardens.
The survey was given to 159 people.
How many people did *not* agree to the proposal?
- 4) 60 balloons are released in a celebration.
A $\frac{1}{4}$ of the balloons are red
Two-fifths of the balloons are green
The remainder of the balloons are yellow.
How many yellow balloons are there?
- 5) Kamaljit wins a prize of £600
She gives half the money to her mother.
Kamaljit donates one third of the money to a charity
How much money does Kamaljit have left to spend?
- 6) Aaron earns £1200 a month take home pay
One third of the money goes on rent.
Half the money goes on food and day-to-day expenses
How much does Aaron have left to pay energy bills and to save?
- 7) Nusut wins a prize and donates a third of the money to a charity.
Nusut donated £250.
How much did Nusut win?
- 8) Calculate the value of 65% of £800
- 9) Work out 17.5% of £900

Worksheet 4

Try all of this worksheet without a calculator

Comparing and recognising fractions

1) Simplify $\frac{12}{16}$

2) Find the missing numbers in this chain of fractions

$$\frac{2}{3} = \frac{?}{9} = \frac{12}{?} = \frac{?}{21}$$

3) Which is the larger of $\frac{7}{9}$ and $\frac{3}{4}$?

You must show a calculation

4) Find the fraction that lies half way between $\frac{2}{3}$ and $\frac{4}{5}$

Hint: write both fractions over the denominator 30

5) Which of the fractions below are equivalent to $\frac{3}{4}$?

$$\frac{75}{100}, \quad \frac{26}{36}, \quad \frac{16}{20}, \quad \frac{45}{60}, \quad \frac{49}{63}$$

6) Put the fractions below in order of size starting with the smallest

$$\frac{2}{5}, \quad \frac{1}{4}, \quad \frac{1}{3}, \quad \frac{2}{9}, \quad \frac{3}{8}$$

7) Which is the smaller of $\frac{2}{3}$ and $\frac{3}{5}$?

You must show a calculation

8) Find the fraction that lies half way between $\frac{1}{2}$ and $\frac{3}{4}$

Hint: write both fractions over the denominator 8

9) Write down three fractions that are equivalent to $\frac{3}{5}$

Add, subtract, divide and multiply fractions

1) Work out $\frac{2}{3} \times \frac{1}{5}$

2) Calculate the value of $\frac{3}{5} \times 650$

3) Work out $\frac{1}{4} + \frac{2}{3}$

4) Work out $\frac{2}{3} - \frac{2}{5}$

5) Calculate the value of $\frac{1}{4} \times 84$

6) Work out $\frac{1}{2} + \frac{3}{8}$

7) Work out $\frac{1}{3} + \frac{1}{6}$

8) Work out $\frac{2}{5} \times \frac{3}{8}$

9) Calculate the value of $12 \div \frac{1}{4}$

10) Work out the value of $\left(\frac{3}{5}\right)^2$

11) Work out $\frac{3}{4} \div \frac{2}{5}$

12) Calculate the value of $1 - \frac{1}{2} \times \frac{3}{5}$

Hint: BIDMAS applies to fractions!

13) Work out the value of $\frac{2}{3} \div \frac{1}{2}$

Mixed numbers and top heavy fractions

- 1) Convert $2\frac{3}{4}$ to an improper fraction
- 2) Convert $\frac{20}{7}$ to a mixed number
- 3) Work out $5\frac{2}{5} + 7\frac{3}{10}$ and give your answer as a mixed number
- 4) Work out $3\frac{3}{4} - 2\frac{1}{2}$ and give your answer as a mixed number
- 5) Work out $2\frac{1}{4} \times 1\frac{1}{2}$ and give your answer as a mixed number
- 6) Work out $4\frac{1}{5} - 3\frac{1}{2}$ and give your answer as a mixed number
- 7) Work out $2\frac{7}{8} + \frac{3}{5}$ and give your answer as a mixed number

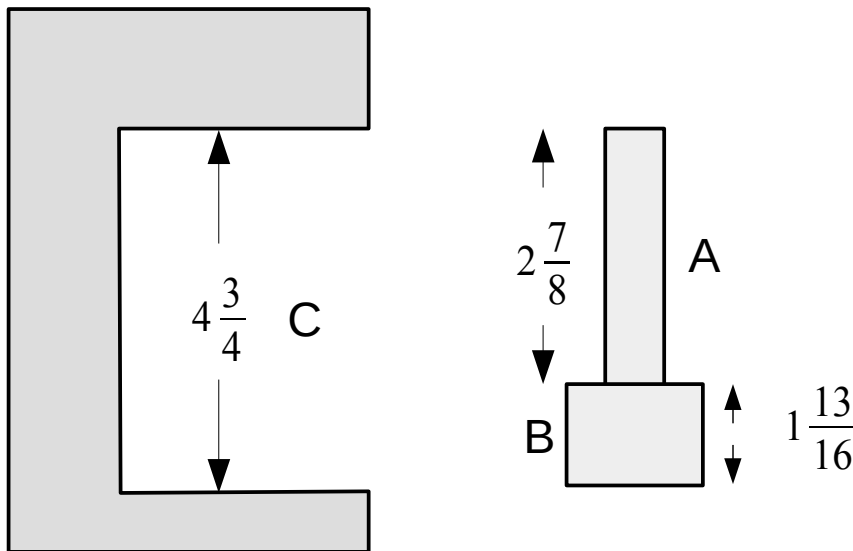
Decimal arithmetic

- 1) Work out $0.75 + 2 + 0.3 + 0.055$
- 2) Work out $1 - 0.375$
- 3) Work out 0.65×350
- 4) Work out $1 - (2 + 0.35 - 1.8)$
- 5) Work out 0.25×1.2
- 6) Work out 6.5×9.1
- 7) Work out $7.2 \div 9$
- 8) Work out $5 \div 0.4$
- 9) Work out $\frac{3.5 - 1.9}{12.7 - 12.5}$

Hint BIDMAS still applies and the fraction bar means \div

Story problems involving fractions and decimals

- 1) A drink needs 125ml orange to every litre of water
What fraction of the drink is orange juice?
Give your answer in its simplest form
- 2) Ethel buys a bus pass each month for £60. She is paid £900 a month. What fraction of her pay does Ethel spend on the bus pass?
Give your answer in its simplest form
- 3) The sketch below (not to scale) shows the dimensions of two parts A and B. Show that the parts A and B will fit into the space in the bracket C.



- 4) A mortgage company offers a mortgage to the value of the total of $3\frac{1}{2}$ times the larger salary and 1 times the smaller salary.
Ethel and Algernon earn £29 500 and £11 650 per year respectively.
They want to buy a house valued at £135 000.
What deposit will they need to find?
- 5) Work out $2\frac{1}{2} \times 3\frac{2}{5} - 1\frac{7}{8} \times 2\frac{7}{10}$
BIDMAS applies!

Worksheet 5

Fractions, decimals and percentages

Convert between Fractions, Decimals and %

Each row shows the same quantity written as a fraction or a decimal or a percentage. Fill in the missing values. We will mark the table in class next week.

Fraction	Decimal	Percentage
$\frac{2}{5}$		
	0.75	
		35%
	0.8	
$1\frac{1}{4}$		
	0.375	
		50%
	2.5	
		325%
$\frac{7}{8}$		
	0.65	
$\frac{2}{3}$		

Percentage increase and decrease

Complete the table below...

...We will mark the table in class on the whiteboard.

Do calculations on some separate paper and have them with you just in case there is a systematic issue to sort out

Qu	Amount	Increase/decrease	New amount
1)	50p	“Surcharge 10%”	
2)	£270.00	“15% off all prices today”	
3)	£15 000	“1% pay rise”	
4)	£300.00	“30% off this week”	
5)	4 500	“Visitor numbers increased by 5%”	
6)	£4.40	“5% increase in price of all day ticket starts today”	
7)	£7.60	“3% increase in hourly rate”	
8)	£120.00	“65% off for just in time booking”	
*9)	50p		55p
*10)	?	Increase by 20%	£240

- 11) Freda earns £14 500.
She is awarded a 10% pay rise when she qualifies
Calculate her new salary
- 12) Algernon is comparing the cost of couches...
Shop A: “One third off all prices”. Normal price is £450
Shop B: “20% off today”: Normal price is £360
Which shop is cheaper for Algernon's new couch?

Write one number as a percentage of another

Complete the table below – again show methods on separate paper and we will mark these on the whiteboard next week.

Qu	Whole	Part	Part as percentage of whole
1)	60	15	
2)	£45	£18	
3)	£3.60	£2.70	
4)	£7.50	£3.00	
5)	500 ml	25 ml	
6)	500g	300g	
*7)	£160	£20	
*8)			

Percentage increase and decrease

Complete the table below and we'll mark it next week.

Qu	Before	After	Percentage increase/decrease
1)	50p	56p	
2)	£45	£60	
3)	£800	£600	
4)	25 mm	26 mm	
5)	£20	£15	
6)	12 cm	9 cm	
*7)	50	62.5	
*8)	£15	£20	

Mixed percentage questions

Answer these questions on separate paper.

They are mixed up – see if you can recognise from the wording what each question is asking you to work out.

- 1) Michael is setting up a new cafe.
The espresso machine costs £800 + VAT at 20%.
Calculate the total cost of the espresso machine
- 2) Nusut buys a house for £150 000 in 2017.
In 2020 the house is valued at 10% more than its value in 2017
In 2024, the house is valued at 10% less than its value in 2020.
Calculate the value of the house in 2024.
- 3) 4% of men have some form of colour blindness.
0.5% of women are colour blind.
A college has 4 500 women students and 3 800 students are men
Calculate an estimate for the total number of colour blind students in the college
- 4) A postage stamp increases in price from 60p to 72p.
Work out the percentage increase
- 5) Naomi buys a box of 48 mangos for £18 at the wholesale market.
Three of the mangoes are badly blemished and cannot be sold.
She needs to make a profit of 100% on the mangoes.
What price should Naomi charge for each remaining mango on her market stall?
- 6) A school has a target of 97% attendance.
The school has 1 400 pupils
On Tuesday, 43 pupils are absent.
Did the school reach the attendance target on that day?
You must show a calculation to support your answer.
- 7) Write 15 as a percentage of 75
- 8) Work out 2.5% of £85 using a non-calculator method

Worksheet 6: number review

- 1) Write down the value of the underlined digit in each of the numbers below
 - a) 1 473 b) 27.9216754 c) 3.1415926
- 2) Decide if the following statements are true or false
 - a) “A square number will always be even”
 - b) “All prime numbers are odd”
 - c) “Multiples of 6 can be even or odd”
 - d) “Prime numbers larger than ten are odd”
 - e) “Multiples of 5 can be even or odd”
- 3) The sum of Bill and Ben's ages is 47
Bill is five years older than Ben
How old is Bill?
- 4) Write down the...
 - a) The HCF of 8 and 12
 - b) The LCM of 12 and 15
 - c) The HCF of 36 and 48

5) Work out each of the following calculations

a) $21 + 327.6 + 0.35 + 1.2$

b) $234.56 + 135.75 - 75.2$

c) $0.035 + 7 + 2.1 + 0.6$

d) $12.5 - 3.17 + 7.1$

6) Work out each of the following calculations

a) 7.2×0.17

b) 1.2×0.35

c) 9.3×5.7

d) 12.5×0.15

7) Work out each of these calculations

a) $17.6 \div 8$

b) $10.24 \div 1.2$

c) $7.5 \div 0.15$

d) $1.69 \div 0.13$

8) Write 70% as a decimal

9) Write 0.6 as a fraction in its simplest form

10) Which is larger: 65% or $\frac{2}{3}$?

Show a calculation

11) Write $\frac{2}{5}$ as a decimal and as a percentage

12) Convert $\frac{3}{8}$ to a decimal

13) Work out

a) 15% of £350

b) 40% of £970

c) 65% of £28

14) Put each of the sets of numbers below in order of size, smallest first

a) 3.1, 0.31, 3.01, 0.031, 0.301

b) 40%, 0.401, $\frac{3}{8}$

c) $\frac{2}{3}$, 66%, 0.667

15) a) Write 629 000 as a number in standard form

b) Write 0.00072 as a number in standard form

16) Francine wins £600 in a competition at work

She gives $\frac{1}{3}$ of the money to charity

She spends £130

How much is left?

17) Work out a) $\frac{1}{5} + \frac{2}{3}$ b) $\frac{5}{8} + \frac{3}{4}$

18) Work out a) $\frac{7}{8} - \frac{4}{5}$ b) $\frac{5}{6} - \frac{3}{4}$

19) Work out a) $\frac{3}{5} \times \frac{3}{4}$ b) $\frac{3}{8} \times \frac{4}{9}$

20) Work out a) $\frac{3}{7} \div \frac{5}{14}$ b) $\frac{4}{5} \div \frac{8}{15}$

21) Mkoase wants to have an annual income of £12 000 from his investments. The interest rate is 5% per year
How much does Mkoase need to invest?

22) The wage deal is agreed: 2% plus a flat increase of £300.
Karen earned £15 000 per year before the wage deal was agreed.
How much will she earn after the deal?

23) Add a pair of brackets to each of the expressions below to make them correct

a) $5 - 3 \times 4 + 3 = 14$

b) $15 \div 6 - 1 \times 2 = 6$

Worksheet 7: Reverse % and compound interest / depreciation

Answers on separate paper so you can hand them in!

Reverse percentages

Remember: divide the amount you know by the percentage that you know to find the value of 1% and then multiply by the percentage you want to find

- 1) 4% of a length is 12cm.
Find the whole length
- 2) 12% of a tin of beans by weight is fibre.
A particular can of beans has 48g of fibre.
How much did the beans weigh?
- 3) 60% of a group of people disagree with the proposal for a new road.
120 people disagree with the proposal.
How many people were asked?
- 4) 17% of a cake is sugar.
The weight of sugar in the cake is 51g
How much did the whole cake weigh?
- 5) A mechanical digger has VAT added to the cost at 20%
The builder paid £8 000 VAT on the digger
How much did the digger cost before the VAT was added?
- 6) A car has VAT added at 20%
The total cost including VAT was £14 400
Work out the cost of the car before the VAT was added.
Hint: $100\% + 20\% = 120\%$
- 7) A coat is advertised in a sale as being reduced by 30%
The sale price of the coat is £84
What should the cost of the coat have been before the sale?

Compound Interest and Depreciation

Use a calculator!

Hint: use multipliers for increasing and decreasing the percentages

Example: increase £300 by 20%.

Suggested calculation: 20% is added on to 100% so the multiplier is 1.2
 $300 \times 1.2 = £360$

- 1) Algernon invests £1200 in an account that pays 10% compound interest per year.

Calculate the value of his investment after 3 years

Hint: find multiplier and raise it to power 3

- 2) There is 1g of bacteria in a dodgy sausage roll left in the sun.

The weight of bacteria grows at a compound 50% per hour

- a) Calculate the weight of bacteria after 1 hour
- b) Calculate the weight of bacteria after 3 hours
- c) Calculate the weight of bacteria after 10 hours

Hint: use that power button with the multiplier

- 3) A car loses 30% of its value each year because of depreciation.

A fleet car is bought new for £15 000

Calculate the value of the car after

- a) 1 year
- b) 3 years

Hint: the multiplier is less than 1 (100% – 30%)

The company decide the scrap the car when its value drops below £1000.

*c) Can you estimate how many years before the car is scrapped?

- 4) Monzur invests £300 000 in a bond that pays 2.4% compound interest per year.

He leaves the bond for 10 years.

Calculate the value of the bond after 10 years.

Hint: power button!

Worksheet 8: Ratio and proportion

Answers on separate paper so you can hand them in!

Simplify these ratios / make ratios from words

- 1) Simplify 600 : 400
- 2) Write 250 : 150 : 300 : 450 as a ratio in its simplest form
- 3) Simplify 900 : 15 : 300
- 4) Write £2.50 : 75p as a ratio in its simplest form
Hint: change £ to pence as ratios can't have units
- 5) Simplify 300ml : 1.5 litres
Hint: change litres to ml
- 6) Write 0.42 : 0.7 as a ratio in its simplest form
Hint: multiply all numbers in the ratio so all whole numbers...
- 7) Simplify 1.25 : 0.8 : 2.5 : 0.4
Hint: write each number as a % or multiply so all whole numbers...
- 8) Write $\frac{3}{4} : \frac{2}{3}$ as a ratio in its simplest form
Hint: write fractions over a common denominator then just don't write the denominator
- 9) Simplify the ratio $\frac{2}{5} : \frac{7}{10} : 2\frac{1}{2}$ so that it uses integers
- 10) Francine is making up reagents in the lab.
She takes 125ml of hydrazine and adds water to make 1 litre
Write the ratio of hydrazine to water as a ratio in its simplest form
- 11) Nusut is making a drink.
She uses 300ml of orange juice, 60ml of lemon juice and 600ml of water.
Write the ratio of orange juice, lemon juice and water as a ratio in its simplest form

Dividing in a ratio

- 1) Divide 360 in the ratio 3 : 4 : 5
- 2) The angles in a triangle are in the ratio 2 : 2 : 5
 - a) Find the size of each of the angles in the triangle
 - b) What kind of triangle is this?
- 3) Bill and Ben share the profits of a used car business in the ratio 4 : 7
Last month, the business made a profit of £12 100
Calculate Ben's share of the profits
- 4) The profits of a small business are distributed between the partners in the ratio 2 : 4 : 4
Write the smallest share as a percentage
- 5) Nigel has £600 to give away.
He donates 40% of the money to a local charity
He splits the remainder in the ratio 4 : 5 to give to his nieces
 - a) Calculate how much each niece receives
 - b) Express the smallest share as a fraction of the £600

Find one part given the other one

- 1) The profits of a small business are split in the ratio 3:4
The smaller share is worth £180.
Calculate the value of the larger share.
- 2) A sum of money is divided in the ratio 3:7.
The largest share was £63. Work out the value of the smaller share.
- 3) Bill and Ben share seeds out in the ratio 3 : 5
Ben has 40 more seeds than Bill
Work out the total number of seeds that they shared
- 4) Alice, Bob and Charlie share the costs of a craft market stall in the ratio 5 : 2 : 3.
The largest share of the costs is £450 larger than the smallest share of the costs. Work out the amount that Charlie has to pay.

Direct proportion questions

- 1) Five apples cost £1.40.
Work out the cost of 7 apples at the same rate.
- 2) 12 turnips cost £1.80.
Work out the cost of 5 turnips at the same rate.
- 3) You need to combine 16 hydrogen atoms with 8 oxygen atoms to make water.
How many hydrogen atoms would you need to combine with 60 oxygen atoms?
- 4) A recipe that serves 4 requires 240g of green split peas.
What weight of green split peas will you need to serve 10 people?
- 5) You can make 16 ships' biscuits from 500g of flour, 300ml of water and 5g of salt.
 - a) How much flour will you need to make 72 ships' biscuits?
 - b) Nigel has 5 kg of flour and 20g of salt and plenty of water
How many ships' biscuits can he make?
- 6) Wooden planks are priced at £3.40 per metre length.
You need 3.5 metres of plank. How much will that cost?
- 7) A taxi company charges £4.50 for a 9 mile journey.
The same company charges £6.00 for a 12 mile journey.
 - a) Is the cost of a journey directly proportional to the distance?
Show a calculation to support your answer
 - b) Calculate the cost of a journey of 15 miles
- 8) (*) A delivery firm charge £15 for a 5 mile journey and they charge £19 for a 7 mile journey.
 - a) Work out their charge for a journey of 2 miles
 - b) Is their cost for a journey directly proportional to the distance?
- 9) 8 kilometres is roughly equivalent to 5 miles.
 - a) How many miles is 48 kilometres?
 - b) How many kilometres is 25 miles?

Mixed up questions (exam style)

- 1) Nigel and Asif share the costs of a small business in the ratio 7 : 5
Nigel paid £70 more than Asif last week
Work out the total of the costs for the small business
- 2) Hermione and Asra share the profits from a craft market stall in the ratio 3 : 5
Hermione received £75 yesterday as her share.
How much more did Asra receive?
- 3) The instructions on the back of the bottle of lawn feed say
“Add 125ml to 5 litres of water”
Algernon wants to use 3 litres of water as he has a very small lawn.
Write some new instructions for Algernon so he can make his solution.
- 4) The profits of a small company are shared out in the ratio 2:3:5
What percentage of the whole profit is the median share?
- 5) A bag contains red, yellow and blue counters.
20% of the counters in the bag are red, $\frac{1}{4}$ of the counters are yellow, and the remainder are blue.
What is the smallest number of blue counters that could be in the bag?
Hint: find % of each colour then think about simplifying
- 6) Johan and Inderjit run a small company.
They agree to put 30% of the profit each month away as provision against bad times.
They share the remainder of the profits in the ratio 2:5.
Inderjit received £4 500 more than Johan last month
Calculate the total profits of the small company for that month

Worksheet 9: Algebra Part 1

Give yourself plenty of space to answer these questions, don't scrunch the answers up in the margin of the handout!

Gateway skills: revision

- 1) Work out $5 - 7 + 6 - 8 + 2 - 4 + 5$
- 2) Work out $14 - 17 + 12 + 3 - 19 + 10 - 20$
- 3) Work out 12×-4
- 4) Write down the value of -5×-6
- 5) Calculate the answer to $5 \times -6 - -7 \times 3$
- 6) Work out $5^8 \times 5^4$ and give your answer as a power of 5
- 7) What is $3^4 \times 3$ as a power of 3?
- 8) Calculate $\frac{2^7 \times 2^3}{2^6}$ and give your answer as a power of 2
- 9) Work out $8 \times 6 - -3 \times 2^2$
- 10) Calculate $5(3 - 7) + 2(21 - 3 \times 2)$

Simplifying combinations of terms

- 1) Simplify $a + a + a + a - a$
- 2) Simplify $a \times b$
- 3) Simplify $b \times b \times b \times b$
- 4) Multiply $6r \times 9s \times 3a$
- 5) Multiply $-5x \times 4y$
- 6) Multiply $-7p \times 5p$
- 7) Simplify $4k + 5k - 7k$
- 8) Simplify $b^2 + b^2 + b^2 - b^2$

Substitute into formulas

- 1) The taxi company charges as follows
“£2.40 goes on the meter when you get in, then its £1.80 per mile travelled”
 - a) Calculate the cost of a journey of 7 miles
 - b) Algernon paid £25.80 for a ride. How far did he go?
 - c) Draw a function machine showing how the cost is calculated
- 2) $A = 3P + 4Q$
 - a) Calculate the value of A when $P = 5$ and $Q = 8$
 - b) Calculate the value of A when $P = 9$ and $Q = -5$
 - c) Calculate the value of P if $A = 20$ and $Q = 2$
- 3) $B = 6R - 7S$
 - a) Calculate the value of B when $R = 3$ and $S = 4$
 - b) Calculate the value of B when $R = 5$ and $S = -6$
 - c) Calculate the value of S if $B = 39$ and $R = 10$
- 4) The formula $A = \frac{(a+b)}{2} \times h$ crops up in a few weeks.
 - a) Calculate the value of A when $a = 5$, $b = 7$ and $h = 4$
 - b) $A = 35$, $a = 6$ and $b = 8$. Find the value of h .
- 5) $y = 3x - 2$
 - a) Calculate the value of y when x is 4
 - b) Calculate the value of y when x is 2
 - c) Calculate the value of y when x is 0
 - d) Calculate the value of y when x is -2
- 6) $y = x^2 + 9$
 - a) Calculate the value of y when $x = 2$
 - b) Calculate the value of y when $x = 0$
 - c) Calculate the value of y when $x = -2$
- 7) $A = \pi R^2$
Calculate A when $\pi = 3.1$ and $R = 7$

Collecting like terms

Simplify all the following expressions where possible.

If you find an expression that is already in its simplest form then copy it out and put a star next to it

1) $3k + 6k - 8k$

2) $4a + 3b$

3) $a + a + a + a + b + b + b$

4) $9x - 12x + 5x$

5) $2y - 5y + y + y$

6) $10x - 8x + x - 3x$

7) $5a + 7 + a - 3$

8) $8x + 14 - 5x + 6$

9) $-5y + 8 - 3y + 7$

10) $9p + 6 - 4p + 8 - 3p - 12$

11) $4x + 3y + 2x + 5y$

12) $6x + 5y$

13) $8x + 2y - 5x + 2y$

14) $4a - b + 3a - 5b$

15) $12p + 4p - 5q + q$

16) $4x^2 + 3x - 2x^2 + x$

17) $x^2 - 5x - 3x^2 + 5x$

18) $7p^2 + p - p^2 - 2p + 5$

19) $3y^2 + 4x^2 + 2y - 4x - 2y^2 - 3x^2$

20) $3x + 2xy - 4y + 3xy - 2x$

Multiplying out brackets

- 1) Multiply out $3(4x + 2)$
- 2) Multiply out $5(2x + 7)$
- 3) Multiply out $-2(4p + 7)$
- 4) Multiply out $7(4p - 3)$
- 5) Multiply out $-2(3q - 5)$
- 6) Multiply out and simplify $2(3x + 1) + 3(4x + 5)$
- 7) Multiply out and simplify $3(2x - 5) + 2(x + 1)$
- 8) Multiply out and simplify $3(5a + 2) - 3(3a + 4)$
- 9) Multiply out and simplify $2(2y - 3) - 3(2y - 7)$
- 10) Multiply out and simplify $2x(x + 3) - (x - 3)$

Factorise

Factorise the expressions below as far as you can.

Watch out for the ones with powers in the expression

- 1) $14x + 7$
- 2) $27x - 12$
- 3) $4x - 6$
- 4) $3x^2 + 6x$
- 5) $x^2 + x$ Hint: common factor is a letter!
- 6) $21x^2 - 28x$
- 7) $x^3 + x$
- 8) $6x^2 - 2xy$
- 9) $3x^2y^2 - 9xy$ Hint: write x^2 as xx and y^2 as yy .

Worksheet 10: Algebra Part 2

Give yourself plenty of space to answer these questions, don't scrunch the answers up in the margin of the handout!

Solving equations

Solve the following equations

1) Solve $3x = 15$

2) Solve $y + 7 = 22$

3) Solve $3a + 7 = 22$

4) Solve $\frac{x}{4} = 20$

Hint: what is the opposite of dividing?

5) Solve $4.5a = 18$

6) Solve $5x - 7 = 3$

7) Solve $4x - 10 = 2$

8) Solve $3k + 10 = 4$

Hint: might be a fraction

9) Solve $\frac{x}{6} + 5 = 8$

10) Solve $2x - 12 = 2$

11) Solve $4(3x - 5) = 28$

12) Solve $6x - 5 = 17$

Hint: might be a mixed number

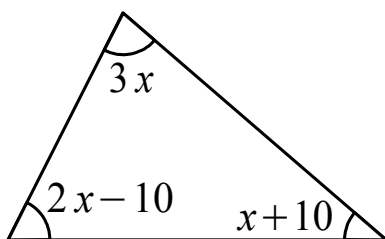
13) Solve $4x + 3 = 6x - 1$

14) Solve $7y - 9 = 5y + 1$

15) Solve $\frac{3}{5}x + \frac{1}{2} = x + 1\frac{1}{2}$

Making expressions (and equations)

- 1) Pens are sold in packs of 12.
Write an expression for the total number of pens in y packs
- 2) Paper clips are sold in boxes of 80.
Write an expression for the total number of paper clips in Q boxes.
- 3) Apples cost 12p each. Satsumas cost 15p each.
Write an expression for the total cost of a apples and s satsumas.
- 4) Cabbages cost 70p each and broccoli costs 60p a bulb.
Write an expression for the cost of c cabbages and b broccoli bulbs.
- 5) Nusut thinks of a number n , doubles it and then adds 3 on.
Write an expression for his answer in terms of n .
- 6) Alice is n years old
Bob is twice as old as Alice
Charlie is 10 years older than Alice
 - a) Form an expression for the total age of the three children
 - b) The total age is 38 years. Work out Alice's age.
- 7) Asif is N years old.
Bharat is three times as old as Asif is.
Cyril is four years younger than Bharat.
 - a) Write an expression for the total age of the three people.
 - b) The total age is 66 years. Work out Cyril's age.
- 8) The triangle below has angles $3x$, $x + 10$ and $2x - 10$
Find the value of the largest angle.



Changing the subject (rearranging the formula)

1) $A = 4b$.

Rearrange the formula to make b the subject.

2) $f = \frac{h}{2}$

Make h the subject of the formula

3) $C = N + 6$

Rearrange the formula to make N the subject

4) $Y = X - 7$

Make X the subject of the formula

5) $C = 5M + 7$

Rearrange the formula to make M the subject

6) $A = \frac{3}{4}b$

Make b the subject of the formula

7) $y = 4x - 5$

Rearrange the formula to express x in terms of y

8) $a = 4x^2$

Make x the subject of the formula

Hint: opposite of squaring is taking the square root

9) $a = \frac{b}{4} - 5$

Rearrange for b

10) $A = ay - y$

Make y the subject of the formula

Hint: factorise y out of the right hand side

11) $y - 3x = 6$

Make y the subject of the formula

Mixed up puzzle problems

These questions are challenging, don't worry about getting 'the answer'. Take a blank sheet of paper and have a bash at each and bring your attempts, doodles and guesses back next week for discussion.

- 1) Find the mean of these three expressions

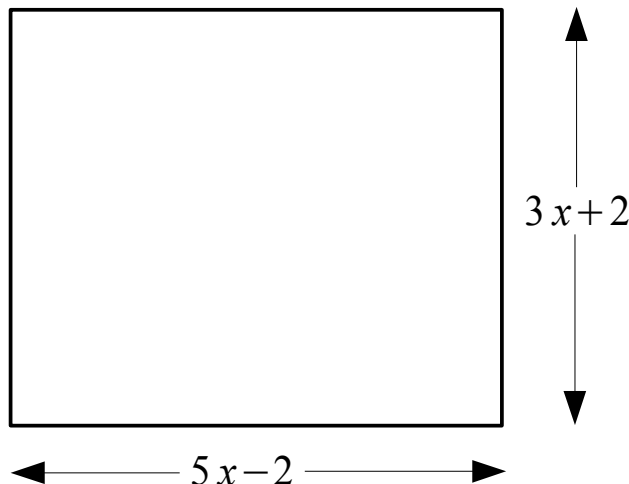
$$x + 10, \quad 3x - 4, \quad 2x + 12$$

Hint: Collect like terms then divide both coefficients by 3

Challenge: is it possible to say which expression is the median?

Challenge 2: can you find a value of x where there is a mode?

- 2) The rectangle below has a perimeter of 48 cm.



Work out the area of the rectangle.

- 3) Below are four expressions

$$3x - 2, \quad 2x^2, \quad 5x, \quad 2x + 4$$

Suppose all you know is that $x > 0$.

Is it possible to put the expressions in order of size?

Hint: try some different values of x like $x = 1$ then $x = 100$

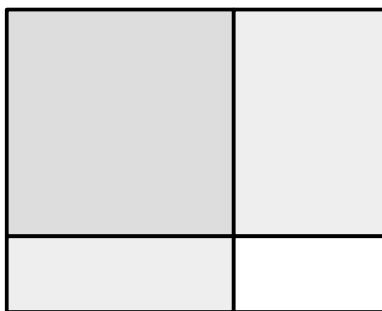
- 4) The sum of two integers is 14 and the product is -72 .
Find the values of the integers.
- 5) If $AB = 0$ and $A \neq B$, what can you say about A or B ?

Worksheet 11: Algebra Part 3

Give yourself plenty of space to answer these questions, don't scrunch the answers up in the margin of the handout!

Gateway skills for this session

- 1) Work out -4×5
- 2) Work out -8×-5
- 3) Simplify $x^2 - 3x + 5x - 15$ as far as you can
- 4) Simplify $x^2 + 9xy + 4yx + 36$ as far as you can
- 5) Multiply out $-6(x - 5)$
- 6) Work out $1\,760 \times 0$
- 7) Write down 0×14.875
- 8) Two different numbers A and B give zero when you multiply them together: in symbols $A \times B = 0$.
What statements can you make about the values of A and B?
- 9) A rectangle is made from four smaller rectangles as shown below



- a) Can you write an *expression* for the perimeter of the rectangle?
- b) Can you write an *expression* for the area of the rectangle?
Hint: find an expression for the area of each of the small rectangles and then add those together and simplify

Multiplying out pairs of brackets (quadratics)

Check the negative multiplications!

Use separate paper and use plenty of space!

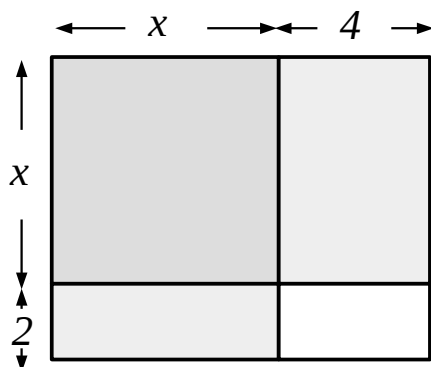
- 1) Multiply out $x(x + 1)$
- 2) Multiply out $3(x + 1)$
- 3) Multiply out $(x + 3)(x + 1)$
- 4) Expand $(x + 3)(x - 1)$
- 5) Multiply out $(x - 3)(x + 1)$
- 6) Expand $(x - 3)(x - 1)$
- 7) Look at your answers to questions 3, 4, 5 and 6 above.
Make a note of the signs of the constant term in each case
Notice how the x terms add up sometimes and subtract sometimes?
- 8) Expand and simplify $4(x - 3) - x(x - 3)$
- 9) Multiply out $(x + 5)(x + 6)$
- 10) Expand $(x + 4)(x - 7)$
- 11) Multiply out $(x - 9)(x - 3)$
- 12) Expand $(x + 7)(x - 6)$
- 13) Multiply out $(x - 4)(x + 3)$
- 14) Expand $(5 - x)(2 - x)$
- 15) Expand $(x + 3)(x - 3)$
- 16) $(x - 3)(x + 7) \equiv ax^2 + bx + c$
Find the values of a , b and c
- 17) $(x - 1)(x + 2) = 0$
Find the two values of x that make this true
- 18) Multiply out $(3x - 4)(2x + 3)$
- 19) $(x - 4)(x + d) = x^2 - x - 12$. Work out the value of d

Factorise quadratics

Complete the table below...

	Quadratic	Factorised into brackets
1	$x^2 + 2x + 1$	
2	$x^2 - 2x + 1$	
3	$x^2 - x - 6$	
4	$x^2 + x - 6$	
5	$x^2 + 5x - 6$	
6	$x^2 - 5x - 6$	
7	$x^2 - 4x + 4$	
8	$x^2 - 4$	
9	$x^2 - 14x + 13$	
10	$x^2 + 12x - 13$	

- 11) a) Factorise $x^2 + 3x + 2$
 b) Write down both solutions to the equation $x^2 + 3x + 2 = 0$
- 12) a) Factorise $x^2 - x - 2$
 b) Write down both solutions to the equation $x^2 - x - 2 = 0$
- 13) (*) Factorise $x^2 - 16$
- 14) (**) The total area of the four rectangles below is 63 cm^2 .
 Work out the value of x .



Identities and equations

Each line of the table below contains two expressions

Some are identities, so $A \equiv B$ for *all* values of the variable

Some are equations, so $A = B$ for *some* specific values of the variable

Decide which sign to use for each of the lines in the table...

	Expression A	"=" or " \equiv "	Expression B
1	$3(4x + 1)$		$12x + 3$
2	$4x + 1$		21
3	$25x^2 - 16$		$(5x + 4)(5x - 4)$
4	$L + W + L + W$		$2(L + W)$
5	$4(2x + 5) + 3(x + 2)$		$11x + 26$
6	$(y + 3)^2$		$y^2 + 6y + 9$
7	$3x + 5$		$7x - 3$
8	$81 - M^2$		$(9 + M)(9 - M)$
9	$x^2 + 6x + 8$		$(x + 2)(x + 4)$
10	$\frac{a}{3} + \frac{a}{5}$		$\frac{8a}{15}$

For each of the lines that is an equation, solve the equation.

For each of the lines that is an identity, show that the identity is valid by transforming one expression into the other.

Worksheet 12: Algebra, Averages, Charts

A mixed bag of stuff including some work on statistics

Algebra recap

Make sure you can do all of these...

- 1) Solve $\frac{x}{5} = 4$
- 2) Expand $3(4x + 7)$
- 3) Solve $5(2x - 3) = 15$
- 4) Rearrange $y = 4x - 3$ to make x the subject
- 5) Factorise $21p - 14$
- 6) Timothy has n packets of pencils
Each packet contains 12 pencils
Write an expression in terms of n for the total number of pencils that Timothy has
- 7) Solve $5x + 10 = 6$
Hint: could be negative, could be a mixed number
- 8) Expand and simplify $2(5x - 6) + 3(2x + 5)$
- 9) Algernon is Y years old
Bertram is 2 years older than Algernon
Cuthbert is double Algernon's age
 - a) Write an expression for the total age of the three friends
 - b) The total age of the three is 62 years.
Work out how old Algernon is
- 10) Multiply out $(x + 4)(x - 2)$
- 11) Solve $3x - 4 = 2x + 1$
- 12) (*) Solve $(x - 2)(x + 3) = 0$
Hint: two solutions

Mean, mode, median and range

- 1) Work out the mean of 10, 9, 11, 10, 100
Is the answer a good 'typical value' for the data? Write a sentence.

- 2) Below are the temperatures in °C recorded outside one December
−6, 2, −4, 3, 7, −1

- Find the range of the temperatures
- Work out the mean of the temperatures
- Find the median temperature

- 3) The annual wages in a small company are shown below
£12 500 £14 749 £14 750 £21 800 £49 500

- Calculate the mean wage for the company
- Calculate the median wage for the company
- Which average is the best for this data? Write a sentence
- All the wages are increased by 3%

Which of the following statements are true and which false?

“The mean wage increases by 3%”

“The range of the wages increases by 3%”

- 4) The table below shows some information about the heights of cress seeds during a biology experiment

Height h / mm	Frequency			
$0 < h \leq 20$	3			
$20 < h \leq 40$	18			
$40 < h \leq 60$	15			
$60 < h \leq 80$	11			
$80 < h \leq 100$	8			

- Calculate an estimate of the mean height
- Write down the median interval
- Write down the modal interval

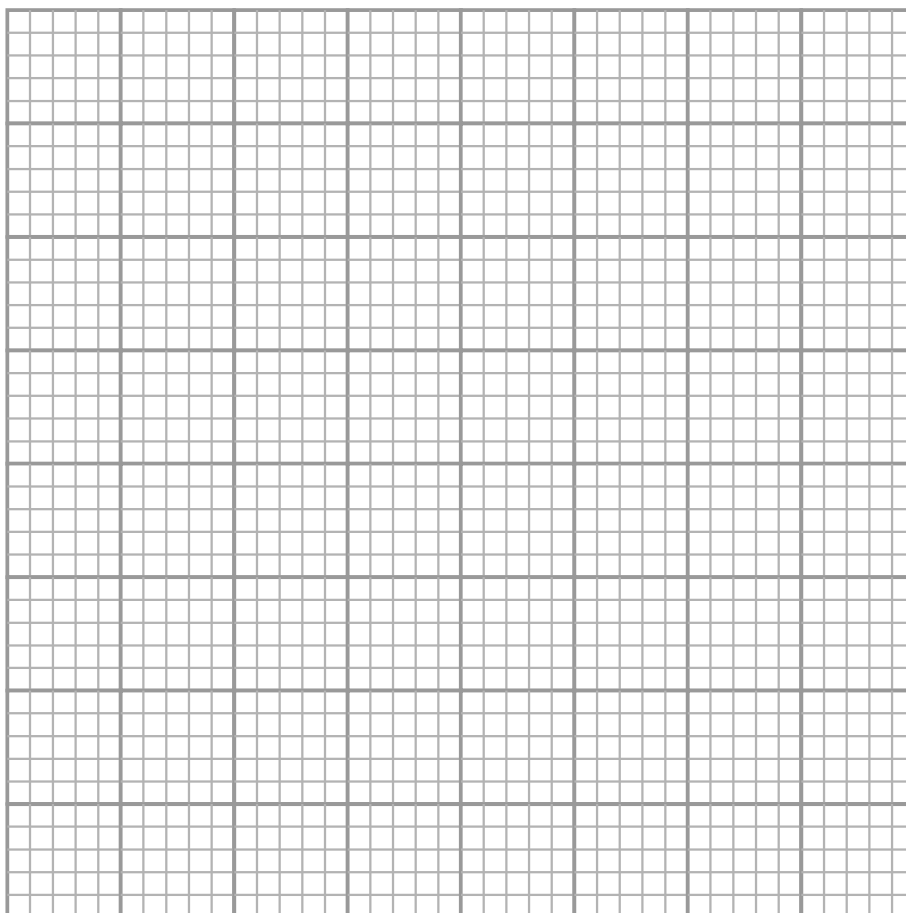
Charts and chart interpretation

Question 1

The table below summarises the journey times at 3pm from Birmingham New Street station to Northfield station

Journey time	Number of journeys
$20 < t \leq 25$	35
$25 < t \leq 30$	15
$30 < t \leq 35$	8
$35 < t \leq 40$	1
$40 < t \leq 45$	1

- a) Use the grid below to plot a frequency polygon of the data



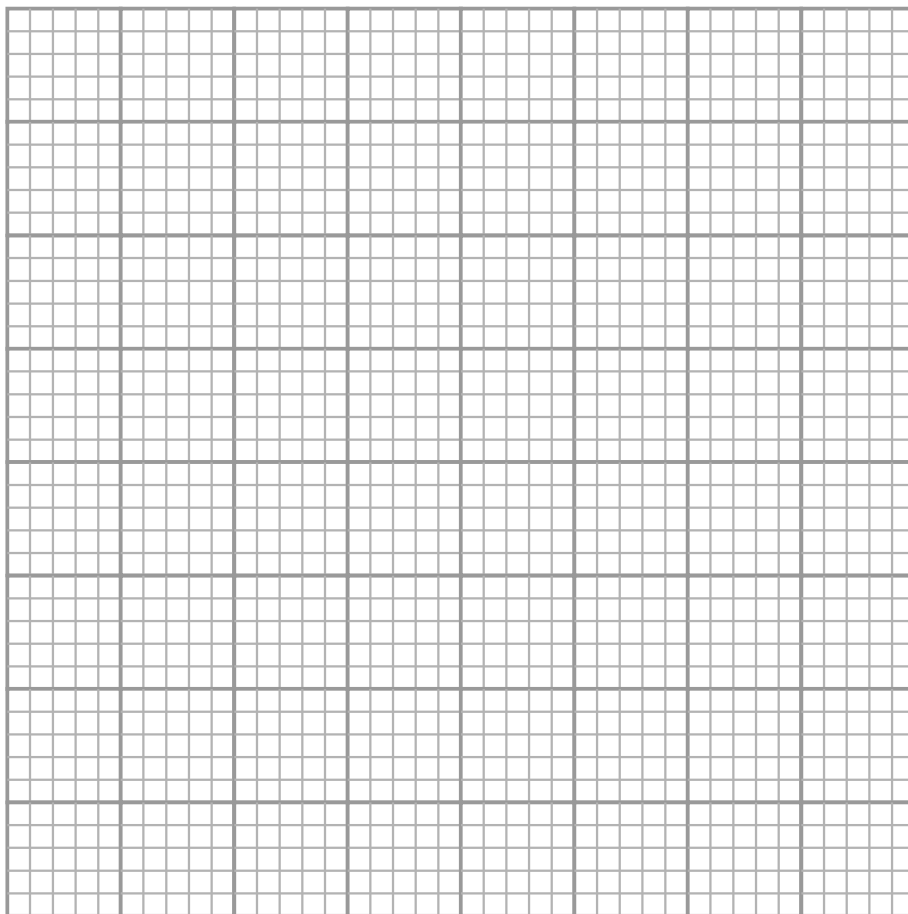
- b) What percentage of journeys took *longer* than 30 minutes?

Question 2

Below is some data on the domestic electricity use from 12 noon to 8pm in a small town somewhere in the UK

At	12	1	2	3	4	5	6	7	8
Power /MW	12	15	14	18	25	50	74	48	40

- a) Use the grid below to plot a time series graph of the data

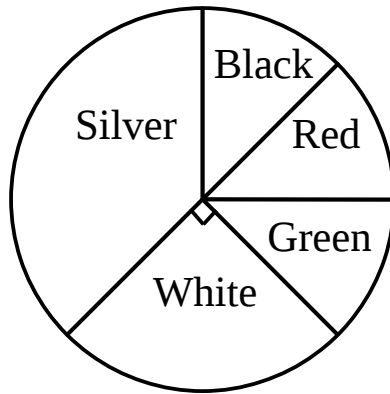


- b) Explain the pattern shown by the time series plot in words

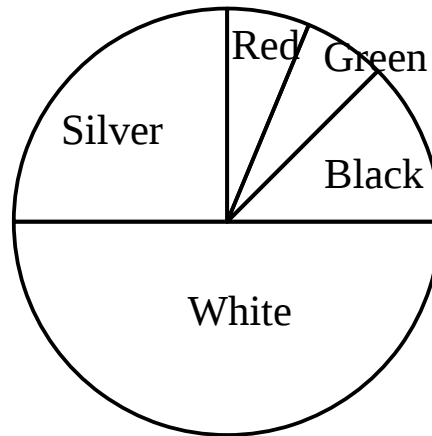
Question 3

Below are two pie charts comparing the number of cars of each colour in the car park in Selly Oak Centre and the car park in Walsall College

Colour of cars in Selly Oak car park



Colour of cars in Walsall Car Park



- a) There are two white cars in the Selly Oak car park.
What is the total number of cars in the Selly Oak car park?
- b) Estimate the number of silver cars in the Selly Oak car park
- c) What percentage of the cars on Walsall College car park are white?
- d) Algernon says “the pie charts show that there are more red cars in the Selly Oak car park than in the Walsall College car park”

Algernon is correct []

Algernon is wrong []

There is not enough information to say []

Question 4

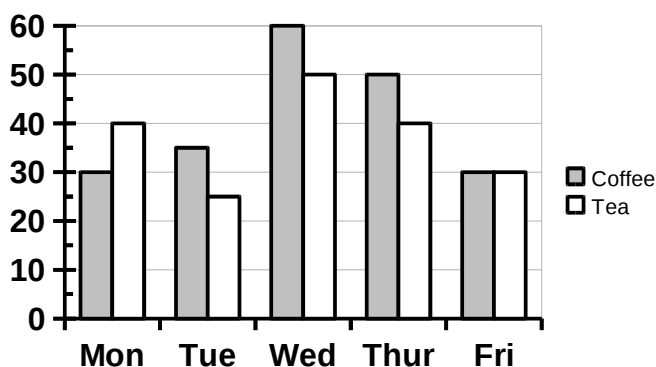
Below is a stem and leaf diagram showing the weights of a group of people.

5		7 9	key 5 7 represents 57 Kg
6		0 0 1 8 8 9	
7		1 2 4 7	
8		3 6 9	
9		1	

- a) How many people weighed less than 70Kg?
- b) Find the median weight of the people
- c) Find the range of weights

Question 5

Below is a bar chart that shows the number teas and coffees sold at a snack bar each day over 5 days last week.



- a) On which day was the number of teas sold the same as the number of coffees?
- b) Which was the only day where more teas were sold than coffees?
- c) What was the mean number of coffees sold per day?
- d) How many more coffees than teas were sold for the whole 5 day period?

Worksheet 13: Christmas Questions!

Mostly non-calculator. Do what you have time for.

Section 1: Number skills (functional)

- 1) Find 34×91 using any non-calculator method
- 2) Work out $\frac{3}{4} + \frac{2}{3}$
- 3) Work out 1.3×4.7 using any non-calculator method
Hint: forget the decimal points, multiply, then count back
- 4) Nigel is paid £8.50 per hour.
One busy Christmas eve, he works a 9 hour shift.
How much should he be paid for the shift?
- 5) “Special Offer: One third off all prices today”
A coat usually costs £72.99.
Work out the special offer price of the coat.
- 6) Work out $742 \div 7$ using a 'bus stop' division
- 7) “Special Thursday: take 20% of all marked prices today”
The marked price on the jumper was £35.
By how much is the jumper reduced?
- 8) Write 0.6 as a fraction in its simplest form
- 9) Write 0.8 as a percentage
- 10) Algernon is selling recycled Christmas cards
Each pack of cards is sold for £1.80
He is paid 27p for each worth of Christmas cards he sells.
Work out 27p as a percentage of £1.80
- 11) Hester wins £60 in the office sweep stake
She decides to donate a third of the money to charity
She puts half of what is left into the coffee fund for next year
What does Hester have left to buy cakes with?

Section 2: Data and averages

12) The ages of 7 people in a minibus are

12, 12, 12, 13, 15, 17, 45

Calculate the mean age of the people in the minibus

13) Write down 5 numbers that have a median of 12 and a range of 4

Hint: make 5 spaces on some scrap paper like in a game of hangman

14) Lionel is selling dresses on his market stall.

He sells 4 dresses at £10 each

He sells another 7 dresses at £8 each

Then he sells 3 dresses at £6 each

How much money has he taken all together?

15) Herbert is researching the diameter in metres of Christmas logs

He records the following data

0.06, 0.61, 0.059, 0.061, 0.6, 0.59, 0.061

Find the median diameter for a Christmas log

16) Below are the temperatures in °C for a week one crisp January

-8 3 5 -7 -3 3 0

Work out the mean temperature

17) Monalisa is collecting data about people's eye colour

She finds the following colours

blue	blue	brown	brown	brown
blue	brown	brown	blue	hazel
blue	brown	brown	brown	green
blue	hazel	brown	brown	green

a) Draw up a tally chart showing the frequencies of the eye colours

b) What is the modal eye colour

c) Algernon wants to work out the mean eye colour.

Write a sentence explaining why that is impossible

Section 3: Algebra

19) Simplify $e + e + e + e - e$

20) Simplify $f \times f \times f \times f \times f$

21) Solve $\frac{p}{4} = 5$

22) Solve $m + 9 = 40$

23) Solve $n - 7 = 3$

24) Solve $3x + 1 = 19$

25) Albertine thinks of a number, doubles it and then takes four away.

Her answer is 6

What number did Albertine think of?

Challenge: can you write an equation in algebraic notation for this question?

26) Solve $2x - 10 = 4$

27) Simplify $y^2 + y^2 + y^2 + y^2$

28) Simplify $3a + 4b + a + b$

29) Simplify $2x + 3y - x + 2y$

30) Solve $5x - 1 = 44$

31) Solve $2x + 10 = 4$

Hint: negative solution

32) Solve $4x + 5 = 11$

Hint: solution is a mixed number

33) Harinder thinks of a number and adds three

Then she multiplies the answer by 2

Her answer is 14

What number did Harinder think of?

Challenge: can you write an equation in algebraic notation for this question?

Section 4: Abstract number (factors &c)

Check Topic Guide 1 for the definitions of underlined words

35) Write down all the factors of 48

Hint: factors are small. For instance 12 is a factor of 48.

36) Write down the first 5 prime numbers

37) Write down a square number between 30 and 40

38) Look at the list of integers below

12, 13, 15, 16, 18, 27, 35, 50, 64, 70, 100

a) Write down a prime number in the list

b) Write down a cube number in the list

c) Write down all the multiples of 7 that are in the list

d) Write down a factor of 100 in the list

39) What is the lowest common multiple of 8 and 12?

Hint: multiples are massive

40) What is the highest common factor of 64 and 48?

Hint: factors are smaller

41) Algernon is at the bus stop early one morning

The 51 comes at 7am and every 12 minutes after that

The 33 comes at 7:05 and every 20 minutes after that

At what time after 7am will Algernon see a 51 and a 33 arrive at the same time?

42) Work out $\frac{3}{4} + \frac{1}{6}$

43) What is $\frac{3}{4}$ of 60?

44) Find $\frac{2}{3} \times \frac{4}{5}$

45) Work out $1 - \left(\frac{2}{9}\right)^2$

Worksheet 14: First term review

Practice for Progress Test 3

There is space on this sheet to write the answers

You can use a calculator

Use black pen

Name _____ Group _____

Action plan: Write three topics to work on after this practice test is marked

Topic 1 _____

Topic 2 _____

Topic 3 _____

Questions

1) Solve $2x - 3 = 6$

Circle the correct answer

[1]

$$x = \frac{2}{3}$$

$$x = 4\frac{1}{2}$$

$$x = 0$$

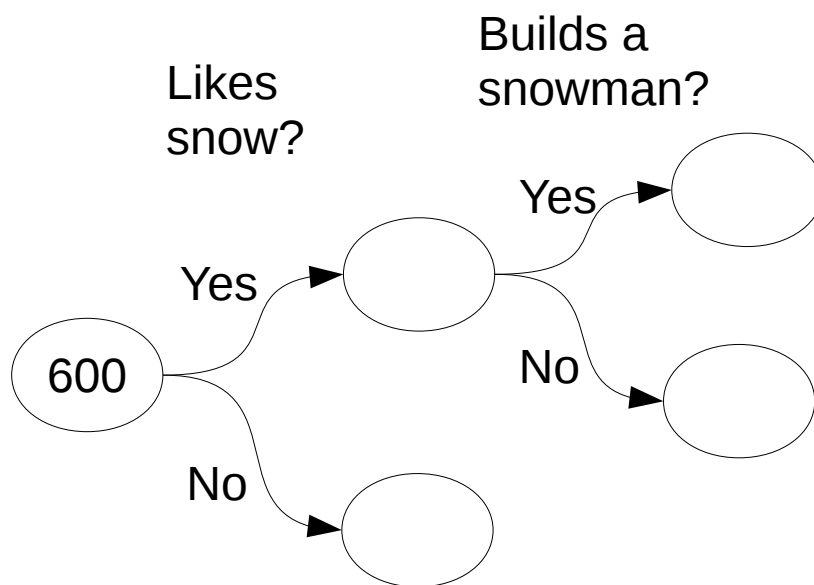
$$x = \frac{4}{3}$$

2) 600 people are asked if they like snow.

$\frac{7}{10}$ Say yes

15% of those who say yes build a snowman

Complete the frequency tree below



[4]

3) Circle the expression that **does not** simplify to a^4

$$a \times a \times a \times a$$

$$a^6 \div a^2$$

$$a^3 \times a$$

$$a^2 + a^2$$

[1]

4) Two fair dice are rolled and the numbers added to get a score

a) Complete the table below showing the scores

+	1	2	3	4	5	6
1	2					
2						
3					8	
4			7			
5						
6						12

[4]

b) What is the probability that the score will be a square number?

[1]

5) a) Simplify $4x + 4y - 2x + y$ [1]

b) Expand $3(4x - 2)$ [1]

c) Factorise $15x^2 - 10x$ [1]

d) Solve $15x - 4 = 4x + 2$ [1]

e) Expand $(x + 1)(x - 3)$ [1]

6) Find the median of the four numbers listed below

$$\frac{2}{3}$$

40%

0.3

$$\frac{3}{5}$$

[3]

7) A company pays five people the salaries shown below

£12 000 £12 500 £14 300 £19 400 £85 000

a) Work out the mean salary paid by the company [2]

b) Work out the range of the salaries [1]

c) Write a sentence explaining why the mean is **not** a good average for this data [2]

8) Cuthbert received a pay rise of 5% when he passed his GCSE

Cuthbert's new pay was £13 125

Calculate Cuthbert's pay before the pay rise [3]

- 9) Below is some information about the number of drawing pins in a sample of boxes of drawing pins taken from a production line

Number of drawing pins in a box	Frequency
48	1
49	0
50	5
51	2
52	2
53	1

- a) How many boxes of drawing pins were in the sample?

[1]

- b) What was the total number of drawing pins in all of the boxes?

[3]

- c) What was the median number of drawing pins in a box?

[2]

- 10) Nigella puts £2000 in a savings account that pays 3% compound interest.

Calculate the value of the savings account after 6 years.

[3]

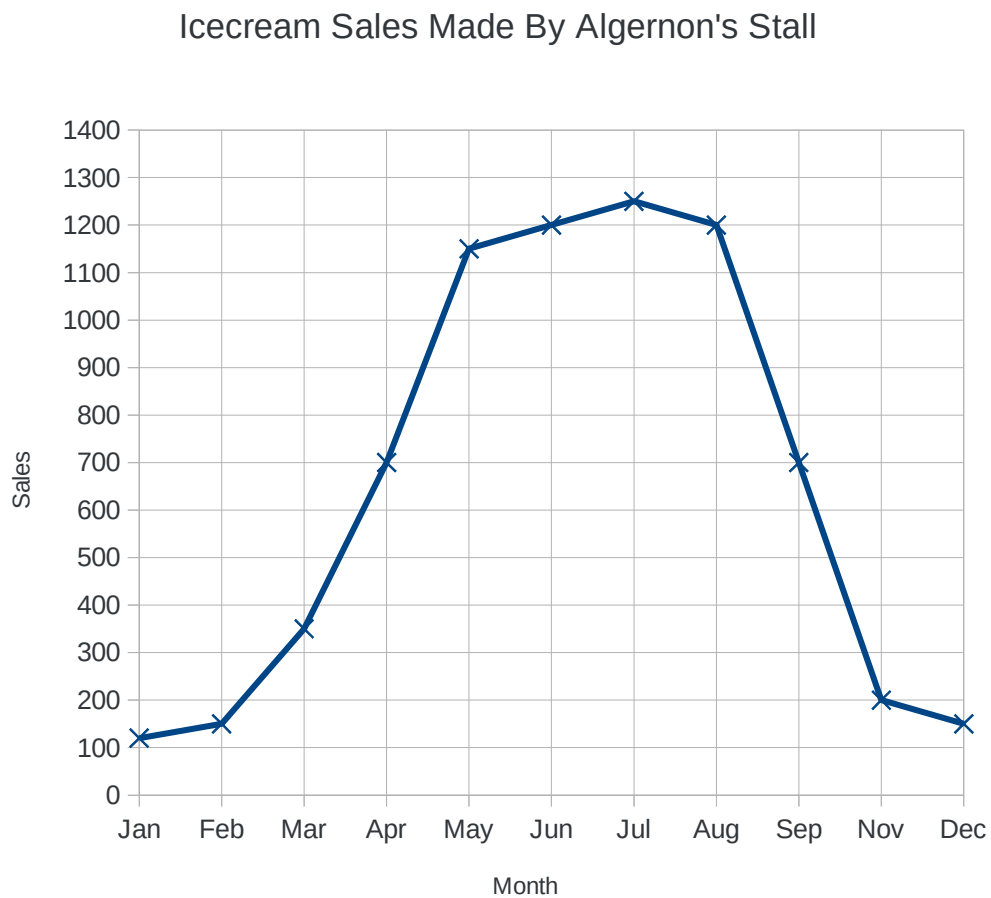
- 11) Rearrange $y = 3x + 1$ to make x the subject

[2]

- 12) There are 10 people at a Christmas party
The mean age of the people is 28
A mysterious stranger joins the party at midnight
The mean age of the people increases to 30
How old was the mysterious stranger?

[3]

13) Below is a chart showing the value of ice cream sales...



a) How much more did the stall make in July than in April?

[1]

b) Calculate the total value of the sales over the year

[2]

c) Write a sentence summarising the pattern of sales for Algernon's report to the shareholders.

[2]

Worksheet 15: Probability

- Probability is a fraction. It is the fraction of time something happens.
- The expected frequency of an event is the probability times the number of goes
- You can describe the likelihood of an event using the words impossible, unlikely, evens, likely and certain
- Mutually exclusive events – the probabilities add to 1
- Independent events – multiply the probabilities
- A sample space diagram is a table showing the outcomes of two events
- On a tree diagram, the probabilities on each branch add to 1 and you multiply the probabilities along a branch to calculate the probability of the combined outcome

Simple probabilities and likelihoods

Fill in the table below...

Event	Probability	Likelihood
Toss a fair coin and get a tail		
Roll a fair dice and get a score larger than 1		
Pick a letter at random from the word MATHEMATICS and get a consonant		
Pick a blue counter from a bag that contains three green and five yellow counters		
Pick a black counter from a bag that contains 4 black and 5 red counters		
Pick a consonant or a vowel from the word HYPOTHESIS		
Toss a fair coin twice and get 2 heads		
Roll a fair dice and get a score of 5		

Expected frequency

- 1) Freda rolls a fair dice 900 times.
How many times should she expect to see a square number?
- 2) Algernon tosses a fair coin 1 000 times.
How many times should he expect to see a head?
- 3) A smoke alarm has a 0.0002 probability of going off each hour it is switched on.
How many times would you expect the smoke alarm to go off in a year (365 days of 24 hours)?
- 4) Algernon tosses two fair coins.
 - a) List all the possible outcomes of the two coins (HH, ..)
 - b) Write down the probability of seeing at least one tailAlgernon tosses his two fair coins 500 times
 - c) How often should he expect to see two heads?
- 5) A photocopier jams with relative frequency 0.05
How many times would you expect the copier to jam when making 500 copies?
- 6) A bag contains 3 white counters, 4 red counters and 9 blue counters.
You pick a counter from the bag, note the colour and replace the counter and repeat for a total of 80 picks.
How many times would you expect to see a counter that was not red?
- 7) You roll a fair dice 300 times. How often would you expect to see the number 5?

Mutually exclusive events

- 1) The probability that a car starts first time on a cold morning is 0.85
What is the probability of the car not starting first time?

- 2) A bag contains red, green and blue counters.

The probability of picking a red counter is $\frac{3}{8}$

The probability of picking a blue counter is $\frac{1}{3}$

Calculate the probability of picking a green counter.

- 3) A bag contains yellow, red and blue counters.

The probability of picking a yellow counter is $\frac{1}{4}$

Red and blue counters are present in the bag in the ratio 2:3

Work out the probability of picking a blue counter.

- 4) A biased dice has the relative frequencies (experimentally determined probabilities) of each score shown below in the table...

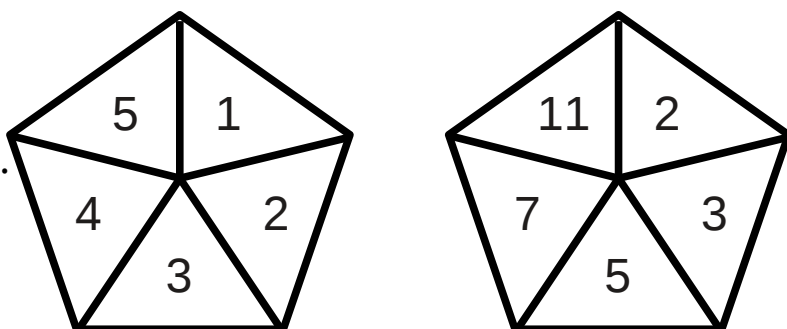
Score	1	2	3	4	5	6
Rel Freq	0.08	0.17	0.17	0.17	0.17	x

- a) Work out the probability of rolling a 6 on this dice
- b) You roll this dice 1 200 times.
How many times would you expect to see a score of 6?

Combined events

Question 1

The two spinners shown below are spun and the numbers on each added together to give a score



- a) Complete the sample space diagram below to show the 25 equally likely scores...

+	2	3	5	7	11
1					
2					
3					
4					
5					

- b) Write down the probability of getting a score that is a square number

Question 2

Fred puts 3 green and 4 red counters in a bag.

He picks one counter from the bag and notes the colour but does not replace the counter.

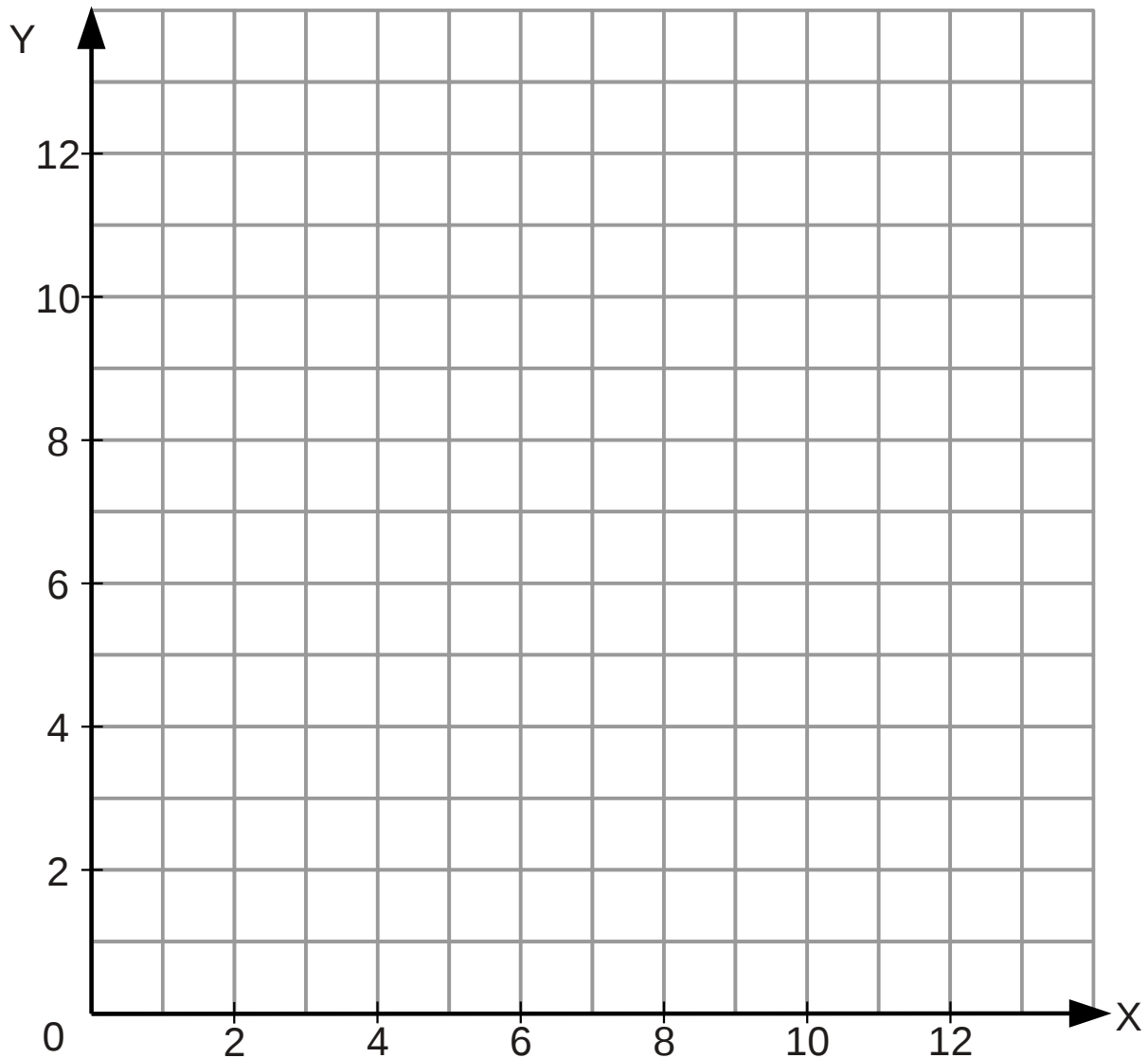
He then picks another counter from the bag and notes the colour.

- a) Draw a tree diagram to represent all four possible outcomes
- b) Work out the probability of getting at least one green counter.

Worksheet 16: Coordinates and graphs

Grids have been provided on this sheet using a drawing package to generate the lines. On the exam they use proper graph grids with a much higher quality of reproduction. You will need a ruler and a pencil.

Plotting coordinates



Plot the point $(11, 10)$ and label the point A. Plot point B at $(3, 5)$

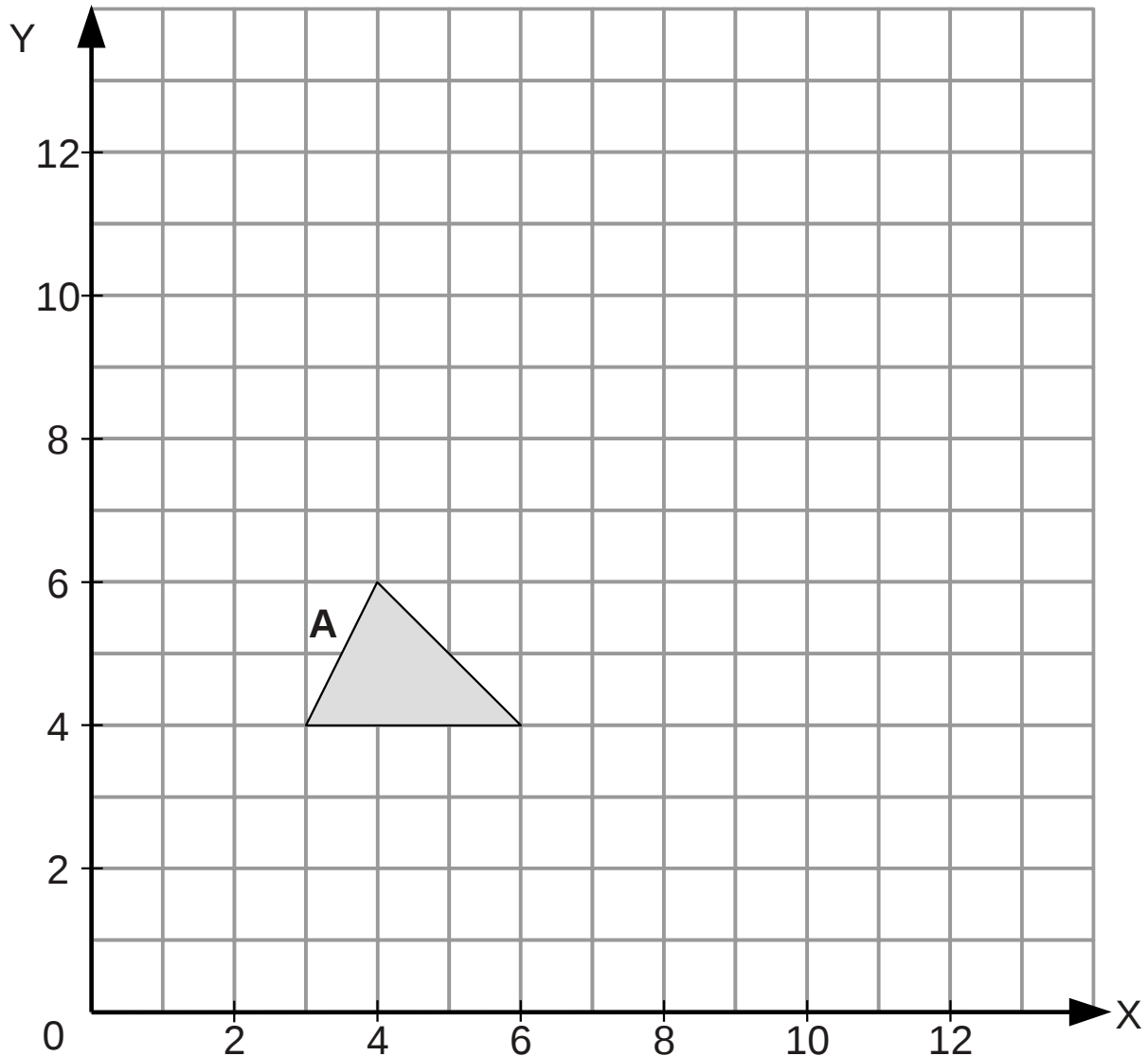
Draw the line AB and mark the midpoint M of the line with a cross.

Write down the coordinates of M.

Add a point C to your plot so that ABC form an isosceles triangle.

Plotting special lines

The axes below show a triangle A.



Plot the line $x = 7$ on the axes

Reflect triangle A in the line $x = 7$ and label the image triangle B

Plot the line $y = 8$ on the axes

Reflect triangle B in the line $y = 8$ and label the image triangle C

Challenge: can you describe the transformation that takes triangle A directly to triangle C?

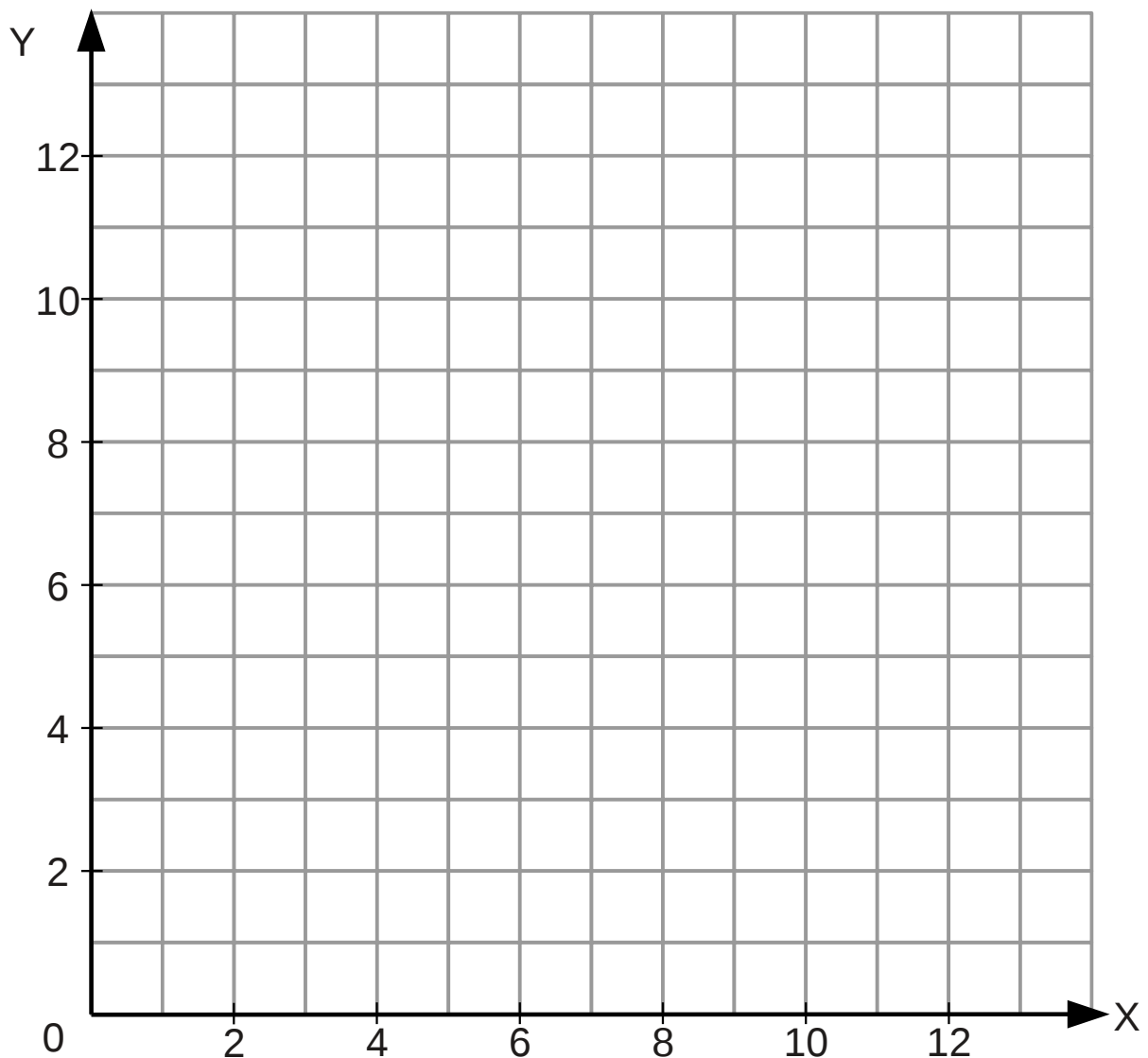
Plotting a straight line graph from a formula

A line has formula $y = 2x + 1$

Complete the table of values below using this formula

X	0	1	2	3	4
Y	1			7	

Plot the graph of $y = 2x + 1$ on the axes below...



Plot the line $y = 2x + 4$ on the same axes.

What do you notice about the two lines?

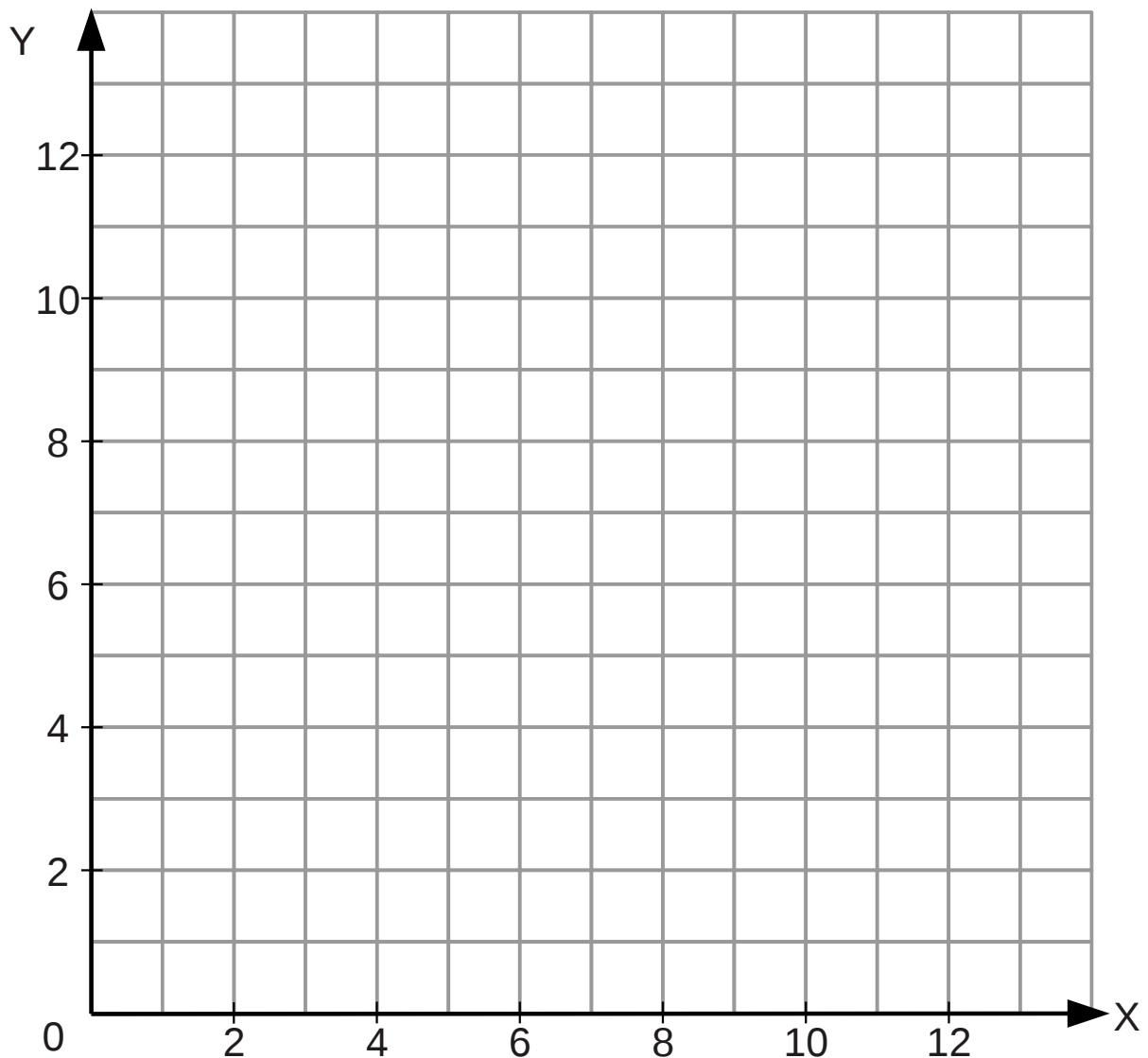
Plotting a curve from a formula

A curve has the formula $y = \frac{12}{x}$

Complete the table of values below using this formula

x	1	2	3	4	6	8	12
y							

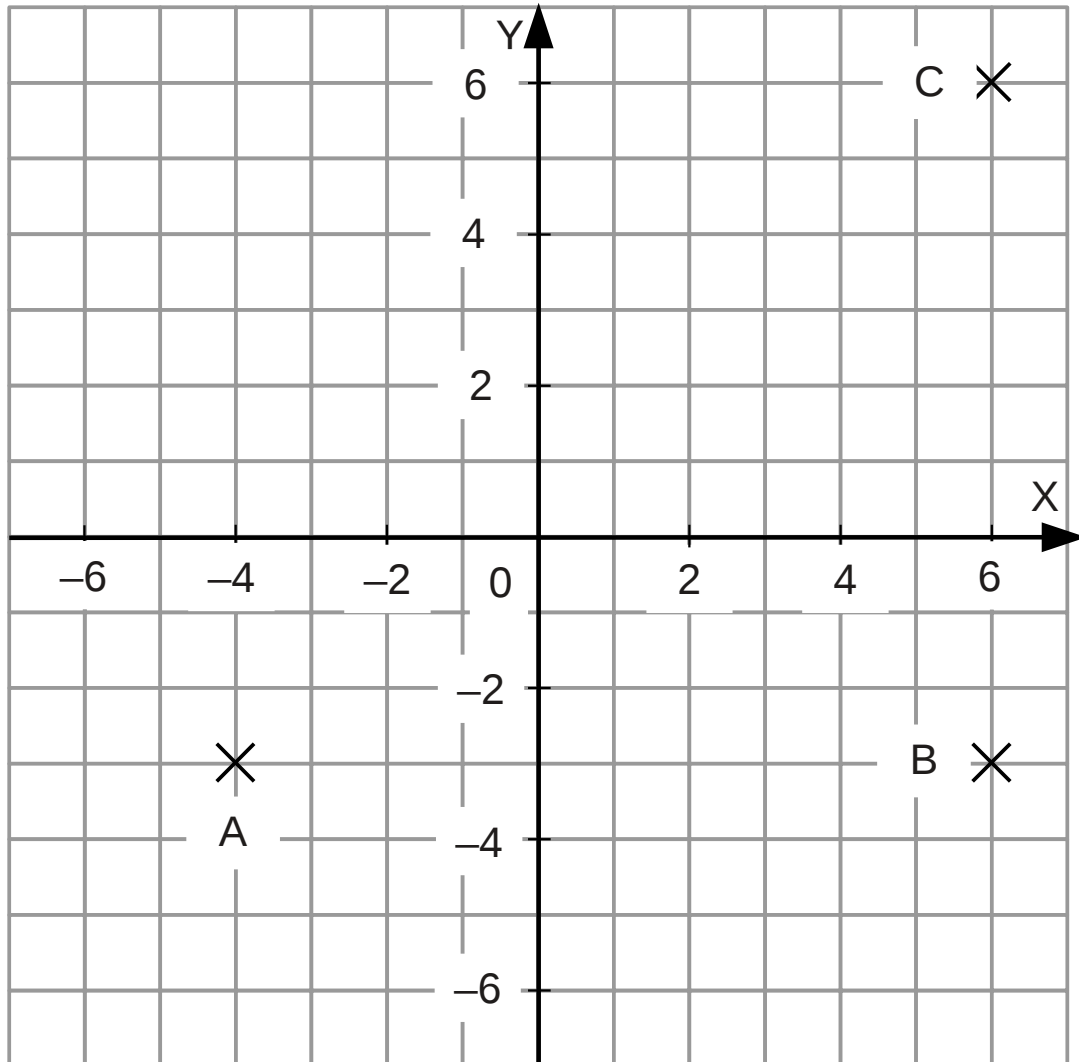
Plot the graph of $y = \frac{12}{x}$ on the axes below...



All four quadrants

Question 1

Three points A, B, C are plotted on the grid below

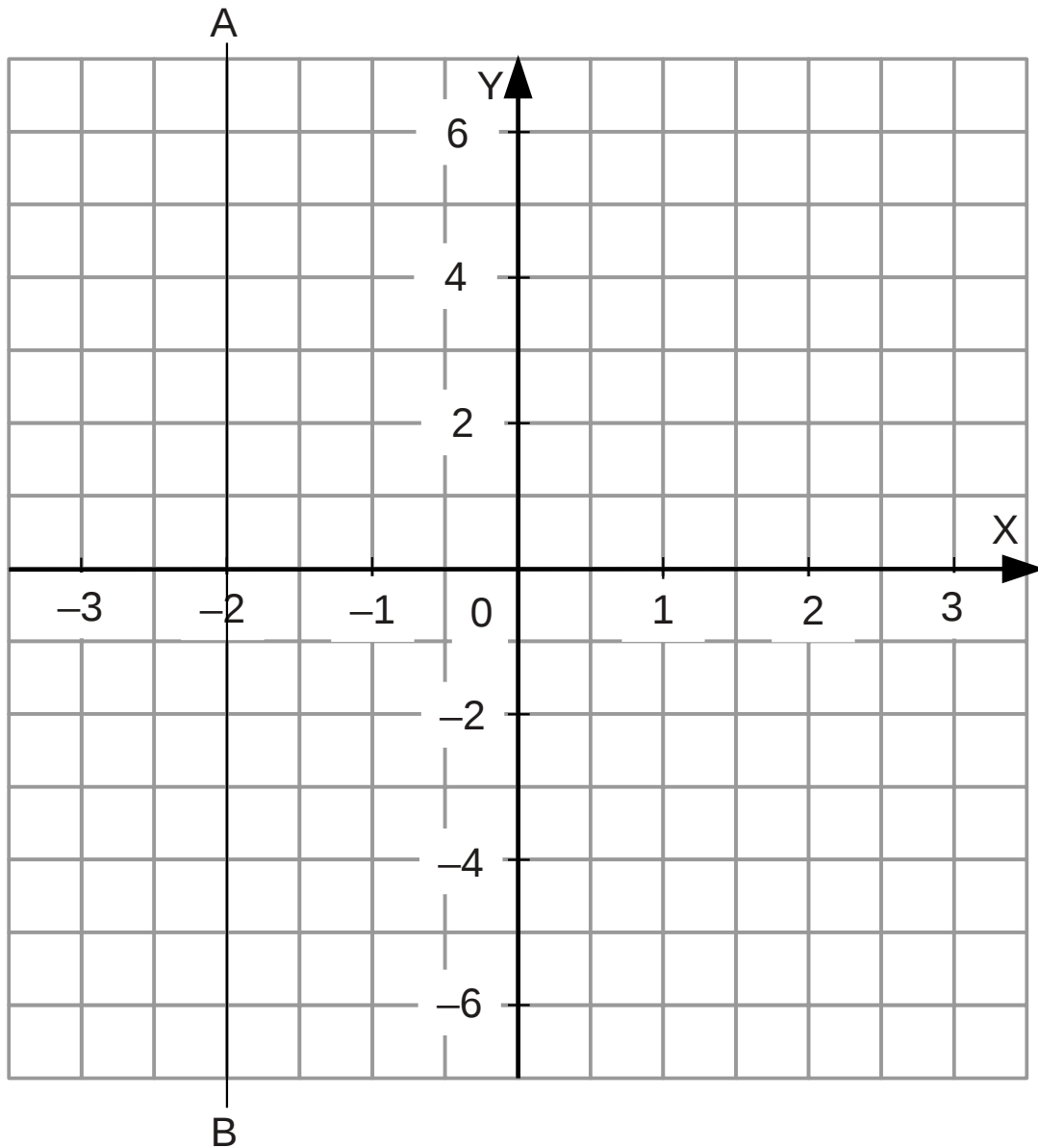


- Write down the coordinates of each of the points A, B, C
- Plot a point D so that ABCD are the vertices of a rectangle
- Draw the lines AC and BD on the grid
- Write down the coordinates of the point where AC crosses BD
- Work out the perimeter of the rectangle ABCD
- Work out the area of the rectangle ABCD
- Challenge:** work out the length of AC using Pythagoras' result

Question 2

A vertical line AB is shown on the grid below.

Note that the X and Y axes are scaled differently.



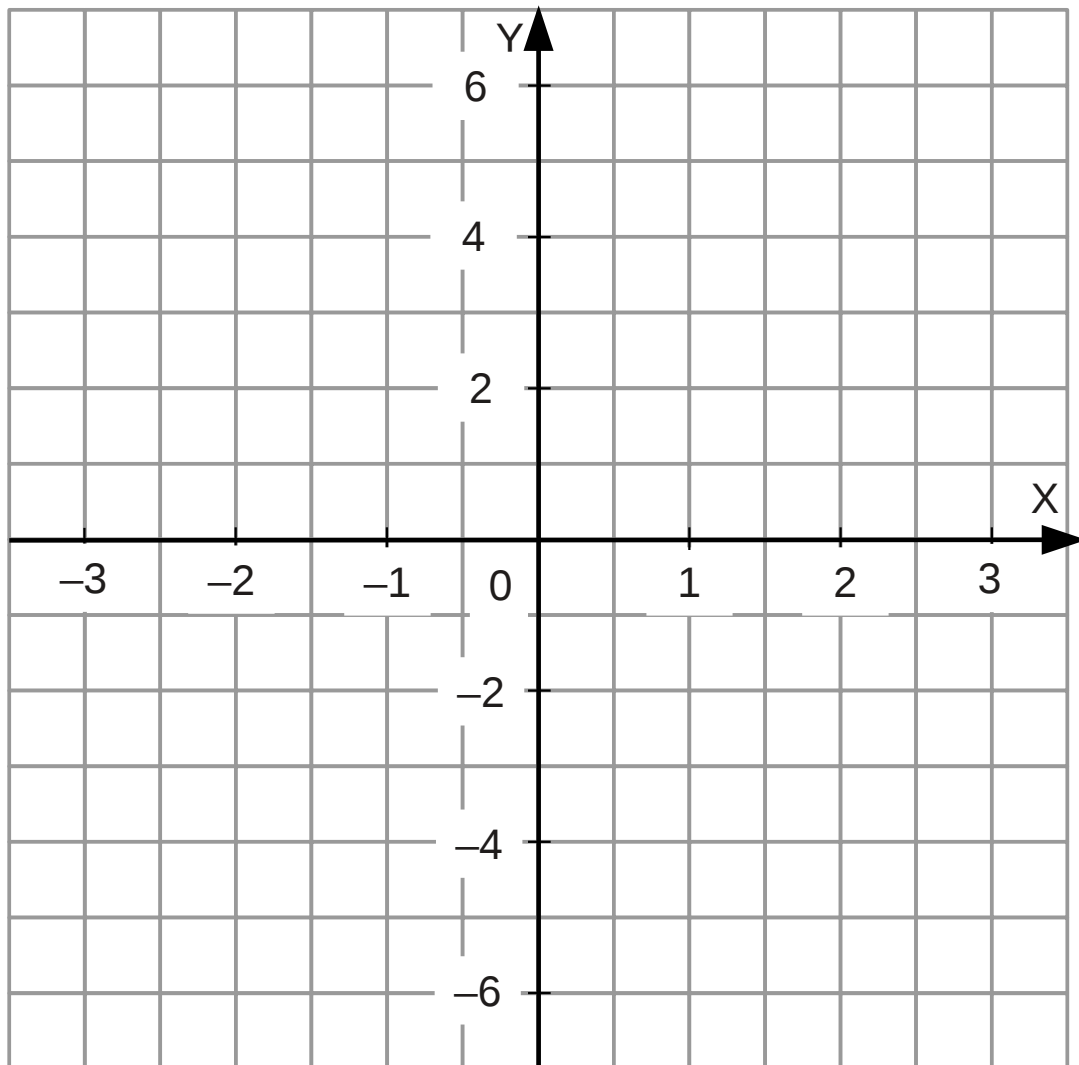
- Write down the equation of the line AB
- Draw the graph of $y = 3x - 1$ on the grid above
- Draw the graph of $2y + x = 2$
Hint: rearrange to make y the subject of the formula
- Pairs of lines on the graph will cross each other at three points
Label these three points and draw the triangle they form.

Question 3

Plot a graph of the formula $y = x^2 - x - 2$ on the grid below

Hint: make a table of y values corresponding to x values from $x = -2$ to $x = +3$. Then plot the points and draw a smooth bowl shaped curve through the points.

Note the scales of the X and Y axes are different.



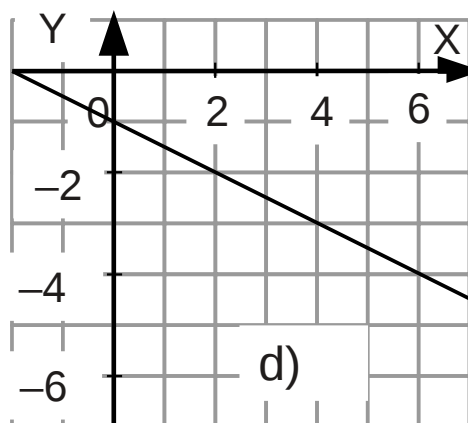
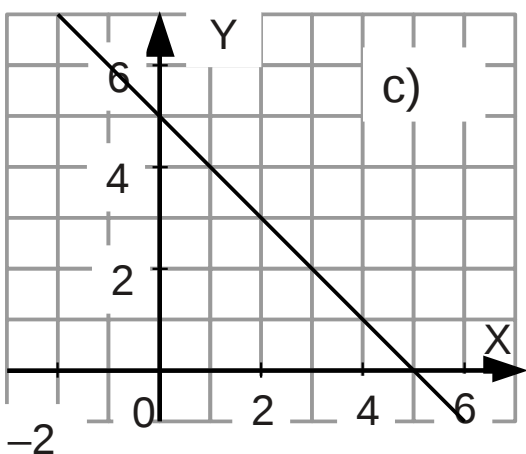
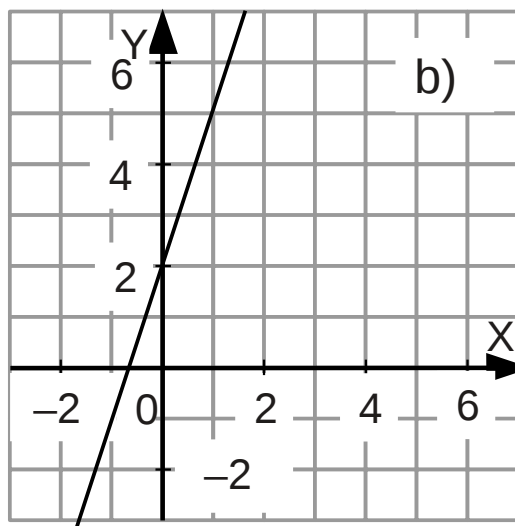
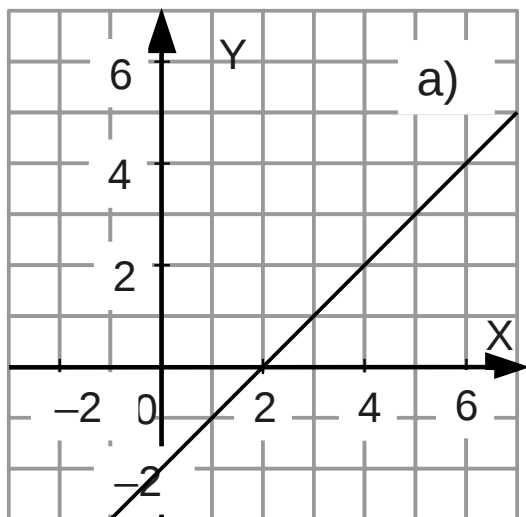
- Factorise $y = x^2 - x - 2$
- Mark with a cross the points where the curve crosses the X axis
- The curve is symmetrical. Draw the line of symmetry on the graph
- Write down the coordinates of the point at the minimum of the curve

Question 4

Below are four straight line graphs labelled a, b, c and d.

For each graph, work out the gradient and write down the intercept.

Then write down the equation of each of the graphs.



Question 5 (Challenge)

For each question below, find the equation of the straight line

- a) The line that passes through (0, 3) and (4, 11)
- b) The line that passes through (-2, -7) and (6, 9)
- c) The line that passes through (-2, 6) and (6, -2)
- d) The line with gradient 2 that passes through point (0, -3)
- e) The line with gradient -3 that passes through (2, 4)

Worksheet 17: Algebra part 4

Simultaneous equations, and graphical solution methods

Gateway skills (revision)

- Rearranging formulas
- Making formulas from words
- Negative numbers and BIDMAS
- Solving linear equations

Questions

- 1) Work out $-3 - 7$
- 2) Work out -5×-7
- 3) Rearrange $I = \frac{V}{R}$ to make V the subject of the formula
- 4) Work out $\frac{4 \times 3 + 8}{5}$
- 5) Florence sells cabbages for 50 pence each
Write an expression for the cost of f cabbages.
- 6) Ahmad sells n lemons at 3 dirham each
Write an expression for the total cost in dirham of the n lemons
- 7) $A = 3P + 5Q$
Work out the value of A when $P = 9$ and $Q = 7$
- 8) $Z = 3W - 4Y$
Work out the value of Z when $W = 5$ and $Y = -6$
- 9) Solve $4x + 5 = 13$
- 10) Solve $3y + 7 = 1$
- 11) Find two integers that add to 10 and multiply to give 21
- 12) Simplify $4x - -3x + 5y - y$

Solve simultaneous equations in two unknowns

1) Solve the simultaneous equations below

$$x + y = 15$$

$$3x + y = 27$$

2) Solve the simultaneous equations below

$$2p - q = 4$$

$$5p + q = 17$$

3) Solve the simultaneous equations below

$$x + y = 8$$

$$x - y = 2$$

4) Solve the simultaneous equations below

$$x + 3y = 14$$

$$2x + y = 13$$

5) Solve the simultaneous equations below

$$4x + 3y = 17$$

$$2x - 3y = 13$$

6) Solve this pair of simultaneous equations

$$9x + 4y = 22$$

$$3x + 2y = 14$$

7) Solve this pair of simultaneous equations

$$4x - 2y = 2$$

$$3x + 3y = 24$$

Setting up and solving simultaneous equations

You can use common sense to solve some of these, but try setting up the algebra as well

- 1) Tom is four years older than Charlie
The total of their ages is 18
Find the age of each of the boys

- 2) Three cabbages and a cauliflower cost a total of £3.00
A cabbage and a cauliflower cost a total of £1.60
Find the cost of a cabbage and the cost of a cauliflower
Hint: work in pence to avoid decimals

- 3) Six lemons and four limes cost a total of £3.80
Two lemons and a lime cost £1.10
 - a) Find the cost of a lemon
 - b) Find the cost of a lime

- 4) The office staff go out for pizza on Fridays.
Last Friday they bought 6 margarita pizzas and one pesto pizza for a total of £15.00
This Friday they buy 2 margarita pizzas and 5 pesto pizzas for £19.00
Use simultaneous equations to work out the cost of a margarita pizza and the cost of a pesto pizza

- 5) **Challenge:** Algernon buys two bananas and four mangos for £3.80
He buys one banana and two mangos for £1.90
Algernon says he has enough information to work out the price of a banana. Is he right?
You must give a reason

Graphical solution of simultaneous equations

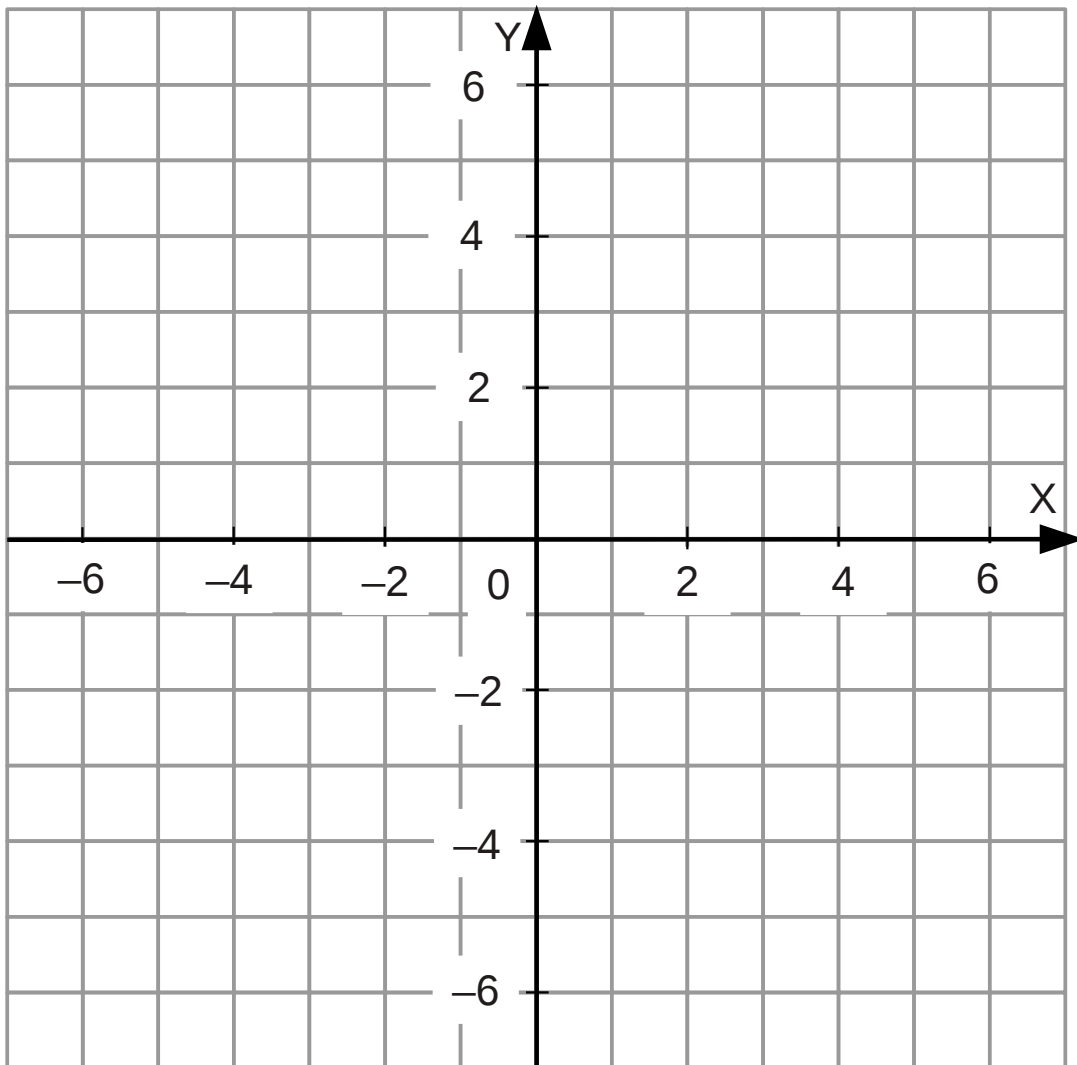
Use the grid below to plot the graphs of

$$4x - y = 3$$

and

$$-2x + 3y = 6$$

and hence solve this pair of simultaneous equations



Challenge: use an algebraic solution to check the result.

Worksheet 20: algebra questions

This worksheet has algebra skills questions plus a few challenge questions.

Make sure you have some notes about each of the section headings.

Basic conventions of algebra

- 1) Simplify $b^2 + b^2 + b^2$
- 2) Simplify $f + f + f + f - f$
- 3) Simplify $4x + 2x + 5x - 3x - x$
- 4) Work out the value of $3b$ when $b = 6$
- 5) Simplify $3a \times 5b$
- 6) Simplify $-7p \times 5q$
- 7) Simplify $-5x \times -6y$
- 8) Simplify $4xy + yx$
- 9) Simplify $5x^2 + 3x^2$
- 10) Simplify $4x \times 5x$
- 11) Write $x^5 \times x^4$ as a single power of x
- 12) Simplify $a \times b \times c$
- 13) Simplify $4xy \times 3x$
- 14) Simplify $-3xy \times 5yx$
- 15) Algernon writes a linear expression as $y \times 20 + 1x$.
Re-write his expression using the conventions of algebra
- 16) Evadne writes a linear expression as $-p15 + q20$.
Re-write her expression using the conventions of algebra
- 17) Write down the median of these three expressions: x^2 , $x^2 + 3$, $x^2 - 4$
Does the order of the expressions depend on the value of x ?

BIDMAS and negative numbers

Algebra depends on these rules. Check your answers before moving on.

- 1) Work out $-3 - 5$
- 2) What is -6×7 ?
- 3) Work out $15 \div -3$
- 4) Work out $-8 + 17$
- 5) Work out -4×-6
- 6) Work out $5 \times 7 + 3 \times 4$
- 7) Work out $6 \times 3 - 5 \times 3$
- 8) Work out $3 \times 4 - 5 \times -2$
- 9) Work out $\frac{(-2)^2 - (3 \times 6)}{\sqrt{49}}$ Hint: answer is an integer

Collect like terms

- 1) Simplify $3y + 4y + 2y + y$
- 2) Simplify $4x + 3 + 2x + 8$
- 3) Simplify $5x + 2y - 2x + 3y$
- 4) Simplify $-3q + 2p - q + 5p$
- 5) Simplify $3x^2 - 4x + x^2 - x$
- 6) Simplify $4xy + 3yx - xy$
- 7) Simplify $x^2 - 3x + 4x - 12$ as far as you can
- 8) Simplify $x + y - x - y + 6$
- 9) Simplify $4x - 2y + 3x - 6y - x + 5y$
- 10) Simplify $\frac{12x - 18y}{6}$ so it is in the form $ax + b$ where a and b are integers.

Multiply out brackets

- 1) Expand $3(4x + 5)$
- 2) Multiply out $2(x - 3)$
- 3) Expand $-3(2x + 1)$
- 4) Expand $-5(3x - 2)$
- 5) Expand $x(x + 1)$
- 6) Multiply out and simplify $2(2x + 1) + 3(5x + 2)$
- 7) Multiply out $3x(2x - 5)$
- 8) Multiply out and simplify $3(x + 1) - 2(4x - 5)$
- 9) Multiply out $3xy(5x + 2y)$
- 10) **Challenge:** Write the expression $\frac{12x-9}{3} - \frac{8x-20}{4}$ as an expression in the form $ax + b$ where a and b are integers

Factorise linear expressions

- 1) Factorise $12x + 6$
- 2) Factorise $4p - 12$
- 3) Factorise $5x + 10$
- 4) Factorise $18 - 6a$
- 5) Factorise $x^2 - x$
- 6) Factorise $3x^2 - 12x$ completely
- 7) Factorise $4xy + 12x^2$ fully
- 8) Factorise $xy^2 - x^2y$
- 9) Factorise $25 - 10x$
- 10) **Challenge:** Factorise $\frac{3}{4}x + 2\frac{1}{4}$ so that the bracket contains an expression with integer coefficients

Multiply out pairs of brackets

- 1) Multiply out $(x + 1)(x + 2)$
- 2) Multiply out $(x + 1)(x - 2)$
- 3) Multiply out $(2x + 1)(x + 5)$
- 4) Multiply out $(x + 3)(x - 3)$
- 5) Multiply out $(2x + 5)(2x - 5)$
- 6) Multiply out $(12 - x)(x + 3)$
- 7) Multiply out $(3x - 6)(4x + 5)$
- 8) Multiply out $(4x - 3)(4x + 3)$
- 9) Write the expression $(x + 3)(x + 2)$ in the form $ax^2 + bx + c$ where a , b and c are integers
- 10) $(x + 3)(x + 1) \equiv ax^2 + bx + c$
Find the values of a , b and c
- 11) **Challenge:** $(x + p)(x + q) \equiv x^2 + 3x + c$
Find possible values of the integers p , q and c
- 12) **Challenge:** Show that $(px + q)(px - q) \equiv (px)^2 - q^2$

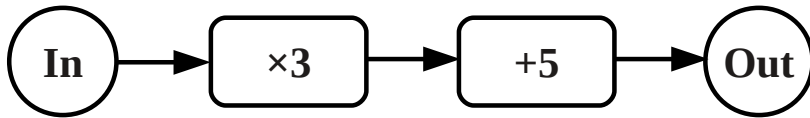
Factorise quadratic expressions

- 1) Factorise $x^2 + 2x + 1$
- 2) Factorise $x^2 + 4x + 4$
- 3) Factorise $x^2 + 2x - 3$
- 4) Factorise $x^2 - 2x + 3$
- 5) Factorise $x^2 - 9$
Hint: 'difference of two squares'
- 6) **Challenge:** Factorise $6x^2 + 19x + 15$

Use function machines

Question 1

Look at the function machine below...

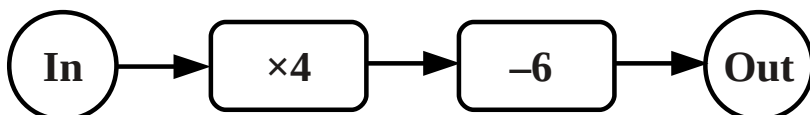


Use the function machine to complete the table of values...

In	Out
0	
1	
2	
3	
$4\frac{1}{2}$	
	32
-1	
-7	
	$9\frac{1}{2}$
x	

Extension: get some squared paper and plot the output against the input for the first four rows of the table. Can you write a formula for the graph?

Question 2



- a) Work out the value of the output when the input is 5
- b) Work out the value of the input that gives the output -10
- c) **Challenge:** find an input so that the output is twice the input

Substituting into expressions

- 1) Work out the value of $3a$ when $a = 7$
- 2) $A = 3x + 2y$
Work out the value of A when $x = 2$ and $y = 5$
- 3) $y = 4x + 3$
Work out the value of y when $x = 3$
- 4) $B = 3x - 2y$
Work out the value of B when $x = 3$ and $y = 8$
- 5) $C = 3p - 4q$
Work out the value of C when $p = 5$ and $q = -2$
- 6) $2y + 3x$
Work out the value of the expression when $y = 0$ and $x = 4$
- 7) **Challenge:** $D = 4x + 3y$
 - a) Work out the value of x when $y = 0$ and $D = 12$
 - b) Work out the value of y when $x = 0$ and $D = 12$

Making expressions from words

- 1) Write down an expression for the cost of n pencils at 15p each
- 2) Write down an expression for the cost of x lemons at 20p each
- 3) Oranges cost 25p and apples cost 20p
Write an expression for the total cost of x oranges and y apples
- 4) Archie thinks of a number n , doubles it then subtracts five
Write an expression in terms of n for Archie's answer
- 5) James is x years old
Inderjit is twice as old as James
Aaron is three years older than James
Write an expression for the total of their ages

Solve (mostly) linear equations

- 1) Solve $3x = 15$
- 2) Solve $\frac{x}{10} = 2$
- 3) Solve $x + 9 = 12$
- 4) Solve $x - 6 = 20$
- 5) Solve $3x + 4 = 19$
- 6) Solve $5x - 6 = 4$
- 7) Solve $4x + 6 = 2$
- 8) Solve $5x + 3 = 10$
- 9) Solve $1.2x - 0.4 = 2$
- 10) Solve $3x + 5 = 4x - 3$
- 11) Solve $2x + 6 = 4x - 14$
- 12) **Challenge:** Write down both solutions of $x^2 = 16$

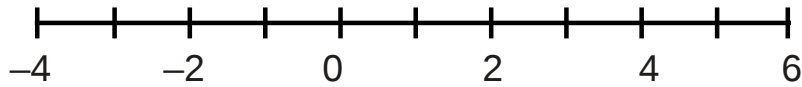
Change the subject of a formula

- 1) Rearrange the formula $y = 3x$ to make x the subject
- 2) Rearrange the formula $A = C + 5$ to make C the subject
- 3) $A = 4m + 5$
Rearrange the formula to make m the subject
- 4) $A = L \times W$
Rearrange the formula to make W the subject
- 5) $y + 3x = 12$
Rearrange the formula to make y the subject
- 6) $y = 2x + 1$
Rearrange the formula to make x the subject

Work with inequalities

Question 1

Represent the inequality $-1 < x \leq 5$ on the number line below

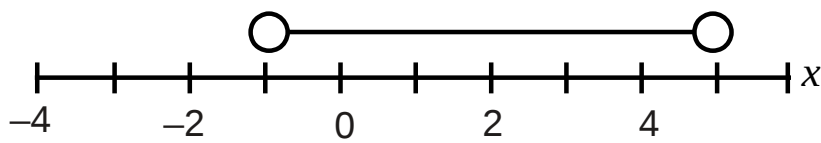


Question 2

Write down all the integers that satisfy the inequality $-2 \leq y < 3$

Question 3

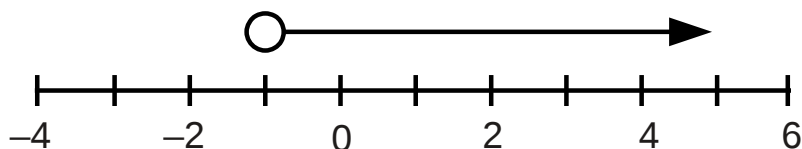
Look at the inequality represented on the number line below...



- a) Write this inequality in symbols
- b) Write down all the integers that satisfy the inequality

Question 4

- a) Solve the inequality $3x + 1 < 16$
- b) Write down the inequality represented on the number line below



- c) Write down all the integers that satisfy both inequalities

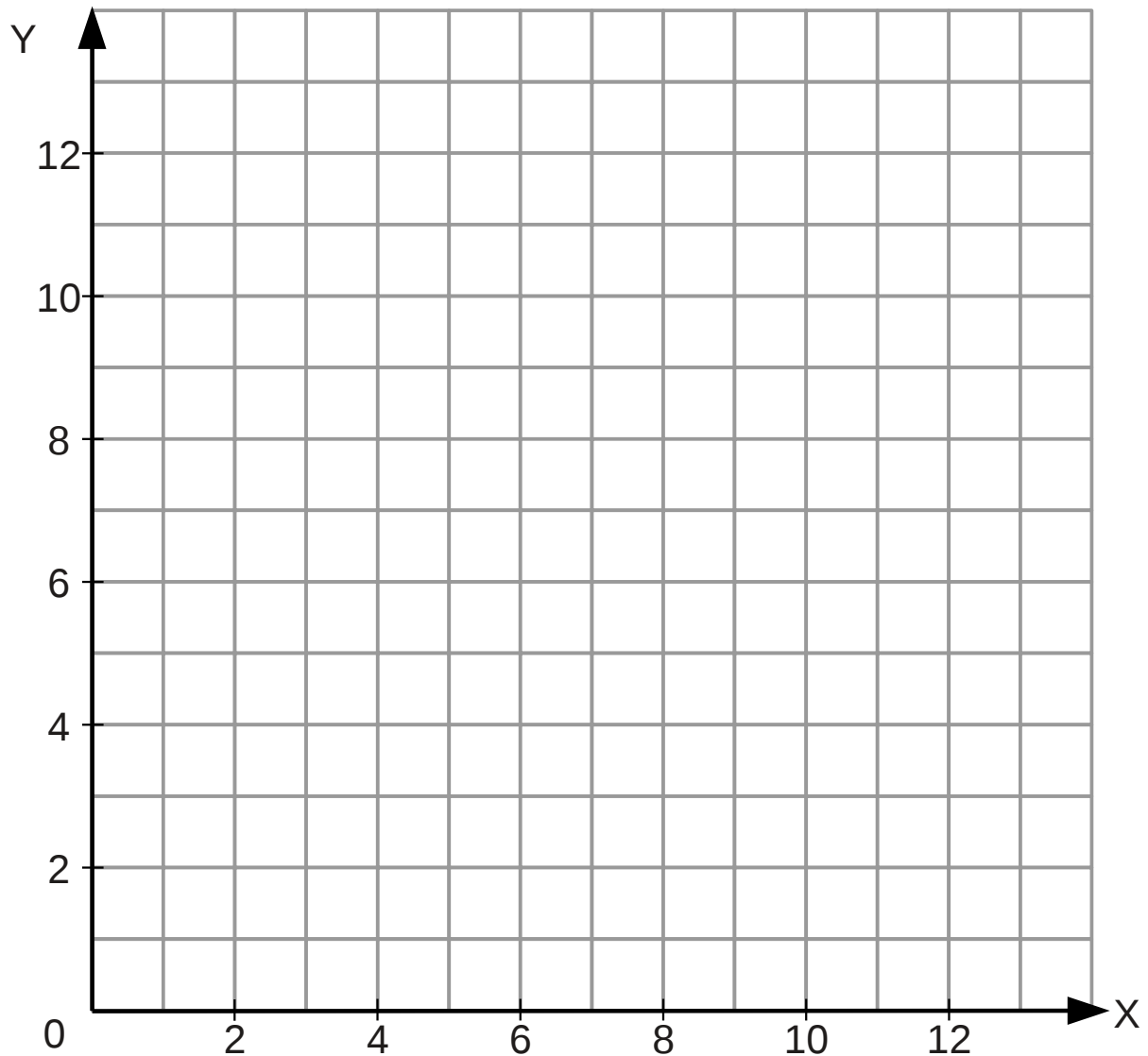
Solve simultaneous equations

- 1) Ethel buys two turnips and three potatoes for £2.10
Thomaz buys a turnip and three potatoes for £1.50
Work out the cost of a single turnip and the cost of a single potato
- 2) Solve the simultaneous equations...
$$3x + y = 18$$
$$x + y = 8$$
- 3) Solve the simultaneous equations
$$4x + 2y = 14$$
$$3x - 2y = 7$$
- 4) Solve the simultaneous equations
$$5x + 3y = 26$$
$$2x + 4y = 16$$
- 5) **Challenge:** Solve the simultaneous equations
$$2x + 3y = 15$$
$$5x - 2y = -\frac{1}{2}$$

Find n^{th} term for linear sequences

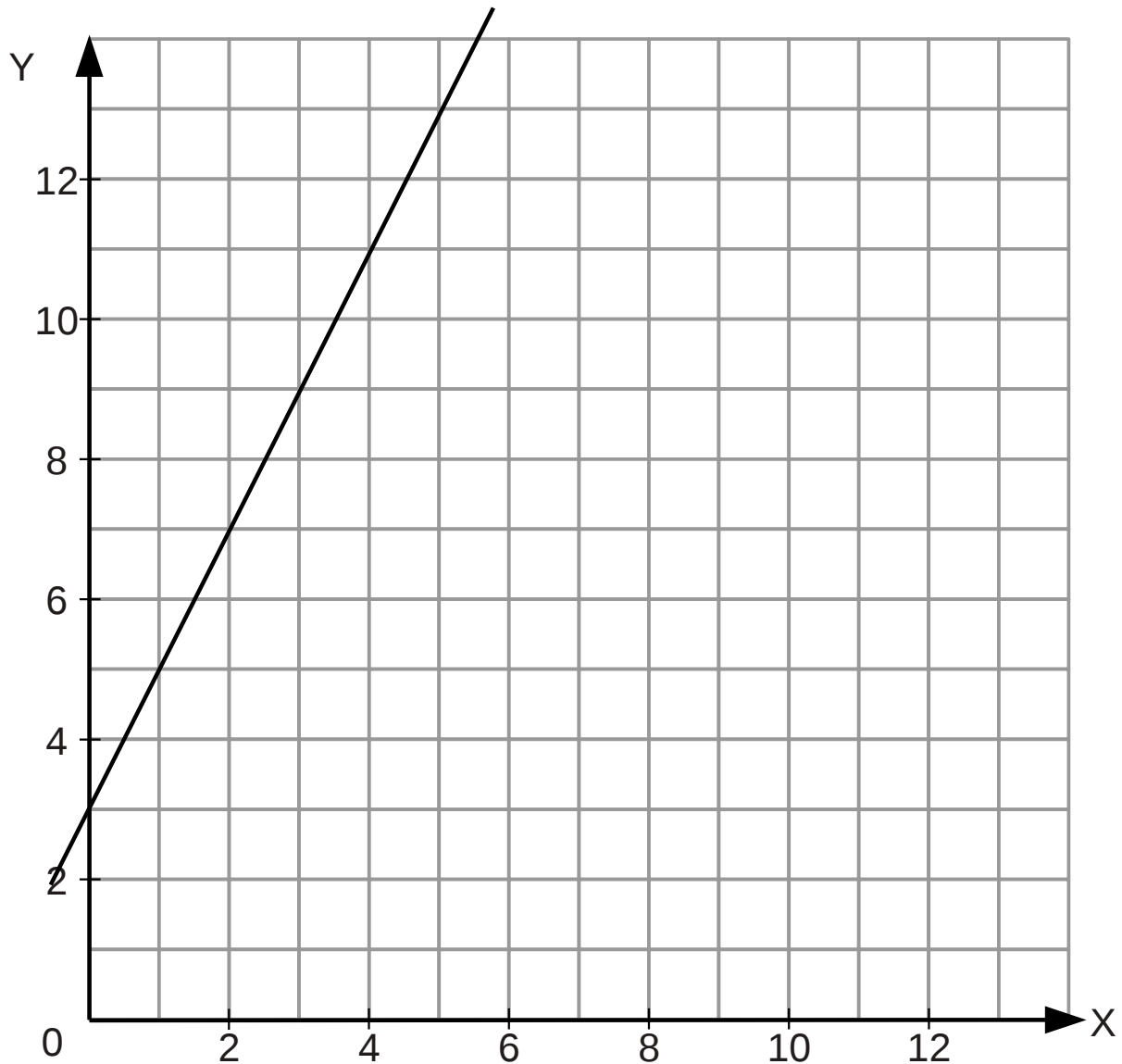
- 1) Find a formula for the n th term of the sequence 7, 10, 13, 16...
- 2) Can 307 be a term in the sequence 3, 7, 11, 15...?
Show a calculation and explain the reason for your answer
- 3) Algernon says that 1, 1, 2, 3, 5, 8, 13 is a linear sequence
Explain why he is wrong
- 4) Find a formula for the n th term of the sequence 2, 8, 14...
- 5) **Challenge:** 40, 37, 34, 31... Find n th term. Which term is the last positive term?

Plot coordinates



- 1) Plot the point (5, 9) and label the point A
- 2) Plot the point (2, 7) and label the point B
- 3) Write down the coordinates of a point C that makes a right angled triangle with A, B and C as vertices
- 4) Draw the line $x = 6$ on the grid
- 5) Reflect the triangle ABC in the line $x = 6$
- 6) Challenge: work out the area of the triangle ABC

Plot and find the formula of a straight line graph



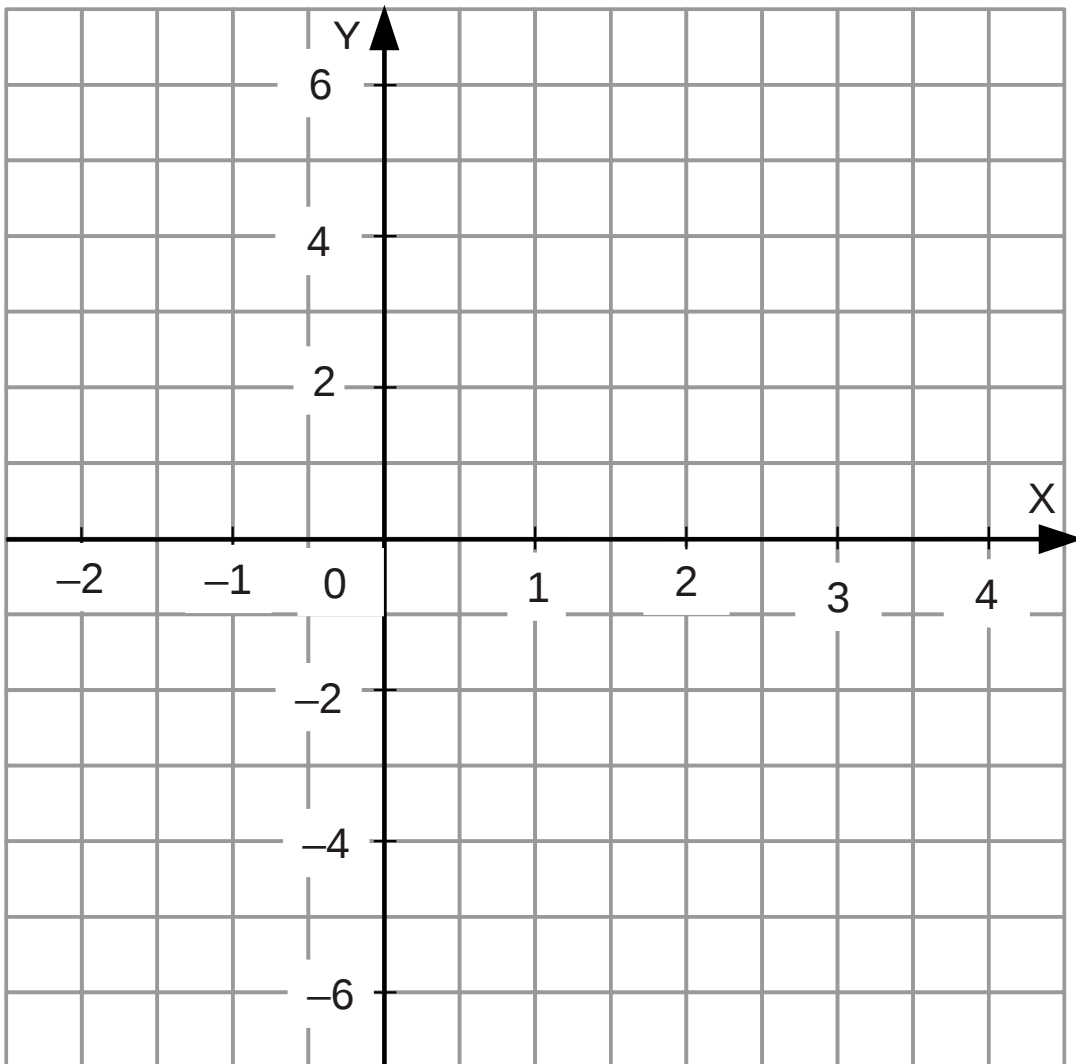
- 1) Find the gradient of the straight line graph drawn on the grid above
- 2) Write down the y-intercept of the line
- 3) Write down the formula of the line
- 4) Plot the graph of $y = 3x + 1$ on the grid above
- 5) Write down the coordinates of the point where the two straight line graphs cross
- 6) **Challenge:** can you set up and solve an equation to find the coordinates of where the two graphs cross?
- 7) **Challenge:** plot the graph of $2y + 3x = 12$ on the grid above

Plot a quadratic graph from the formula

a) Complete the table of values for the formula $y = x^2 - 2x - 3$

x	-2	-1	0	1	2	3	4
y	5		-3			0	

b) Plot the graph of $y = x^2 - 2x - 3$ on the grid below



c) Draw the axis of symmetry of the curve on the grid

d) **Challenge:** Circle the points on the graph where $x^2 - 2x - 3 = 0$

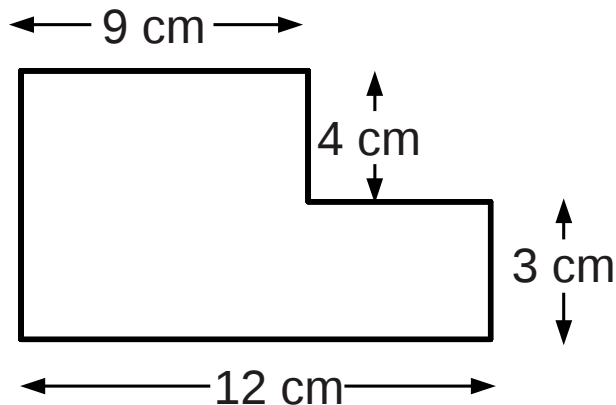
Worksheet 21: Mensuration

Perimeter, area, volume

Perimeters

Question 1

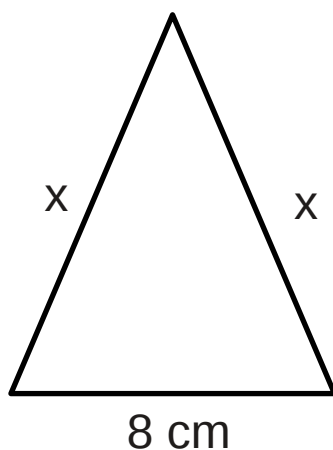
Find the perimeter of the compound shape below



Question 2

The perimeter of the isosceles triangle below is 32cm

Find the length of the side marked x



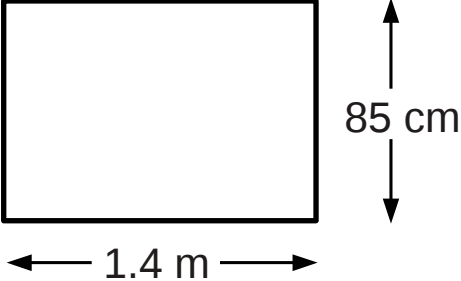
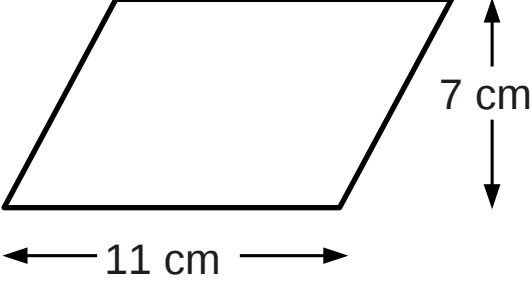
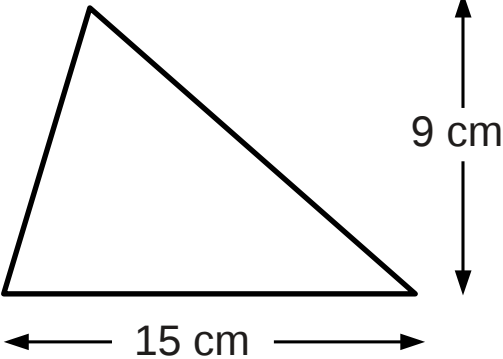
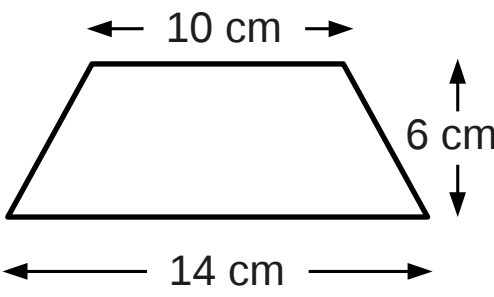
Question 3

A circle has diameter 25cm. Calculate the circumference of the circle and quote your answer to 1 d.p.

Areas

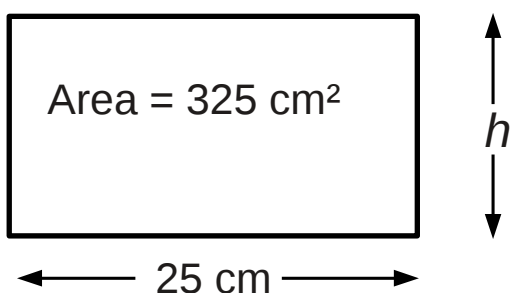
Question 1

For each of the shapes below, name the shape and calculate the area

<p>Shape A</p>  <p>1.4 m</p> <p>85 cm</p>	<p>Shape B</p>  <p>11 cm</p> <p>7 cm</p>
<p>Shape C</p>  <p>15 cm</p> <p>9 cm</p>	<p>Shape D</p>  <p>10 cm</p> <p>14 cm</p> <p>6 cm</p>

Question 2

Calculate the perimeter of the rectangle shown in the diagram below



Question 3

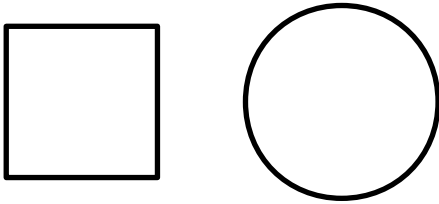
A circle has diameter 2.7m measured to the nearest 10cm.

Calculate the area of the circle and round your answer to three significant figures.

Challenge: calculate the largest area consistent with the measurements

Problem solving questions about perimeter/area

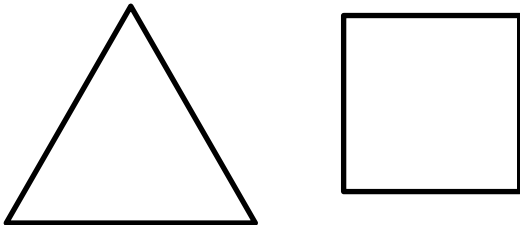
Question 1



The square and the circle have perimeters that are equal.

The square has an area of 64 cm^2 . Calculate the diameter of the circle.

Question 2

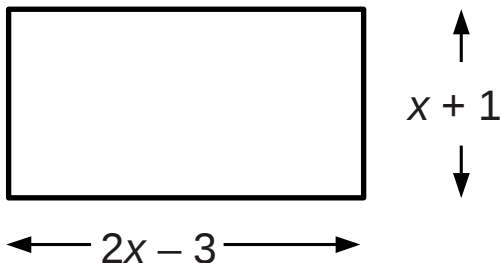


The equilateral triangle has the same perimeter as the square.

One side of the equilateral triangle is 10 cm long.

Work out the area of the square.

Question 3



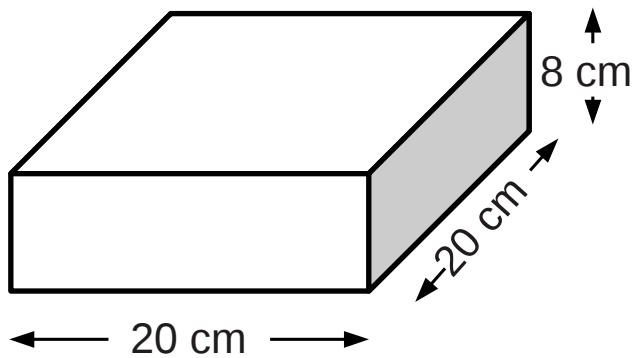
The perimeter of the rectangle shown above is 26 cm

Set up and solve an equation for x

Work out the dimensions of the rectangle

Volumes

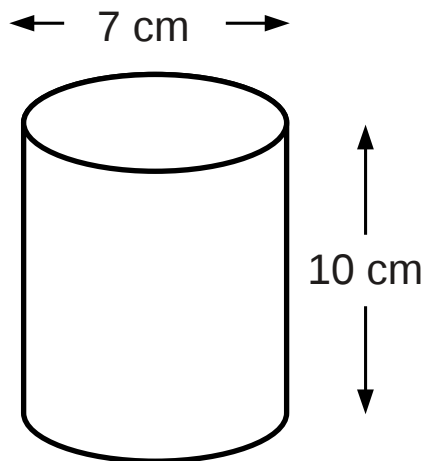
Question 1



Calculate the volume of the cuboid shown above in cm^3

What is the volume in litres to the nearest whole litre?

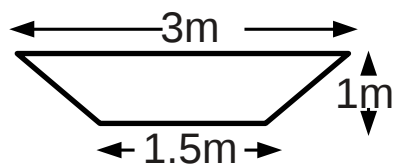
Question 2



Calculate the volume of the cylindrical food tin shown above

Give your answer to 1 decimal place of cm^3

Question 3



The diagram above shows the cross-section of a flood drainage trench.

How long will the trench need to be to hold 100 m^3 of water?

Worksheet 22: Angle facts

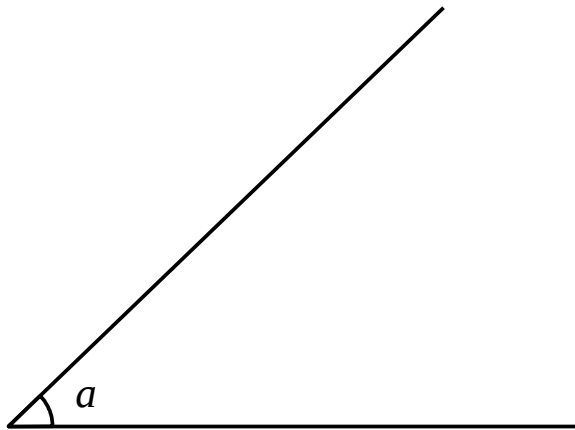
Reasoning about relationships between angles

Measuring angles

You need a protractor for this section.

Question 1

Look at angle a below



- a) What type of angle is angle a ?
- b) Measure the size of angle a using a protractor

Question 2

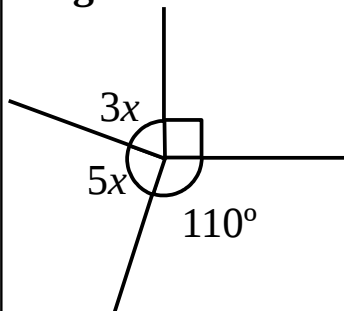
Take a piece of paper in 'portrait' orientation and

- a) Draw a line measuring 10 cm across the middle of the sheet
- b) Label the left end of the line A and the right end B
- c) At point A mark an angle of 60 degrees and draw a line
- d) At point B mark an angle of 30 degrees and draw a line
- e) Label the point where the two lines cross C
- g) What shape is ABC?
- f) Measure the angle ACB – can you predict what the value should be?

Basic angle facts

Question 1

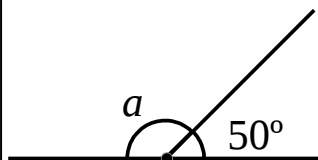
Diagram A



Find value of x and the values of all the angles.

State the angle fact that you use.

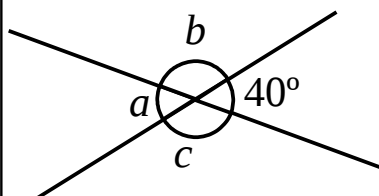
Diagram B



Find the value of angle a in the diagram.

State the angle fact that you use.

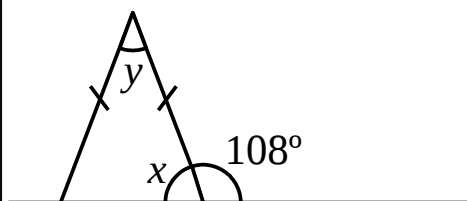
Diagram C



Find the values of each of the angles labelled a , b and c .

In each case, state a reason for your answer.

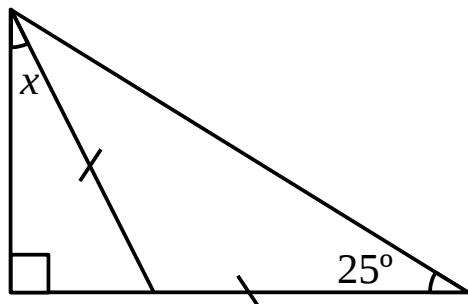
Diagram D



Calculate the size of angle x and angle y

Write out the angle facts you used for each of the angles.

Question 2

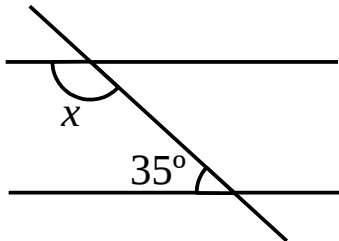


Calculate the value of angle x . Explain your reasoning step by step.

Parallel lines with a transversal line

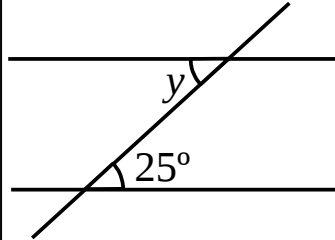
Question 1

Diagram A



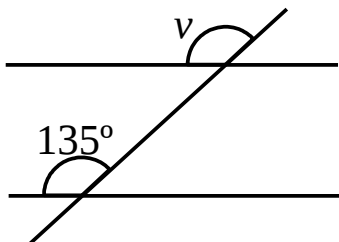
Calculate the size of angle x
Give a reason for your answer

Diagram B



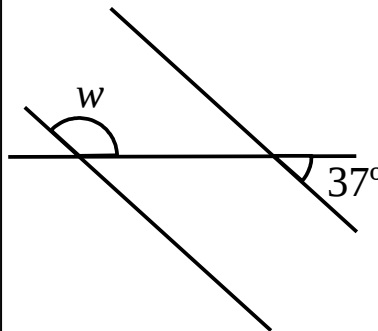
State the size of angle y and give a reason for your answer

Diagram C



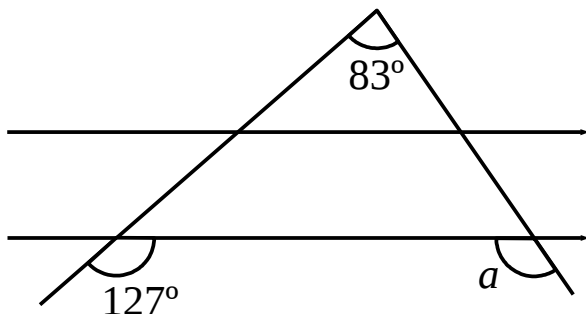
State the size of angle v and give a reason for your answer

Diagram D



Calculate the size of angle w and explain the steps you used.

Question 2

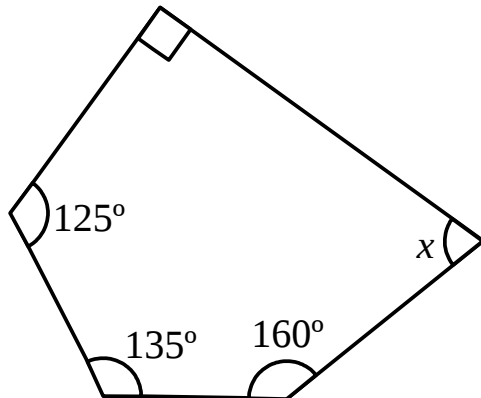


Calculate the size of angle a

Carefully explain your reason for each step

Polygon puzzles

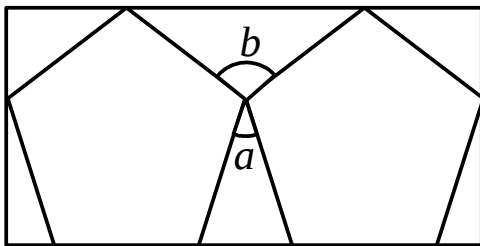
Question 1



Calculate the size of angle x

State the angle fact you made use of

Question 2

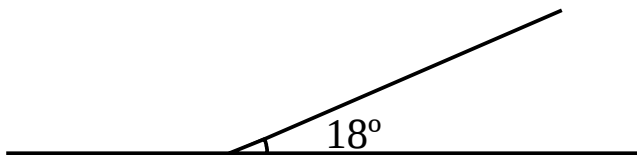


Two identical regular pentagons are placed in a rectangle as shown.

Find the size of angle a and the size of angle b

Explain the steps in your solution.

Question 3



A regular polygon has an exterior angle of 18°

How many sides does the polygon have?

Calculate the total internal angle of the polygon

Worksheet 23: Right-angled triangles

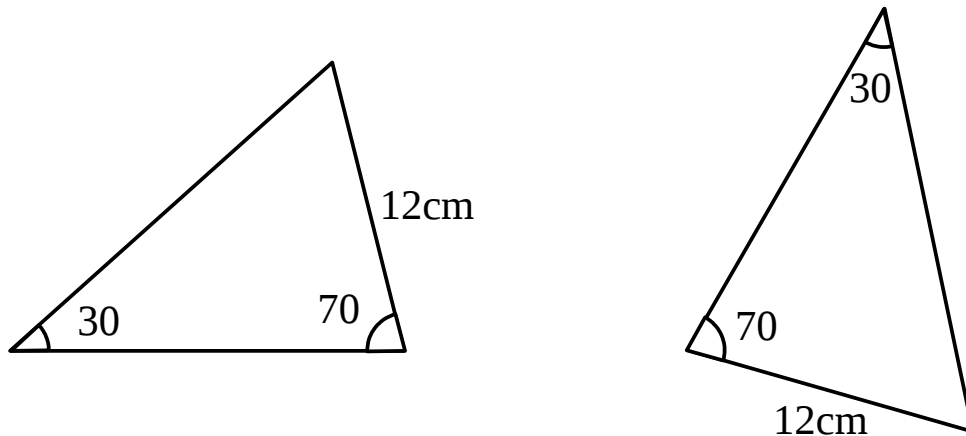
Similarity, congruence, Pythagoras' result and a few trigonometry questions.

Similarity and congruence

(Actually any shape not just triangles)

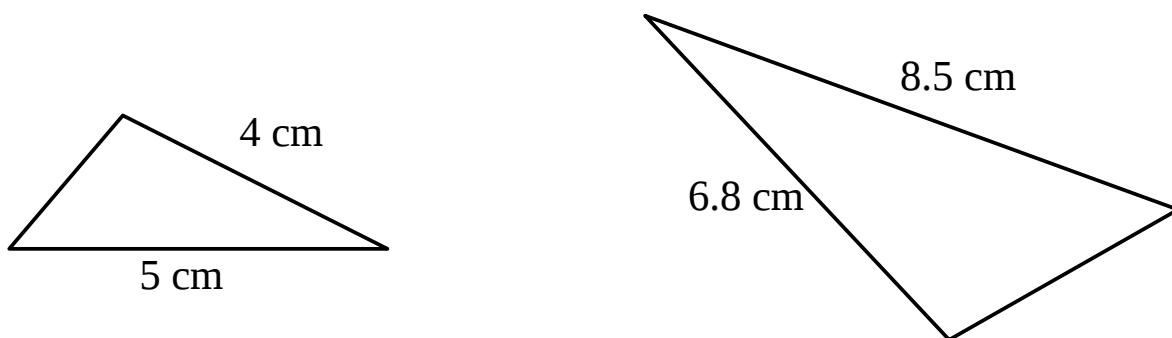
Question 1

Is this pair of triangles congruent? If so, explain the criteria they meet



Question 2

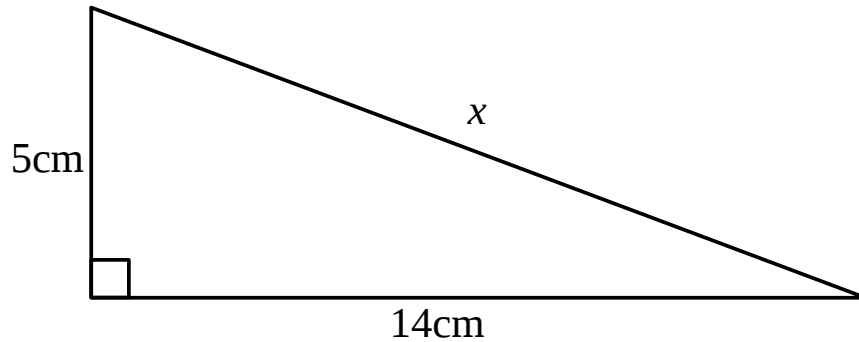
Is this pair of triangles similar? If so, find the scale factor



Pythagoras' result

Question 1

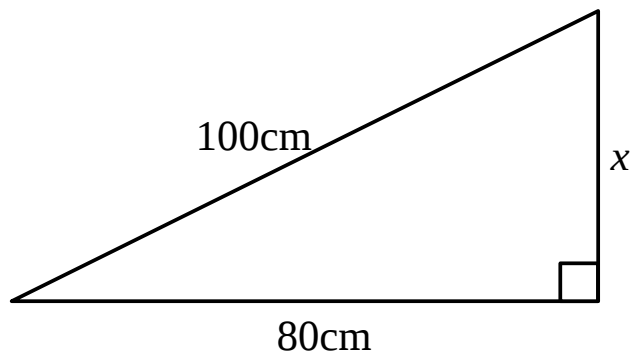
Find the length of the side marked x in the triangle below correct to 1 d.p.



Challenge: Calculate the size of the smaller acute angle in the triangle.

Question 2

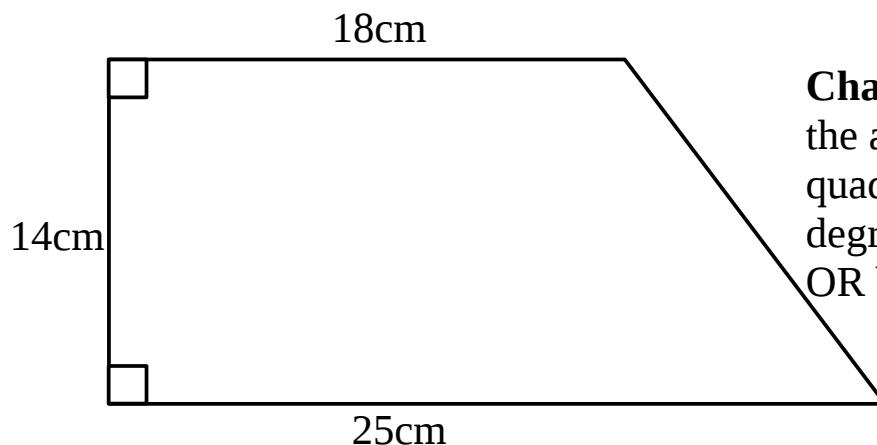
Find the length of the side labelled x without using a calculator.



Challenge: calculate the size of the two acute angles using trigonometry. You *will* need a calculator.

Question 3

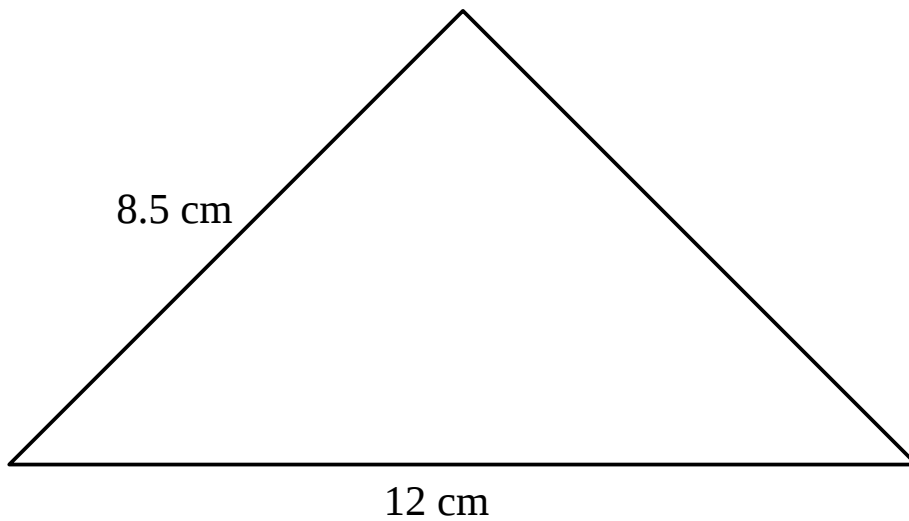
Find the perimeter of the shape below. Round your answer to 1 d.p.



Challenge: Check that the angles in this quadrilateral add to 360 degrees by calculation OR by construction.

Question 4

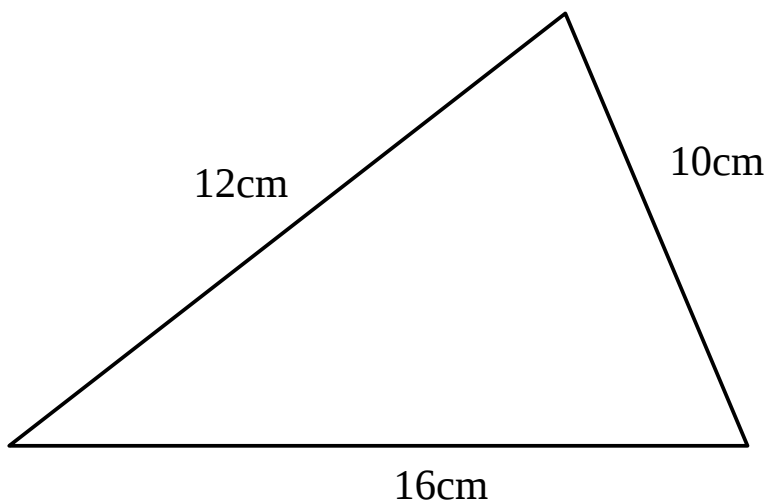
Find the area of this isosceles triangle.



Question 5

Algernon says that the triangle below has a right angle.

Is he right? Explain your answer and show detailed calculations.



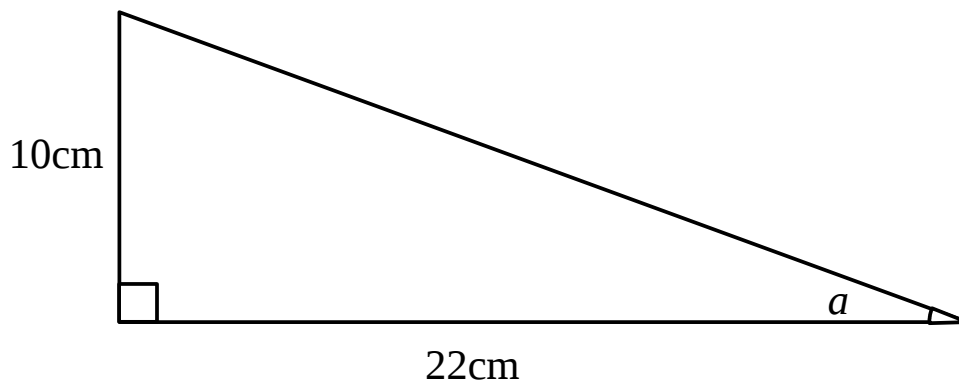
Challenge: use your compass and ruler to construct this triangle on a blank sheet of paper and check your result by measuring the angles

Higher challenge: calculate the angles in the triangle using the cosine and sine rules.

Trigonometry

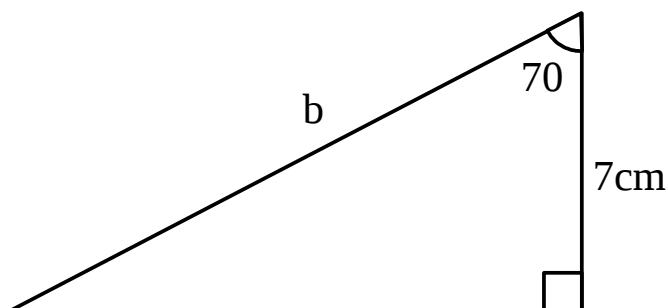
Question 1

Calculate the value of angle a in the triangle below. Give your answer to 1 decimal place of degrees.

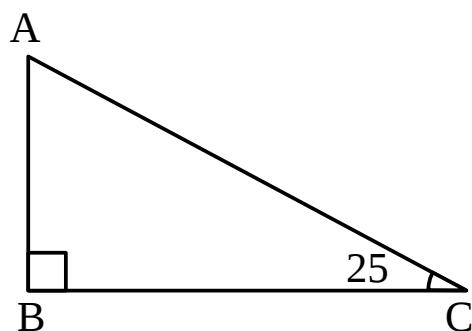


Question 2

Calculate the length of side b of the triangle below. Round to 1d.p.



Question 3



$AC = 15\text{cm}$. Angle $ACB = 25^\circ$. Calculate the length of AB to 1 d.p.

Worksheet 24: Compound measures

Metric units, speed-distance-time, density and pressure

Gateway skills: time and metric units

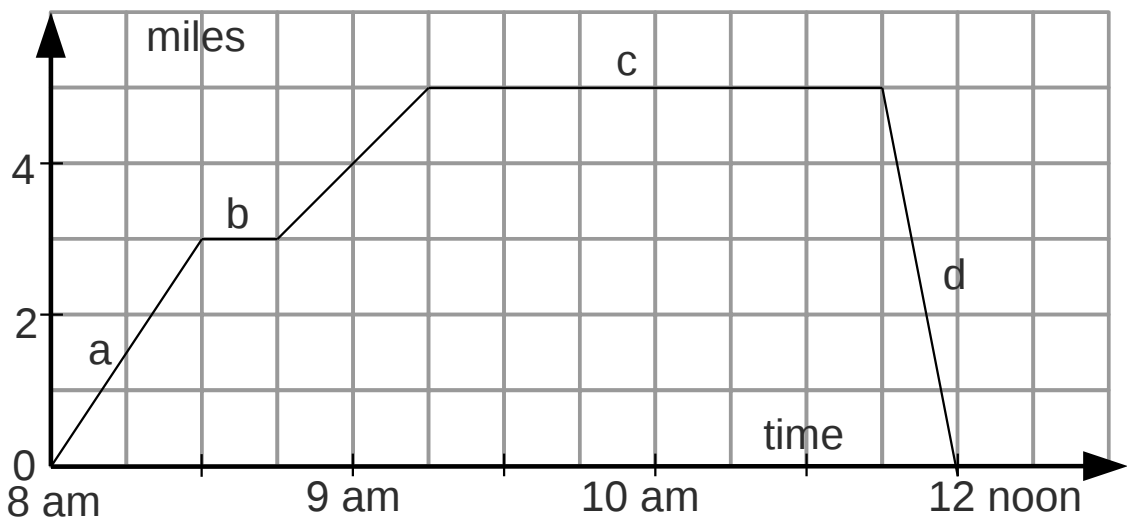
Complete this table

Qu	Time	Time in decimal hours
1	15 minutes	
2		0.5
3	2h 30	
4		2.1
5	1h 45	
6		1.9
7	4h 24	

- 8) A television programme starts at 21:07 and ends at 23:01
How long did the programme last in decimal hours?
- 9) Convert 810g into kilogrammes
- 10) What is 1.5 litres in millilitres?
- 11) A 70cl bottle of wine costs £6.30
How much should a 1 litre bottle of the same wine cost?
- 12) How many full cups of 240ml of orange juice can you take from a 2.7 litre bottle?
- 13) Convert 0.43Kg to grams
- 14) A car advert claims an mpg figure of 35.
The car has 5 gallons of petrol in the tank. How far should the car be able to travel without refilling?
- 15) A 750ml bottle of olive oil costs £3.60.
Work out the cost per 100ml of the oil.

Speed Distance and Time

- 1) A car travels at 30 mph for 3 hours. How far did it travel?
- 2) Fred leaves home at 0745 and arrives at work at 0830
He lives 15 miles from where he works
Calculate Fred's average speed for the journey
- 3) Look at the distance-time diagram below



Write a detailed description of the journey shown including the speed for each of the sections labelled a to d.

- 4) Amjad travels at 60 mph for 2h 15 minutes, then slows down to 30mph for the last 1h 30 minutes of his journey.
Calculate the average speed for the whole journey.
- 5) Angela walks at 5 mph for 45 minutes and then slows down to 3mph for the last 15 minutes.
How far has she walked in total?
- 6) A plane travels at 600 mph over the Atlantic, a distance of 3 600 miles. How many hours will it take?
- 7) Usain Bolt once ran 100 metres in 9.58 seconds.
 - a) Calculate his speed in metres per second
 - b) Convert this to kilometres per hour

Density

You will need the *Density of Common Materials* table for this section.

- 1) 100 cm³ of ice has a weight/mass of 83g.
Calculate the density of the ice in gcm⁻³

- 2) Hassan has a sample of a bright silver metal in the form of a cuboid measuring 4cm by 5cm by 6cm.
He weighs the metal cuboid and finds the mass to be 325g
 - a) Calculate the density of the cuboid
 - b) What metal could the cuboid be made of?

- 3) A cylinder of polystyrene measures 1m long and 30cm in diameter.
What is the largest mass it could have consistent with the densities shown in the density sheet?

- 4) A block of wood measures 20cm by 20cm by 10cm.
It weighs 2.9 kg
 - a) Calculate the density of the block of wood
 - b) Compare the density with values in the table of densities and identify the type of wood the block could be

- 5) A sawmill sells timber from sustainable fir forests at £130 per cubic metre.
Stanislaw needs to buy 2.6 m³ for his new timber house.
 - a) Calculate the cost of the timber
 - b) Estimate the weight in kg of the consignment.

- 6) A cylinder of lead measures 3cm long and 1cm diameter.
Calculate the weight of the cylinder.

Pressure and flow rates

Force (N)= mass (kg) \times g. Take g as 9.98 in the questions below

- 1) An oil tank is a cuboid, measuring 2m by 3m by 4m long.
A tanker fills the tank at the rate of 1 500 litres per minute.
How long would it take to fill the tank at that rate?
Give your answer in minutes

- 2) A mass of 3kg is spread over an area of 100cm²
Calculate the pressure exerted in Nm⁻²

- 3) A large water tank is in the shape of a cylinder with diameter 10m and height 5m.
A small village uses about 100 litres of water per person per day.
The population of the village is 50.
Does the water tank hold enough water to supply the village for a month if fully filled?
Show calculations to support your answer

- 4) A high-heel shoe has a heel with an area of 1cm²
The wearer has a body weight of 50Kg
Assume the wearer is leaning back on one heel
 - a) Calculate the force exerted by the 50Kg mass
 - b) Calculate the pressure exerted on the dance floor

- 5) Algernon leaves his cold water tap on full one weekend and goes away. The tap runs at the rate of 0.2li per second.
Agernon was away for 48 hours
How many cubic metres of water awaited him in the basement?

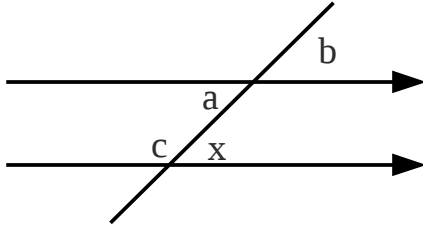
Table 1. Densities of Common Materials

Material	Density (g/cm ³)	Material	Density (g/cm ³)	Material	Density (g/cm ³)
Aluminum (Al)	2.71	Iron (Fe)	7.87	Steel	7.85
Aluminum Alloy	2.64 - 2.8	Iron - Cast	7.0 - 7.4	Stone - Granite	2.6
Brass	8.4 - 8.75	Iron - Wrought	7.4 - 7.8	Stone - Limestone	2.0 - 2.9
Brass - Noval	8.4	Lead (Pb)	11.3	Stone - Marble	2.6 - 2.9
Brass - Red	8.75	Magnesium (Mg)	1.74	Stone - Quartz	2.6
Brick	1.8 - 2.4	Magnesium Alloy	1.77	Tin (Sn)	7.3
Bronze - Reg.	7.8 - 8.8	Monel (67% Ni, 30% Cu)	8.84	Titanium (Ti)	4.54
Bronze - Managanese	8.3	Neoprene Rubber	1.23	Titanium Alloy	4.51
Carbon	2.25	Nickel (Ni)	8.89	Tungsten (W)	19.3
Ceramic	2.0 - 3.0	Nylon	1.15	Wood - Ash	0.56 - 0.64
Concrete	2.3 - 2.4	Parafin	0.8	Wood - Balsa	0.16
Copper (Cu)	8.94	Platinum (Pt)	21.4	Wood - Douglas Fir	0.48 - 0.56
Copper Alloy	8.23	Polystyrene	0.027 - 0.064	Wood - Oak	0.64 - 0.72
Cork	0.15 - 0.2	Rubber	0.96 - 1.3	Wood - South. Pine	0.55 - 0.64
Glass	2.4 - 2.8	Silicon (Si)	2.33	Zinc (Zn)	7.14
Gold (Au)	19.32	Silver (Ag)	10.49		

Worksheet 25: Progress test practice

Try these over Easter and see what you need to revise

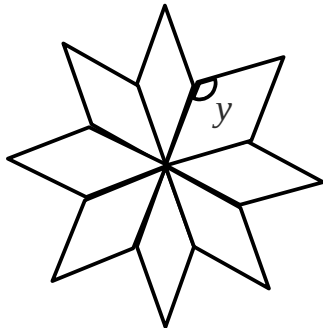
Question 1



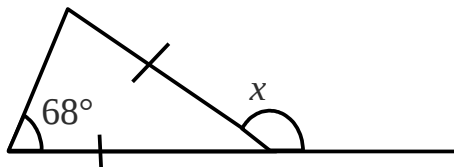
- a) Which angle is alternate to x ?
- b) Angle c and a are _____ angles
- c) Angle b is 75° . What is the value of angle c ?

Question 2

Philomena has sketched a floral pattern below.
She has arranged 8 identical diamonds as shown.
Calculate the size of angle y .



Question 3



Find the size of angle x
Give a reason for each step in your answer

Question 4

Solve the simultaneous equations

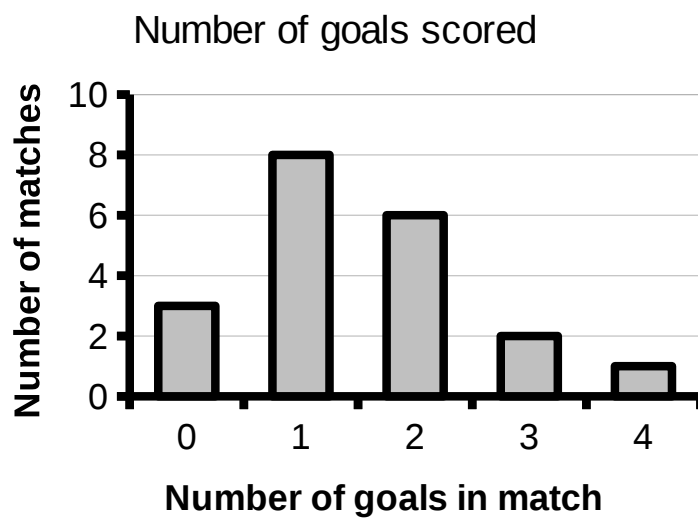
$$4x + 3y = 38$$

$$3x + 6y = 51$$

Do not use trial and improvement

You must show your working to gain marks

Question 5



The chart shows the number of goals scored in each football match

- Find the total number of goals scored.
- What is the modal number of goals per match?

Question 6

Bill and Ben run a small business and share the profits

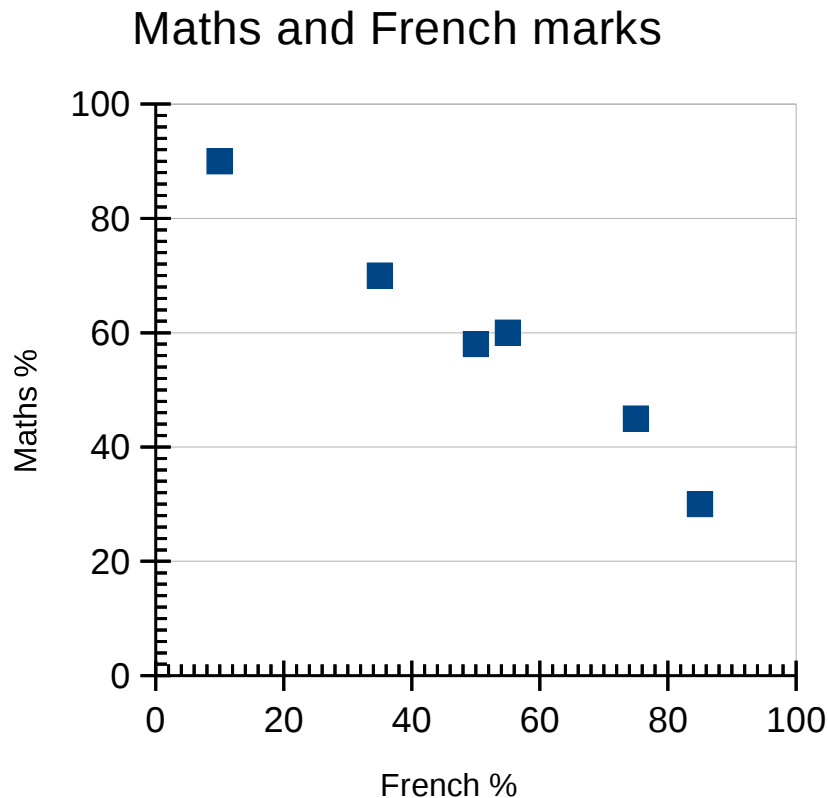
Bill receives half as much again as Ben receives one week

Work out the ratio of their earnings for that week

Give your answer in the simplest form

Question 7

The scatter chart shows the scores in Maths and French for six students in a small school support unit.

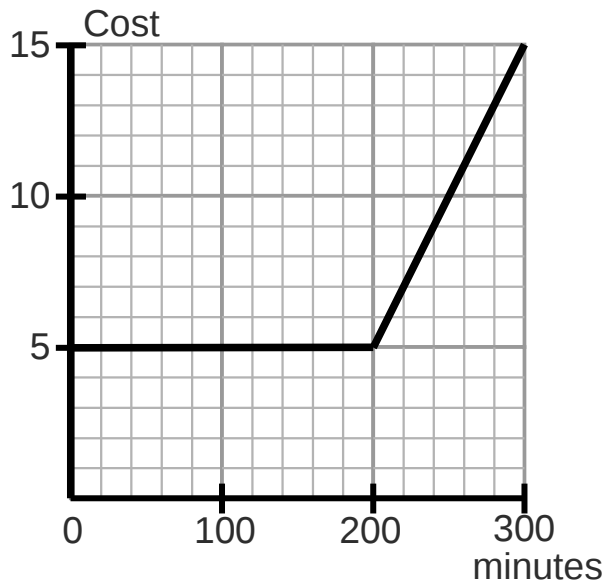


- a) Write a sentence describing the relationship between the French and Maths scores for this group of students.
- b) Use the graph to estimate the French score for a student who scored 80% in Maths.
- c) What fraction of the students scored more than 60% in French?

Question 8

Solve $2x - 6 > 3x - 10$

Question 9



The graph above shows how much a phone contract costs for each monthly period. Algernon uses 240 minutes one month. How much is his bill?

Question 10

Algernon, Bertram and Cuthbert share some money as follows...

Algernon	£45
Bertram	£60
Cuthbert	£15

Algernon gives Cuthbert some money

Afterwards, their money is in the ratio 1 : 2 : 1

How much did Algernon give to Cuthbert?

Question 11

Asif drives to work. He leaves the house at 0830 and stops off at the shop 7 miles away at 0912. He stays at the shop for 18 minutes. Then he drives to work a further 8 miles away and arrives at 10:00

Draw the distance time graph showing Asif's journey.

Worksheet 26a: Vector arithmetic

You will need a ruler and a pencil and a few sheets of tracing paper

Column vector arithmetic

1) Let $\underline{a} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$. Write down $-\underline{a}$ in column vector format

2) Let $\underline{a} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and let $\underline{b} = \begin{pmatrix} 4 \\ 6 \end{pmatrix}$.

a) Write down $\underline{a} + \underline{b}$ in column vector format

b) Work out $\underline{a} - \underline{b}$ as a column vector

Hint: $\underline{a} - \underline{b}$ is the same as $\underline{a} + (-\underline{b})$

c) Work out $5\underline{a} + 2\underline{b}$ in column vector format

d) Write the vector $2\underline{a} - \frac{1}{2}\underline{b}$ in column vector form

3) Let $\underline{p} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ and let $\underline{q} = \begin{pmatrix} -6 \\ 4 \end{pmatrix}$

a) Work out the value of $\frac{1}{2}(\underline{p} + \underline{q})$ as a column vector

*b) Use Pythagoras' result to work out the length of \underline{p} , the length of \underline{q} and the length of $(\underline{p} - \underline{q})$

4) Challenge question

Solve $2\underline{a} + \begin{pmatrix} 6 \\ 5 \end{pmatrix} = \begin{pmatrix} 16 \\ 7 \end{pmatrix}$

Worksheet 26: Transformations

You will need a ruler and a pencil and a few sheets of tracing paper

Column vector arithmetic

1) Let $\underline{a} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$. Write down $-\underline{a}$ in column vector format

2) Let $\underline{a} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and let $\underline{b} = \begin{pmatrix} 4 \\ 6 \end{pmatrix}$.

a) Write down $\underline{a} + \underline{b}$ in column vector format

b) Work out $\underline{a} - \underline{b}$ as a column vector

Hint: $\underline{a} - \underline{b}$ is the same as $\underline{a} + (-\underline{b})$

c) Work out $5\underline{a} + 2\underline{b}$ in column vector format

d) Write the vector $2\underline{a} - \frac{1}{2}\underline{b}$ in column vector form

3) Let $\underline{p} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ and let $\underline{q} = \begin{pmatrix} -6 \\ 4 \end{pmatrix}$

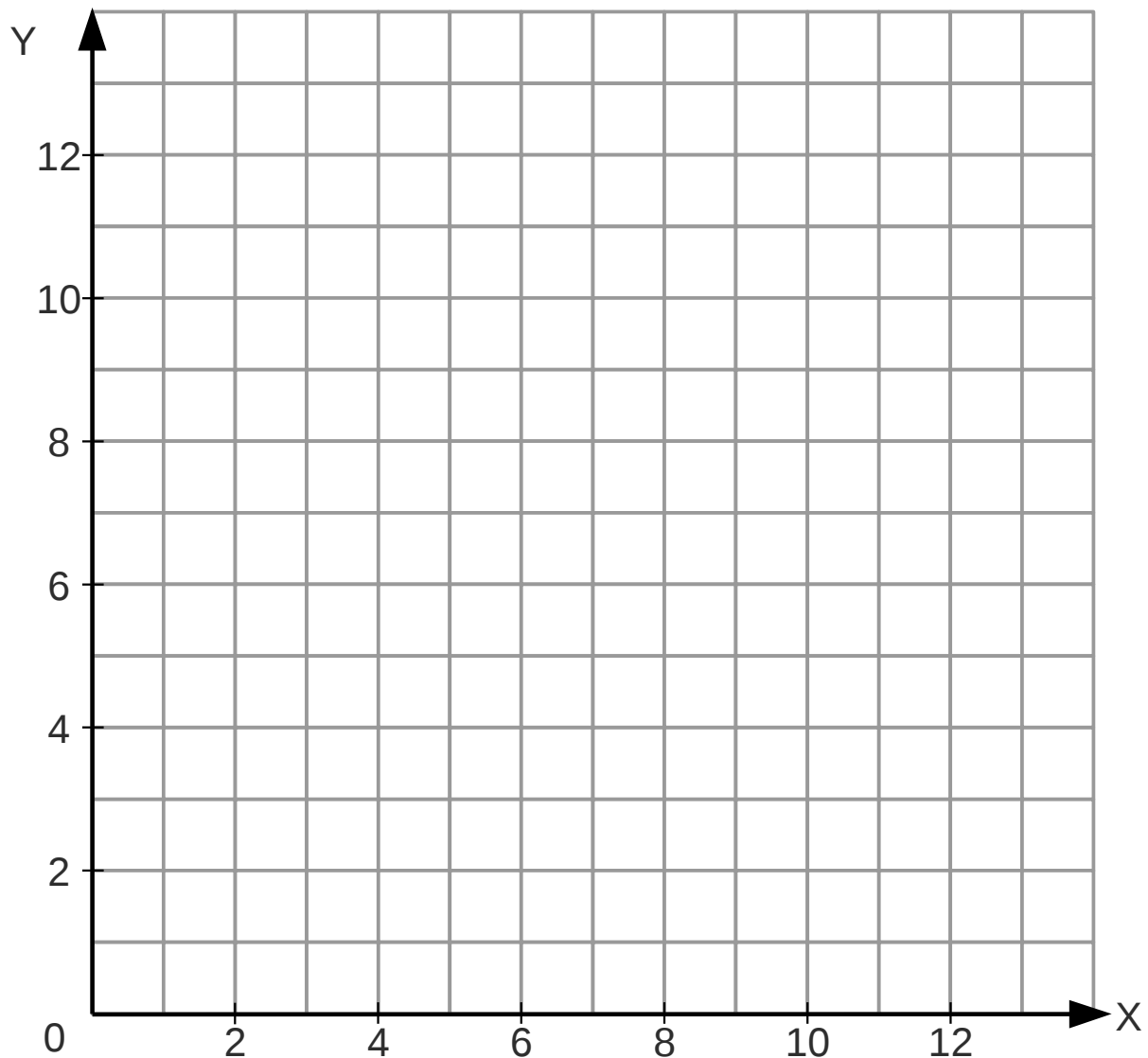
a) Work out the value of $\frac{1}{2}(\underline{p} + \underline{q})$ as a column vector

*b) Use Pythagoras' result to work out the length of \underline{p} , the length of \underline{q} and the length of $(\underline{p} - \underline{q})$

4) Challenge question

Solve $2\underline{a} + \begin{pmatrix} 6 \\ 5 \end{pmatrix} = \begin{pmatrix} 16 \\ 7 \end{pmatrix}$

Coordinates review



Plot and label the following points on the 1 centimetre grid above

A (2, 1), B (10, 12), C (2, 12)

Draw the line AB.

Calculate the length of the line using Pythagoras' result.

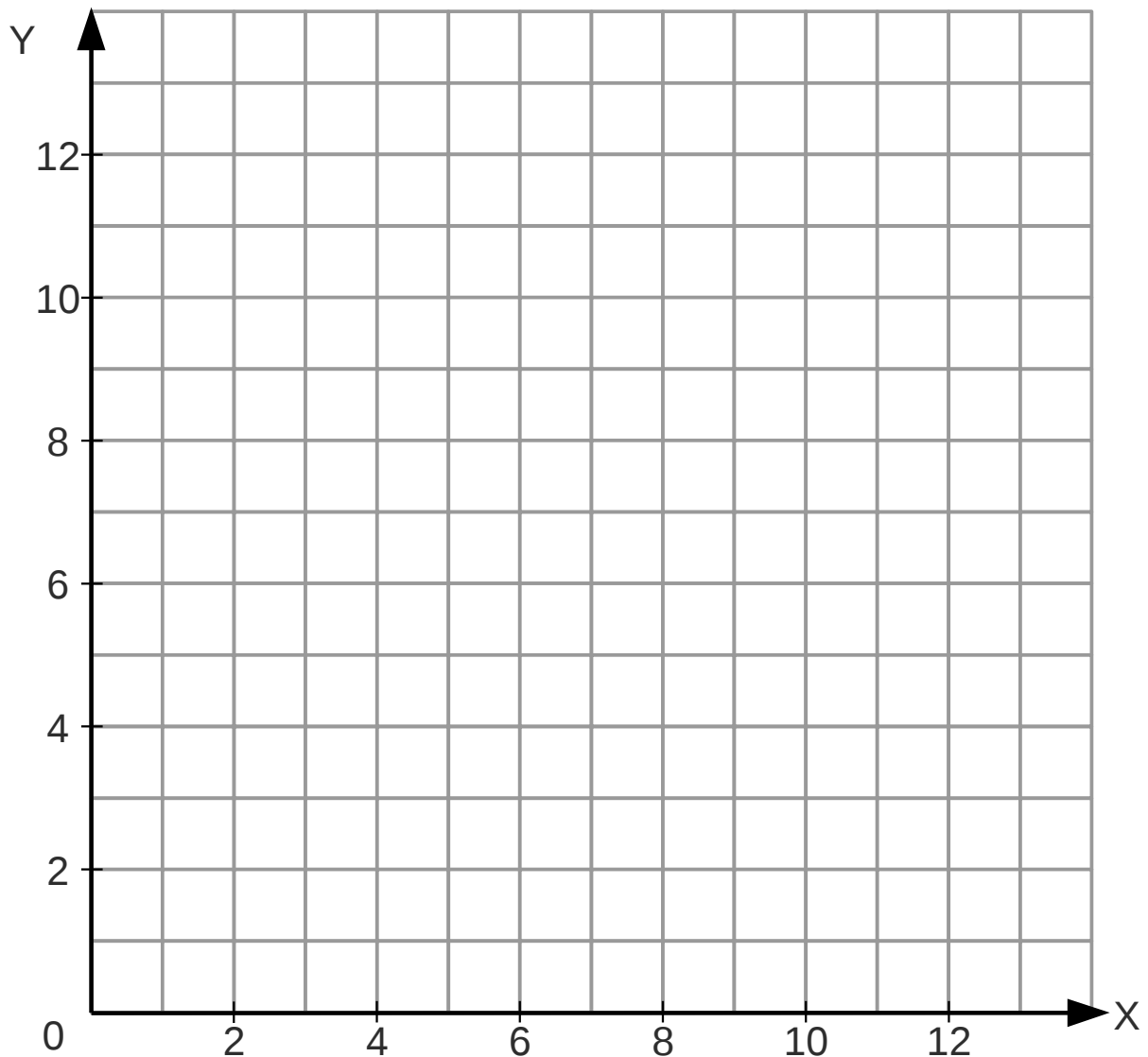
Give your answer to 1dp.

Write down the column vector \mathbf{p} that moves A to B.

Work out the area of the triangle ABC

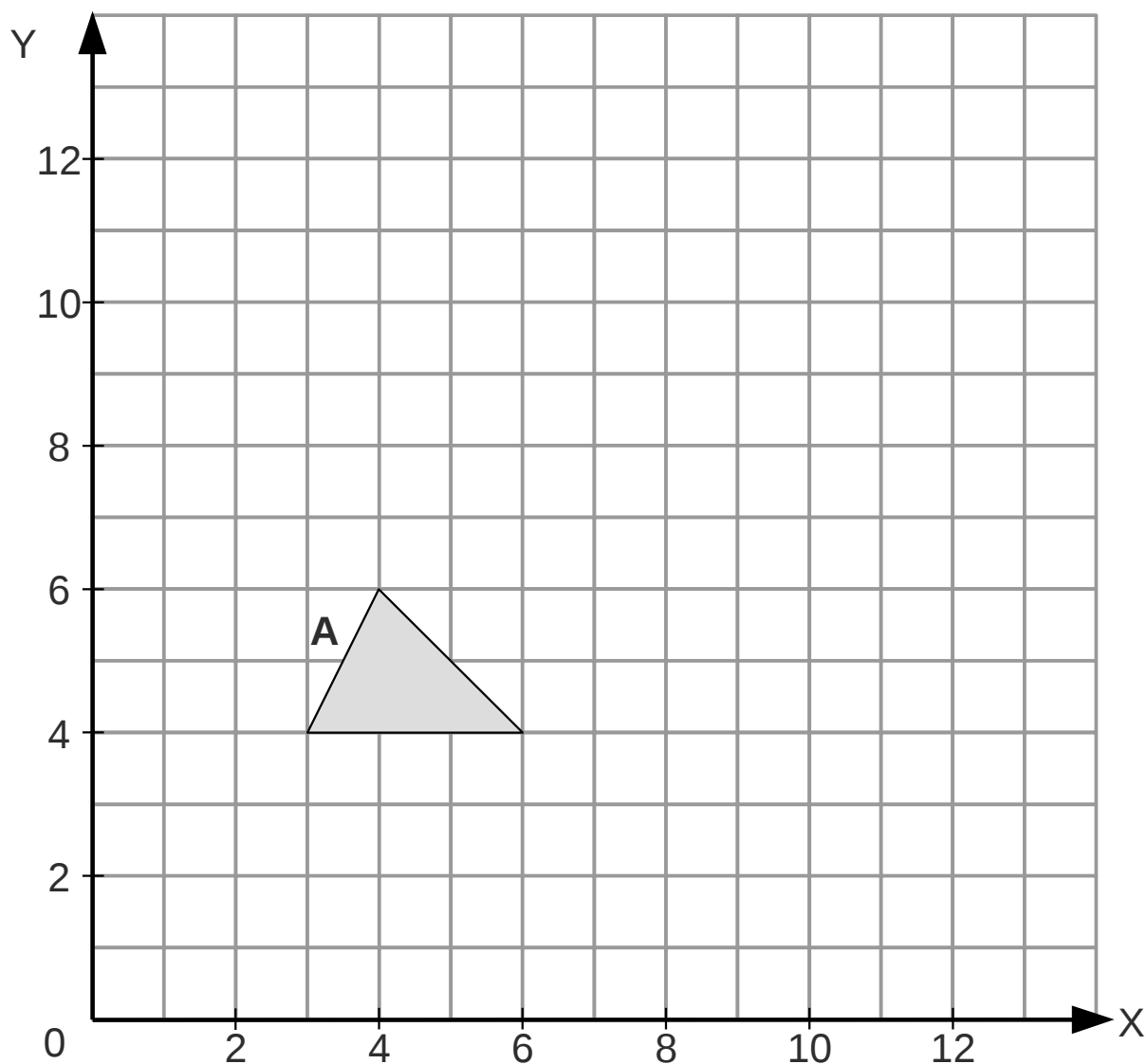
Translation

The axes below are drawn on a 1cm grid



- 1) Plot the points A (1, 2), B(1, 4), C(2, 4)
- 2) Draw the triangle ABC and label the triangle R
- 3) Translate the triangle through the vector $\begin{pmatrix} 9 \\ 6 \end{pmatrix}$
Label the translated triangle S
- 4) Write down the coordinates of the vertices of triangle S
- 5) Write down the column vector that will translate S \rightarrow R

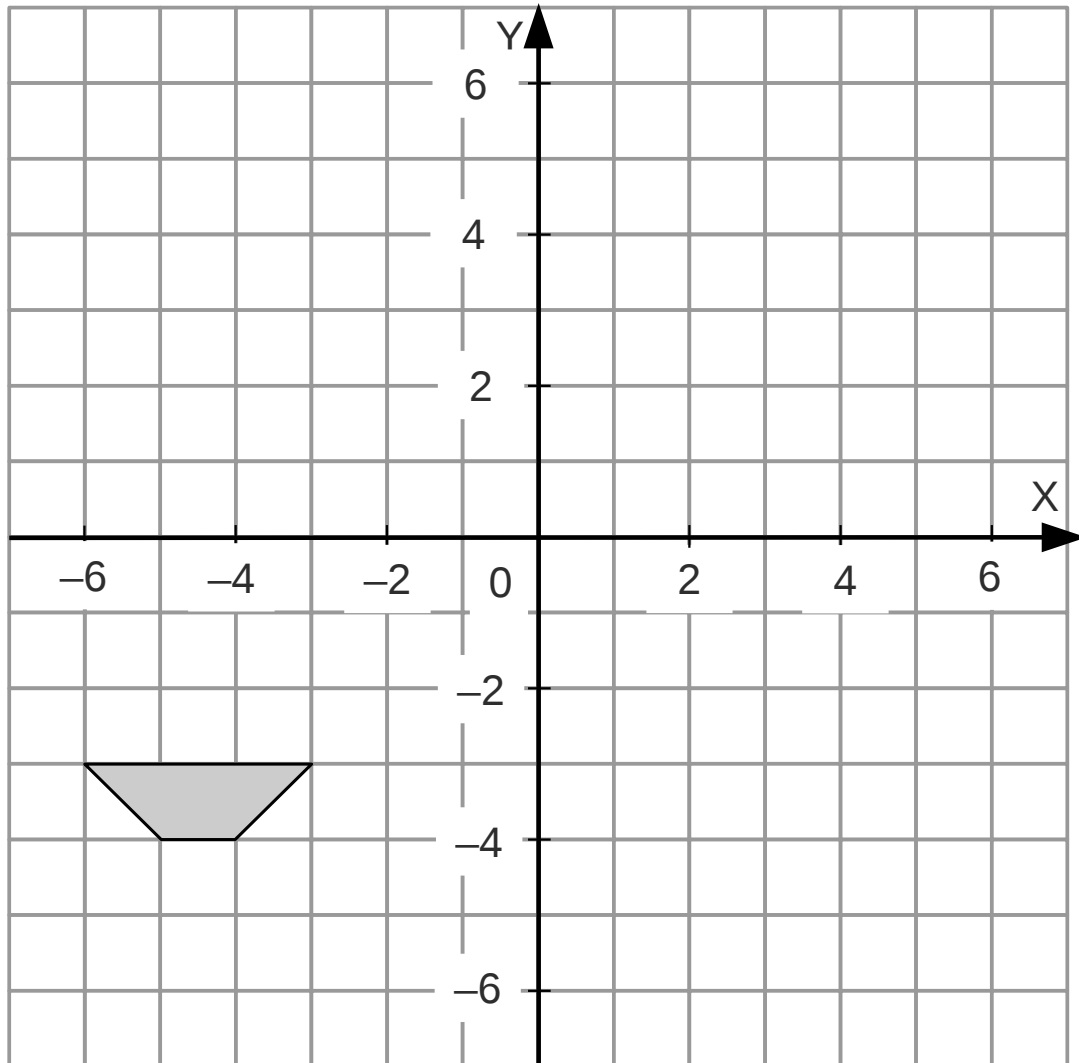
Reflection



- 1) Plot the line $x = 7$ on the grid above
- 2) Reflect triangle A in the line $x = 7$ and label the image B
- 3) Draw the line $y = 8$ on the grid
- 4) Reflect triangle B in the line $y = 8$ and label the image C
- 5) What type of transformation will take $C \rightarrow A$?
Give as much detail as you can

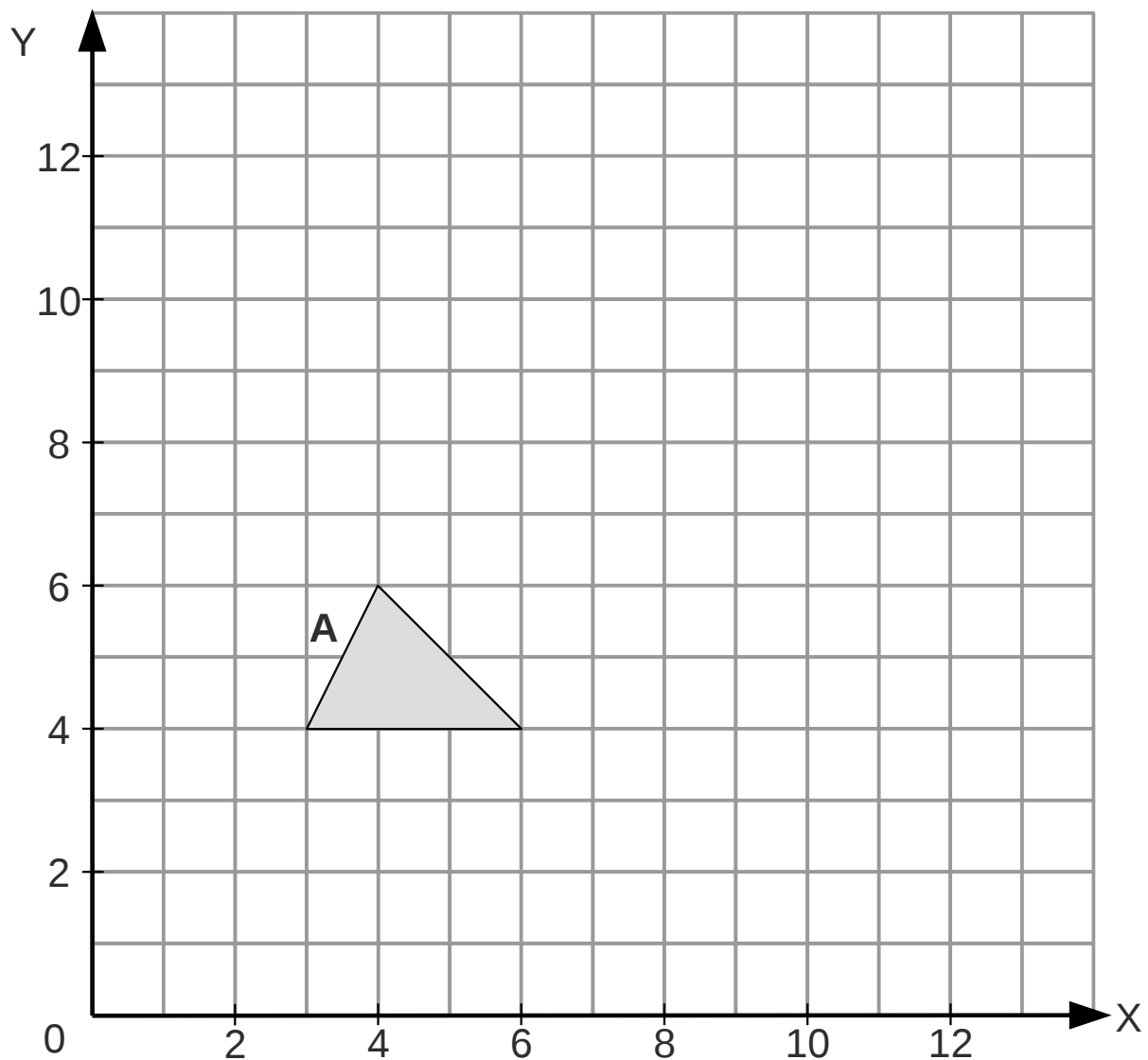
Rotation

You might need some tracing paper for this question



1. Rotate the trapezium 90 degrees clockwise about the origin and label the image A
2. Rotate the original trapezium 180 degrees about the point $(-2, 2)$ and label the image B
3. Describe a single transformation that can take $A \rightarrow B$

Enlargement



- 1) Enlarge the triangle A through the point (2, 3) using a scale factor of 2 and label the enlarged triangle B
- 2) Calculate the area of triangle A
- 3) Calculate the area of triangle B
- 4) Algernon says that
“triangle B should be twice the area of triangle A because the scale factor of the enlargement was 2”
Write a sentence explaining why Algernon is wrong

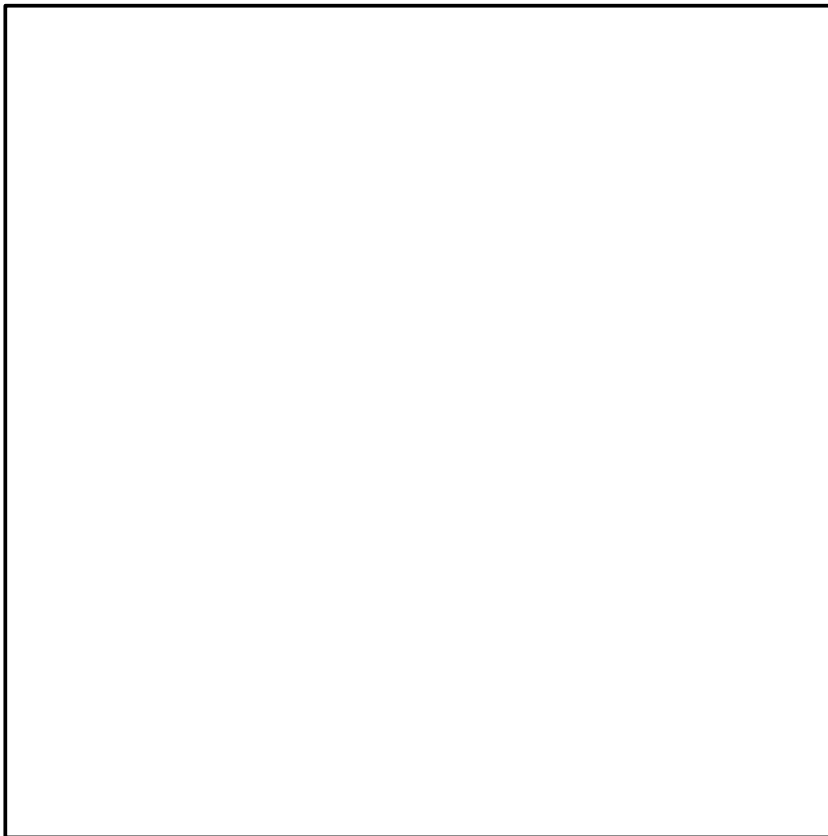
Worksheet 27: Constructions part 1

You will need a ruler, pencil, protractor and a pair of compasses

Work on this worksheet. Loci being covered in the next worksheet.

Gateway skills

- 1) Draw a circle of diameter 8cm inside the box below.



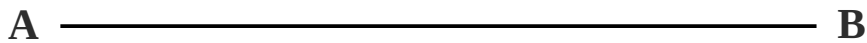
- 2) On your circle above, draw and label a radius, a diameter, a chord and a tangent.
- 3) On your circle above, draw two radii to draw a sector that is one sixth of the area of the circle.

Constructions

Each one of these could be one step in a loci question or similar

Question 1

Construct the bisector of the line AB below.



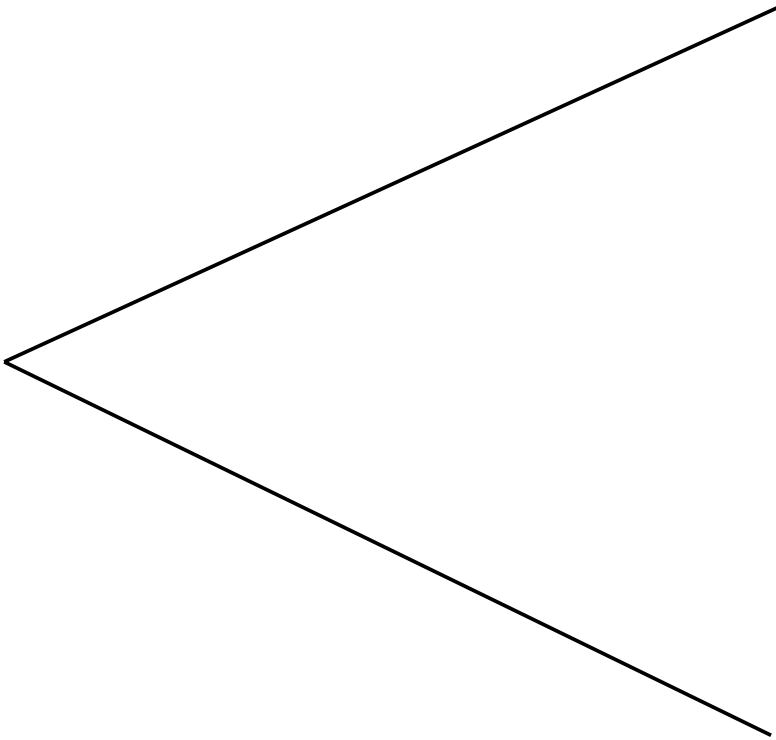
Question 2

Construct an equilateral triangle of side 6cm in the space below...

Challenge: calculate the perpendicular height of the triangle and compare your answer with the height measured on your drawing.

Question 3

Construct the bisector of the acute angle shown below.



Question 4

An airliner is on a bearing of 080 from the control tower

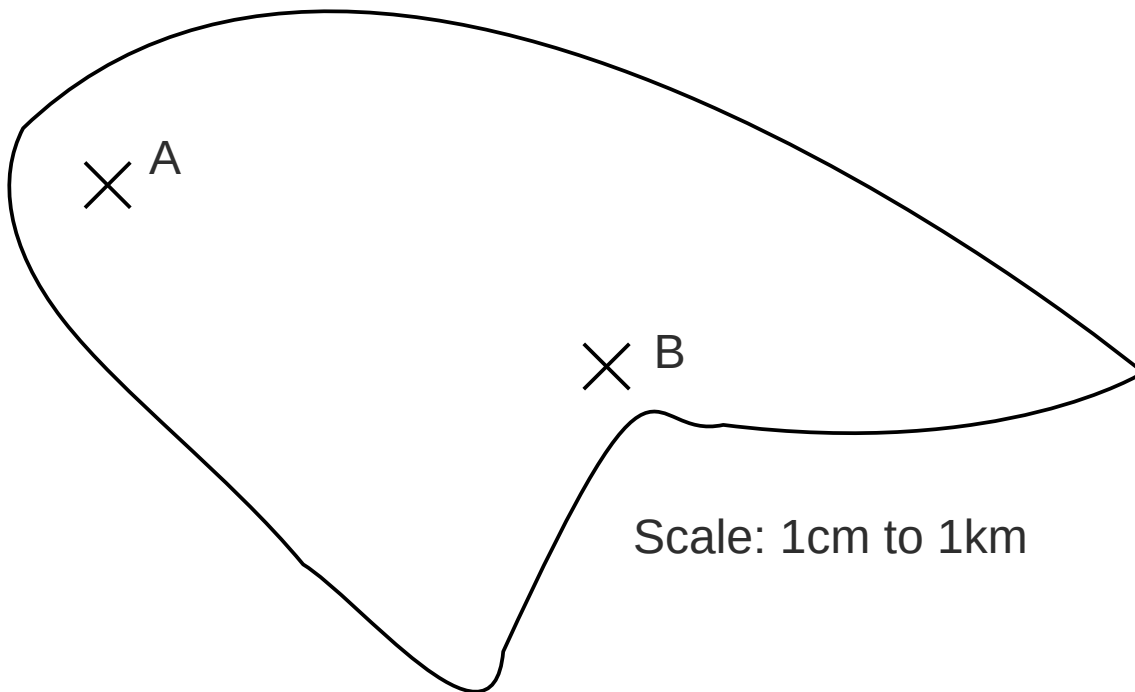
Calculate the bearing of the control tower from the airliner

Hint: draw a sketch below. Bearings measured clockwise from North

Take all north lines as parallel

Question 5

Below is a map of a small island somewhere in the ocean...



A mobile phone transmitter is placed at A and it can provide a good signal within a radius of 4 km

Another less powerful mobile phone transmitter is placed at B. That transmitter can provide a good signal within a radius of 3 km

Draw circles on the map to show the region of the island that could receive a good mobile signal

Estimate the percentage of the area of the island that is not able to receive a good mobile signal.

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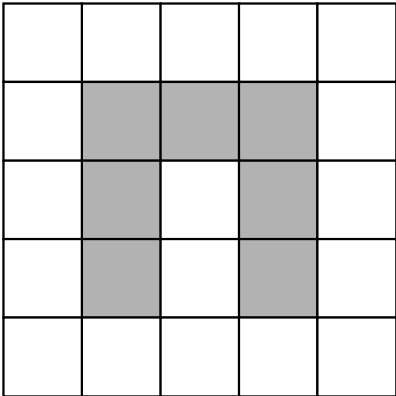
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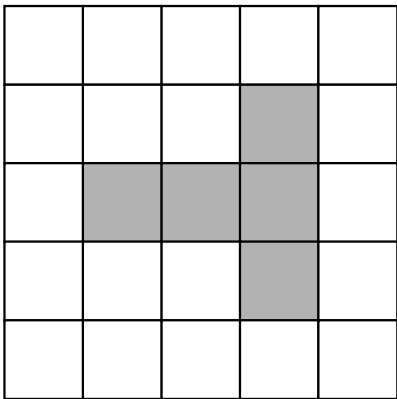
GCSE Maths worksheet 1

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Write the number fourteen thousand and twelve in figures.	
2	What value does the digit 2 have in the number 12 456 ?	
3	Write down $45 \div 9$	
4	Write down the first ten square numbers... ...I've done the first three for you 1, 4, 9...	
5	<div></div> <div>a) Write down the <u>area</u> of the grey shape drawn on the 1cm grid left. b) Find the <u>perimeter</u> of the grey shape</div>	
6	Write down 8×7	
7	Write down <u>all</u> the prime numbers between 40 and 60.	

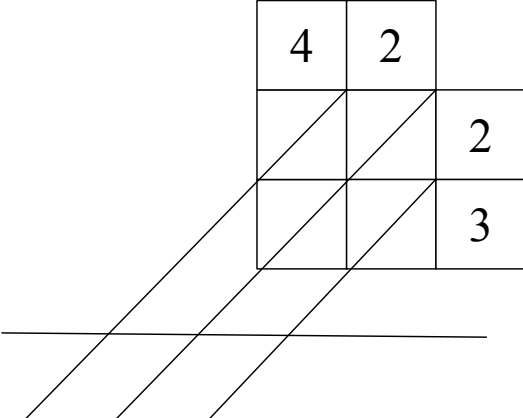
8	Algernon claims that the number 3 315 375 921 can be divided by three. Is he right? Show a calculation or some reasoning to support your answer.	
9	Write down nineteen eighty four plus twenty twelve in figures and add them up!	
10	Work out $2000 - 809$	
11	 <p>a) Write down the <u>area</u> of the grey T shape drawn on the 1 cm grid left.</p> <p>b) Find the <u>perimeter</u> of the grey shape</p>	
12	The population of Wales in 2011 was about three million sixty three thousand four hundred. Write this figure in words.	
13	Johan has £7 500. He spends £1 500 on furniture carpets and curtains and puts £2 500 in the building society. How much does he have left?	
14	Write down the value of the 5 in the number 34 560	

GCSE Maths worksheet 2

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>Work out 34×75 using the box method in the template below...</p> <table><tr><td>\times</td><td>70</td><td>5</td></tr><tr><td>30</td><td></td><td></td></tr><tr><td>4</td><td></td><td></td></tr></table>	\times	70	5	30			4			
\times	70	5									
30											
4											
2	<p>Work out 42×23 using the 'lattice' or 'Napier's bones' method in the template below...</p> <table><tr><td>4</td><td>2</td><td></td></tr><tr><td></td><td></td><td>2</td></tr><tr><td></td><td></td><td>3</td></tr></table> 	4	2				2			3	
4	2										
		2									
		3									
3	<p>Work out 51×27 using the 'traditional' columns method...</p>										

4	Work out $1760 \div 4$ using any method	
5	Calculate $360 \div 12$ using any method	
6	Find half of 720	
7	<p>Freda is packing Christmas decorations. She puts 6 glass baubles in a pack. A box can hold 36 packs. The van can take 100 boxes. How many baubles can Freda fit in the van?</p>	
8	<p>Nathando has to pack 1200 washers into polythene bags with 8 washers in each. How many bags will Nathando need?</p>	
9	<p>A school is taking pupils to London by coach and you have been asked to hire the coaches. Each coach can take 46 children. The school has 360 pupils.</p> <p>a) How many coaches must you hire?</p> <p>b) It costs £400 to hire a coach for the trip. How much will the total cost be?</p>	
10	<p>Hilda wants to build a fence that is 16 metres long. She decides to put a fence post every 2 metres. How many fence posts will Hilda need including one at the beginning and one at the end?</p>	

GCSE Maths worksheet 3

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	The temperature at Midnight is -8°C . The temperature at Noon the next day is 5 degrees warmer. What is the temperature at Noon the next day?	
2	Work out the value of $\frac{4^2}{17-15}$	
3	Write down the value of $\sqrt[3]{125}$	
4	The population of Greece was 10 816 286 in 2011. Round this to the nearest hundred thousand.	
5	Work out $12 - 4 \times 2$	
6	Add one pair of brackets to the <u>expression</u> below to make the <u>equality</u> true. $17 - 2 \div 5 = 3$	
7	The population of Scotland was 5 295 000 in 2011. Round this figure to nearest million.	

8	<p>The table below shows the lowest temperature in four cities one winter night...</p> <table><tr><td>City</td><td>Temperature</td></tr><tr><td>Athens</td><td>10°C</td></tr><tr><td>Sofia</td><td>−3°C</td></tr><tr><td>Berlin</td><td>−8°C</td></tr><tr><td>Inverness</td><td>−12°C</td></tr></table> <p>a) How much warmer is Sofia than Berlin?</p> <p>b) What is the difference in temperature between the warmest and coldest city?</p> <p>c) Which cities have a temperature difference of 9°C?</p>	City	Temperature	Athens	10°C	Sofia	−3°C	Berlin	−8°C	Inverness	−12°C	
City	Temperature											
Athens	10°C											
Sofia	−3°C											
Berlin	−8°C											
Inverness	−12°C											
9	<p>Add brackets to the expression below so that it is true.</p> <p>$2 + 4 \times 6 = 36$</p>											
10	<p>Work out the value of $2^2 + 5^2$</p>											
11	<p>Write down <u>both</u> values of $\sqrt{64}$</p>											
12	<p>A small business has assets worth £7861.40. Round this number to the nearest hundred pounds.</p>											
13	<p>Work out $10 - 7 + 9 - 20 + 15$</p>											

GCSE Maths worksheet 4

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Write down all the <u>factors</u> of 72	
2	Find the <u>lowest common multiple</u> (LCM) of 24 and 30.	
3	<p>Below is a list of numbers...</p> <p>6, 15, 25, 32, 51, 60, 72</p> <p>a) Write down a <u>factor</u> of 100 in the list</p> <p>b) Write down <u>all</u> the multiples of 3 in the list</p> <p>c) Write down <u>multiple</u> of 12 in the list</p>	
4	Write down all the <u>prime numbers</u> less than 20	
5	<p>One lighthouse flashes every 90 seconds.</p> <p>Another lighthouse flashes every 120 seconds.</p> <p>Both lighthouses flash at the same time at 2217 one day.</p> <p>At what time will both flash together again on that day?</p>	
6	Write down the highest common factor of 30 and 12.	

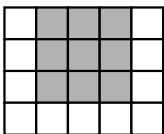
7	A carton measures 90cm by 60cm by 15cm tall Boxes of raisins measure 9cm by 12cm by 3cm tall. How many boxes of raisins will fit in the carton?	
8	Write down the value of $5^6 \div 5^4$ as a power of 5	
9	Work out $8^{12} \times 8^5$ and put your answer in <u>index form</u> .	
10	Work out the value of $2^3 + 3^2$	
11	Write 24 as a <u>product</u> of its <u>prime factors</u> . Write your answer using <u>index notation</u> .	
12	Write 36 as a product of its prime factors. Write your answer using index notation.	
13	Below is a list of numbers... 5, 7, 12, 20, 27, 54 a) From the list write down a factor of 72 b) Write down a cube number that is in the list c) Write down all the multiples of 9 in the list	

GCSE Maths worksheet 5

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Write $3\frac{2}{5}$ as an improper fraction	
2	Work out $\frac{2}{5} + \frac{1}{4}$ using any (correct!) method you know	
3	<p>The rectangle below is divided up into smaller squares. Some of the smaller squares have been shaded in.</p>  <p>a) What fraction of the rectangle is shaded?</p> <p>b) Hermione wants to shade in $\frac{3}{4}$ of the rectangle. How many more squares does she need to shade?</p>	
4	<p>Spyridon wins €6 000</p> <p>He gives half to his mother</p> <p>He puts one third away in a savings account</p> <p>How much does Spyridon have left to travel around Europe?</p>	
5	Find $\frac{2}{5}$ of £700.	

6	Simplify $\frac{24}{30}$	
7	Write $\frac{14}{3}$ as a mixed number	
8	Diomedes claims that $\frac{2}{3}$ is larger than $\frac{3}{4}$ Is Diomedes correct? Give a reason for your answer.	
9	Work out $\frac{2}{5} \times \frac{3}{4}$	
10	Lydia has 12 pizzas. Lydia is expecting a total of 16 people. What fraction of a pizza would each person receive if she divides the pizzas equally?	
11	Eurydice sees this sign in the furniture shop: “One third off all marked prices today” The arm chair is marked at £330. How much would Eurydice pay for the armchair today?	
12	Two thirds of the women in a factory want to work more hours. Two fifths of the men in the same factory want to work more hours. There are 240 women and 300 men in the factory. How many people want more hours in total?	

GCSE Maths worksheet 6

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	What is 50% of £75?	
2	Find 10% of £45.60	
3	Find 15% of 780g	
4	Amajid is offered a 10% pay rise when he completes his trial period at his new job. Amajid is currently paid £7.20 per hour. How much will his new hourly rate become after completing the trial period?	
5	Write 0.34 as a percentage	
6	What is £6 as a percentage of £30?	
7	3 out of 10 cats prefer Fishytale cat food. Write the percentage of cats that prefer Fishytale cat food.	
8	A phone case is usually £12. It is reduced by 25% in a sale to clear stock What should the sale price be?	

9	<p>Neema runs a market stall. She buys a case of 48 mangoes for £26.88.</p> <p>Neema has to make a profit of 50% on the mangoes.</p> <p>What price should Neema put on a mango?</p>	
10	<p>Clinton is comparing the price of paint in 1 litre tins. He needs to buy 6 tins to complete the job.</p> <p>Shop A: A tin costs £3.99. Three tins for the price of 2.</p> <p>Shop B: A tin costs £3.60 but there is a 30% discount</p> <p>Which shop should Clinton buy the paint from?</p> <p>Show full calculations to support your answer.</p>	
11	Find 12.5% of £60	
12	Write 37.5% as a decimal	
13	<p>Frantiček sells insurance and he is paid commission.</p> <p>Commission on house insurance is 10%</p> <p>Commission on employment insurance is 5%</p> <p>Frantiček sold £2 000 worth of house insurance and £4 000 of employment insurance last week.</p> <p>Calculate his total commission.</p>	

GCSE Maths worksheet 7

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Write 0.56 as a fraction in its <u>simplest form</u> .	
2	Write these numbers <u>in order of size</u> starting from the smallest. 25% $\frac{1}{25}$ 2.5 0.025	
3	Work out $0.056 + 0.4 + 3 + 0.72$	
4	Calculate 0.34×7 using any method you know...	
5	Work out $1 - 0.375$	
6	Write 34% as a fraction in its simplest form	
7	Work out 0.14×2.6 using any method you know...	
8	Write $\frac{3}{5}$ as a percentage.	

9	Work out $2.8 \div 7$	
10	You are told that $236 \times 17 = 4012$ <u>Use this information</u> to work out the answer to 23.6×1.7	
11	Hari knows that $497 \times 12 = 5964$ Use this information to work out the answer to $59.64 \div 4.97$	
12	Work out $7.2 \div 0.06$	
13	Each Aspirin tablet contains <u>75mg</u> of active ingredient. A packet of Aspirin has 16 tablets. A box contains 50 packets. Calculate the number of <u>grams</u> of Aspirin in a box.	
14	A portable ice rink is rectangular in shape and measures 12m by 10m. The ice is 0.1m thick. Calculate the volume of the ice in the rink.	

GCSE Maths worksheet 8

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Write the ratio 300:60 in its simplest form	
2	Four out of 10 cats are white <u>and the rest are black</u> . What is the ratio of white to black cats? Give your answer in its simplest form.	
3	Simplify the ratio 45p:£3.60 Hint: change the £ to p	
4	Nigella pours (carefully!) 200ml of molar strength H_2SO_4 into a beaker and then <u>adds water to make 1 litre</u> . Write the ratio of acid to water in its simplest form.	
5	Divide £600 in the ratio 1:5	
6	Kamaljit and Ian share the cost of a business trip in the ratio 3:2. The trip cost £180. Calculate Ian's share.	
7	A drink is made from orange juice and grapefruit juice in the ratio 4:1. How much orange juice do you need to make 500ml of the drink?	

8	<p>Bill and Ben share the profits of their successful comedy act in the ratio 3:4.</p> <p>Ben received £2 000 last week.</p> <p>How much should Bill have received?</p>	
9	<p>Janine and Françoise divide the profits of a stall in a craft market in the ratio 2:5 to reflect the number of days they worked on the stall.</p> <p>Françoise received £600 <u>more than</u> Janine.</p> <p>Work out Janine's share of the profits.</p>	
10	<p>Michael wins £800 on the lottery.</p> <p>He keeps $\frac{1}{4}$ of the money for himself.</p> <p>He divides the remainder of the money between his nieces Meela and Mindy in the ratio 2:3.</p> <p>How much does Mindy receive?</p>	
11	<p>Electrical wire costs 60p for 2 metres.</p> <p>How much would 5 metres cost at the same rate?</p>	
12	<p>Apples are 4 for £1.08.</p> <p>How much would 10 apples cost at the same rate?</p>	
13	<p>300ml of olive oil costs £1.20</p> <p>How much would 2.5 litres cost at the same rate?</p>	

GCSE Maths worksheet 9

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	A film starts at 9:30 pm and lasts 96 minutes. At what time will the film end?																												
	<p>Below is an extract from the timetable for the Walsall to Wolverhampton (local stations) train, used for the next four questions.</p> <table><tr><td>Walsall</td><td>0731</td><td>0801</td></tr><tr><td>Bescot Stadium</td><td>0734</td><td>0804</td></tr><tr><td>Tame Bridge Parkway</td><td>0737</td><td>0807</td></tr><tr><td>Hamstead</td><td>0741</td><td>0811</td></tr><tr><td>Perry Barr</td><td>0744</td><td>0814</td></tr><tr><td>Witton</td><td>0747</td><td>0817</td></tr><tr><td>Aston</td><td>0749</td><td>0819</td></tr><tr><td>Duddeston</td><td>0752</td><td>0822</td></tr><tr><td>Birmingham New Street</td><td>0757</td><td>0829</td></tr></table>	Walsall	0731	0801	Bescot Stadium	0734	0804	Tame Bridge Parkway	0737	0807	Hamstead	0741	0811	Perry Barr	0744	0814	Witton	0747	0817	Aston	0749	0819	Duddeston	0752	0822	Birmingham New Street	0757	0829	
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Witton	0747	0817																											
Aston	0749	0819																											
Duddeston	0752	0822																											
Birmingham New Street	0757	0829																											
2	Navid catches the 0731 from Walsall. The train is reported to be running 7 minutes late. What time will he arrive at Witton?																												
3	Stavros works near the centre of Birmingham and has to arrive at work for 0845. He estimates that it takes about 12 minutes to walk from Birmingham New Street to his work. What is the latest train Stavros can catch? Show a method.																												

4	<p>Camilla catches the 0801 train from Walsall. She gets off at Perry Barr and walks to the Birmingham City University library in Kendrick Building, which takes about 15 minutes.</p> <p>Camilla's friend Lucidia sends a text message to say that she is late and will arrive at the library at about five past nine. How long will Camilla have to wait for Lucidia? Show a method.</p>	
5	<p>Aaron catches the early train to Birmingham from Tame Bridge Parkway and gets off at Hampstead to meet a work mate and pick up sandwiches. They then catch the next train into Duddeston.</p> <p>How long does Aaron's journey from Tame Bridge Parkway to Duddeston last?</p>	
6	<p>A car drives at 30 miles per hour for $4\frac{1}{2}$ hours</p> <p>How far does the car travel?</p>	
7	<p>The distance between Walsall and Birmingham is about 10 miles. The train takes roughly half an hour to travel from Walsall to Birmingham. What is the average speed of the train?</p>	
8	<p>A car travels 12 km in 15 minutes.</p> <p>What is the average speed of the car?</p>	
9	<p>A bicycle rider can manage a steady 12 miles per hour. How long would it take the bicycle rider to ride from Coventry to Walsall, about 30 miles?</p>	

GCSE Maths worksheet 10

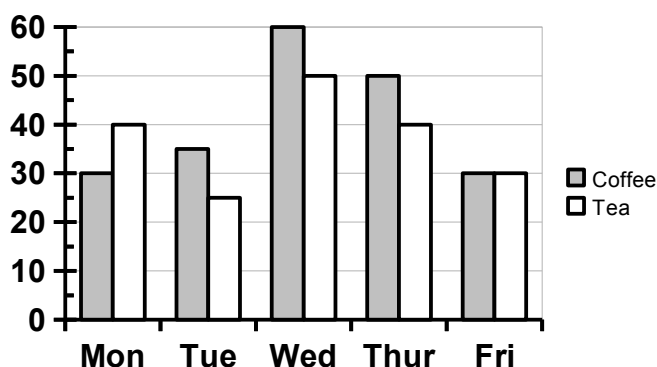
Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1

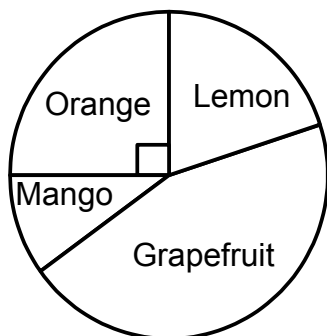
Below is a bar chart that shows the number teas and coffees sold at a snack bar each day over 5 days last week.



- On which day was the number of teas sold the same as the number of coffees?
- Which was the only day where more teas were sold than coffees?
- What was the mean number of coffees sold per day?
- How many more coffees than teas were sold for the whole 5 day period?

2

The pie chart below shows the number of juice drinks of various flavours sold in a visitor centre café one lunchtime.

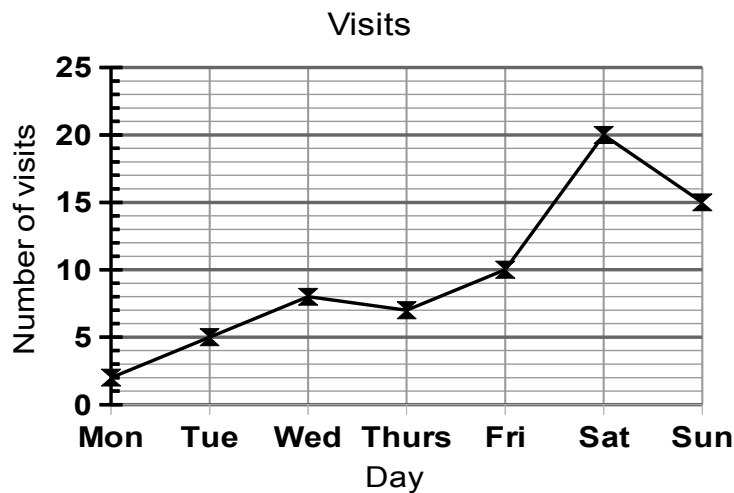


10 orange drinks were sold.

Work out the total number of drinks of all flavours sold.

3

The line chart below shows the number of visits each day to an art display in a local community centre.



- Which day had the most visitors to the display?
- What was the range of visitor numbers?
- How many more visitors were there on Sunday than Tuesday?

4

Algernon has done a survey of fruit preferences in the café. He has coded his raw results for each person's favourite fruit using the symbols B = banana, A = apple, O = orange and M = melon. Algernon's results are shown below...

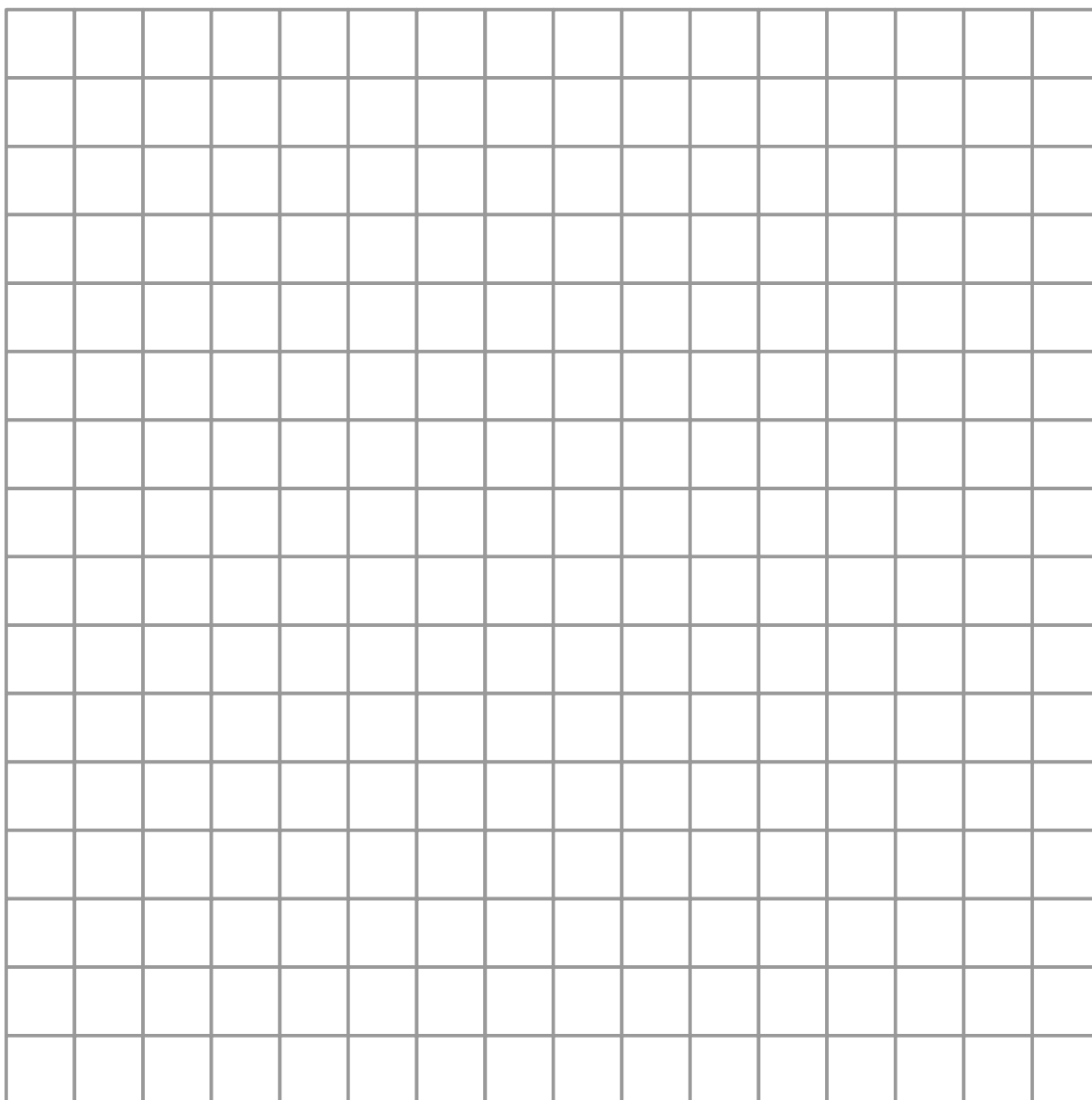
B, M, B, B, A, B, O, M, B, A, A, A, B, B, O, M

B, M, A, O, M, B, A, A, B, M, A, O, O, A, B, B

- Use the space and the grid over the page below to represent this information using a suitable table and an appropriate chart...
- Write a sentence explaining a reason for the popularity of bananas in the café.

Space for table

Grid for chart



GCSE Maths worksheet 11

Name _____

Group _____

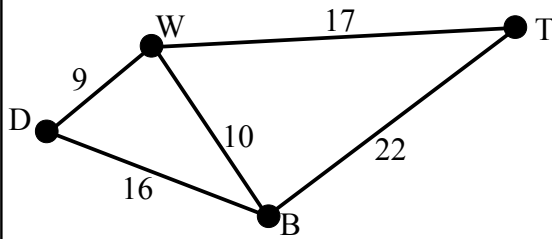
Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>Flossie is collecting data about shoe sizes. She has decided to base her survey on British sizes, like $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4 and so on. Flossie is going to ask students to put their right foot on a shoe size gauge and write down the measurement. Which phrase below best describes the data Flossie is collecting?</p> <p>a) Discrete secondary data b) Continuous secondary data c) Discrete primary data d) Continuous primary data</p>																																																										
2	<p>Below is some of Flossie's data on shoe size.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">$7\frac{1}{2}$</td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">9</td> <td style="padding: 5px;">$5\frac{1}{2}$</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">9</td> <td style="padding: 5px;">7</td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">7</td> </tr> <tr> <td style="padding: 5px;">$8\frac{1}{2}$</td> <td style="padding: 5px;">$7\frac{1}{2}$</td> <td style="padding: 5px;">7</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">7</td> <td style="padding: 5px;">9</td> <td style="padding: 5px;">7</td> <td style="padding: 5px;">$6\frac{1}{2}$</td> <td style="padding: 5px;">7</td> </tr> <tr> <td style="padding: 5px;">7</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">$6\frac{1}{2}$</td> <td style="padding: 5px;">$5\frac{1}{2}$</td> <td style="padding: 5px;">7</td> <td style="padding: 5px;">$6\frac{1}{2}$</td> <td style="padding: 5px;">$7\frac{1}{2}$</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">7</td> </tr> </table> <p>Use the table below to tally Flossie's data.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Shoe Size (UK)</th> <th style="width: 50%;">Tallies</th> <th style="width: 30%;">Frequency</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">$5\frac{1}{2}$</td><td></td><td></td></tr> <tr><td style="text-align: center;">6</td><td></td><td></td></tr> <tr><td style="text-align: center;">$6\frac{1}{2}$</td><td></td><td></td></tr> <tr><td style="text-align: center;">7</td><td></td><td></td></tr> <tr><td style="text-align: center;">$7\frac{1}{2}$</td><td></td><td></td></tr> <tr><td style="text-align: center;">8</td><td></td><td></td></tr> <tr><td style="text-align: center;">$8\frac{1}{2}$</td><td></td><td></td></tr> <tr><td style="text-align: center;">9</td><td></td><td></td></tr> <tr> <td colspan="2" style="text-align: center;">Total of Frequencies</td> <td></td> </tr> </tbody> </table>	$7\frac{1}{2}$	8	9	$5\frac{1}{2}$	6	9	7	8	7	$8\frac{1}{2}$	$7\frac{1}{2}$	7	6	7	9	7	$6\frac{1}{2}$	7	7	6	$6\frac{1}{2}$	$5\frac{1}{2}$	7	$6\frac{1}{2}$	$7\frac{1}{2}$	6	7	Shoe Size (UK)	Tallies	Frequency	$5\frac{1}{2}$			6			$6\frac{1}{2}$			7			$7\frac{1}{2}$			8			$8\frac{1}{2}$			9			Total of Frequencies			
$7\frac{1}{2}$	8	9	$5\frac{1}{2}$	6	9	7	8	7																																																			
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3	<p>Flossie wants to include a question about age group in her questionnaire. She has drafted the question/response section in the box below...</p> <div data-bbox="304 376 1209 521" style="border: 1px solid black; padding: 5px;"> <p>Please tick the age group that you belong to</p> <p>16 – 18 [] 18 – 24 [] 24 – 45 []</p> </div> <p>State two things are wrong with Flossie's question/response section.</p>	
4	<p>Hiren is carrying out a survey on how much time people spend listening to music. Hiren has drafted a question/response section in the box below...</p> <div data-bbox="304 1099 1209 1328" style="border: 1px solid black; padding: 5px;"> <p>How many hours do you listen to music for?</p> <p>0 [] 1 – 2 [] 2 – 6 [] 6 – 10 [] 10+ []</p> <p>Please tick ONE box</p> </div> <p>a) State two things that are wrong with Hiren's question/response section</p> <p>b) Draft a corrected version for Hiren to use...</p>	

5

Below is a map showing distances in miles by road between Dudley, Walsall, Tamworth and Birmingham.



Wei is planning his delivery route. He travels from Tamworth to Birmingham via Walsall and Dudley. How much further has Wei travelled than going direct from Tamworth to Birmingham?

6

Sophie is using the chart below to calculate her mileage claim for the week. She is allowed to claim 40p per mile for journeys.

Lichfield

10	Tamworth			
10	17	Walsall		
27	33	9	Dudley	
23	22	10	9	Birmingham

Sophie's diary shows the following journeys...

Monday: From Birmingham to Tamworth then to Walsall then directly back to Birmingham

Wednesday: Birmingham to Dudley then to Lichfield then directly back to Birmingham

Calculate the total value of Sophie's claim.

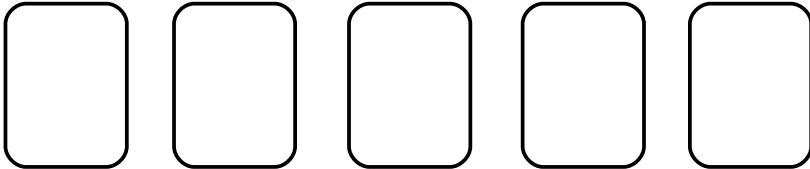
GCSE Maths worksheet 12

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>Below are the ages of 8 people in a minibus</p> <p>7, 7, 8, 10, 12, 12, 18, 46</p> <p>Calculate the <u>mean</u> age of the people in the minibus</p>											
2	<p>Below are the age in months of some toddlers in a nursery.</p> <p>36, 24, 27, 25, 35, 27, 30, 32, 24</p> <p>Find the <u>median</u> age of the toddlers</p>											
3	<p>The number of children per household in one street in Walsall is shown below...</p> <p>0, 0, 3, 2, 1, 0, 1, 0, 2, 0, 1, 2, 3, 2, 1, 0, 0, 0, 1, 2, 0, 0, 1</p> <p>What is the <u>modal</u> number of children per household in this street?</p>											
4	<p>Terrance does odd jobs for people. He keeps a record of the number of jobs and the price for each. The table below is for one month...</p> <table><tr><th>Price of job</th><th>Number of jobs</th></tr><tr><td>£30</td><td>3</td></tr><tr><td>£40</td><td>6</td></tr><tr><td>£50</td><td>5</td></tr><tr><td>£60</td><td>2</td></tr></table> <p>Calculate the <u>total</u> value of the jobs for that month.</p>	Price of job	Number of jobs	£30	3	£40	6	£50	5	£60	2	
Price of job	Number of jobs											
£30	3											
£40	6											
£50	5											
£60	2											

5	<p>There are 6 people in a room and the mean age is 30 years. One person leaves. The mean age drops to 24 years. How old was the person who left the room?</p>	
6	<p>Francine has 5 blank cards as shown below....</p> <div style="text-align: center;">  </div> <p>Write a number on each card so the <u>median</u> is 10 and the <u>range</u> is 6.</p>	
7	<p>Below is a stem and leaf diagram showing the time in minutes that people took to complete an athletics event.</p> <pre> 4 8 9 5 0 0 2 3 5 7 6 1 3 3 3 3 6 8 9 7 0 0 2 </pre> <p style="text-align: right;">key 4 8 represents 48 mins</p> <p>a) Find the <u>median</u> time taken to complete</p> <p>b) Find the <u>range</u> of times taken</p>	
8	<p>Below is a stem and leaf diagram showing the weights of a group of people.</p> <pre> 5 7 9 6 0 0 1 8 8 9 7 1 2 4 7 8 3 6 9 9 1 </pre> <p style="text-align: right;">key 5 7 represents 57 Kg</p> <p>a) How many people weighed less than 70Kg?</p> <p>b) Find the median weight of the people</p> <p>c) Find the range of weights</p>	

GCSE Maths worksheet 13

Name _____

Group _____

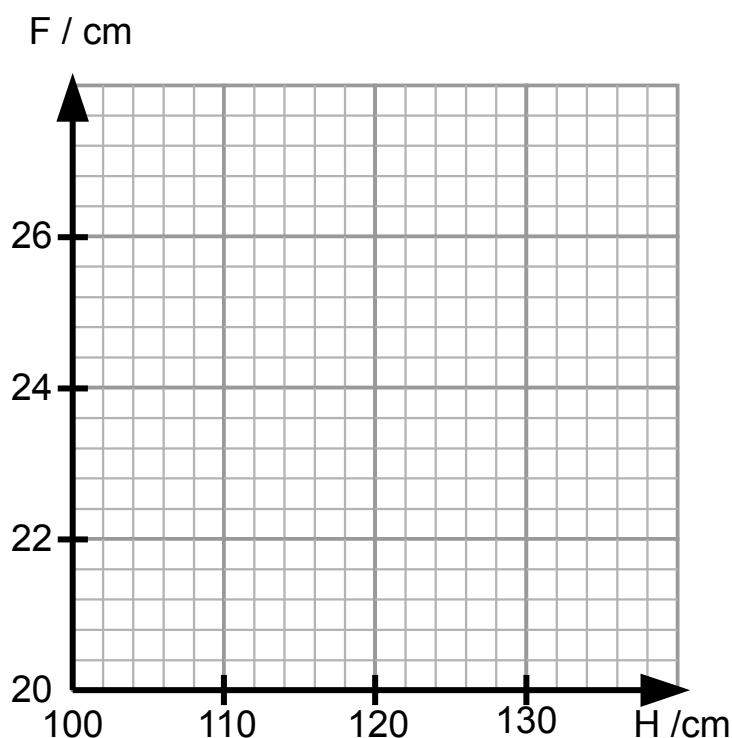
Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1

Children of various ages had their heights (H) measured and measured the forearm (F). The data is shown below in the table.

H cm	104	110	110	116	128	130	130	136
F cm	22	22	23	24	25	26	27	27

a) Use the axes below to plot a scatter diagram



b) Describe the pattern

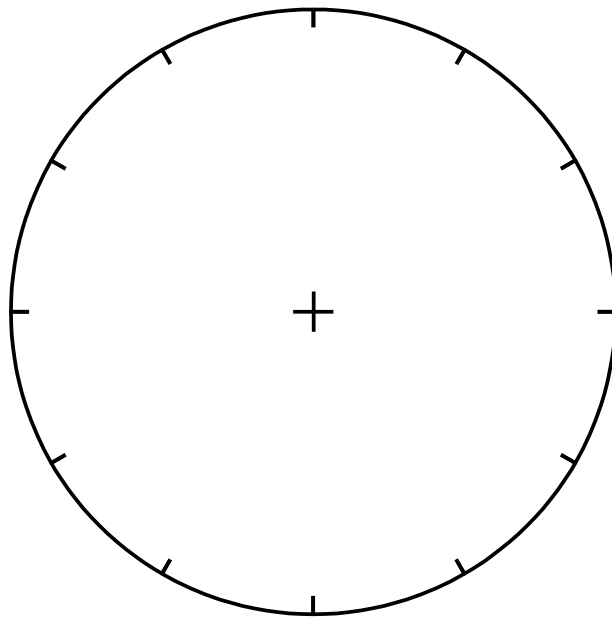
c) Use the scatter diagram to estimate the height of a child with forearm length 25cm

2

Francine keeps a record of the kinds of sandwiches she sells in the café at lunchtime. Her frequency table for yesterday is shown below...

Sandwich	Number sold
Cheese	24
Tuna	32
Salad	8
Chicken	16
Egg and cress	16
Total sold	

Draw a labelled pie chart showing Francine's data using the template below or using some blank paper.



3

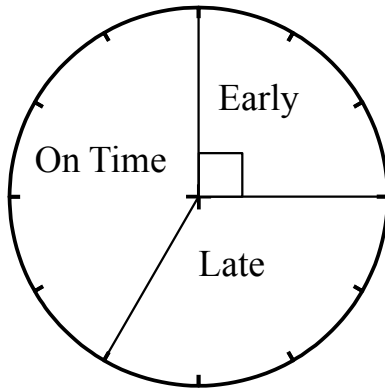
The table below shows the number of students choosing activities. Fill in the missing figures.

	Swim	Train	Run	Total
1st Year	65			180
2nd Year		30		
Total	110	100		300

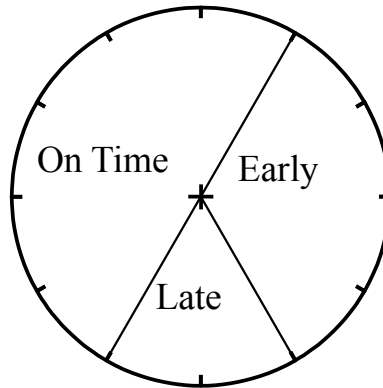
4

Algernon has prepared two pie charts to compare the punctuality of two local train companies for last week.

Argent Trains



Blackadder Trains



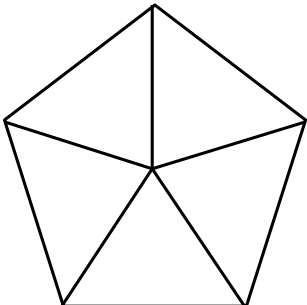
- a) Argent Trains had 120 early trains. How many trains were late?
- b) What fraction of Blackadder Trains were late? Give your answer in its simplest form.
- c) Algernon says:
“Blackadder had less late trains than Argent last week”
Is Algernon right or wrong?
Do you have enough information to decide?
Write a sentence explaining your answer.

GCSE Maths worksheet 14

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>A <u>fair</u> dice is rolled once. Write down the probability of scoring 5</p>	
2	<p>A café menu lists the following starters and main courses.</p> <p>Starters: Melon, Avocado, Prawn cocktail</p> <p>Main courses: Chicken, Lamb, Vegetarian</p> <p>a) List all the possible <u>combinations</u> of starter and main course. The first has been completed for you as an example.</p> <p>MC,</p> <p>b) Algernon chooses a starter and a main course <u>at random</u>. What is the probability that the particular combination he chooses will be meat free?</p>	
3	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Each sector in the spinner is labelled with an A, B or a C.</p> <p>Label the spinner in a way that makes C likely, A unlikely and B unlikely.</p> </div> </div>	

4

A biased dice has the following probabilities

Score	1	2	3	4	5	6
Prob.	0.05	0.2	0.1	0.2	X	2X

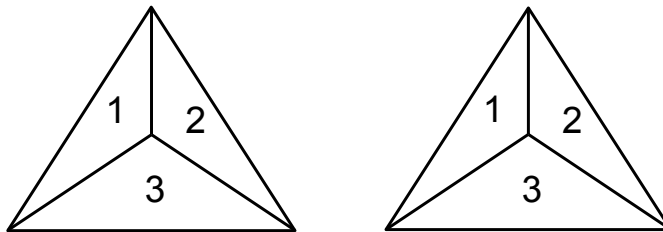
a) Work out the probability of rolling a 6 on this dice

The dice is rolled 200 times.

b) How many times would you expect to see the score 2?

5

Harjit has two spinners as shown...



In Harjit's game you spin both spinners and calculate the score by adding the result of spinner 1 to the result of spinner 2.

- What is the smallest score you can get?
- What is the largest score you can get?
- The table below shows all possible scores. The first row has been filled in for you. Complete the table...

		First spinner			
		+	1	2	3
Second spinner	1	2	3	4	
	2				
	3				

GCSE Maths worksheet 15

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Simplify $e + e + e + e + e - e$	
2	Simplify $f \times f \times f \times f$	
3	Simplify $3x + x - 4x + 2x + x$	
4	Simplify $-3y \times 4x$	
5	Simplify $5a + 3a + a - 4a$	
6	Simplify $6a + 2b + a + 3b$	
7	Simplify $8x - 2y + 3x - 5y$	
8	Simplify $x^2 + 2x + 4x^2 - 3x$	

9	Expand $3(4x + 5)$	
10	Multiply out $2(3p - 1)$	
11	Expand $3(12 - 7x)$	
12	Factorise $6x - 15$	
13	Factorise $5x + 10$	
14	Factorise fully $4x^2 + 12x$	
15	Factorise fully $15x - 10x^2$	
16	Factorise fully $x^3 - x$	
17	Expand and simplify $3(2x + 1) + 2(3x + 4)$	
18	Expand and simplify $4(3x - 5) - 2(4x - 4)$	

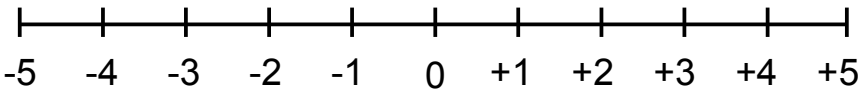
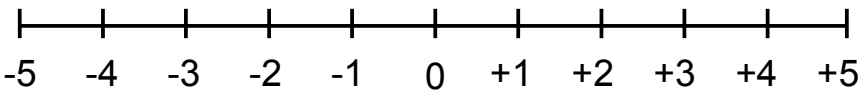
GCSE Maths worksheet 16

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Solve $\frac{x}{3}=6$	
2	Solve $3x=12$	
3	Solve $x+7=15$	
4	Solve $3x+7=19$	
5	Solve $2x-7=3$	
6	Solve $5x-2=8$	
7	Solve $2x+10=4$	
8	Solve $3x+5=2$	
9	Solve $\frac{x}{2}+2=7$	
10	Solve $\frac{x}{3}-4=1$	

11	Solve $2x+5=12$	
12	Solve the inequality $2x>10$	
13	Solve the inequality $\frac{x}{2}\leq 10$	
14	Solve the inequality $3x+5>11$	
15	Solve the inequality $4p-3<9$	
16	<p>Show the inequality $x\geq -4$ on the number line below</p> 	
17	<p>Show the inequality $-2\leq p<3$ on the number line below</p> 	

GCSE Maths worksheet 17

Name _____

Group

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>Hermione is N years old.</p> <p>Bertha is three years older than Hermione.</p> <p>Write down a formula for Bertha's age in years.</p>	
2	<p>Nigella is P years old.</p> <p>Mkose is twice the age of Nigella.</p> <p>Write down a formula for Mkose's age in years.</p>	
3	<p>Alan is X years old.</p> <p>Kurt is twice the age of Alan.</p> <p>Alonso is 10 years younger than <u>Kurt</u>.</p> <p>Write down a formula for <u>Alonso's</u> age.</p>	
4	<p>Harinder has S sweets.</p> <p>Babita has twice as many sweets as Harinder.</p> <p>Shaheeda has 10 less sweets than Harinder has.</p> <p>a) Write a formula for the total number of sweets.</p> <p>b) There are 50 sweets in total, how many does Harinder have?</p>	

5	<p>Below is a number sequence</p> <p>4, 7, 10, 13...</p> <p>a) Write down the next two terms in the sequence</p> <p>b) Write a phrase explaining the term to term rule</p>	
6	<p>Below is a number sequence</p> <p>5, 9, 13, 17</p> <p>Write down a formula for the nth term of the sequence.</p>	
7	<p>Below is a number sequence</p> <p>2, 8, 14, 20</p> <p>Write down a formula for the nth term of the sequence.</p>	
8	<p>Below is a number sequence</p> <p>12, 15, 18, 21</p> <p>a) What is the 1000th term in the sequence?</p> <p>b) Is 152 a number in the sequence? How would you prove that using algebra?</p>	

GCSE Maths worksheet 18

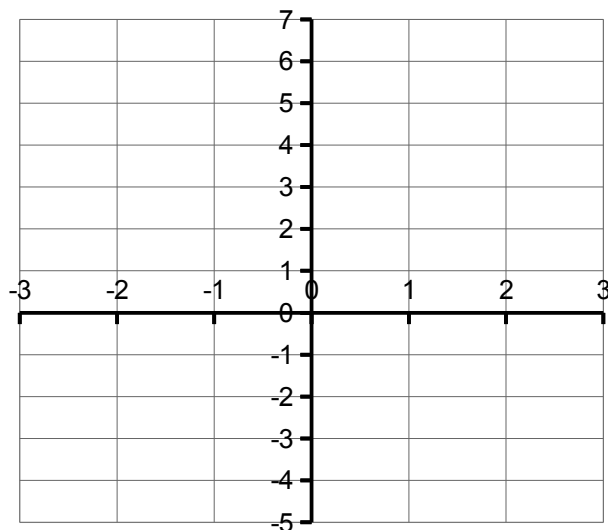
Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

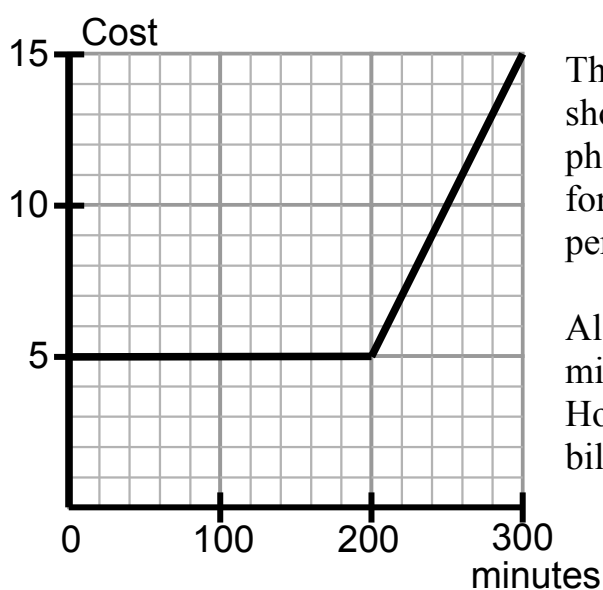
1

a) Plot and label the points A $(-2, 5)$ and B $(2, -3)$



b) Draw the line AB and mark the midpoint with a cross

2



The graph left shows how much a phone contract costs for each monthly period.

Algernon uses 240 minutes one month. How much is his bill?

3

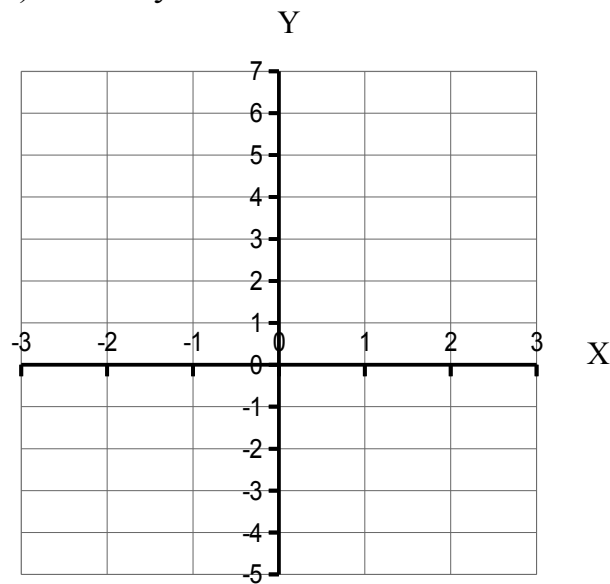
Use the graph grid on the page below to draw the lines represented by these formulas...

a) $x = 2$

b) $y = -4$

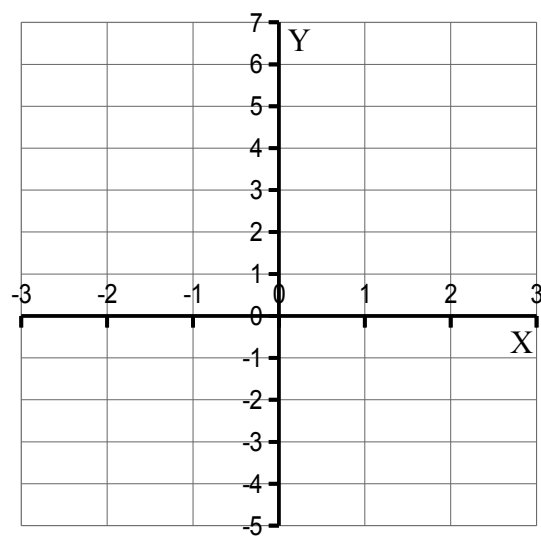
c) $y = x$

d) $x + y = 2$



4

Plot the graph of $y = 2x + 1$ for $x = -3$ to $x = +3$ on the grid below.



GCSE Maths worksheet 19

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

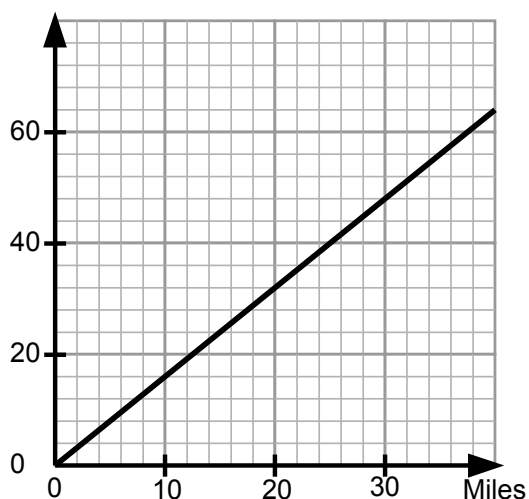
1

Which unit would you use to measure the...

Object Measurement	Metric unit	Imperial unit
Weight of a Baby		
Length of a bus		
Distance from Birmingham to Coventry		
Capacity of a table spoon		

2

Kilometres



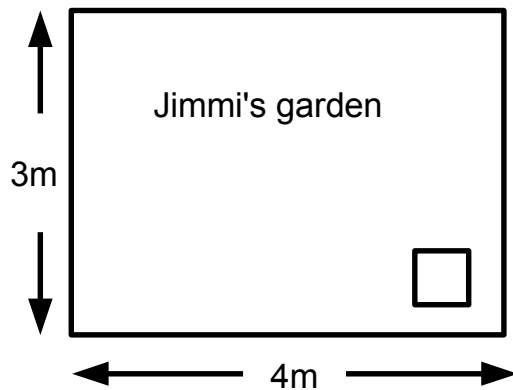
a) Use the chart to convert 40km to miles.

b) Use the chart to convert 35 miles to km.

c) Use the chart to convert 240 km to miles.

3

Jimmi wants to pave her front garden.
She wants to use tiles that are 50cm by 50cm (see sketch)
How many tiles does Jimmi need to buy?

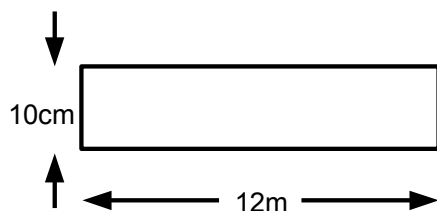


4

Kirsty is making orange squash for the marathon runners.
She has to put 30ml of squash in each plastic cup.
She has 1.5 litres of squash.
How many cups can Kirsty fill?

5

Work out the area of this worktop.
Give the units of your answer.

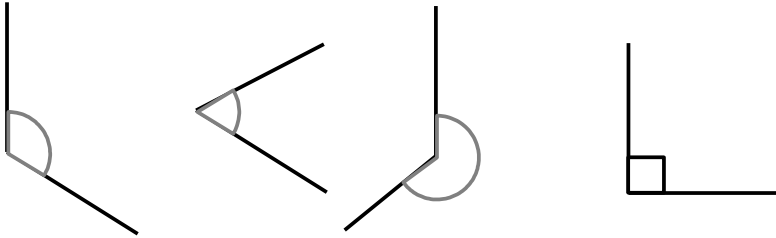
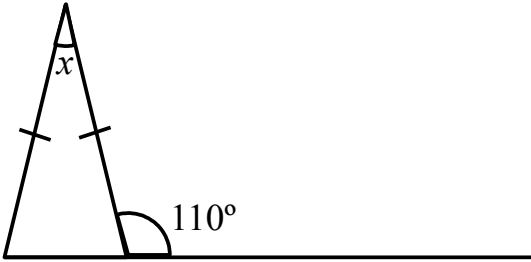


GCSE Maths worksheet 20

Name _____

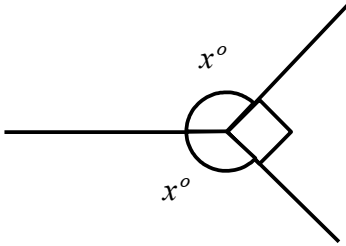
Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>Name each of the angles below...</p> 	
2	<p>The diagram below is not drawn accurately.</p>  <p>a) Work out the size of angle x</p> <p>b) Give a reason for each step</p>	

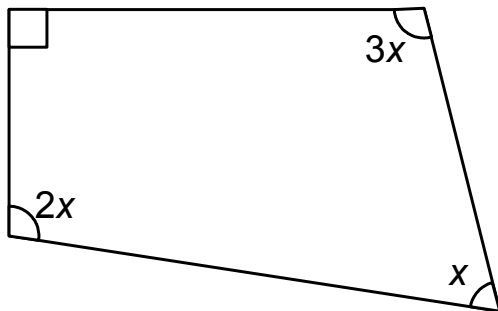
3

Work out the value of angle x .



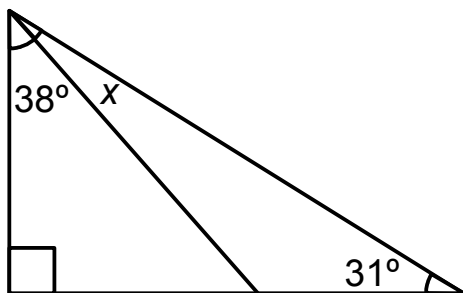
4

Work out the value of x° .



5

Work out the value of x° .

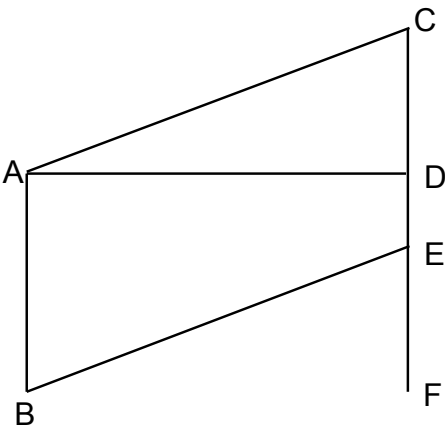
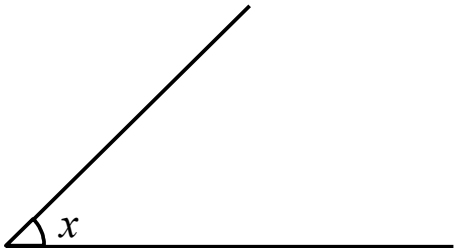


GCSE Maths worksheet 21

Name _____

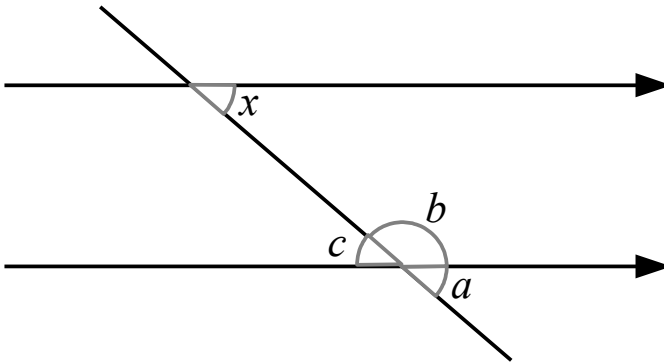
Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>The diagram below has been drawn accurately. Each vertex has been labelled with a letter. The line AB is the vertical line on the left of the diagram.</p>  <table><tr><td>Write down a pair of lines that are parallel to each other</td><td></td></tr><tr><td>Write down the three letter name of an acute angle on the diagram</td><td></td></tr><tr><td>Write down a pair of lines that are perpendicular</td><td></td></tr><tr><td>Angle BEF is 70°. Write down the value of angle ACD.</td><td></td></tr></table>	Write down a pair of lines that are parallel to each other		Write down the three letter name of an acute angle on the diagram		Write down a pair of lines that are perpendicular		Angle BEF is 70° . Write down the value of angle ACD.		
Write down a pair of lines that are parallel to each other										
Write down the three letter name of an acute angle on the diagram										
Write down a pair of lines that are perpendicular										
Angle BEF is 70° . Write down the value of angle ACD.										
2	<p>Measure angle x as accurately as you can</p> 									

3

Below are two parallel lines crossed by a third line.



Complete these sentences...

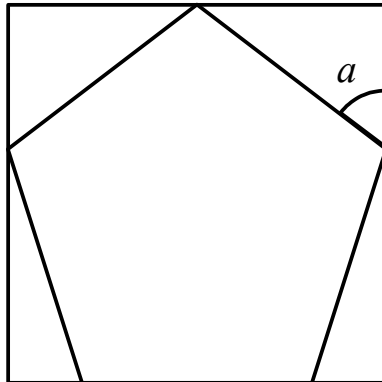
Angle a and x are _____ angles.

Angle b and x are _____ angles.

Angle c and x are _____ angles.

4

The square below has a regular pentagon drawn inside it.




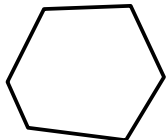
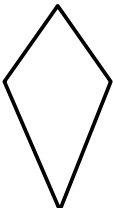
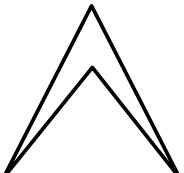

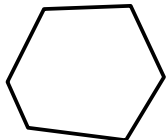
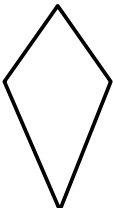
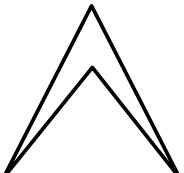

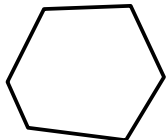
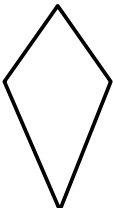
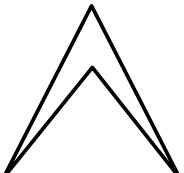
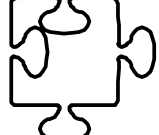

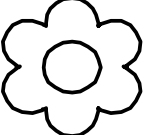

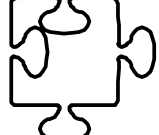

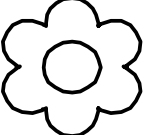

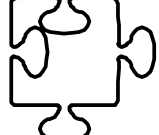

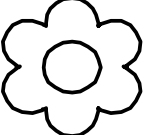

Work out the size of angle a .

GCSE Maths worksheet 22

Name _____

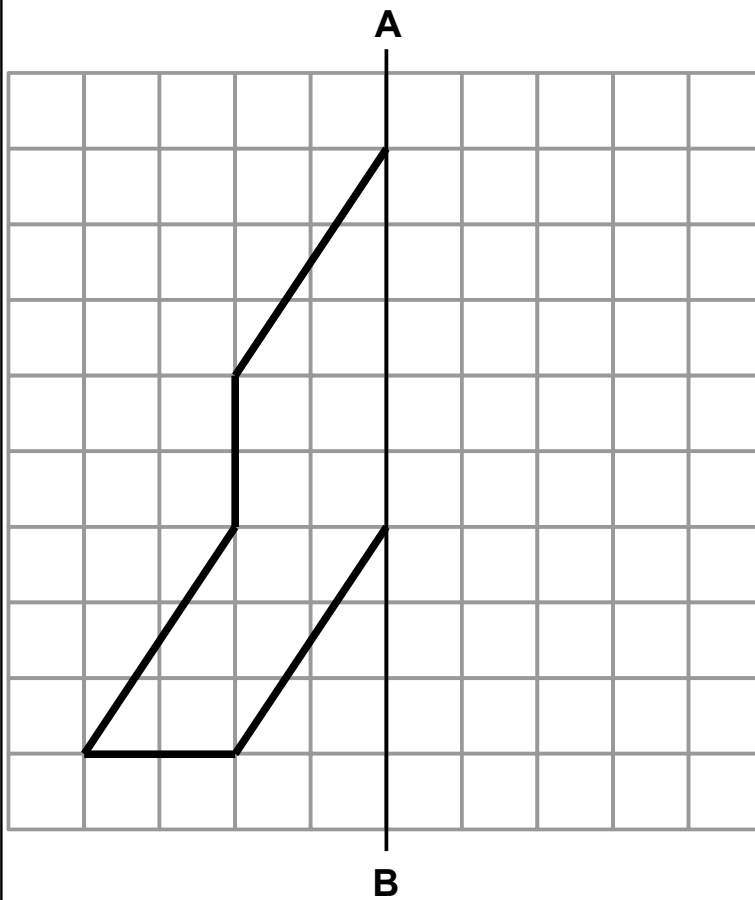
Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

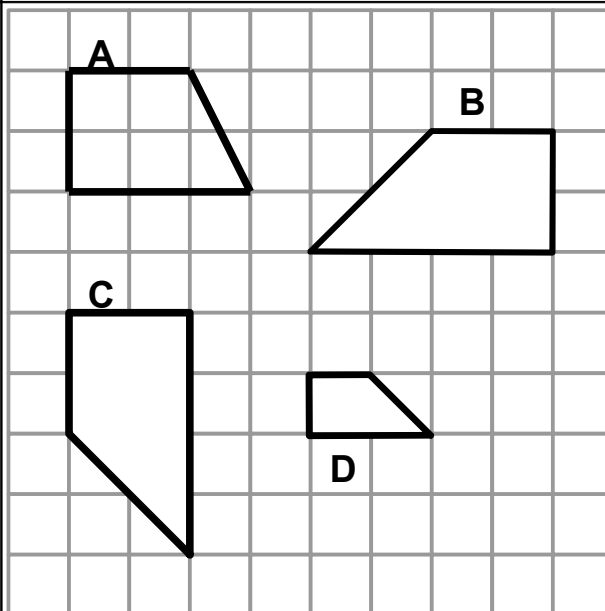
1	<p>Write the name below each shape in the table...</p> <table border="1"> <tr> <td data-bbox="303 593 526 817"></td> <td data-bbox="526 593 758 817"></td> <td data-bbox="758 593 981 817"></td> <td data-bbox="981 593 1204 817"></td> </tr> <tr> <td data-bbox="303 817 526 918"></td> <td data-bbox="526 817 758 918"></td> <td data-bbox="758 817 981 918"></td> <td data-bbox="981 817 1204 918"></td> </tr> </table>									
										
2	<p>The symbols A, B, C, D all have some symmetry properties.</p> <table border="1"> <tr> <td data-bbox="303 1108 526 1164">A</td> <td data-bbox="526 1108 758 1164">B</td> <td data-bbox="758 1108 981 1164">C</td> <td data-bbox="981 1108 1204 1164">D</td> </tr> <tr> <td data-bbox="303 1164 526 1321"></td> <td data-bbox="526 1164 758 1321"></td> <td data-bbox="758 1164 981 1321"></td> <td data-bbox="981 1164 1204 1321"></td> </tr> </table> <p>Write down the letters of two symbols that have exactly one line of symmetry _____ and _____</p> <p>Which shape has exactly two lines of symmetry? _____</p> <p>What is the order of rotational symmetry of shape C?</p> <p>_____</p> <p>Which shape has an order of rotational symmetry of 2?</p> <p>_____</p>	A	B	C	D					
A	B	C	D							
										

3

Draw the mirror image of the shape using the line AB as the mirror line.



4



Which two shapes are congruent?

Which shape is similar to shape B?

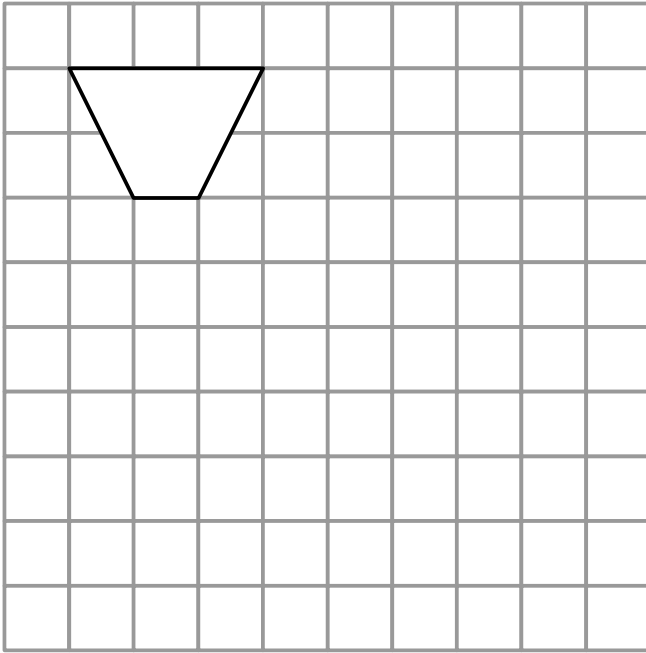
Which shape isn't congruent or similar to any of the others?

5

Algernon says that the shape below can tessellate.

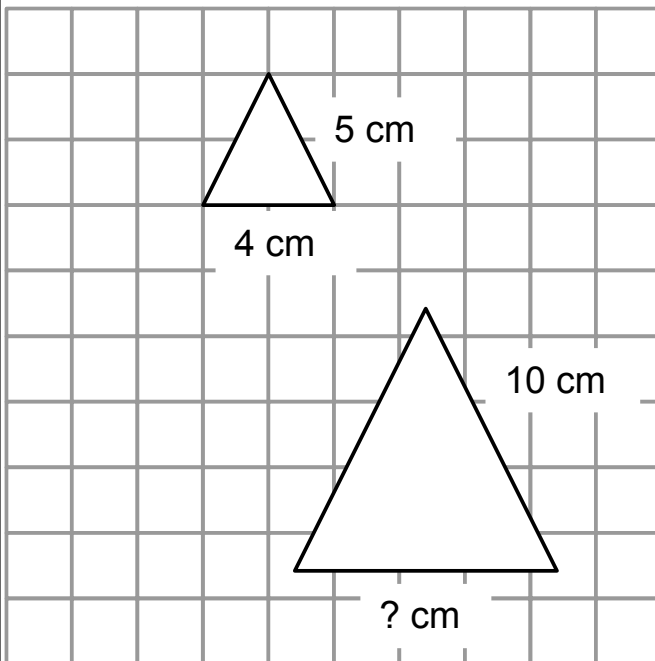
Evadne insists that it can't.

Try to draw at least 6 shapes that tessellate to see who is right.



6

The two isosceles triangles below are similar.



How long is the bottom side of the larger triangle?

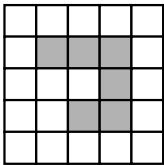
GCSE Maths progress test 1

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Circle the fractions that are equivalent to $\frac{2}{3}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{15}{20}$ $\frac{18}{27}$ $\frac{27}{36}$	
2	Write down the lowest common multiple of 8 and 12	
3	Circle <u>all</u> the numbers in this list that are factors of 100 10, 12, 15, 25, 48, 50, 100, 150, 200	
4	Find $\frac{3}{4}$ of £700	
5	Work out 23×47 using any method you like	
6	What is 50% of £35.60 ?	
7	Work out the value of $5^2 + 2^3$	
8	Add brackets to the expression below to make it true $19 - 7 \div 4 = 3$	

9	Work out $1760 \div 8$	
10	The temperature one night in February was -15°C . Next day at noon, the temperature was 8°C warmer. What was the temperature at noon?	
11	The population of Wales is approximately two million nine hundred and four thousand. Write the population of Wales in figures.	
12	<p>Look at the shape made from grey squares on the 1cm grid below...</p>  <p>What is the <u>perimeter</u> of the shape made from the grey squares.</p>	
13	Harinder wins £900 in a competition. She gives one third of the money to charity. Harinder puts half the money in her savings account How much does Harinder have left to spend on a new chair?	
14	Write 120 as a product of its prime factors	
15	Work out $\frac{2}{5} + \frac{3}{10}$	

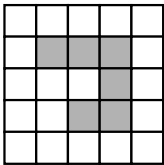
GCSE Maths progress test 1

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Circle the fractions that are equivalent to $\frac{2}{3}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{15}{20}$ $\frac{18}{27}$ $\frac{27}{36}$	$\frac{8}{12}$ $\frac{18}{27}$
2	Write down the lowest common multiple of 8 and 12	24
3	Circle <u>all</u> the numbers in this list that are factors of 100 10, 12, 15, 25, 48, 50, 100, 150, 200	10, 25, 100
4	Find $\frac{3}{4}$ of £700	£525.00 (accept 525)
5	Work out 23×47 using any method you like	1081
6	What is 50% of £35.60 ?	£17.80 (strict currency)
7	Work out the value of $5^2 + 2^3$	33
8	Add brackets to the expression below to make it true $19 - 7 \div 4 = 3$	$(19 - 7) \div 4$

9	Work out $1760 \div 8$	220
10	The temperature one night in February was -15°C . Next day at noon, the temperature was 8°C warmer. What was the temperature at noon?	-7
11	The population of Wales is approximately two million nine hundred and four thousand. Write the population of Wales in figures.	2 904 000 (allow comas and allow no spaces)
12	Look at the shape made from grey squares on the 1cm grid below...  What is the <u>perimeter</u> of the shape made from the grey squares.	14 cm (allow 14 at this stage but warn about units)
13	Harinder wins £900 in a competition. She gives one third of the money to charity. Harinder puts half the money in her savings account How much does Harinder have left to spend on a new chair?	$300 + 450 = 750$ $900 - 750 = £150$
14	Write 120 as a product of its prime factors	$2 \times 2 \times 2 \times 3 \times 5$ (welcome index form)
15	Work out $\frac{2}{5} + \frac{3}{10}$	$\frac{7}{10}$

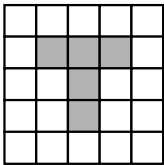
GCSE Maths progress test 1a

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Circle the fractions that are equivalent to $\frac{3}{4}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{17}{20}$ $\frac{18}{27}$ $\frac{27}{36}$	
2	Write down the highest common factor of 18 and 42	
3	Circle <u>all</u> the numbers in this list that are multiples of 6 10, 12, 15, 25, 48, 50, 100, 150, 216	
4	Find $\frac{2}{5}$ of £600	
5	Work out 38×52 using any method you like	
6	What is 50% of £73.00 ?	
7	Work out the value of $4^2 + 3^3$	
8	Add brackets to the expression below to make it true $3 + 9^2 \div 7 = 12$	

9	Work out $360 \div 8$	
10	One crisp November evening the temperature in Aldridge was -9°C and the temperature in Walsall was -3°C . How much warmer was Walsall than Aldridge?	
11	The population of Scotland is approximately five million two hundred and twelve thousand. Write the population of Scotland in figures.	
12	<p>Look at the shape made from grey squares on the 1cm grid below...</p>  <p>What is the <u>perimeter</u> of the shape made from the grey squares.</p>	
13	Rajpal wins £600 in a competition. She gives one quarter of the money to charity. Rajpal puts one third of the money in her savings account How much does Rajpal have left to spend on a make-over?	
14	Write 72 as a product of its prime factors	
15	Work out $\frac{1}{3} + \frac{1}{6}$	

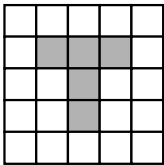
GCSE Maths progress test 1a

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Circle the fractions that are equivalent to $\frac{3}{4}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{17}{20}$ $\frac{18}{27}$ $\frac{27}{36}$	$\frac{9}{12}$ $\frac{27}{36}$
2	Write down the highest common factor of 18 and 42	6
3	Circle <u>all</u> the numbers in this list that are multiples of 6 10, 12, 15, 25, 48, 50, 100, 150, 216	12, 48, 216
4	Find $\frac{2}{5}$ of £600	£240 (accept 240)
5	Work out 38×52 using any method you like	1976
6	What is 50% of £73.00 ?	£36.50 (strict currency)
7	Work out the value of $4^2 + 3^3$	43
8	Add brackets to the expression below to make it true $3 + 9^2 \div 7 = 12$	$(3 + 9^2) \div 7$

9	Work out $360 \div 8$	45
10	One crisp November evening the temperature in Aldridge was -9°C and the temperature in Walsall was -3°C . How much warmer was Walsall than Aldridge?	6°C
11	The population of Scotland is approximately five million two hundred and twelve thousand. Write the population of Scotland in figures.	5 212 000 (allow comas and allow no spaces)
12	Look at the shape made from grey squares on the 1cm grid below...  What is the <u>perimeter</u> of the shape made from the grey squares.	12 cm (allow 12 but warn about units)
13	Rajpal wins £600 in a competition. She gives one quarter of the money to charity. Rajpal puts one third of the money in her savings account How much does Rajpal have left to spend on a make-over?	$150 + 200 = 350$ $600 - 350 = £250$
14	Write 72 as a product of its prime factors	$2 \times 2 \times 2 \times 3 \times 3$ (welcome index form)
15	Work out $\frac{1}{3} + \frac{1}{6}$	$\frac{7}{10}$

GCSE Maths progress test 2 (wk10)

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

Remember to provide units with your answer when needed.

1	Fred and Kamaljit share the costs of a trip in the ratio 3:2. The trip cost £600 Calculate Kamaljit's share of the costs.	
2	Work out 2.6×7	
3	A coach travels at 50 miles per hour for 3.5 hours. How far has the coach travelled?	
4	Nahidar has a recipe that makes 8 pancakes. The recipe needs 100g of flour. How much flour does Nahidar need to make 20 pancakes?	
5	Aaron goes to Birmingham New Street station and catches the 0942 to Glasgow. He arrives in Glasgow Central Station at 1607. How long did Aaron's journey take?	
6	Find 15% of £70	

7	Convert 0.78 into a fraction in its simplest form.	
8	The shop has a notice saying “20% off all prices”. The scarf used to cost £18. What should it cost now?	
9	Write 1200:800:200 as a ratio in its simplest form	
10	You are told that $235 \times 17 = 3995$ Use this information to find $39.95 \div 17$?	
11	8 pints is roughly 5 litres. Convert 125 litres of milk to pints.	
12	Which is the smallest of these quantities? 1.1 11% $\frac{1}{11}$ 0.011	
13	Ethel and Nasim divide the profits of a market stall in the ratio 2:7. Nasim receives £45 more than Ethel. What was Ethel's share?	
14	Estimate the value of $\frac{3.9^2}{0.92 \times 9.69}$	
15	Work out $0.37 + 2 + 7.1$	

GCSE Maths progress test 2 (wk10)

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

Remember to provide units with your answer when needed.

1	Fred and Kamaljit share the costs of a trip in the ratio 3:2. The trip cost £600 Calculate Kamaljit's share of the costs.	$600 \div 5 = 120$ $120 \times 2 =$ £240
2	Work out 2.6×7	18.2
3	A coach travels at 50 miles per hour for 3.5 hours. How far has the coach travelled?	$50 \times 3.5 =$ 175 miles
4	Nahidar has a recipe that makes 8 pancakes. The recipe needs 100g of flour. How much flour does Nahidar need to make 20 pancakes?	250g
5	Aaron goes to Birmingham New Street station and catches the 0942 to Glasgow. He arrives in Glasgow Central Station at 1607. How long did Aaron's journey take?	6 hours 25 minutes (accept 325 minutes, 6:25, anything sensible)
6	Find 15% of £70	£10.50 (currency)

7	Convert 0.78 into a fraction in its simplest form.	$\frac{39}{50}$
8	The shop has a notice saying “20% off all prices”. The scarf used to cost £18. What should it cost now?	£14.40
9	Write 1200:800:200 as a ratio in its simplest form	6:4:1 (must have colons)
10	You are told that $235 \times 17 = 3995$ Use this information to find $39.95 \div 17$?	2.35
11	8 pints is roughly 5 litres. Convert 125 litres of milk to pints.	$125 \div 5 \times 8 =$ 200 pints
12	Which is the smallest of these quantities? 1.1 11% $\frac{1}{11}$ 0.011	0.011
13	Ethel and Nasim divide the profits of a market stall in the ratio 2:7. Nasim receives £45 more than Ethel. What was Ethel's share?	$45 \div 5 = \text{£}9$ per part $\text{£}9 \times 2 = \text{£}18$
14	Estimate the value of $\frac{3.9^2}{0.92 \times 9.69}$	Roughly 16
15	Work out $0.37 + 2 + 7.1$	9.47

GCSE Maths progress test 2a

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

Remember to provide units with your answer when needed.

1	Divide £800 in the ratio 1:3	
2	Work out 3.2×6	
3	A plane travels at 450 miles per hour for 5 hours. How far has the plane travelled?	
4	Gemma has a recipe that makes 12 cupcakes. The recipe needs 120g of flour. How much flour does Gemma need to make 30 cupcakes?	
5	Manjit goes to Digbeth Coach Station and catches the 0845 coach to London Central. She arrives in London at 1125. How long did Manjit's journey take?	
6	Find 35% of £40	
7	Convert 0.65 into a fraction in its simplest form.	

8	The shop has a notice saying “30% off during sale”. The headphones cost £50.00 before the sale. What should they cost now?	
9	The plant food bottle says “add 300ml to 10 litres of water” 1 litre = 1 000 ml Write the ratio of plant food to water in its simplest form.	
10	You are told that $56 \times 82 = 4592$ Use this information to find 5.6×8.2	
11	5 miles is roughly 8 kilometres Convert 30 miles to kilometres	
12	Which is the largest of these quantities? 0.081 81% $\frac{9}{11}$ 0.812 8.10	
13	Rob and Stig share the rent of a student flat in the ratio 7:5 because Stig is never there at the weekend. Rob pays £30 more than Stig each week How much does the flat cost to rent?	
14	Estimate the value of $\frac{\sqrt{15.89}}{1.98 \times 2.034}$	
15	Work out $4 + 0.3 + 0.056$	

GCSE Maths progress test 2a

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

Remember to provide units with your answer when needed.

1	Divide £800 in the ratio 1:3	$£800 \div 4 =$ $£200$ $£200 \times 3 =$ $£600$
2	Work out 3.2×6	19.2
3	A plane travels at 450 miles per hour for 5 hours. How far has the plane travelled?	$450 \times 5 =$ 2250 miles
4	Gemma has a recipe that makes 12 cupcakes. The recipe needs 120g of flour. How much flour does Gemma need to make 30 cupcakes?	300g
5	Manjit goes to Digbeth Coach Station and catches the 0845 coach to London Central. She arrives in London at 1125. How long did Manjit's journey take?	2h 40min (accept any correct answer including 160 min)
6	Find 35% of £40	£14.00 (currency)
7	Convert 0.65 into a fraction in its simplest form.	$\frac{13}{20}$

8	The shop has a notice saying “30% off during sale”. The headphones cost £50.00 before the sale. What should they cost now?	£35.00
9	The plant food bottle says “add 300ml to 10 litres of water” 1 litre = 1 000 ml Write the ratio of plant food to water in its simplest form.	300ml : 10000 ml = 3:100
10	You are told that $56 \times 82 = 4592$ Use this information to find 5.6×8.2	45.92
11	5 miles is roughly 8 kilometres Convert 30 miles to kilometres	$30 \div 5 \times 8 =$ 48 Km
12	Which is the largest of these quantities? 0.081 81% $\frac{9}{11}$ 0.812 8.10	8.10
13	Rob and Stig share the rent of a student flat in the ratio 7:5 because Stig is never there at the weekend. Rob pays £30 more than Stig each week How much does the flat cost to rent?	$7 - 5 = 2$ parts $£30 \div 2 = £15$ per part $12 \times 15 =$ £180 p.w.
14	Estimate the value of $\frac{\sqrt{15.89}}{1.98 \times 2.034}$	Roughly 1
15	Work out $4 + 0.3 + 0.056$	4.356

GCSE Maths progress test 3 (wk15)

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>The ages of 5 people in a minibus are shown below.</p> <p>12, 15, 18, 27, 48</p> <p>Calculate the mean of the ages.</p>	
2	<p>You roll a fair dice and record the score.</p> <p>Circle the word below that best describes the likelihood of getting a 5 on the dice.</p> <p>Impossible Unlikely Evens Likely Certain</p>	
3	<p>Below is a stem and leaf diagram that represents the number of seconds it takes a student to complete a sorting puzzle.</p> <div><div><div>1 8 9 9</div><div>2 0 0 2 4 7 9</div><div>3 0 3 5 5 5 7 9</div><div>4 0 2 3</div></div><div>Key 4 2 means 42 seconds</div></div> <p>a) What is the modal time taken to complete the puzzle?</p> <p>b) What is the median of the completion times?</p> <p>c) What is the range of completion times?</p>	
4	<p>Fozia has worked out that the probability of arriving at College in time for the free breakfast is 0.8</p> <p>Over the 150 days of her course, how many times would you expect Fozia to arrive in time for the breakfast?</p>	

5

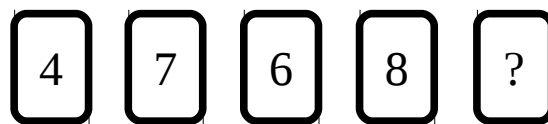
A biased spinner has four sectors labelled A, B, C and D. The probabilities of each of the sectors are listed in the table below...

Outcome	A	B	C	D
Prob	0.3	x	0.1	x

Find the probability of outcome B

6

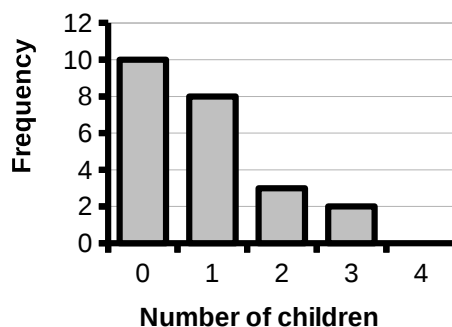
Tim is writing numbers on the cards below to make a game.



What number should he write on the last card so the numbers have a median of 7 and a range of 6?

7

Number of children in households

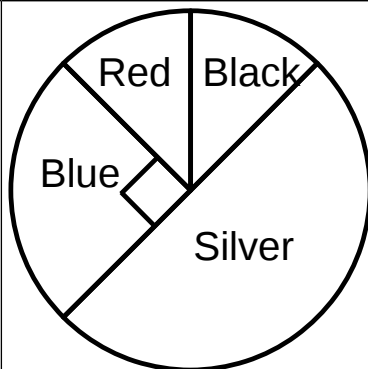


The chart on the left shows the number of children in 23 households.

a) Find the total number of children.

b) What is the modal number of children per house?

8

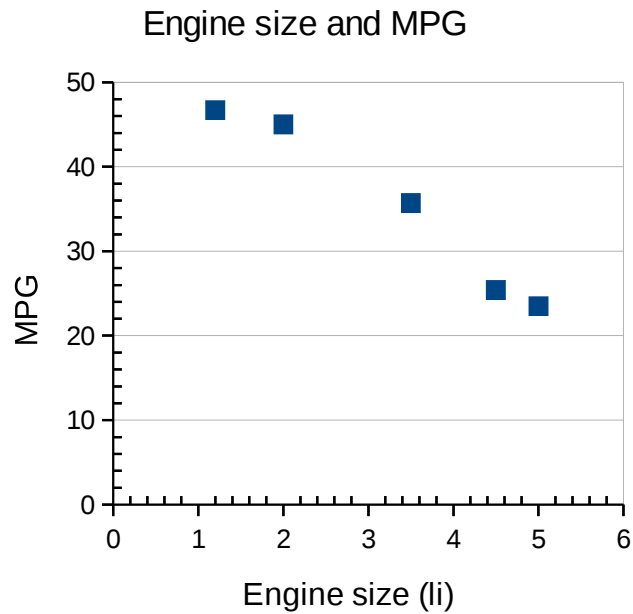


The pie chart shows the colours of cars in the College car park. There were 18 blue cars. The number of black cars is equal to the number of red cars.

How many red cars were in the car park?

9

Below is a scatter diagram that compares the engine size and miles per gallon of various sizes of car...



a) Write a sentence describing the relationship between engine size and miles per gallon in words.

b) Use the graph to estimate the miles per gallon for a car with engine size 4 litres.

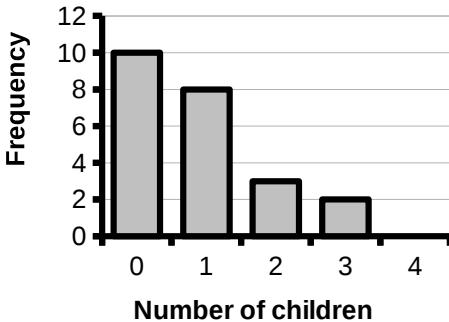
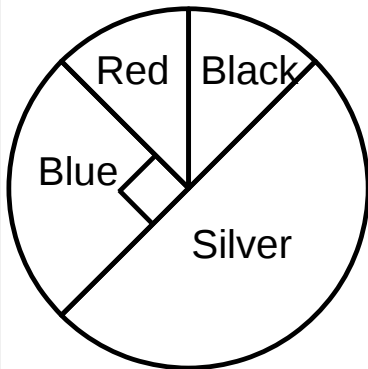
GCSE Maths progress test 3 (wk15)

Name _____

Group _____

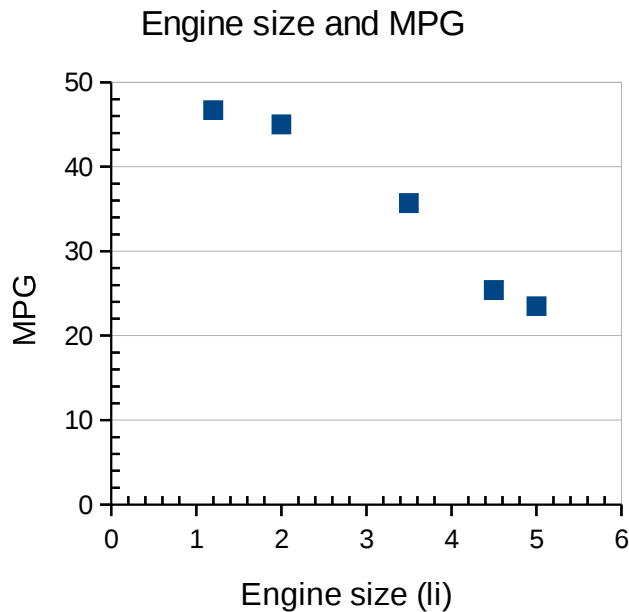
Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>The ages of 5 people in a minibus are shown below.</p> <p>12, 15, 18, 27, 48</p> <p>Calculate the mean of the ages.</p>	24 years
2	<p>You roll a fair dice and record the score.</p> <p>Circle the word below that best describes the likelihood of getting a 5 on the dice.</p> <p>Impossible Unlikely Evens Likely Certain</p>	Unlikely
3	<p>Below is a stem and leaf diagram that represents the number of seconds it takes a student to complete a sorting puzzle.</p> <div><div><div>1 8 9 9</div><div>2 0 0 2 4 7 9</div><div>3 0 3 5 5 5 7 9</div><div>4 0 2 3</div></div><div>Key 4 2 means 42 seconds</div></div> <p>a) What is the modal time taken to complete the puzzle?</p> <p>b) What is the median of the completion times?</p> <p>c) What is the range of completion times?</p>	<p>a) 35 s</p> <p>b) 30 s</p> <p>c) $43 - 18 = 25\text{s}$</p> <p>(1 mark each)</p>
4	<p>Fozia has worked out that the probability of arriving at College in time for the free breakfast is 0.8</p> <p>Over the 150 days of her course, how many times would you expect Fozia to arrive in time for the breakfast?</p>	<p>120 days</p> <p>(0.8×120)</p>

5	<p>A biased spinner has four sectors labelled A, B, C and D. The probabilities of each of the sectors are listed in the table below...</p> <table><tr><td>Outcome</td><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>Prob</td><td>0.3</td><td>x</td><td>0.1</td><td>x</td></tr></table> <p>Find the probability of outcome B</p>	Outcome	A	B	C	D	Prob	0.3	x	0.1	x	0.3
Outcome	A	B	C	D								
Prob	0.3	x	0.1	x								
6	<p>Tim is writing numbers on the cards below to make a game.</p> <div><div>4</div><div>7</div><div>6</div><div>8</div><div>?</div></div> <p>What number should he write on the last card so the numbers have a median of 7 and a range of 6?</p>	10										
7	<div><div><p>Number of children in households</p></div><div><p>The chart on the left shows the number of children in 23 households.</p><p>a) Find the total number of children.</p><p>b) What is the modal number of children per house?</p></div></div>	<p>20 children</p> <p>$(0 \times 10 + 1 \times 8 + 2 \times 3 + 3 \times 2)$</p>										
8	<div><div></div><div><p>The pie chart shows the colours of cars in the College car park. There were 18 blue cars. The number of black cars is equal to the number of red cars.</p><p>How many red cars were in the car park?</p></div></div>	<p>9 red cars</p> <p>$(18 \div 2$ because black and blue is 90 degs or any other method)</p>										

9

Below is a scatter diagram that compares the engine size and miles per gallon of various sizes of car...



a) Write a sentence describing the relationship between engine size and miles per gallon in words.

b) Use the graph to estimate the miles per gallon for a car with engine size 4 litres.

a) Any suitable sentence like “the miles per gallon drops for larger engine sizes”

b) MUST draw a line of best fit. Accept any value between 24 and 32 mpg.

GCSE Maths progress test 3a

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>The cost of 5 pairs of headphones is shown below.</p> <p>£16, £30, £30, £24, £90</p> <p>Calculate the mean cost of a pair of headphones.</p>	
2	<p>You roll a fair dice and record the score.</p> <p>Circle the word below that best describes the likelihood of getting a score that is less than 4 on the dice.</p> <p>Impossible Unlikely Evens Likely Certain</p>	
3	<p>Below is a stem and leaf diagram that represents the total number of hours it takes various teams to build a wall.</p> <div><div><div>4 8 9 9</div><div>5 0 0 2 4 7 9</div><div>6 0 3 5 5 5 7 9</div><div>7 0 2 3</div></div><div>Key 4 8 means 48 hours</div></div> <p>a) What is the median number of hours?</p> <p>b) How many teams took less than 70 hours?</p> <p>c) What is the range of times taken?</p>	
4	<p>Hermione calculates that her probability of arriving at College at or before 9am is 0.7</p> <p>Over the 150 days of her course, how many times would you expect Hermione to arrive later than 9am?</p>	

5

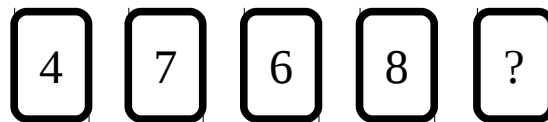
A biased spinner has four sectors labelled A, B, C and D. The probabilities of each of the sectors are listed in the table below...

Outcome	A	B	C	D
Prob	0.4	$2x$	0.3	x

Find the probability of outcome D

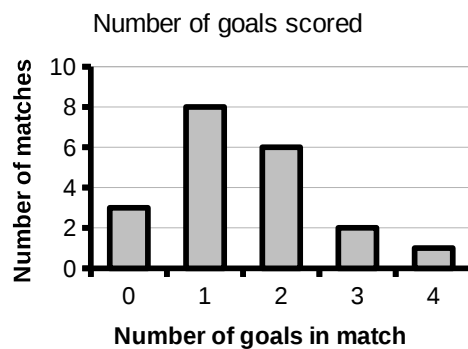
6

Galia is writing digits on the cards below to make a game.



What number should she write on the last card so the numbers have a mean 30?

7

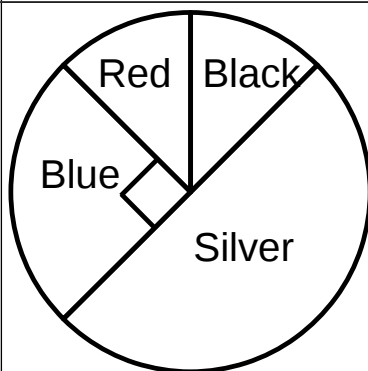


The chart shows the number of goals scored in each football match

a) Find the total number of goals scored.

b) What is the modal number of goals per match?

8

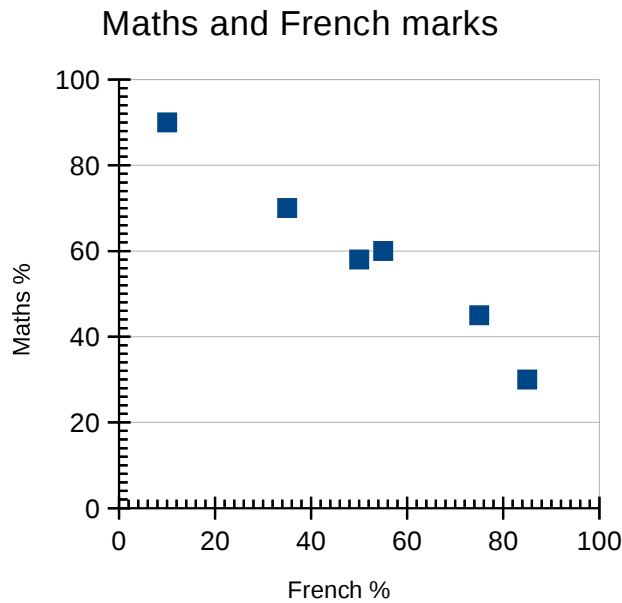


The pie chart shows the colours of cars in the College car park. There were 300 cars in the car park.

How many more silver cars than blue cars were in the car park?

9

The scatter chart shows the scores in Maths and French for six students in a small school support unit.



a) Write a sentence describing the relationship between the French and Maths scores for this group of students.

b) Use the graph to estimate the French score for a student who scored 80% in Maths.

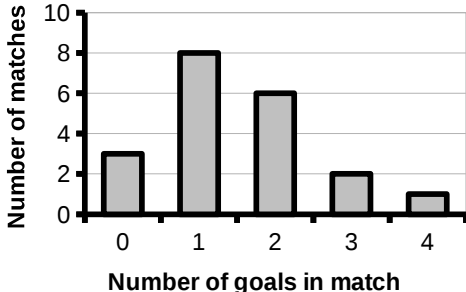
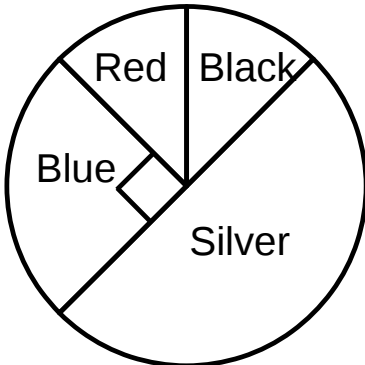
GCSE Maths progress test 3a

Name _____

Group _____

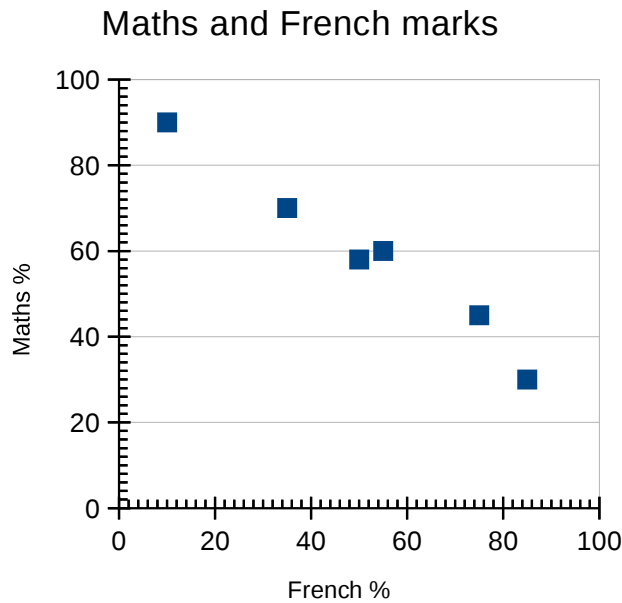
Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	<p>The cost of 5 pairs of headphones is shown below.</p> <p>£16, £30, £30, £24, £90</p> <p>Calculate the mean cost of a pair of headphones.</p>	<p>£38.00 (stretch: 4 out of 5 cost less, mean not useful)</p>
2	<p>You roll a fair dice and record the score.</p> <p>Circle the word below that best describes the likelihood of getting a score that is less than 4 on the dice.</p> <p>Impossible Unlikely Evens Likely Certain</p>	<p>Evens</p>
3	<p>Below is a stem and leaf diagram that represents the total number of hours it takes various teams to build a wall.</p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="margin-right: 20px;"> <pre> 4 8 9 9 5 0 0 2 4 7 9 6 0 3 5 5 5 7 9 7 0 2 3 </pre> </div> <div> <p>Key 4 8 means 48 hours</p> </div> </div> <p>a) What is the median number of hours?</p> <p>b) How many teams took less than 70 hours?</p> <p>c) What is the range of times taken?</p>	<p>a) 60 hours</p> <p>b) 16 teams</p> <p>c) $73 - 48 = 25$ hours</p> <p>(1 mark each)</p>
4	<p>Hermione calculates that her probability of arriving at College at or before 9am is 0.7</p> <p>Over the 150 days of her course, how many times would you expect Hermione to arrive later than 9am?</p>	<p>45 days (0.3×150)</p>

5	<p>A biased spinner has four sectors labelled A, B, C and D. The probabilities of each of the sectors are listed in the table below...</p> <table><tr><td>Outcome</td><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>Prob</td><td>0.4</td><td>2x</td><td>0.3</td><td>x</td></tr></table> <p>Find the probability of outcome D</p>	Outcome	A	B	C	D	Prob	0.4	2x	0.3	x	<p>$1 - 0.7 = 0.3$ so $3x = 0.3$ and $x = 0.1$</p> <p>Prob of D is 0.1</p>
Outcome	A	B	C	D								
Prob	0.4	2x	0.3	x								
6	<p>Galia is writing digits on the cards below to make a game.</p> <div><div>4</div><div>7</div><div>6</div><div>8</div><div>?</div></div> <p>What number should she write on the last card so the numbers have a mean 30?</p>	5										
7	<div><div><p>Number of goals scored</p><p>Number of matches</p><p>Number of goals in match</p></div><div><p>The chart shows the number of goals scored in each football match</p><p>a) Find the total number of goals scored.</p><p>b) What is the modal number of goals per match?</p></div></div>	<p>30 goals</p> <p>$(0 \times 3 + 1 \times 8 + 2 \times 6 + 3 \times 2 + 4 \times 1)$</p>										
8	<div><div><p>Red</p><p>Black</p><p>Blue</p><p>Silver</p></div><div><p>The pie chart shows the colours of cars in the College car park. There were 300 cars in the car park.</p><p>How many more silver cars than blue cars were in the car park?</p></div></div>	<p>150 silver 75 blue so 75 more silver than blue</p>										

9

The scatter chart shows the scores in Maths and French for six students in a small school support unit.



a) Any suitable sentence like “Maths and French scores have a negative correlation”

b) **MUST** draw a line of best fit. Accept any value between 45% and 55% consistent with LOBF.

a) Write a sentence describing the relationship between the French and Maths scores for this group of students.

b) Use the graph to estimate the French score for a student who scored 80% in Maths.

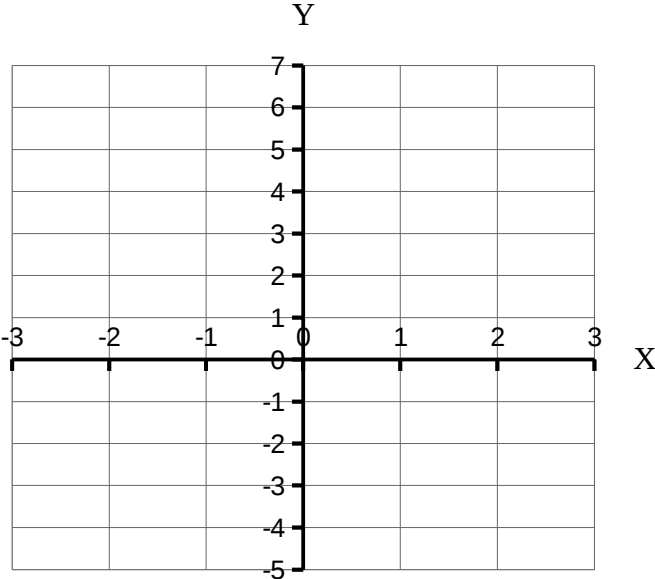
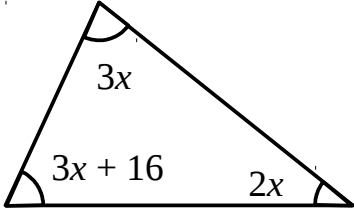
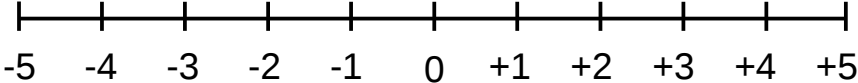
GCSE Maths progress test 4 (wk20)

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Simplify $p \times p \times p \times p$	
2	Simplify $g + g + g + g - g$	
3	Multiply out $3(2x - 5)$	
4	Solve $\frac{x}{4} = 8$	
5	Solve $3n + 4 = 20$	
6	Solve $4x + 10 = 2$	
7	Solve $3(4x - 5) = 21$	
8	<p>Hari has x sweets Bertram has twice as many sweets as Hari has Naomi has ten more sweets than Bertram has. Write an expression in terms of x for the number of sweets that Naomi has.</p>	

9	<p>The first four terms of a number sequence are shown below</p> <p>7, 10, 13, 16</p> <p>Write an expression for the nth term of the sequence</p>	
10	<p>Plot the graph of $y = 2x + 1$ on the grid below.</p> 	
11	<p>Find the value of x by solving an equation.</p> 	
12	<p>Show the inequality $-3 \leq x < 2$ on the number line below</p> 	
13	<p>Solve the inequality $7x - 12 \leq 23$</p>	

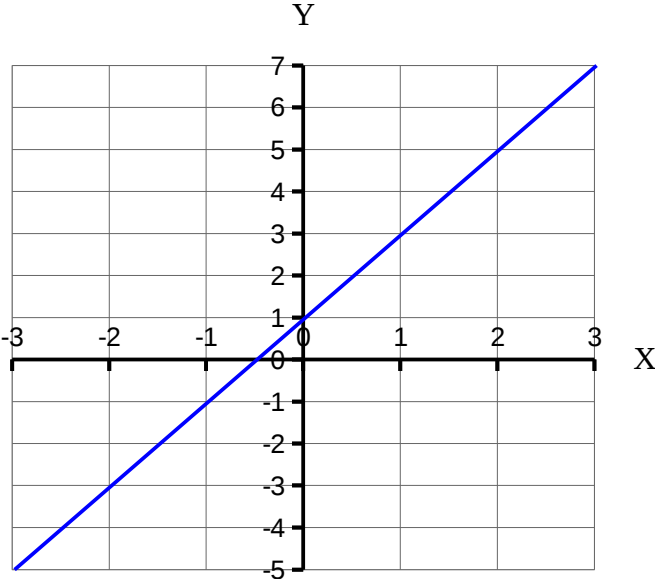
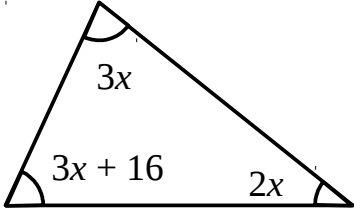
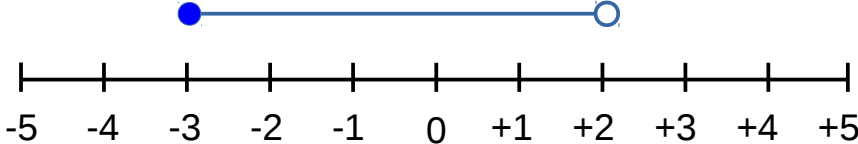
GCSE Maths progress test 4 (wk20)

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Simplify $p \times p \times p \times p$	p^4
2	Simplify $g + g + g + g - g$	$3g$
3	Multiply out $3(2x - 5)$	$6x - 15$
4	Solve $\frac{x}{4} = 8$	$x = 32$
5	Solve $3n + 4 = 20$	$n = \frac{16}{3} = 5\frac{1}{3}$ (5.333... or $5.\bar{3}$)
6	Solve $4x + 10 = 2$	$x = -2$
7	Solve $3(4x - 5) = 21$	$x = 3$
8	Hari has x sweets Bertram has twice as many sweets as Hari has Naomi has ten more sweets than Bertram has. Write an expression in terms of x for the number of sweets that Naomi has.	$2x + 10$

9	<p>The first four terms of a number sequence are shown below</p> <p>7, 10, 13, 16</p> <p>Write an expression for the nth term of the sequence</p>	$3n + 4$
10	<p>Plot the graph of $y = 2x + 1$ on the grid below.</p> 	Line as shown in blue
11	<p>Find the value of x by solving an equation.</p> 	$x = 43^\circ$
12	<p>Show the inequality $-3 \leq x < 2$ on the number line below</p> 	See symbols on diagram in blue
13	Solve the inequality $7x - 12 \leq 23$	$x \leq 5$

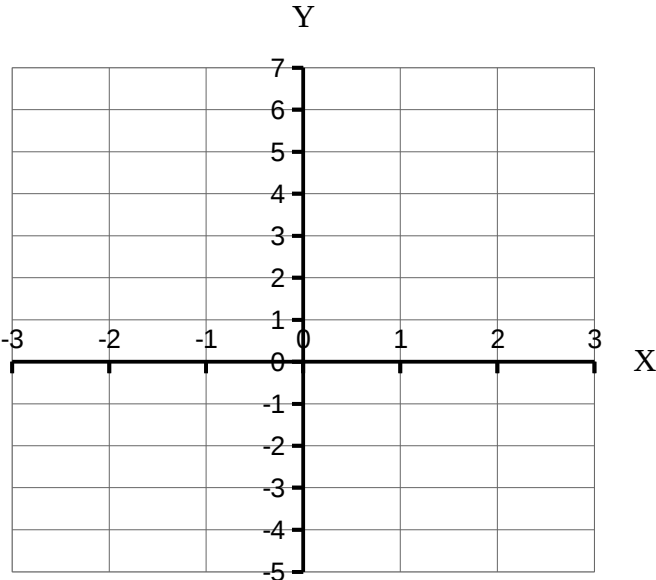
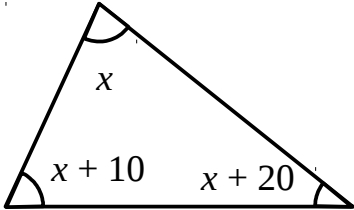
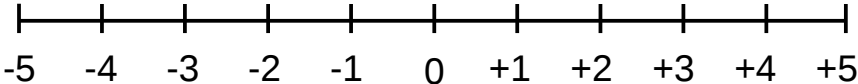
GCSE Maths progress test 4a

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Simplify $f + f + f + f + f + f$	
2	Simplify $d \times d \times d \times d \times d$	
3	Multiply out $4(3x - 1)$	
4	Solve $\frac{x}{2} = 10$	
5	Solve $5n + 4 = 20$	
6	Solve $2x + 10 = 4$	
7	Solve $5(2x - 1) = 35$	
8	Harry has m marbles Penelope has three times as many marbles as Harry has. Algernon has one less marble than Penelope because he lost one last week. Write an expression in terms of m for the number of marbles Algernon has.	
9	The first four terms of a number sequence are shown below 3, 9, 15, 21	

	Write an expression for the n th term of the sequence	
10	<p>Plot the graph of $y = 3x - 1$ on the grid below.</p> 	
11	<p>Find the value of x by solving an equation.</p> 	
12	<p>Show the inequality $-5 < x < -2$ on the number line below</p> 	
13	Solve the inequality $2x + 4 > 10$	

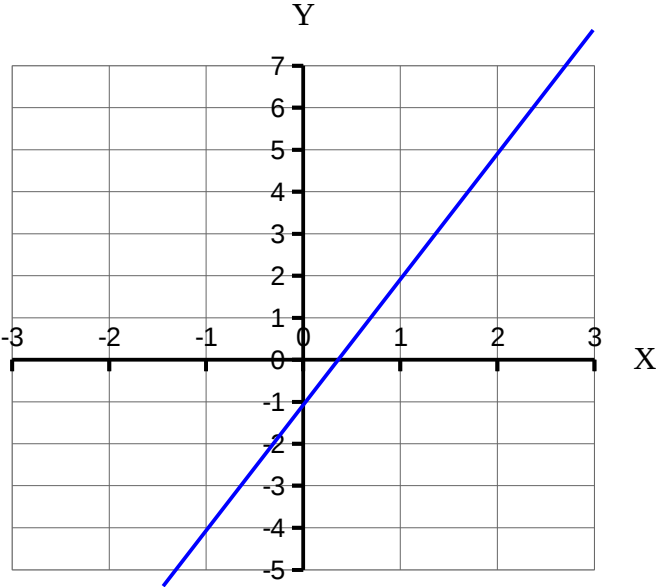
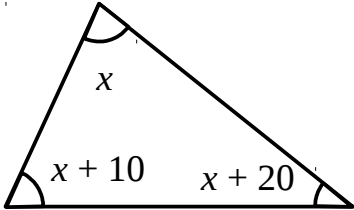
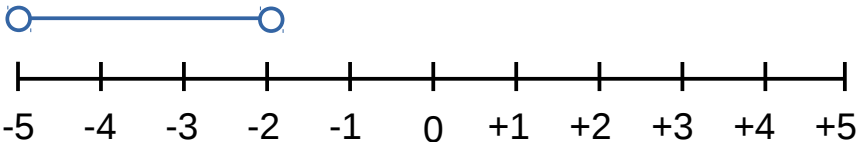
GCSE Maths progress test 4a

Name _____

Group _____

Don't use a calculator. Do all your working on this sheet. Answer all the questions.

1	Simplify $f + f + f + f + f + f$	$6f$
2	Simplify $d \times d \times d \times d \times d$	d^5
3	Multiply out $4(3x - 1)$	$12x - 4$
4	Solve $\frac{x}{2} = 10$	$x = 20$
5	Solve $5n + 4 = 20$	$n = 3.2 = 3\frac{1}{5}$
6	Solve $2x + 10 = 4$	$x = -3$
7	Solve $5(2x - 1) = 35$	$x = 4$
8	Harry has m marbles Penelope has three times as many marbles as Harry has. Algernon has one less marble than Penelope because he lost one last week. Write an expression in terms of m for the number of marbles Algernon has.	$3m - 1$
9	The first four terms of a number sequence are shown below 3, 9, 15, 21	$6n - 3$

	Write an expression for the n th term of the sequence	
10	<p>Plot the graph of $y = 3x - 1$ on the grid below.</p> 	Line as shown in blue
11	<p>Find the value of x by solving an equation.</p> 	$x = 50^\circ$
12	<p>Show the inequality $-5 < x < -2$ on the number line below</p> 	See symbols on diagram in blue
13	Solve the inequality $2x + 4 > 10$	$x > 3$

GCSE Maths progress test 5 (wk26)

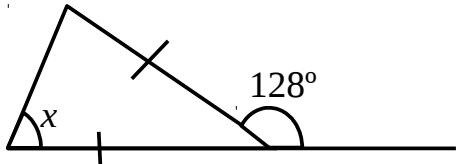
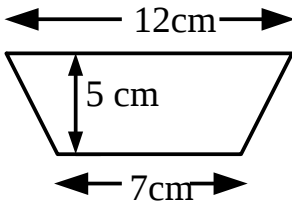
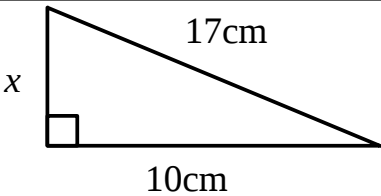
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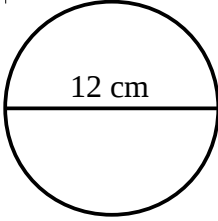
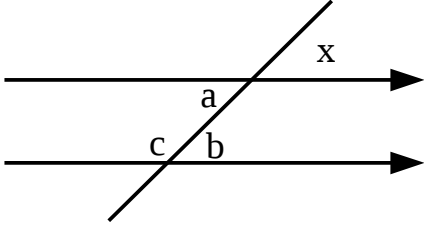
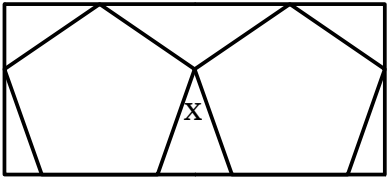
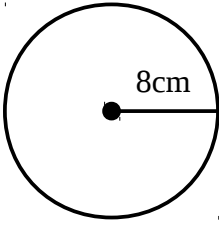
Group _____

You need a calculator with a square root button and your mathematical instruments.

Do working on this sheet and on one blank A4 sheet.

Answer all the questions. Use $\pi = 3.142$.

1	 <p>Find the size of angle x</p>	
2	<p>Draw a cross in the middle of a blank piece of paper.</p> <p>a) Use the cross as the centre of a circle of radius 4cm.</p> <p>b) Draw a tangent to the circle and label it</p> <p>c) Draw a chord on your diagram and label it</p>	
3	<p>Work out the area of the trapezium shown below.</p> <p>Give a unit with your answer.</p> 	
4	 <p>Work out the length of the side labelled x.</p> <p>Round your answer to one decimal place.</p>	

5	<p>This circle has a diameter of 12cm</p> <p>Calculate the circumference of the circle.</p> <p>Round your answer to three significant figures.</p> 	
6	 <p>a) Which angle <u>corresponds</u> to x?</p> <p>b) Angle a and b are _____ angles</p> <p>c) Angle c is 145°. What is the value of angle x?</p>	
7	<p>The diagram shows two regular pentagons in a rectangle.</p> <p>Calculate the size of angle x.</p> 	
8	 <p>This circle has a radius of 8cm.</p> <p>Calculate the area of the circle.</p> <p>Round answer to the nearest whole cm^2</p>	

9

Below is a map of the Arctic ice field showing the position of Algernon's base camp. The map has a scale of 1cm = 1Km.

●
Base Camp

Algernon walks 10Km due north.
Then he turns to face due East and walks another 8km.
Algernon then sets up East Camp.

a) Draw a scale diagram of Algernon's journey on the map above. Label the position of East Camp.

b) Measure and record the three figure bearing East Camp from Base Camp.

GCSE Maths progress test 5 (wk26)

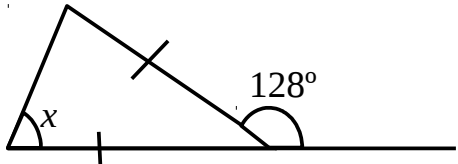
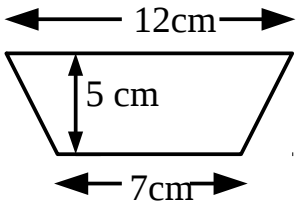
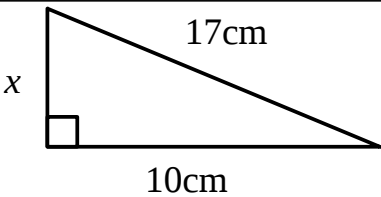
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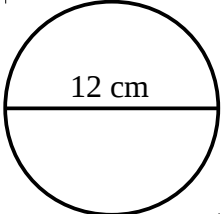
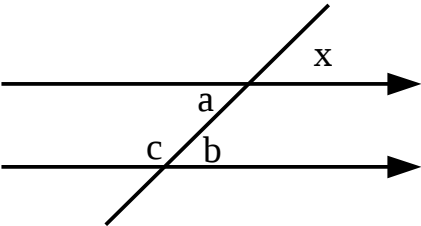
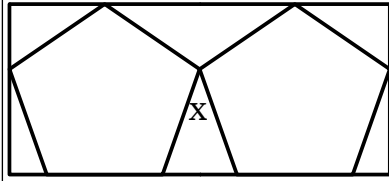
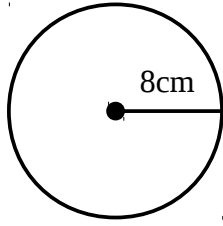
Group _____

You need a calculator with a square root button and your mathematical instruments.

Do working on this sheet and on one blank A4 sheet.

Answer all the questions. Use $\pi = 3.142$.

1	 <p>Find the size of angle x</p>	<p>Angle $x = 64^\circ$</p> <p>Challenge: students describe their reasoning</p>
2	<p>Draw a cross in the middle of a blank piece of paper.</p> <p>a) Use the cross as the centre of a circle of radius 4cm.</p> <p>b) Draw a tangent to the circle and label it</p> <p>c) Draw a chord on your diagram and label it</p>	<p>Acetate?</p>
3	<p>Work out the area of the trapezium shown below.</p> <p>Give a unit with your answer.</p> 	<p>47.5 cm²</p>
4	 <p>Work out the length of the side labelled x.</p> <p>Round your answer to one decimal place.</p>	<p>Side $x = 13.7$ cm</p>

5	<p>This circle has a diameter of 12cm</p> <p>Calculate the circumference of the circle.</p> <p>Round your answer to three significant figures.</p> 	<p>37.7 cm</p> <p>(same if use 3.142 or calculator value)</p>
6	 <p>a) Which angle <u>corresponds</u> to x?</p> <p>b) Angle a and b are _____ angles</p> <p>c) Angle c is 145°. What is the value of angle x?</p>	<p>a) angle b</p> <p>b) allied</p> <p>c) 35°</p>
7	<p>The diagram shows two regular pentagons in a rectangle. Calculate the size of angle x.</p> 	<p>$X = 36^\circ$</p> <p><i>Can you say how you found your answer?</i></p>
8	 <p>This circle has a radius of 8cm. Calculate the area of the circle. Round answer to the nearest whole cm^2</p>	<p>201 cm^2</p>

9	<p>Below is a map of the Arctic ice field showing the position of Algernon's base camp. The map has a scale of 1cm = 1Km.</p> <div data-bbox="427 958 609 1048" data-label="Text"> <p style="text-align: center;">● Base Camp</p> </div> <p>Algernon walks 10Km due north. Then he turns to face due East and walks another 8km. Algernon then sets up East Camp.</p> <p>a) Draw a scale diagram of Algernon's journey on the map above. Label the position of East Camp.</p> <p>b) Measure and record the three figure bearing East Camp from Base Camp.</p>	<p>Correct 10cm, 8cm triangle</p> <p>039°</p>
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GCSE Maths progress test 5a

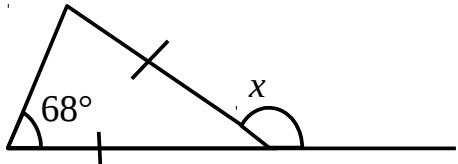
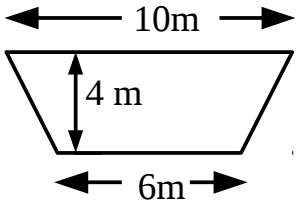
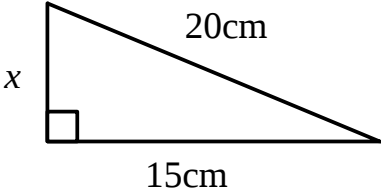
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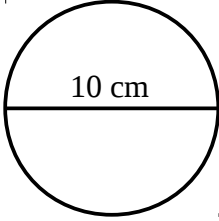
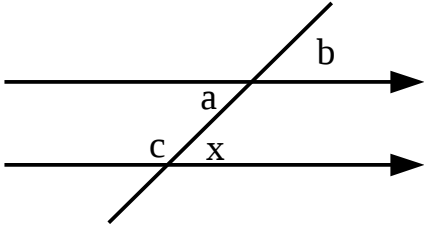
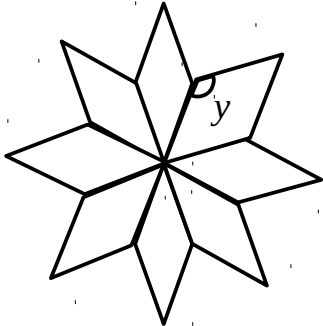
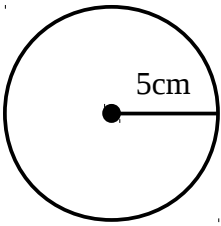
Group _____

You need a calculator with a square root button and your mathematical instruments.

Do working on this sheet and on one blank A4 sheet.


Answer all the questions. Use $\pi = 3.142$.


1	 <p>Find the size of angle x</p>	
2	<p>Draw a cross in the middle of a blank piece of paper.</p> <p>a) Use the cross as the centre of a circle of radius 4cm.</p> <p>b) Draw a tangent to the circle and label it</p> <p>c) Draw a chord on your diagram and label it</p>	
3	<p>Work out the area of the trapezium shown below.</p> <p>Give a unit with your answer.</p> 	
4	 <p>Work out the length of the side labelled x.</p> <p>Round your answer to one decimal place.</p>	

5	<p>This circle has a diameter of 10cm</p> <p>Calculate the circumference of the circle.</p> <p>Round your answer to three significant figures.</p> 	
6	 <p>a) Which angle <u>is</u> alternate to x?</p> <p>b) Angle c and a are _____ angles</p> <p>c) Angle b is 75°. What is the value of angle c?</p>	
7	<p>Philomena has sketched a floral pattern below. She has arranged 8 identical diamonds as shown. Calculate the size of angle y.</p> 	
8	 <p>This circle has a radius of 5cm. Calculate the area of the circle. Round answer to one decimal place.</p>	

9

Below is a map of part of the sea.
The scale of the map is 1cm = 1km.


Oil Rig A


Supply Ship B

- a) Measure the bearing of supply ship B from oil rig A
- b) How far is supply ship B from oil rig A in Km?

GCSE Maths progress test 5a

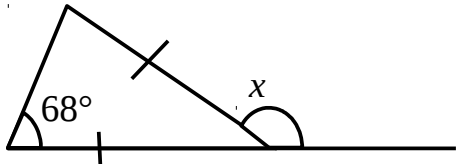
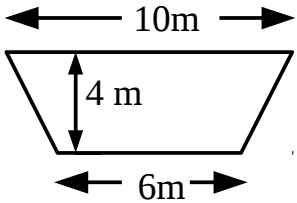
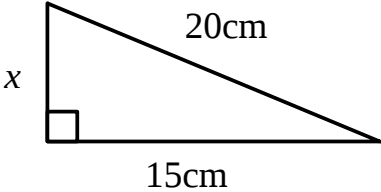
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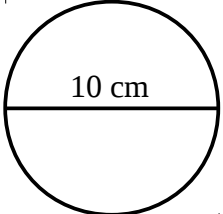
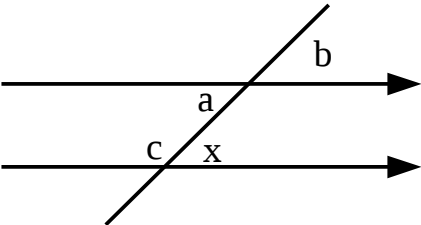
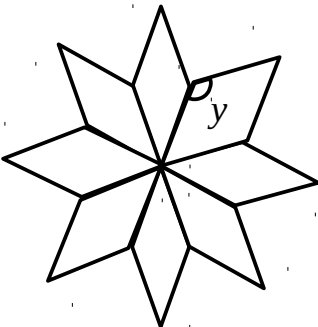
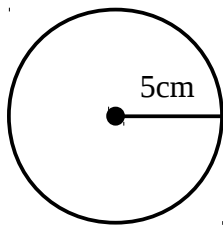
Group _____

You need a calculator with a square root button and your mathematical instruments.

Do working on this sheet and on one blank A4 sheet.


Answer all the questions. Use $\pi = 3.142$.

1	 <p>Find the size of angle x</p>	<p>Angle $x = 136^\circ$</p> <p>Challenge: students describe their reasoning</p>
2	<p>Draw a cross in the middle of a blank piece of paper.</p> <p>a) Use the cross as the centre of a circle of radius 4cm.</p> <p>b) Draw a tangent to the circle and label it</p> <p>c) Draw a chord on your diagram and label it</p>	Acetate?
3	<p>Work out the area of the trapezium shown below.</p> <p>Give a unit with your answer.</p> 	32 m ²
4	 <p>Work out the length of the side labelled x.</p> <p>Round your answer to one decimal place.</p>	Side $x = 13.2$ cm


5	<p>This circle has a diameter of 10cm</p> <p>Calculate the circumference of the circle.</p> <p>Round your answer to three significant figures.</p> 	<p>31.4 cm</p> <p>(same if use 3.142 or calculator value)</p>
6	 <p>a) Which angle <u>is</u> alternate to x?</p> <p>b) Angle c and a are _____ angles</p> <p>c) Angle b is 75°. What is the value of angle c?</p>	<p>a) angle a</p> <p>b) allied</p> <p>c) 105° (stretch: give reasons for results)</p>
7	<p>Philomena has sketched a floral pattern below. She has arranged 8 identical diamonds as shown. Calculate the size of angle y.</p> 	<p>Angle $y = 135^\circ$</p> <p>(stretch: students give reasons for answer)</p>
8	 <p>This circle has a radius of 5cm. Calculate the area of the circle. Round answer to one decimal place.</p>	<p>75.6 cm^2</p>

9

Below is a map of part of the sea.
The scale of the map is 1cm = 1km.



Oil Rig A



Supply Ship B

- a) Measure the bearing of supply ship B from oil rig A
- b) How far is supply ship B from oil rig A in Km?