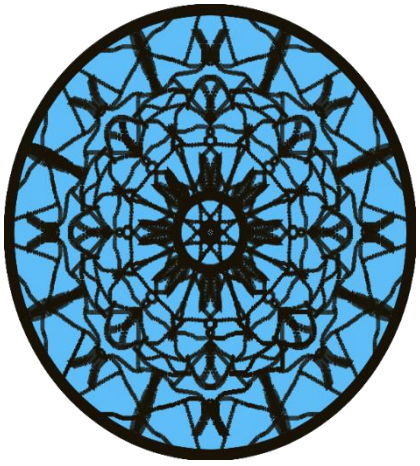
Year 7
Maths Christmas Booklet



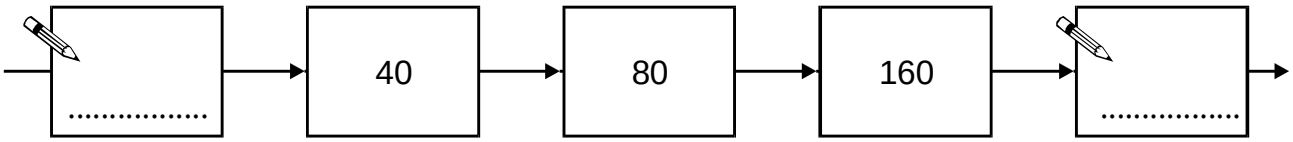
Name:

Level:

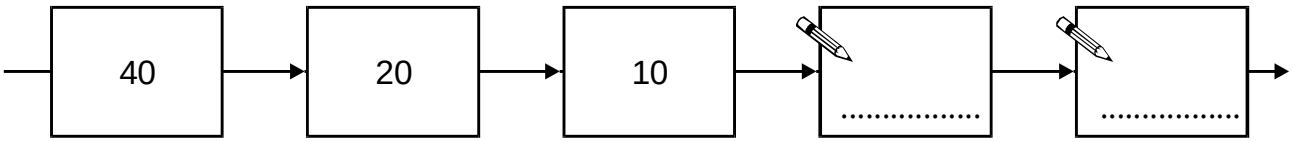
Target:

Level 4

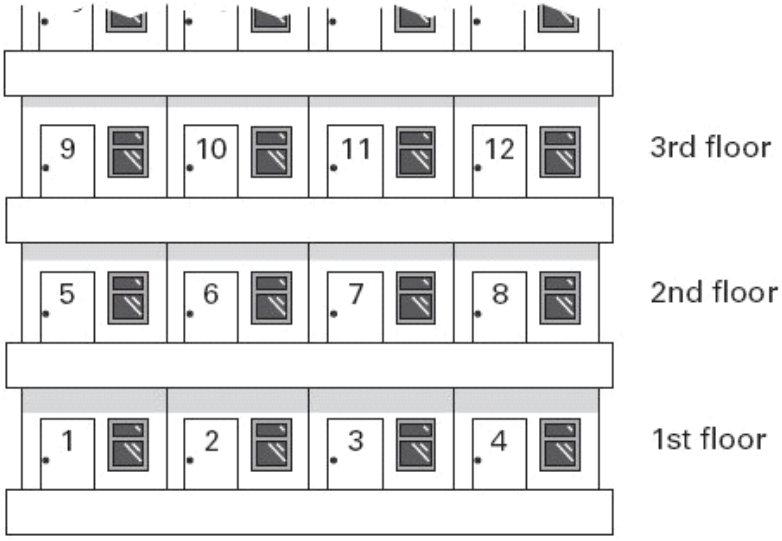
1. (a) The number chain below is part of a doubling number chain.
Fll in the two missing numbers.



(b) The number chain below is part of a halving number chain.
Fill in the two missing numbers.



2. The diagram shows part of a block of flats. There are four flats on each floor.



(a) What are the numbers of the flats on the 10th floor?

..... , ... , ... , ...

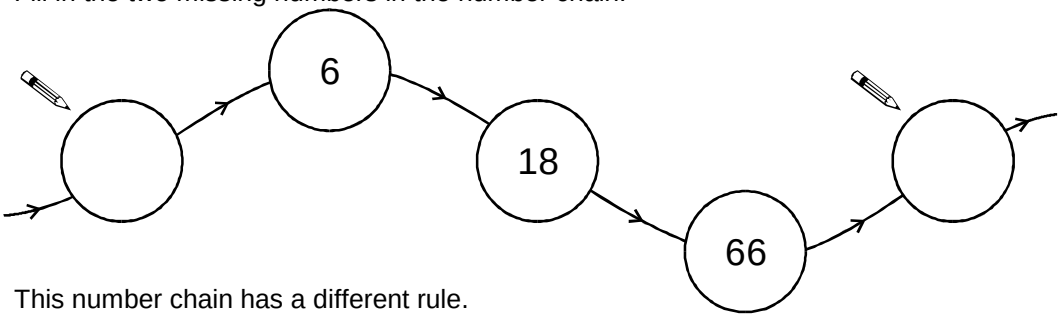
(b) On what floor is flat number 60?

.....

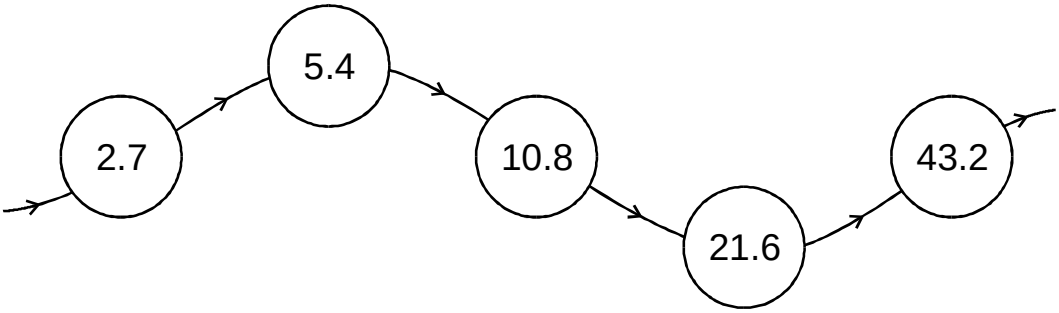
Level 5

3.
(a) The rule to get the next number in this number chain is multiply by 4 then subtract 6

Fill in the two missing numbers in the number chain.



(b) This number chain has a different rule.

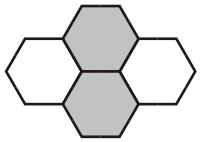


Write what that rule might be.

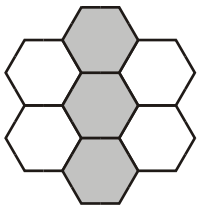
.....

Level 6

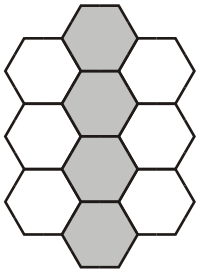
4. This is a series of patterns with grey and white tiles.



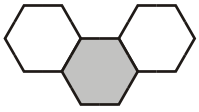
pattern number 1



pattern number 2



pattern number 3

The series of patterns continues by adding  each time.

(a) Complete this table:

pattern number	number of **grey** tiles	number of **white** tiles
5		
16		

(b) Complete this table by writing expressions:

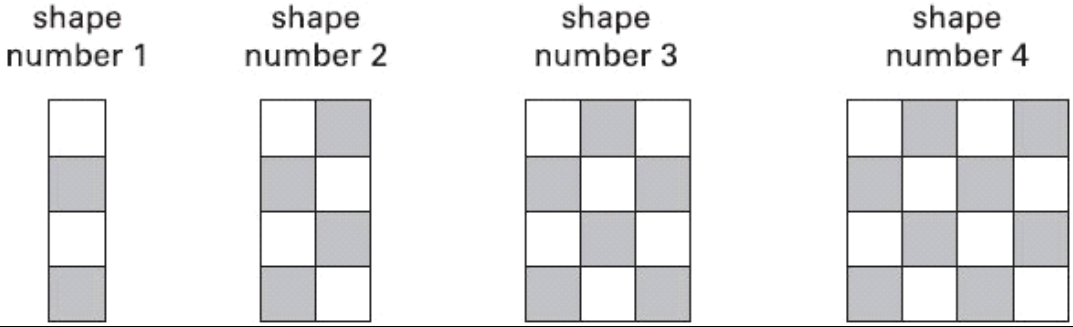
pattern number	expression for the number of grey tiles	expression for the number of **white** tiles
n		

(c) Write an expression to show the total number of tiles in pattern number *n*.
Simplify your expression.

.....

Level 4

1. Here is a sequence of shapes made with grey and white tiles.



The number of grey tiles=	2	×	the shape number	
The number of white tiles	=	2	×	the shape number

(a) Altogether, how many tiles will be in shape number 5?

..... tiles

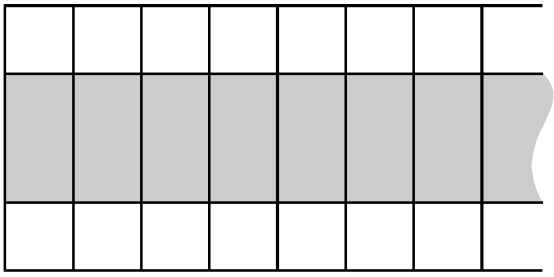
(b) Altogether, how many tiles will be in shape number 15?

..... tiles

(c) Write the missing number below.

The total number of tiles = ... × the shape number

2. Kerry makes a pattern from grey tiles and white tiles.
You cannot see all of the pattern but it continues in the same way.



(a) Kerry uses 30 grey tiles. How many white tiles does she use?

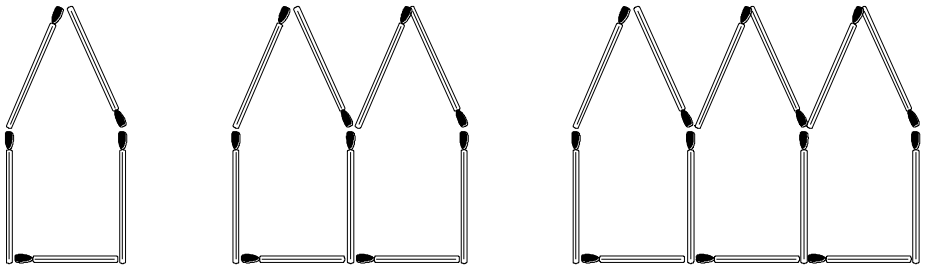
..... white tiles

(b) Tim makes a pattern like Kerry's but he uses 64 white tiles. How many grey tiles does Tim use?

..... grey tiles

Level 5

3. You can make 'huts' with matches.



1 hut needs 5 matches

2 huts need 9 matches

3 huts need 13 matches

A rule to find how many matches you need is

$$m = 4h + 1$$

m stands for the number of matches.
h stands for the number of huts.\

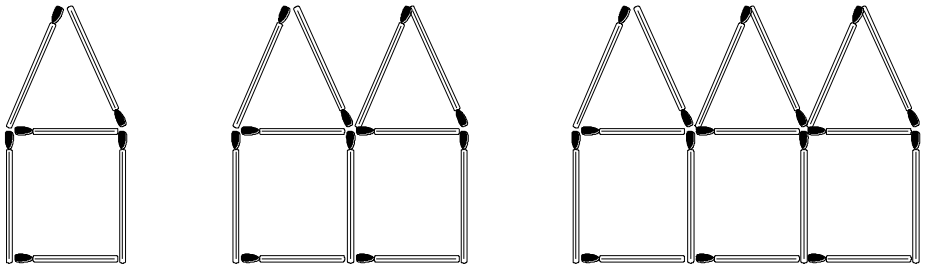
(a) Use the rule to find how many matches you need to make 8 huts.

..... matches

(b) I use 81 matches to make some huts. How many huts do I make?
.

..... huts

Andy makes different 'huts' with matches.



1 hut needs 6 matches

2 huts need 11 matches

3 huts need 16 matches

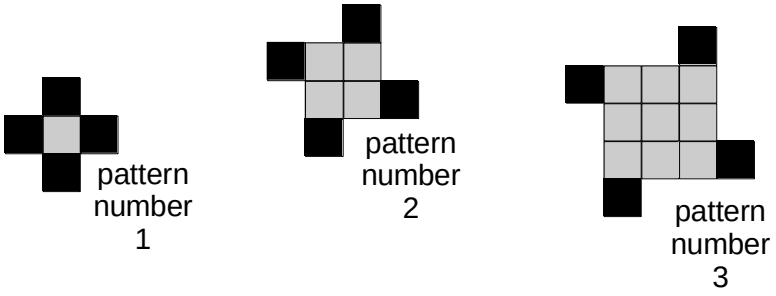
(c) Circle the rule below that shows how many matches he needs.

$m = h + 5$ $m = 4h + 2$ $m = 4h + 3$

$m = 5h + 1$ $m = 5h + 2$ $m = h + 13$

Level 6

4. This is a series of patterns with grey and black tiles.



pattern number 1

pattern number 2

pattern number 3

(a) How many grey tiles and black tiles will there be in pattern number 8?

..... **grey** tiles and ..... **black** tiles

(b) How many grey tiles and black tiles will there be in pattern number 16?

..... **grey** tiles and ..... **black** tiles

(c) How many grey tiles and black tiles will there be in pattern number P?

..... **grey** tiles and ..... **black** tiles

(d) T = total number of grey tiles and black tiles in a pattern
P = pattern number

Use symbols to write down an equation connecting T and P.

(e) What is T when P = 20?

Level 4

1. Work out the values of a, b and c in the number sentence below.

$3 \times 10 + 4 = a$ $\quad a =$ .....

$3 \times 10 + b = 38$ $\quad b =$ .....

$c \times 10 + 12 = 52$ $\quad c =$ .....

2. What numbers?

(a) I think of a number. I call my number n

n

Then I add 5 to my number.

$n + 5$

The answer is 8

$n + 5 = 8$

What was my number?

$n =$ .....

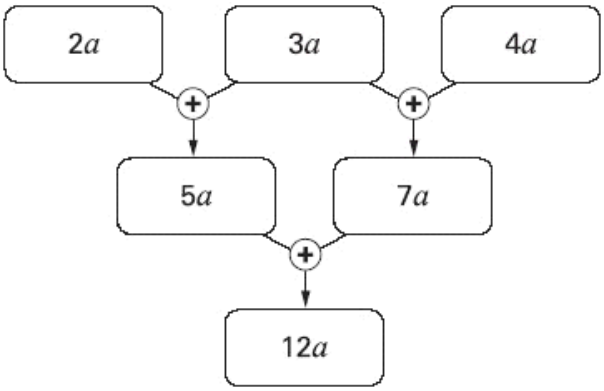
(b) Solve this equation to find the value of m

$m - 2 = 8$

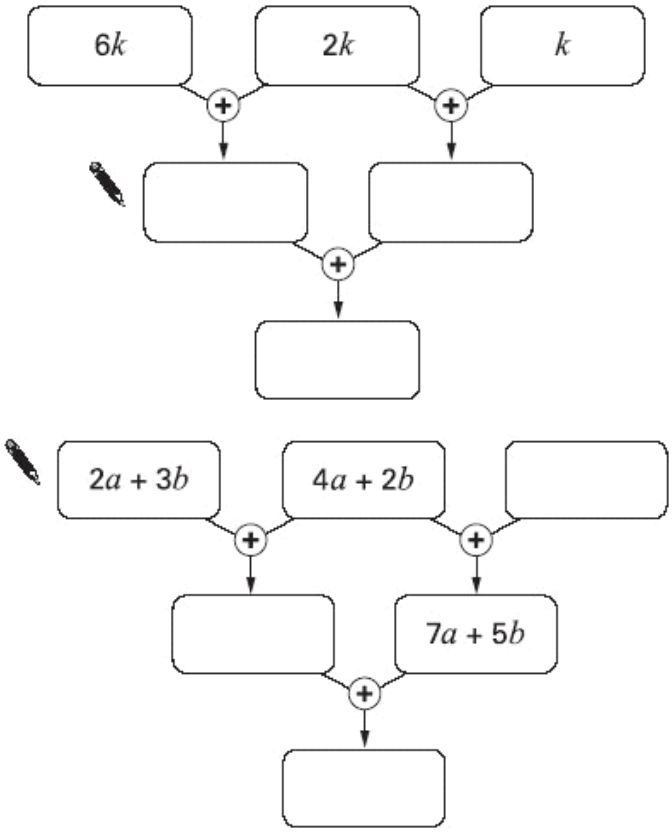
$m =$ .....

Level 5

3. Look at this algebra grid.



Complete the algebra grids below, simplifying each expression.



4. Simplify these expressions.

$5k + 7 + 3k =$ .....

$k + 1 + k + 4 =$ .....

Level 6

5. (a) Rearrange the equations.

$b + 4 = a$ $b =$ ……

$4d = c$ $d =$ ……

$m - 3 = 4k$ $m =$ ……

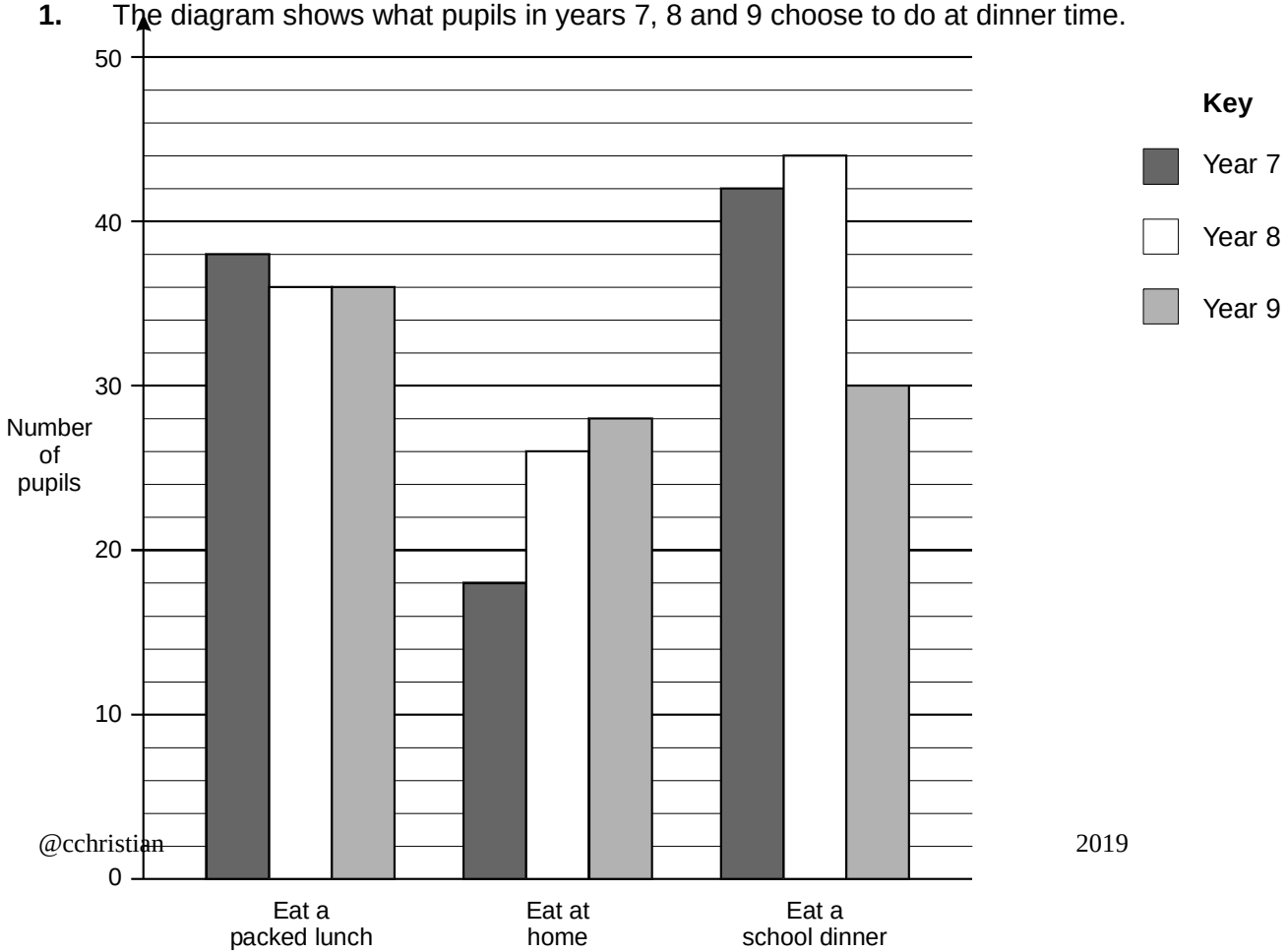
(b) Rearrange the equation to make t the subject. Show your working.

$5(2 + t) = w$

$t =$ ……

Level 4

1. The diagram shows what pupils in years 7, 8 and 9 choose to do at dinner time.



(a) A pupil from each year group is chosen at random. Are they **most likely** to eat a packed lunch, or eat at home, or eat a school dinner?

Tick (✓) the correct boxes.	Eat a packed lunch	Eat at home	Eat a school dinner
Pupil from year 7	☐	☐	☐
Pupil from year 8	☐	☐	☐
Pupil from year 9	☐	☐	☐

(b) How many **more** pupils are there in year **8** than year **9**? Show your working.

Level 5

2. (a) There are four people in Sita's family. Their shoe sizes are 4, 5, 7 and 10. What is the **median** shoe size in Sita's family?

 .....

(b) There are **three** people in John's family. The **range** of their shoe sizes is **4.** . Two people wear shoe size 6. John's shoe size is **not 6** and it is **not 10** . What is John's shoe size?

 .....

3. Which two numbers have a **mean** of **10** and a **range** of **8**?

 The numbers are ☐ and ☐

Level 6

4. The mean of three numbers is six. Two of the numbers are five.

What is the third number?

.....

5. Here is some information about all the pupils in class 9A.

	girls	boys
right-handed	13	14
left-handed	1	2

A teacher is going to choose a pupil from 9A at random.

(a) What is the probability that the pupil chosen will be a **girl**?

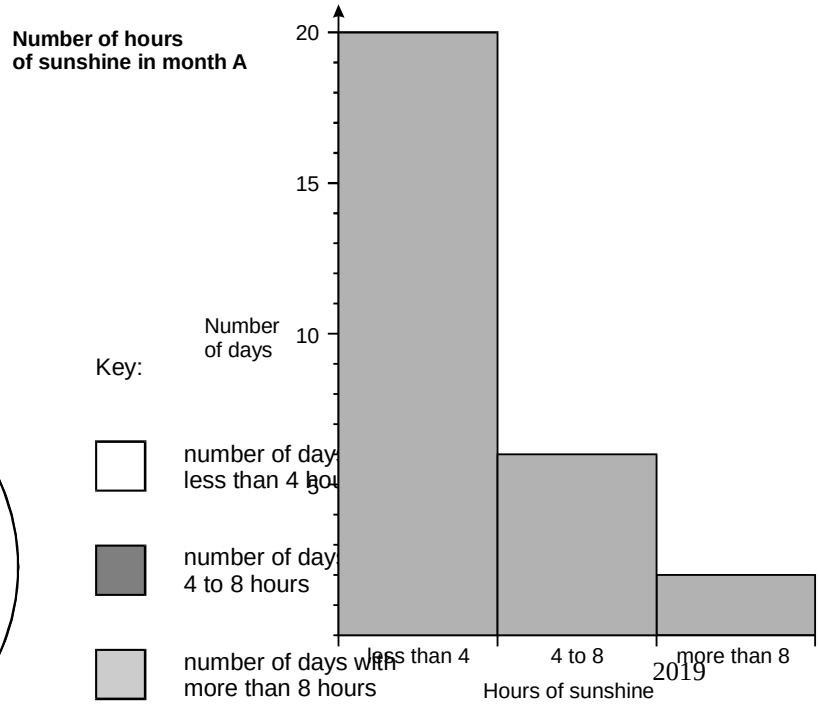
(b) What is the probability that the pupil chosen will be **left-handed**?

(c) The teacher chooses the pupil at random.
She tells the class the pupil is **left-handed**.
What is the probability that this left-handed pupil is a **boy**?

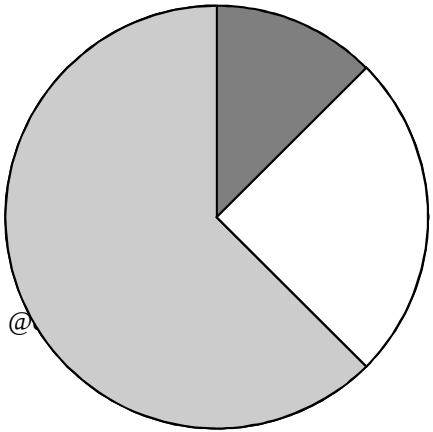
Level 4

1. The diagrams show the number of hours of sunshine in two different months.

Number of hours of sunshine in month A



Number of hours of sunshine in month B



Key:

number of day
less than 4 ho

number of day
4 to 8 hours

number of days with
more than 8 hours

(a) How many days are there in month A? Tick (✓) the correct box.

28 ☐ 29 ☐ 30 ☐ 31 ☐ not possible to tell ☐

(b) How many days are there in month B? Tick (✓) the correct box.

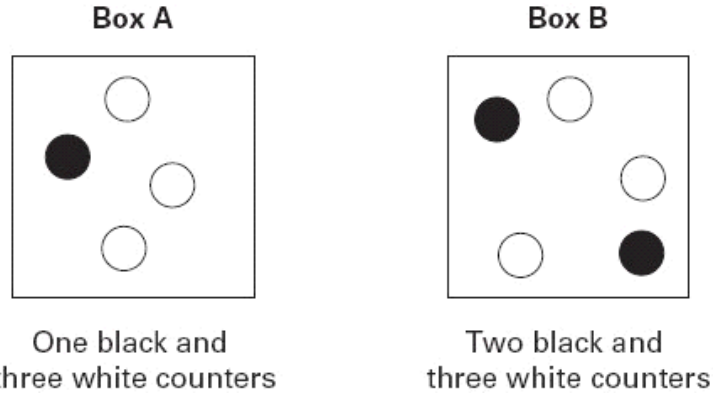
28 ☐ 29 ☐ 30 ☐ 31 ☐ not possible to tell ☐

(c) Which month had more hours of sunshine? Tick (✓) the correct box.

month A ☐ month B ☐

Explain how you know.

2.



(a) I am going to take a counter from one of the boxes without looking.
Which box gives the higher chance of taking a white counter?

☐ Box A ☐ Box B

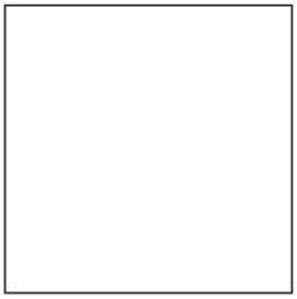
Explain your answer.

(b) I am going to take a counter from box C without looking.

It is just as likely that I will get a white counter as a black counter.

Show what counters might be in box C.

Box C



Level 5

3. (a) Look at these three numbers.

9	11	10

Show that the mean of the three numbers is 10

Explain why the median of the three numbers is 10

(b) Four numbers have a mean of 10 and a median of 10, but none of the numbers is 10
What could the four numbers be?

4. The median of these five numbers is 12

5	5	12	13	20

Write a set of four numbers that has a median of 12

5. The mean of these number is 6

10	1	7

Write three numbers that have a mean of 7

Level 6

6. There are some cubes in a bag. The cubes are either red (R) or black (B).
The teacher says:

> If you take a cube at random out of the bag,
> the probability that it will be red is $\frac{1}{5}$

(a) What is the probability that the cube will be black?

……

(b) A pupil takes one cube out of the bag. It is red. What is the smallest number of black cubes there could be in the bag?

……

(c) Then the pupil takes another cube out of the bag. It is also red. From this new information, what is the smallest number of black cubes there could be in the bag?

……

(d) A different bag has blue (B), green (G) and yellow (Y) cubes in it. There is at least one of each of the three colours.
The teacher says:

> If you take a cube at random out of the bag,
> the probability that it will be green is $\frac{3}{5}$

There are 20 cubes in the bag.
What is the greatest number of yellow cubes there could be in the bag?
Show your working.

.....cubes

Level 4

1. What is one third of twenty-seven?

……..

2. When the wind blows it feels colder. The stronger the wind, the colder it feels.
Fill in the gaps in the table. The first row is done for you.

Wind strength	Temperature out of the wind (^{0}C)	How much colder it feels in the wind (^{0}C)	Temperature it feels in wind (^{0}C)
Moderate breeze	5	7 degrees colder	–2
Fresh breeze	–8	11 degrees colder	.....
Strong breeze	–4	.... degrees colder	–20
Gale	.....	23 degrees colder	–45

Level 5

3.

Museum

entrance fee
£1.20 per person

(a) 240 people paid the entrance fee on Monday.
How much money is that altogether?
Show your working.

……

(b) The museum took £600 in entrance fees on Friday.
How many people paid to visit the museum on Friday?
Show your working.

……
…..

Level 6

4. (a) Look at this information.

Two numbers multiply to make zero.

One of the statements below is true.
Tick (✓) the true statement.

☐	Both numbers must be zero.
☐	At least one number must be zero.
☐	Exactly one number must be zero.
☐	Neither number can be zero.

(b) Now look at this information.

Two numbers add to make zero.

If one number is zero, what is the other number?

 .....

If neither number is zero, give an example of what the numbers could be.

 ..... and ……..

5. On average, the driest place on earth gets only nought point five millimetres of rain every year. In total, how much rain would it expect to get in twenty years?

.....

Level 4

1.

(a) Add together **3.7** and **6.5**

.....

(b) Subtract **5.7** from **15.2**

.....

c) Multiply **254** by **5**

.....

(d) Divide **342** by **6**

.....

Level 5

2. Work out 374 x 23

.....

3. I am thinking of a number.

My number **multiplied by 15** is **315** My number **multiplied by 17** is **357**

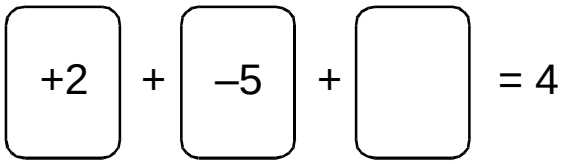
What is my number?

Level 6

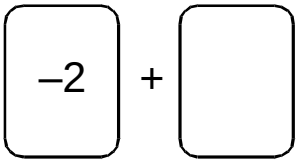
4. Look at these number cards

+3	0	–5	+9
+2	–8	+7	–2

(a) Choose a card to give the answer 4.

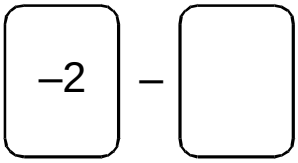


(b) Choose a card to give the **lowest** possible answer.
Fill in the card below and work out the answer.



.....

(c) Choose a card to give the **lowest** possible answer.
Fill in the card and work out the answer.



.....

(d) Now choose a card to give the **highest** possible answer.
Fill in the card below and work out the answer.

$-2 - \square = \ldots\ldots$

Level 4

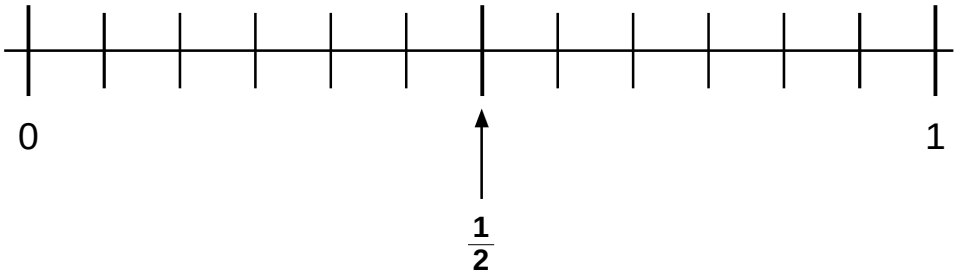
1. Write a number that is bigger than 0.3 and smaller than 0.4.

.....

2. (a) Look at these fractions.

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{5}{6}$

Mark each fraction on the number line. The first one is done for you.



(b) Fill in the missing numbers in the boxes.

$\frac{2}{12} = \frac{\square}{6}$ $\frac{1}{2} = \frac{12}{\square}$ $\frac{1}{\square} = \frac{6}{24}$

Level 5

3. (a) Complete the sentence.

..... **out of 10** is the same as **70%**

(b) Complete the sentence.

..... **out of** ..... is the same as **5%**

(c) Now complete the sentence using **different** numbers.

..... **out of** .....is the same as **5%**

4. What is twenty per cent of sixty pounds?

.....%

5. Ten per cent of a number is seven. What is the number?

.....%

Level 6

6. A garden centre sells plants for hedges.
The table shows what they sold in one week.

Plants	Number of plants sold	Takings
Beech	125	£212.50
Leylandii	650	£2437.50
Privet	35	£45.50
Hawthorn	18	£23.40
Laurel	5	£32.25
Total	**833**	**£2751.15**

(a) What percentage of the total number of plants sold was **Leylandii**?
Show your working.

.....%

(b) What percentage of the **total takings** was for Leylandii?
Show your working.

.....%

(c) Which is the **cheaper** plant, Beech or Privet?
Show working to explain how you know.

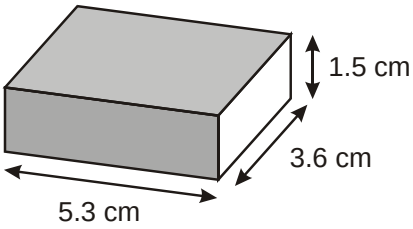
.....

.....

.....

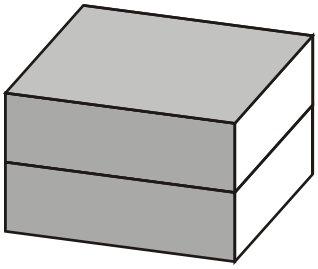
Level 4

1. The diagram shows a matchbox.
Its length is 5.3 cm. Its width is 3.6 cm. Its height is 1.5 cm.

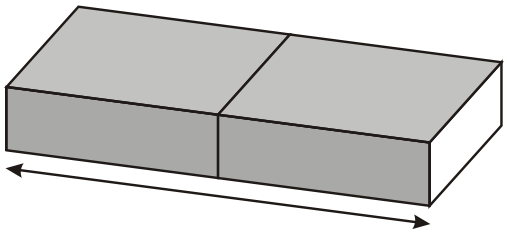


Not drawn accurately

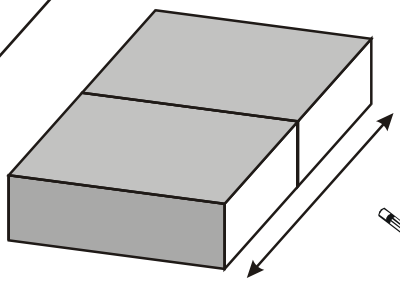
(a) I join two matchboxes in different ways.
Fill in the missing values.



height = cm

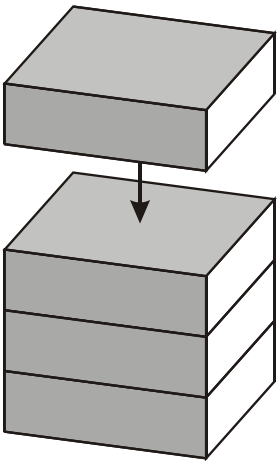


length = cm



width = cm

(b) I start joining matchboxes like this:



How many matchboxes will be in the pile
when its height is 12 cm?

.....

.....

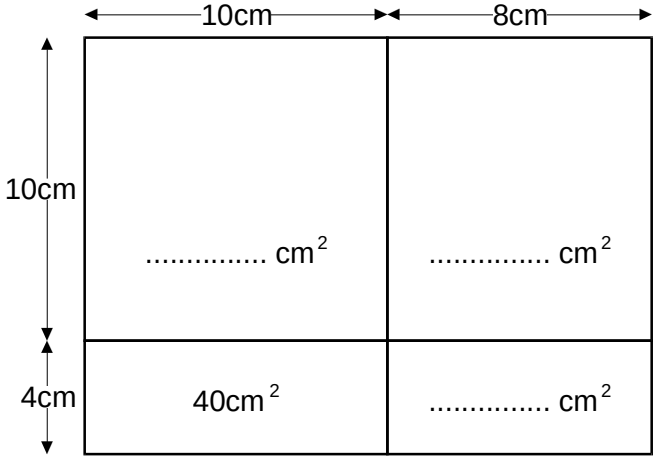
Level 5

2. (a) The diagram shows a rectangle 18cm long and 14cm wide.

It has been split into four smaller rectangles.

Write the area of each small rectangle on the diagram.

One has been done for you.



(b) What is the area of the whole rectangle?

..... cm²

(c) What is 18 × 14?

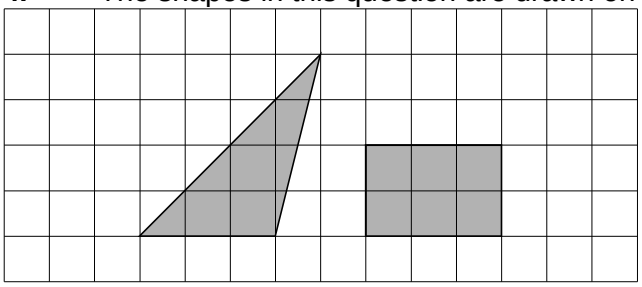
18 × 14 = …….

3. Centimetres are a measure of length.
What are square centimetres a measure of?

.....

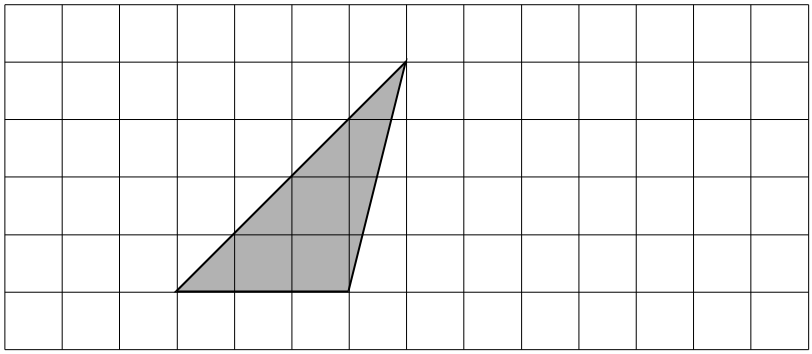
Level 6

4. The shapes in this question are drawn on square grids.

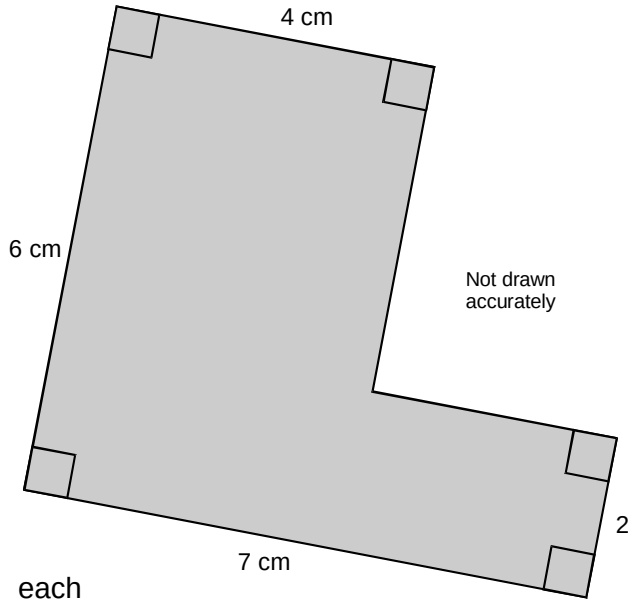


(a) Show that the triangle and the rectangle have the same area.

(b) On the grid below, draw a parallelogram that has the same area as the triangle. It must not have any right angles.



5. What is the area of this L-shape? Show your working.

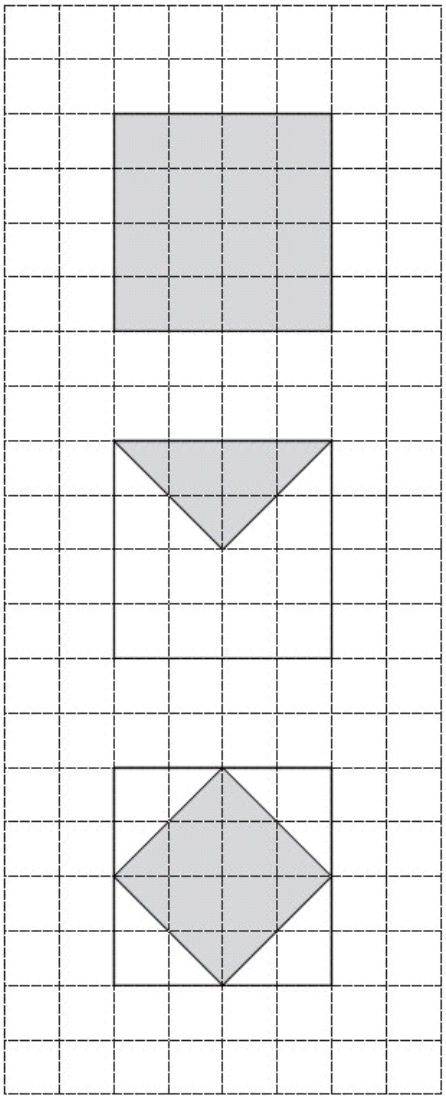


..... cm²

Level 4

1. Look at the diagrams on the centimetre square grid.

Work out the area that is shaded on each



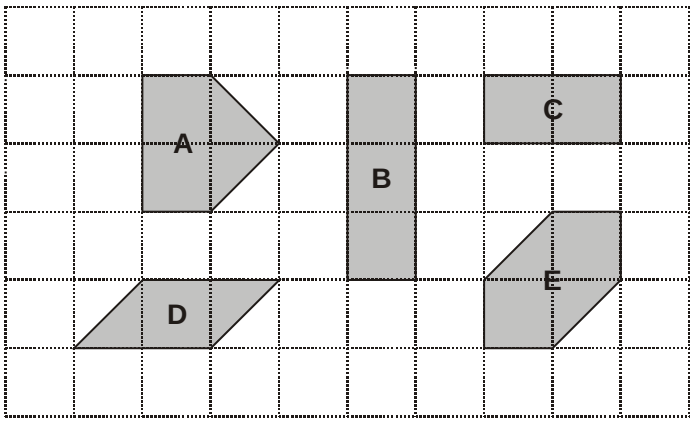
..... cm^2

..... cm^2

..... cm^2

diagram.

2. The diagram shows some shapes on a 10 by 6 square grid.



(a) Which two shapes have the same area as shape A?

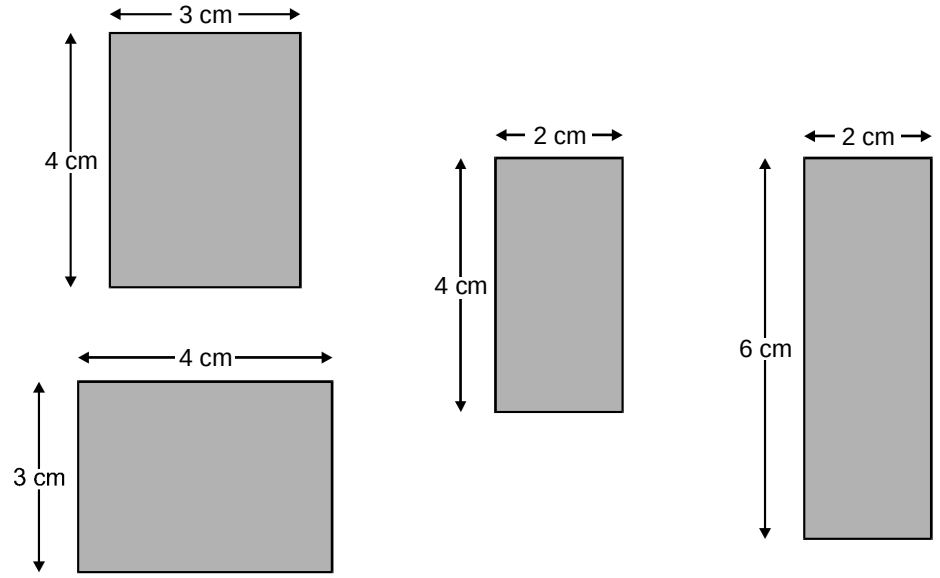
.....

(b) Which two shapes have the same perimeter as shape A?

.....

Level 5

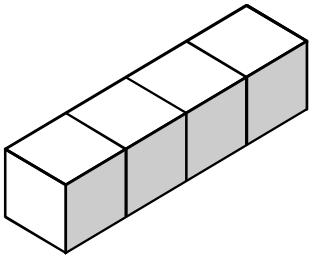
3. (a) Tick (✓) any rectangles below that have an area of $12cm^2$



(b) A square has an area of $100cm^2$? What is its perimeter? Show your working.

…… cm

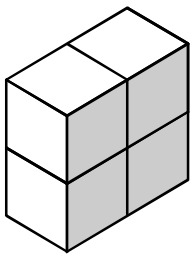
4. This shape is made from four cubes joined together.



The table shows information about the shape.

Volume	4 cm^3
Surface Area	18 cm^2

The same four cubes are then used to make this new shape.



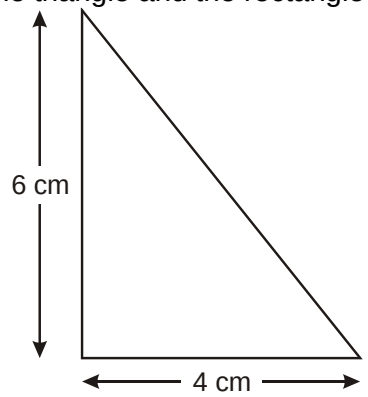
Complete the table for the new shape.

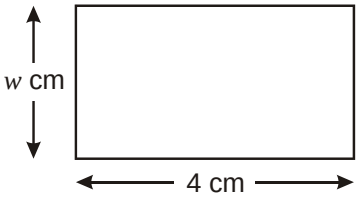
Volume	..... cm^3
Surface Area	..... cm^2

Level 6

5. The triangle and the rectangle below have the same area.

Not drawn accurately

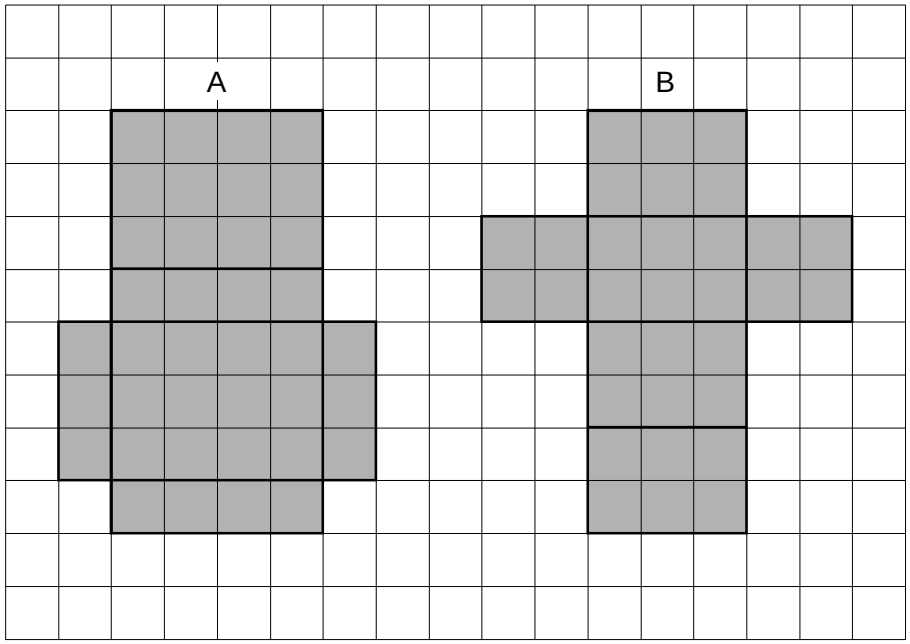




Work out the value of w
Show your working.

w = …… cm

6. The squared paper shows the nets of cuboid A and cuboid B.



(a) Do the cuboids have the same surface area?

Show calculations to explain how you know.

(b) Do the cuboids have the same volume?
Show calculations to explain how you know.

Extension Test Question

Question 1

Sixty four thousand eight hundred and six people watched a football match.

(a) i) Write this number in figures.
ii) Write this number to the nearest thousand.

There were 26 431 visiting supporters present.

(b) i) Write this number in words.
ii) Write this number to the nearest hundred.

Question 2

(a) Write the number 807 in words.

(b) Write the number one hundred thousand and fifty seven in figures.

5342, 2104, 483, 2901, 712

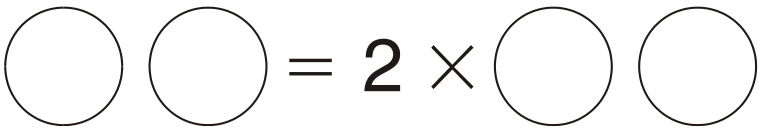
(c) Write these numbers in order. Start with the smallest number.

Question 3

The diagram shows four discs with numbers on.

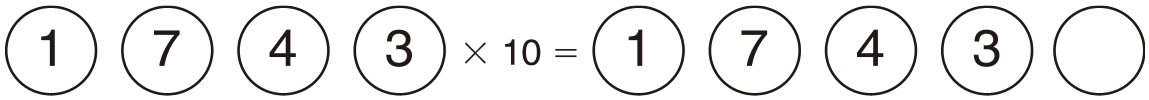
The number shown here is 1743.

(a) Using all these four discs only, write down
i) the **largest** number you could make,
ii) the **smallest** number you could make,
iii) the missing numbers in this problem. **(4 marks)**



Another different disc is needed to complete the problem below.

(b) Write the missing number on the empty disc. **(1 mark)**



Here is another disc

The number on this disc is doubled. Then 3 is added.
The answer is then 15.

(c) What is the number on this disc? **(1 mark)**

Question 4

(a) i) Write down the number **fifty two thousand four hundred and six** in figures.

ii) Write down **fifty two thousand four hundred and six** to the nearest thousand.

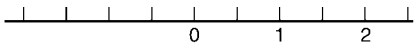
(2 marks)

(b) i) Write down 10 292 in words.

ii) Write down 10 292 to the nearest hundred. **(2 marks)**

Question 5

On the number line mark with an arrow the position of the number.



i) $1\frac{1}{2}$

ii) -2

Question 6

The lowest temperatures recorded in Manchester each night for a week are given below.

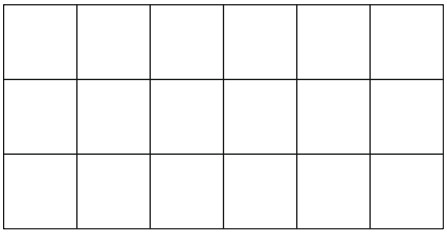
7°C, –4°C, 3°C, 1°C, –2°C, 0°C, –1°C

(a) Write down the temperatures in order. Start with the lowest temperature.

(b) Work out the difference between the highest and lowest temperatures.

Question 7

(a) Shade $\frac{2}{3}$ of this shape.



(1 mark)

(b) Write $\frac{3}{5}$

(i) as a decimal,
(ii) as a percentage. **(2 marks)**

(c) **(i)** Write down **thirty one thousand three hundred and two** in figures.

(ii) Write down 13 820 to the nearest thousand. **(2 marks)**

(d) Explain how you would estimate 97×62. **(2 marks)**

Question 8

The price of a box of chocolates is £4.32
There are 24 chocolates in the box.

(a) Work out the cost of **one** chocolate. ..... p

(3 marks)

> **Special offer.**
>
> Buy **one** box of chocolates for £4.32
>
> Buy a **second** box of chocolates for half price.

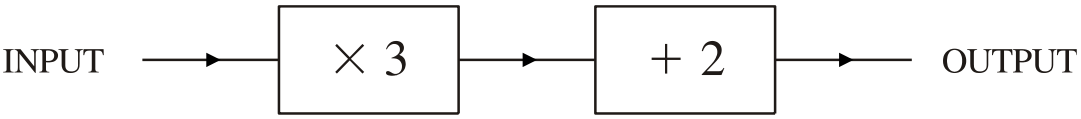
George buys two boxes of chocolates on the special offer.

(b) Work out the total amount George should pay for the two boxes of chocolates. £ .....

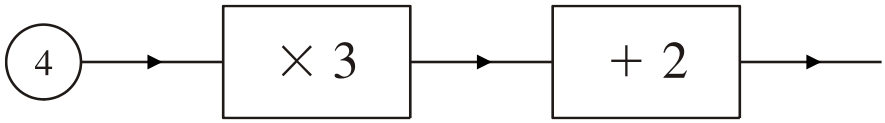
(2 marks)

Question 9

The diagram shows a mathematical rule.

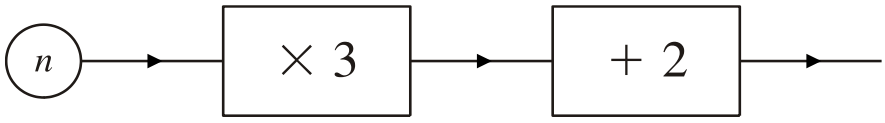


(a) Work out the output.



(1 mark)

(b) Write down an expression, in terms of n, for the output.



(1 mark)

(c) $y = 3x + 2$

(i) Find y when $x = 3$.

(ii) Find x when $y = 17$. **(3 marks)**

Question 10

Simplify

(i) $a + a + a + a$
(ii) $4b + 2c + 3b - 6c$ **(3 marks)**

Question 11

30 people used a Sports Centre one evening.
Here is a list of the activities in which they took part.

Gym	Swimming	Squash	Swimming	Aerobics
Swimming	Aerobics	Aerobics	Aerobics	Gym
Aerobics	Gym	Gym	Gym	Squash
Squash	Gym	Squash	Gym	Gym
Gym	Aerobics	Aerobics	Squash	Gym
Gym	Aerobics	Squash	Gym	Aerobics

(a) Complete the table to show this information

Activity	Tally	Frequency
Gym		
Swimming		
Squash		
Aerobics		
Total		30

(3 marks)

Question 12

There are 50 pupils in each of the groups, Year 9, Year 10 and Year 11 at Lucea High School.
A survey was carried out to find how many pets these pupils owned.
The results are shown in the table below.

Number of pets	Year 9	Year 10	Year 11
0	2	5	32
1	29	22	11
2	14	19	6
3	5	4	1
4	1	0	0

(a) How many pupils in Year 10 own no pets?

(b) How many of the pupils own exactly 2 pets?

(c) What is the most common number of pets owned by pupils?

(d) Which year group owns the least number of pets? Use the figures to explain your answer.

Question 13

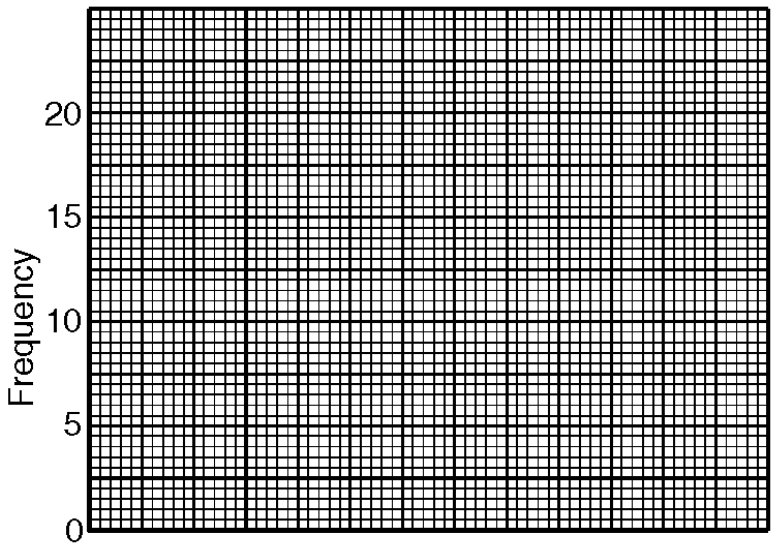
Robin had a holiday job packing cheese.
Each pack of cheese should weigh 500 grams.
Robin had 30 packs of cheese.
Robin checked the weights, in grams, correct to the nearest gram.
These are the results.

512	506	503	506	499
499	500	504	502	503
496	497	497	509	506
499	497	498	507	511
498	491	496	506	507
493	496	503	510	508

(a) Complete the grouped frequency table for the weights. Use class intervals of 5 g.

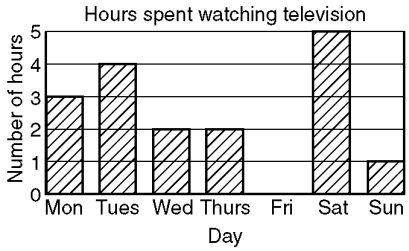
Weight (w grams)	Tally	Frequency
$490 \leq w < 495$		

(b) On the grid draw a frequency diagram to represent the data.



Question 14

The bar chart shows the number of hours Jason spent watching television in one week.

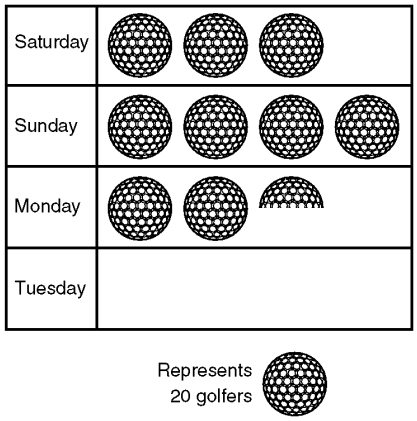


(a) Write down the day on which he watched most television.

(b) Work out the total number of hours he spent watching television during the week.

Question 15

The pictogram shows the number of golfers who played at the local golf club last week.



(a) How many golfers played on Sunday?

(b) How many golfers played on Monday?

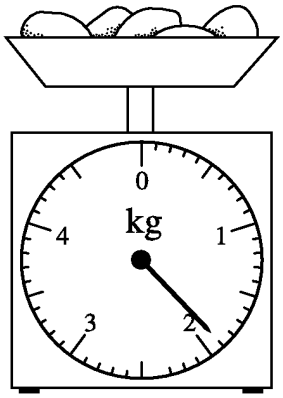
On Tuesday 35 golfers played
(c) Complete the pictogram to show this.

Question 16

Write down the **metric** unit you would use to measure:
i) the length of a person's hand
ii) the weight of a mouse
iii) the distance from Manchester to London
iv) a teaspoon of medicine **(4 marks)**

Question 17

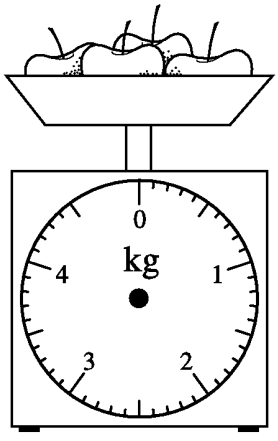
The diagram shows some potatoes on a set of scales.



(a) Write down the weight of the potatoes.

Fred buys some apples.
They weigh 3.65 kilograms.

(b) Draw a pointer showing 3.65 kilograms on the scales.



(c) Work out the approximate weight of the apples in pounds.

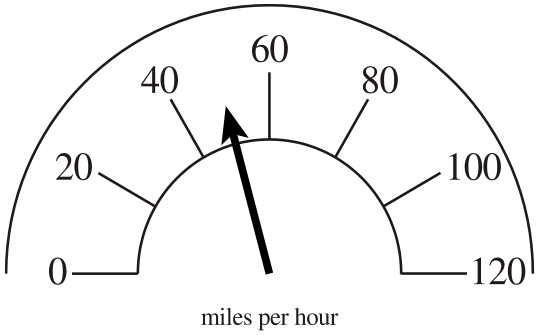
In part d you must write down the units with your answer.
The apples cost 99p per kilogram.

(d) Work out the total cost of 3.65 kg of apples.

Question 18

Write down the reading shown on this scale.

Be as accurate as you can.



..... miles per hour
(1 mark)