

Year 8 Maths



Home Learning Summer Term



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Remember, you do not need to complete these questions in the given order. If you find a topic/question difficult, move on to another topic/question and then go back to the difficult topic/question at the end.

There are some useful websites listed on the last page of this booklet which might be helpful if you are stuck.

You can also contact your teacher via email, the hegarty maths website or Microsoft Teams if you are stuck and need help.

Types of Numbers

Things to remember:

- A factor is a whole number that divides exactly into another number.
- A multiple is a number that may be divided by another a certain number of times without a remainder.
- A prime number only has 2 factors; 1 and itself.
- A power tells us how many times the base number has been multiplied by itself
- A root is the opposite of a power.
- A square number is the result of multiplying an integer (whole number) by itself.

Questions:

1. (a) Write down the square of 8

.....
(1)

(b) Write down the value of 10^3

.....
(1)

2. Here is a list of eight numbers: 4 5 14 25 29 30 33 39 40
From the list, write down

(i) a factor of 20

.....

(ii) a multiple of 10

.....

(iii) the prime number that is greater than 15

.....

(Total for Question is 3 marks)

3. Express 180 as a product of its prime factors. (Draw a prime factor tree).

4. (a) Write down the value of 7^2

.....
(1)

(b) Write down the value of $\sqrt{25}$

.....
(1)

(c) Write down the value of 2^3

.....

Place Value

Things to remember:

Label columns as below

Thousands	Hundreds	Tens	Units	●	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
-----------	----------	------	-------	---	----------------	-----------------	------------------

Questions:

1. (a) Write the number **seven thousand and twenty five** in figures.

.....
(1)

- (b) Write the number 9450 in words.

.....
(1)

- (c) Write the number 28.75 to the nearest whole number.

.....
(1)

- (d) Write the number 7380 to the nearest thousand.

.....
(1)

(Total for Question is 4 marks)

2. Write down the value of the 3 in the number 4376

.....
(Total for question = 1 mark)

3. Write down the value of the 3 in 16.35

.....
(Total for question is 1 mark)

4. (a) Work out $90 \div 10$

.....
(1)

- (b) Write these numbers in order of size. Start with the smallest number.

2.8 4.71 0.6 13.4

.....
(1)

- (c) Write $\frac{7}{10}$ as a decimal.

Rounding

Things to remember:

- If the next number is less than 5, round down.
- If the next number is 5 or more, round up.

Questions:

1. Write the number 2.738 correct to 2 decimal places.

.....
(Total for Question is 1 mark)

2. Write the number **7378** to the nearest hundred.

.....
(Total for Question is 1 mark)

3. 28569 people watch a football match. Write 28569 to the nearest hundred.

.....
(Total for Question is 1 mark)

4. (a) Write 5643 to the nearest hundred.

.....
(1)

(b) Write 197 768 to the nearest thousand.

.....
(1)
(Total for Question is 2 marks)

5. (a) Write the number 28.75 to the nearest whole number.

.....
(1)

(b) Write the number 7380 to the nearest thousand.

.....
(1)
(Total for Question is 4 marks)

6. Write down 157 correct to the nearest 10

.....
(Total for Question is 1 mark)

7. Write 6431 to the nearest thousand.

.....
(Total for Question is 1 mark)

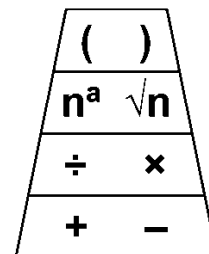
8. Write 6718 correct to the nearest hundred.

.....
(Total for Question is 1 mark)

Order of Operations

Things to remember:

- Brackets, indices, division and multiplication (left to right), addition and subtraction (left to right).



Questions:

1. Work out

(i) $2 \times 3 + 4$

(ii) $10 - 2 \times 5$

(iii) $16 \div (2 \times 4)$

.....

.....

.....

(Total 3 marks)

2. Beth says $20 - 5 \times 3$ is 45

Pat says $20 - 5 \times 3$ is 5

(a) Who is right?

Give a reason for your answer.

..... is right because

.....

.....

(1)

(b) Work out $(12 + 9) \div 3$

.....

(1)

(Total 2 marks)

3. Work out

(i) $3 \times 3 - 5$

(ii) $20 \div (12 - 2)$

(iii) $7 + 8 \div 4$

.....

.....

.....

(Total 3 marks)

4. (a) Work out $2 \times (11 + 9)$

.....
(1)

(b) Work out $3 \times 5 + 4$

.....
(1)

(c) Work out $20 - 5 \times 3$

.....
(1)
(Total 3 marks)

5. (a) Work out $4 \times 5 - 8$

.....
(1)

(b) Work out $18 + 2 \times 3$

.....
(1)

(c) Work out $(4 + 3) \times 7$

.....
(1)
(Total 3 marks)

6. (a) Work out the value of $(2 + 3) \times 4 + 5$

.....
(1)

(b) Add brackets () to make each statement correct.
You may use more than one pair of brackets in each statement.

(i) $2 + 3 \times 4 + 5 = 29$

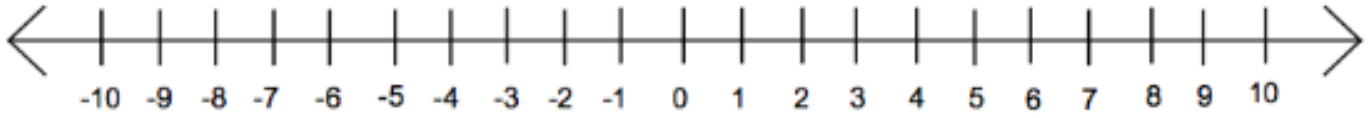
(ii) $2 + 3 \times 4 + 5 = 45$

(2)
(Total 3 marks)

Directed Numbers

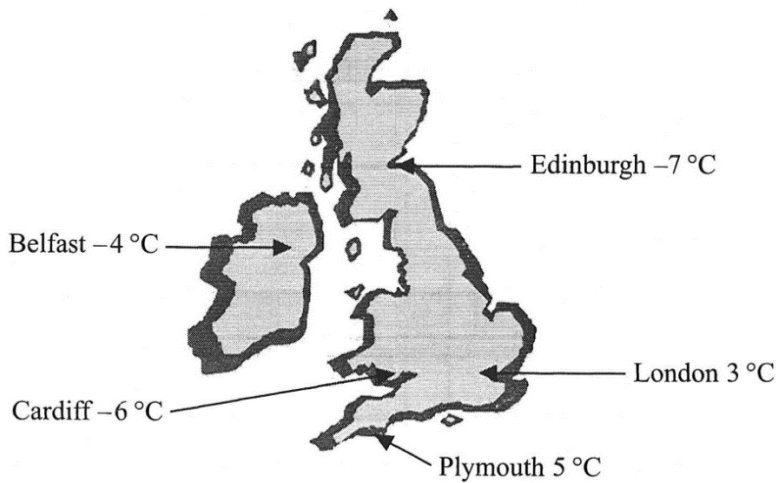
Things to remember:

- Mixed means minus!
- Use a number line – if you're adding you need to move in a positive direction (right), if you're subtracting you need to move in a negative direction (left).



Questions:

1. Here is a map of the British Isles. The temperatures in some places, one night last winter are shown on the map.



- (a) (i) Write down the names of the two places that had the biggest difference in temperature.

.....

- (ii) Work out the difference in temperature between these two places.

..... $^{\circ}\text{C}$
(3)

- (b) Two pairs of places have a difference in temperature of 2°C . Write down the names of these places.

(i) and

(ii) and

(2)
(Total 5 marks)

2. Sally wrote down the temperature at different times on 1st January 2003.

Time	Temperature
midnight	- 6 °C
4 am	-10 °C
8 am	- 4 °C
noon	7 °C
3 pm	6 °C
7 pm	-2 °C

- (a) Write down
- (i) the **highest** temperature,°C
- (ii) the **lowest** temperature.°C
(2)
- (b) Work out the difference in the temperature between
- (i) 4 am and 8 am,°C
- (ii) 3 pm and 7 pm.°C
(2)

At 11 pm that day the temperature had fallen by 5 °C from its value at 7 pm.

- (c) Work out the temperature at 11 pm.
.....°C
(1)
- (Total 5 marks)**

3. The table shows the temperature on the surface of each of five planets.

Planet	Temperature
Venus	480 °C
Mars	- 60 °C
Jupiter	- 150 °C
Saturn	- 180 °C
Uranus	- 210 °C

- (a) Work out the difference in temperature between Mars and Jupiter.
.....°C
(1)
- (b) Work out the difference in temperature between Venus and Mars.
.....°C
(1)
- (c) Which planet has a temperature 30 °C higher than the temperature on Saturn?
.....
(1)

The temperature on Pluto is 20 °C lower than the temperature on Uranus.

- (d) Work out the temperature on Pluto.
.....°C
(1)

4. The table shows the highest and lowest temperatures one day in London and Moscow.

	Highest	Lowest
London	8°C	-6°C
Moscow	-3°C	-8°C

- (a) Work out the difference between the **lowest** temperature in London and the **lowest** temperature in Moscow.

.....°C
(1)

- (b) Work out the difference between the **highest** and **lowest** temperature in London.

.....°C
(1)

(Total 2 marks)

5. The table shows the midday temperatures in 4 different cities on Monday.

City	Midday temperature (°C)
Belfast	5
Cardiff	-1
Glasgow	-6
London	-4

- (a) Which city had the lowest temperature?

.....
(1)

- (b) Work out the difference between the temperature in Cardiff and the temperature in Belfast.

.....°C
(1)

By Tuesday, the midday temperature in London had risen by 7 °C.

- (c) Work out the midday temperature in London on Tuesday.

.....°C

Area and Perimeter of Rectangles and Triangles

Things to remember:

- Area of a rectangle = base x height
- Area of a triangle = $\frac{1}{2}$ x base x height
- The perimeter is the distance around the outside of shape

Questions:

1. On the centimetre grid, draw a rectangle with an area of 12 cm^2 .



(Total for Question is 2 marks)

2. On the grid of centimetre squares, draw a rectangle with a perimeter of 10 cm.



(Total for Question is 2 marks)

3. Here is a rectangle. Work out the area of this rectangle.

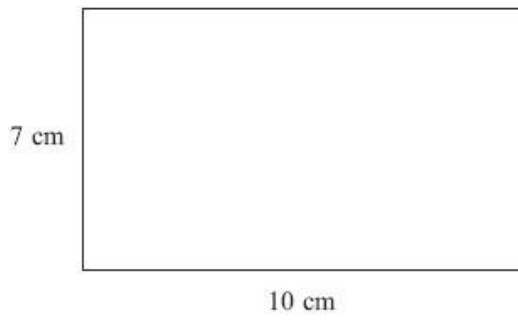
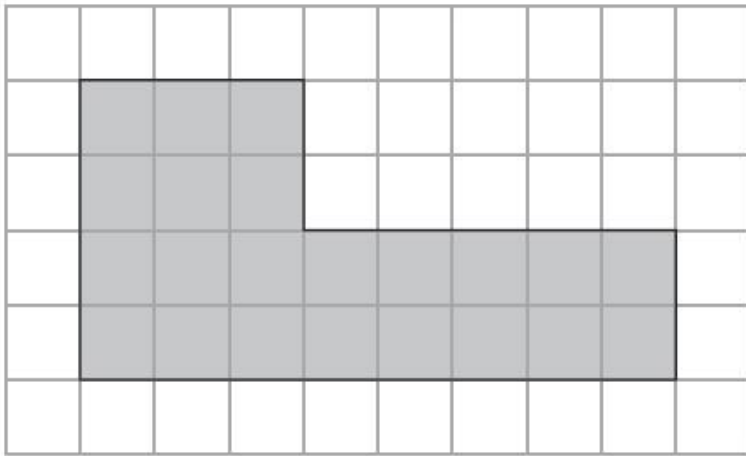


Diagram **NOT**
accurately drawn

..... cm²
(Total for Question is 2 marks)

4. The shaded shape is drawn on a grid of centimetre squares.



- (a) Find the perimeter of the shaded shape.

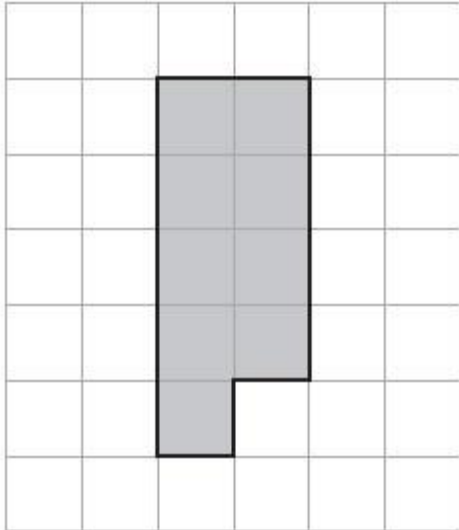
..... cm
(1)

- (b) Find the area of the shaded shape.

..... cm²
(1)

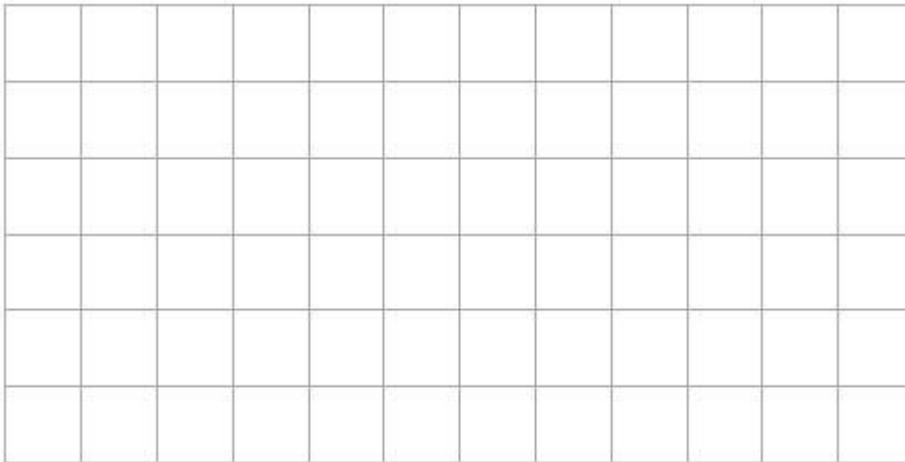
(Total for Question is 2 marks)

5. The shaded shape is drawn on a grid of centimetre squares.
(a) Find the perimeter of the shaded shape.



..... cm
(2)

- (b) On the grid below, draw a square with the same area as the shaded shape.



(1)
(Total for Question is 3 marks)

6. Dilys buys a new house.
She wants to have a lawn in the back garden.
The lawn is going to be in the shape of a rectangle.

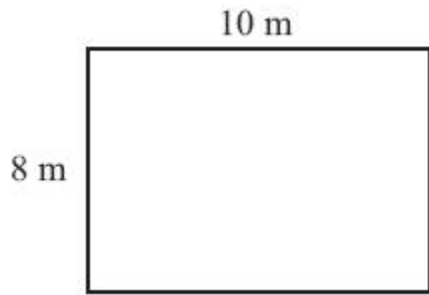


Diagram **NOT**
accurately drawn

The lawn will have a length of 10 m. The lawn will have a width of 8 m.
Dilys wants to buy edging strip for her lawn.
The length of the edging strip needs to be equal to the perimeter of her lawn.
Edging strip costs £1.50 per metre. What is the total cost of the edging strip?

£.....
(Total for Question is 4 marks)

Collecting Like Terms (Simplifying)

Things to remember:

- $2a$ means $a + a$ or 2 lots of a
- a^2 means $a \times a$
- The sign (+ or -) belongs to the term following it. You may find it easier to identify like terms using two different highlighters.

Questions:

1. (a) Simplify $a + a + a + a$

.....
(1)

(b) Simplify $3 \times c \times d$

.....
(1)

(c) Simplify $3ef + 5ef - ef$

.....
(1)

2. (a) Simplify $b + b + b + b$

.....
(1)

(b) Simplify $8n - 3n$

.....
(1)

(c) Simplify $3 \times c \times d$

.....
(1)

(d) Simplify $3x + 7y + 2x - y$

.....
(2)

3. Simplify $3x + 5y + x + 4y$

.....

4. (a) Simplify $a \times c \times 3$

(b) Simplify $p \times p \times p$

.....
(1)

(c) Simplify $5x - 4y + 3x - 3y$

.....
(1)

.....
(2)
(Total for Question is 4 marks)

5. (a) Simplify $5a - 2a$

.....
(1)

(b) Simplify $3 \times 4y$

.....
(1)

(c) Simplify $3e + 4f + 2e - f$

.....
(2)
(Total for Question is 4 marks)

Expanding and Factorising (Single Brackets)

Things to remember:

- Expand brackets means to multiply what is outside the bracket with everything inside the bracket.
- Factorising is the opposite of expanding – put the HCF outside the brackets to factorise fully.

Questions:

1. (a) Expand $5(m + 2)$

.....
(1)

(b) Factorise $y^2 + 3y$

.....
(1)

(c) Simplify $a^5 \times a^4$

.....
(1)

(Total for Question is 3 marks)

2. (a) Expand $2m(m + 3)$

.....
(1)

(b) Factorise fully $3xy^2 - 6xy$

.....
(2)

(Total for Question is 3 marks)

3. (a) Expand $3(x + 4)$

.....
(1)

(b) Expand $x(x^2 + 2)$

.....
(2)

(c) Factorise $x^2 - 6x$

.....
(1)

(Total for Question is 4 marks)

4. (a) Expand and simplify $5(x + 7) + 3(x - 2)$

(b) Factorise completely $3a^2b + 6ab^2$

.....
(2)

.....
(2)
(Total for Question is 4 marks)

5. (a) Expand $3(2y - 5)$

.....
(1)

(b) Factorise completely $8x^2 + 4xy$

.....
(2)
(Total for Question is 3 marks)

6. (a) Factorise $3x + 6$

.....
(1)

(b) Expand and simplify $5(y - 2) + 2(y - 3)$

.....
(2)
(Total for Question is 3 marks)

7. (a) Factorise $4x + 10y$

.....
(1)

(b) Factorise $x^2 + 7x$

.....
(1)
(Total for Question is 2 marks)

Substitution

Things to remember:

- There is always 1 mark just for writing down the numbers you have had to put into the expression.
- Your answer must be a number – don't forget to finish the sum
- The question will always use the words "Work out the value of"

Questions:

1. (a) Work out the value of $3x - 4y$ when $x = 3$ and $y = 2$

.....
(2)

(b) Work out the value of when $p = 2$ and $q = -7$

.....
(3)
(Total 5 marks)

2. Find the value of $t^2 - 4t$ when $t = -3$

.....
(Total 2 marks)

3. $P = x^2 - 7x$
Work out the value of P when $x = -5$

$P =$
(Total 2 marks)

4. T, x and y are connected by the formula
 $T = 5x + 2y$
 $x = -3$ and $y = 4$
 (a) Work out the value of T.

T =
 (2)

- T = 16 and x = 7
 (b) Work out the value of y.

y =
 (3)
(Total 5 marks)

5. $P = 4k - 10$
 $P = 50$
 (a) Work out the value of k.

.....
 (2)

6. $h = 5t^2 + 2$
 (i) Work out the value of h when $t = -2$

- (ii) Work out a value of t when $h = 47$

.....

.....

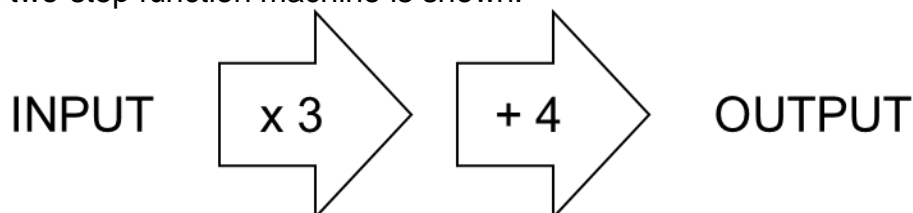
Solving Linear Equations

Things to remember:

- “Solve” means to find the value of the variable (what number the letter represents).
- The inverse of + is – and the inverse of \times is \div
- Work one step at a time, keeping you = signs in line on each new row of working.

Questions:

1. A two-step function machine is shown.



(a) When the input is -4, what is the output?

.....
(1)

(b) If the output is 25, what was the input?

.....
(1)

(c) If the input is n , what is the output?

.....
(2)

(Total for Question is 4 marks)

2. You can use this rule to work out the total cost of hiring a car.

Total cost = £4 per hour plus £12
--

Arun hires a car for 5 hours.

(a) Work out the total cost.

£.....
(2)

Raj hires a car.

The total cost is £40

(b) Work out how many hours Raj hires the car for.

..... hours
(3)

(Total for Question is 5 marks)

3. (a) Solve $6g = 18$

$g = \dots\dots\dots$
(1)

(b) Solve $5h + 7 = 17$

$h = \dots\dots\dots$
(2)

(Total for Question is 3 marks)

4. (a) Solve $x + 9 = 19$

$x = \dots\dots\dots$
(1)

(b) Solve $2y = 17$

$y = \dots\dots\dots$
(1)

(c) Solve $\frac{w}{4} = 8$

$w = \dots\dots\dots$
(1)

(Total for Question is 3 marks)

5. (a) Solve $\frac{n}{7} = 2$

$n = \dots\dots\dots$
(1)

(b) Solve $3g + 4 = 19$

$g = \dots\dots\dots$
(2)

(Total for Question is 3 marks)

6. (a) Solve $4x = 20$

$x = \dots\dots\dots$
(1)

(b) Solve $y - 9 = 17$

$y = \dots\dots\dots$
(1)
(Total for question = 2 marks)

7. Solve $3x + 7 = 1$

$x = \dots\dots\dots$
(Total for question = 2 marks)

8. Solve $4x + 5 = x + 26$

$x = \dots\dots\dots$
(Total for question = 2 marks)

Inequalities

Things to remember:

- $<$ means less than
- $>$ means greater than
- \leq means less than or equal to
- \geq means greater than or equal to
- An integer is a whole number
- On a number line, use a full circle to show a value can be equal, and an empty circle to show it cannot.

Questions:

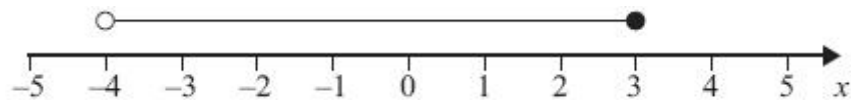
1. $-2 < n \leq 3$
 n is an integer.
Write down all the possible values of n .

.....
(Total for Question is 2 marks)

2. (a) n is an integer.
 $-1 \leq n < 4$
List the possible values of n .

.....
(2)

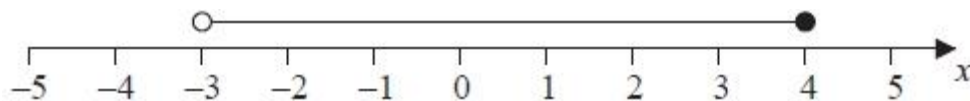
(b)



Write down the inequality shown in the diagram.

.....
(2)
(Total for Question is 4 marks)

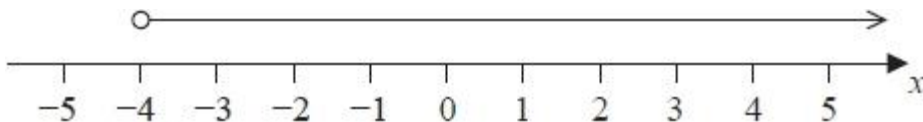
3. Here is an inequality, in x , shown on a number line.



Write down the inequality.

.....
(Total for Question is 2 marks)

4.



(a) Write down the inequality represented on the number line.

.....
(1)

(b) $-3 \leq n < 2$

$-2 < m < 4$

n and m are integers.

Given that $n = m$, write down all the possible values of n .

.....
(2)

(Total for question = 5 marks)

5. $-5 < y \leq 0$

y is an integer.

Write down all the possible values of y .

.....
(Total for Question is 2 marks)

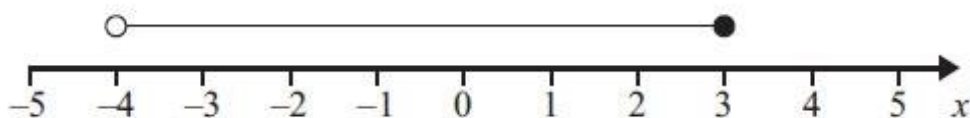
6. (a) n is an integer.

$-1 \leq n < 4$

List the possible values of n .

.....
(2)

(b)



Write down the inequality shown in the diagram.

.....
(2)

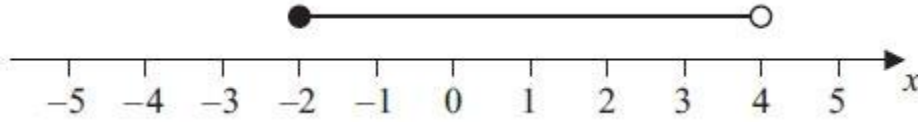
(Total for Question is 4 marks)

7. $-4 < n \leq 1$
 n is an integer.

(a) Write down all the possible values of n .

.....
(2)

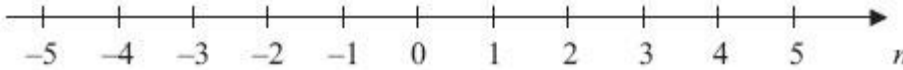
(b) Write down the inequalities represented on the number line.



.....
(2)

(Total for Question is 4 marks)

8. $-2 < n \leq 3$
Represent this inequality on the number line.



(Total for Question is 2 marks)

Solving Inequalities

Questions:

1. (i) Solve the inequality
 $5x - 7 < 2x - 1$

.....

- (ii) On a number line, represent the solution set to part (i).

(Total 3 marks)

2. (a) List all the possible integer values of n such that
 $-2 \leq n < 3$

.....

(2)

- (b) Solve the inequality
 $4p - 8 < 7 - p$

(2)

(Total 4 marks)

3. (a) $-3 \leq n < 2$
 n is an integer.
Write down all the possible values of n .

.....

(2)

- (b) Solve the inequality
 $5x < 2x - 6$

.....

(2)

(Total 4 marks)

4. (a) Solve the inequality
 $3t + 1 < t + 12$

.....
(2)

- (b) t is a whole number.
Write down the largest value of t that satisfies
 $3t + 1 < t + 12$

.....
(1)
(Total 3 marks)

5. Solve $4 < x - 2 \leq 7$

.....
(Total 3 marks)

6. Solve $5x + 3 > 19$

.....
(Total 2 marks)

Simplifying Fractions and Fractions of Amounts

- Divide both the numerator (top) and denominator (bottom) of the fraction by the same factor until in its simplest form.
- To find a fraction of an amount, divide the amount by the denominator, then multiply by the numerator.

Questions:

1. Sam has £480
He spends $\frac{1}{4}$ of the £480
Work out how much money Sam has left.

£

(Total for Question is 3 marks)

- *2. The normal price of a denim shirt at a shop is £9.60
On Special Offer Day, there is $\frac{1}{3}$ off the normal price.



Billy has £13
Has he enough money to buy two denim shirts on Special Offer Day?
You must show all your working.

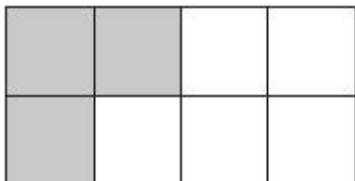
(Total for Question is 4 marks)

3. Here is a shape. Shade $\frac{3}{4}$ of this shape.



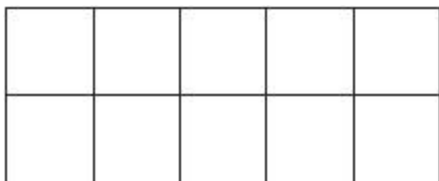
(Total for Question is 1 mark)

4. (a) Write down the fraction of this shape that is shaded.



..... (1)

(b) Shade $\frac{1}{5}$ of this shape.



(1)

Here are some fractions.

$\frac{3}{10}$ $\frac{2}{8}$ $\frac{4}{12}$ $\frac{12}{40}$ $\frac{5}{20}$

Two of these fractions are equivalent to $\frac{1}{4}$

(c) Which two fractions?

..... and (2)

(Total for question = 5 marks)

- *5. Here are two fractions.
 $\frac{2}{3}$ $\frac{7}{8}$
 Which of these fractions has a value closer to $\frac{3}{4}$?
 You must show clearly how you get your answer.

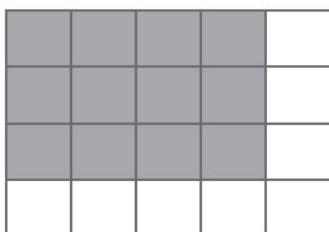
(Total for Question is 3 marks)

6. Why does $\frac{1}{4} = \frac{2}{8}$?

.....

(Total for Question is 2 marks)

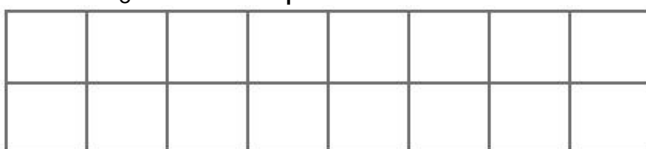
7. (a) What fraction of this shape is shaded?



Write your fraction in its simplest form.

..... (2)

- (b) Shade $\frac{3}{8}$ of this shape.



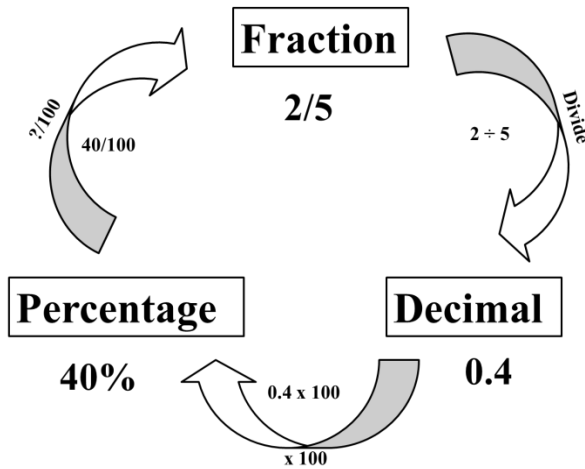
(1)
 (Total for Question is 3 marks)

8. Write 35 out of 65 as a fraction.
 Give your fraction in its simplest form.

.....
 (Total for question = 2 marks)

Fractions, Decimals and Percentages

Things to remember:



Questions:

1. (a) Write 0.1 as a fraction.

.....
(1)

(b) Write $\frac{1}{4}$ as a decimal.

.....
(1)

(Total for Question is 2 marks)

2. (a) Write $\frac{3}{4}$ as a decimal.

.....
(1)

(b) Write 0.3 as a fraction.

.....
(1)

(Total for Question is 2 marks)

3. (a) Write $\frac{1}{4}$ as a decimal.

.....
(1)

(b) Write 0.15 as a fraction.

.....
(1)

(c) Write 17 out of 40 as a fraction.

.....
(1)

(Total for question = 3 marks)

4. (a) Write $\frac{7}{10}$ as a decimal.

 (1)
- (b) Write 0.45 as a percentage.

 (1)
- (c) Write 30% as a fraction.
 Give your fraction in its simplest form.

 (2)
- (Total for Question is 4 marks)**

5. (a) Write 0.7 as a fraction.

 (1)
- (b) Write 0.3 as a percentage.

 (1)
- (c) Write $\frac{8}{12}$ in its simplest form.

 (1)
- (Total for Question is 3 marks)**

6. Write these numbers in order of size. Start with the smallest number.
 75% $\frac{7}{8}$ 0.25 $\frac{1}{2}$ $\frac{2}{3}$
-

- (Total for question = 2 marks)**

7. Write these numbers in order of size. Start with the smallest number.
 0.6 $\frac{2}{3}$ 65% 0.606

.....
.....
(Total for question = 2 marks)

Percentages of Amounts, Increasing and Decreasing

Things to remember:

- “Per cent” means “out of 100”.
- Increase means the value will go up, decrease means the value will go down.

Questions:

1. David is going to buy a cooker.
The cooker has a price of £320
David pays a deposit of 15% of the price of the cooker.
How much money does David pay as a deposit?

£
(Total for Question is 2 marks)

2. Work out 65% of 300

.....
(Total for question = 2 marks)

£
(Total for Question is 5 marks)

- *6. Jim's pay is £180 each week.
Jim asks his boss for an increase of £20 a week.
Jim's boss offers him a 10% increase.
Is the offer from Jim's boss more than Jim asked for?
You must show your working.

(Total for Question is 3 marks)

- *7. Gordon owns a shop.
Here are the prices of three items in Gordon's shop and in a Supermarket.

Gordon's Shop	
400 g loaf of bread	£1.22
1 litre of milk	£0.96
40 tea bags	£2.42

Supermarket	
400 g loaf of bread	£1.15
1 litre of milk	£0.86
40 tea bags	£2.28

Gordon reduces his prices by 5%.
Will the total cost of these three items be cheaper in Gordon's shop than in the Supermarket?

(Total for Question is 3 marks)

8. Mr Brown and his 2 children are going to London by train.
An adult ticket costs £24
A child ticket costs £12
Mr Brown has a Family Railcard.

Family Railcard gives

$\frac{1}{3}$ off adult tickets

60% off child tickets

Work out the total cost of the tickets when Mr Brown uses his Family Railcard.

Useful websites:

www.mathswatchvle.com

www.methodmaths.com

www.hegartymaths.com

www.mymaths.co.uk

www.dr frost.com

www.bbc.co.uk/schools/gcsebitesize/maths

**Remember: Do your best;
it is all you can do 😊**