Preparing for Year 10 Foundation Maths

This booklet contains all of the key topics you need to be confident with, in order to succeed at GCSE maths.

You must complete all of the questions. You can print and complete this booklet or complete the work in your exercise books. Alternatively, all documents that form this booklet have been set to you on Dr Frost.

Each question has a code listed. If you search the code on Dr Frost you will find a video, and examples to help. If completing on Dr Frost, the video link should appear at the top right of each question.

Your username is your school email.

Your password should be Downham, unless you have changed it.

Please ensure that you have your completed work with you, during the first Maths lesson in September.

Preparing for Year 10 - Foundation. Number. FDP.

Question 1

Skill involved: 106a: Convert a percentage up to 100% to a decimal with up to 2 decimal places.

Convert 43% to a decimal.

....

Question 2

Skill involved: 106b: Convert a decimal with 1 decimal place to a percentage.

Write 0.3 as a percentage.

.... %

Question 3

Skill involved: 172d: Convert a fraction to a percentage, where the denominator is a factor or multiple of 10, 100 or 1000.

Convert $\frac{22}{25}$ to a percentage.

.... %

Question 4

Skill involved: 172c: Convert a fraction to a non-recurring decimal using equivalent fractions and place value.

Convert $\frac{12}{40}$ to a decimal.

....

Question 5

Skill involved: 172h: Convert a non-recurring decimal to a fraction.

Write 0.54 as a fraction.
Give your answer in its simplest form.

Question 6

Skill involved: 172i: Convert a decimal with up to 3 decimal places to a percentage.

Write 0.099 as a percentage.

.... %

Question 7

Skill involved: 172j: Convert a percentage to a decimal with up to 3 decimal places.

Write 91.3 % as a decimal.

....

Question 8

Skill involved: 172k: Convert a percentage to a fraction.

Convert 66% to a fraction.
Give your answer in its simplest form.

Question 9

Skill involved: 175d: Order a mixture of fractions, decimals and percentages.

Put the numbers below in ascending order.

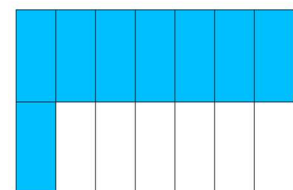Order the following: $\frac{51}{100}$, 0.03 , 58% , 0.24 , $\frac{61}{100}$

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

Question 10

Skill involved: 172b: Determine what percentage of a shape is shaded for more general grid sizes.

Find what percentage of the shape is shaded.

Give your percentage correct to the nearest whole number.

.... %

Preparing for Year 10 - Foundation. Number. Fraction Arithmetic

Question 1

Skill involved: 98d: Write a fraction in simplest form.

Write $\frac{36}{42}$ in its simplest form.

Question 2

Skill involved: 101a: Write an improper fraction as a mixed number.

Write $\frac{49}{9}$ as a mixed number.

Question 3

Skill involved: 100a: Add fractions with different denominators where one fraction needs changing.

Work out $\frac{3}{4} + \frac{19}{20}$

Give your answer as an improper fraction in its simplest form.

Question 4

Skill involved: 100a: Add fractions with different denominators where one fraction needs changing.

Determine $\frac{23}{24} - \frac{1}{8}$

Give your answer in its simplest form.

Question 5

Skill involved: 116b: Order fractions where denominators are different.

Here are four fractions. Put the fractions in order of size. Start with the smallest fraction.

Order the following: $\frac{3}{4}, \frac{5}{7}, \frac{19}{25}, \frac{11}{15}$

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

(2 marks)

Question 6

Skill involved: 165a: Multiply a fraction by a fraction, requiring simplification.

Determine $\frac{2}{9} \times \frac{12}{5}$

Give your answer in its simplest form.

dfm   2

 Preparing for Year 10 - Foundation. Number. Fraction Arithmetic

Question 7

Skill involved: 166b: Divide a fraction by a fraction, requiring simplification.

Calculate $\frac{6}{7} \div \frac{3}{8}$

Give your answer as an improper fraction in its simplest form.

Question 8

Skill involved: 57b: Calculate two-thirds of a given quantity.

The gift shop also sells pencils.

The price of a pencil is $\frac{2}{3}$ of the price of a pen.

Work out the price of a pencil.

Gift shop

Price list

Key ring	£3.20
Hat	£3.99
Pencil case	£2.70
Ruler	45p
Pen	60p
Pencil	

.... p

(2 marks)

Question 9

Skill involved: 101b: Write a mixed number as an improper fraction.

Convert $3\frac{2}{9}$ to an improper fraction.

Question 10

Skill involved: 98h: Interpret values from a graph or table and give the result as a fraction in simplest form.

Ray and Clare are pupils at different schools.
They each did an investigation into their teachers'
favourite colours.

Clare drew a bar chart of her teachers' favourite colours.
Part of her bar chart is shown below.

4 teachers said that Yellow was their favourite colour.
2 teachers said that Green was their favourite colour.
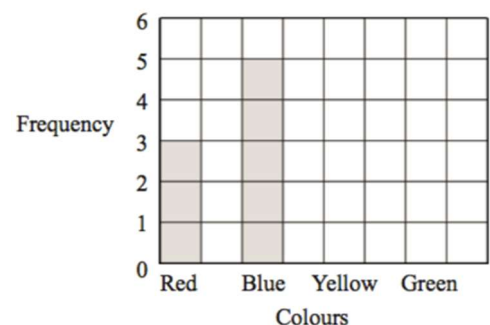
Write down the fraction of the number of teachers that Clare asked who said Red was their
favourite colour.

Preparing for Year 10 - Foundation. Number. Percentages

Question 1

Skill involved: 130f: Calculate the percentage of an amount without a calculator, using chunking with multiples of 10%.

Find 80% of 90

....

Question 2

Skill involved: 130g: Calculate the percentage of an amount without a calculator, using chunking with multiples of 5%.

Find 95% of 80

....

Question 3

Skill involved: 214a: Determine what percentage one number is of another.

Alicia scored 50 out of 55 in a Arithmetic test.
Write Alicia's score as a percentage.

.... %

Question 4

Skill involved: 215a: Calculate a percentage change with a calculator.

The price of a flat increases from £132085 to £169068.80

Find the percentage increase.

.... %

Question 5

Skill involved: 215b: Calculate percentage profit or loss when selling items at a fixed price.

Fatima buys 30 cuddly toys for a total cost of £360.
She sells them all for £6.60 each
Calculate her percentage loss.

.... %

Question 6

Skill involved: 215c: Calculate percentage profit or loss when selling items at variable prices.

Aadhya buys 360 dog toys for £4.80 each.

She sells $\frac{2}{3}$ of the toys for £6.14 each.

She sells 17.5% of the toys for £5.71 each. She sells the remaining toys for £5.31 each.

Calculate her percentage profit.

.... %

Question 7

Skill involved: 219a: Determine the decimal multiplier for a percentage less than 100%.

Write down the percentage multiplier to find 22% of an amount.

multiplier = ...

Question 8

Skill involved: 219b: Calculate the percentage of an amount (less than 100%) using decimal multipliers.

Find 88% of 3710

....

Question 9

Skill involved: 221a: Determine the decimal multiplier that would lead to a percentage increase or decrease.

Write down the percentage multiplier to decrease a quantity by 71%.

multiplier = ...

Question 10

Skill involved: 221b: Increase or decrease an amount by a percentage with a calculator.

Increase 4622 by 18%

....

Preparing for Year 10 – Foundation. Algebra. Simplifying

Question 1

Skill involved: 193b: Add and subtract algebraic terms containing the same variable.

Simplify $a + 4a + 5a - 4a$

....

Question 2

Skill involved: 193b: Add and subtract algebraic terms containing the same variable.

Simplify $5p - 3p + p$

....

Question 3

Skill involved: 193d: Collect like terms involving multiple variables and without powers.

Simplify $6x + 9y + 2x - 3y$.

....

Question 4

Skill involved: 193d: Collect like terms involving multiple variables and without powers.

Simplify $3p + 7q - p - 4q$

....

Question 5

Skill involved: 193b: Add and subtract algebraic terms containing the same variable.

Simplify $3cd + 2cd - cd$

....

Question 6

Skill involved: 193e: Collect like terms with powers.

Simplify $m^3 + m^3$

....

Question 7

Skill involved: 193d: Collect like terms involving multiple variables and without powers.

Simplify $10 + 3c + 5d - 7c + d$

....

Question 8

Skill involved: 191d: Multiply algebraic terms with positive coefficients (no powers).

Simplify fully $4a \times 5b$

....

Question 9

Skill involved: 191d: Multiply algebraic terms with positive coefficients (no powers).
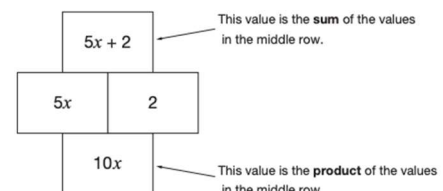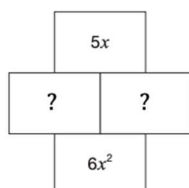
Simplify $3a \times 5b \times 2c$

....

Question 10

Skill involved: 191e: Multiply algebraic terms with positive coefficients (maximum power of 2).

Here are the rules for an algebra grid.
Use these rules to complete the algebra grids below.
Write your expressions as simply as possible.

$5x + 2$	This value is the **sum** of the values in the middle row.
$5x$	2
$10x$	This value is the **product** of the values in the middle row.

| $5x$ |
| ? | ? |
| $6x^2$ |

$? = \ldots\ldots\ldots$

or $? = \ldots\ldots\ldots$

Preparing for Year 10 - Foundation. Algebra. Expand & Factorise

Question 1

Skill involved: 252a: Expand a single bracket with an integer on the front.

Expand $4(7x - 4)$

....

Question 2

Skill involved: 252a: Expand a single bracket with an integer on the front.

Expand $5(2m - 3)$

....

Question 3

Skill involved: 252g: Expand two sets of single brackets and collect like terms, where mutlipliers are positive integers only.

Expand and simplify
    $4(2x + 4) + 5(x - 6)$

....

Question 4

Skill involved: 252h: Expand and simplify expressions involving subtraction of a bracket with a term or bracket before.

Expand and simplify
        $4(2 + 6x) - 3(2x + 4)$

....

Question 5

Skill involved: 252d: Expand a single bracket with an algebraic term at the front.

Expand $4a(6a - 3r)$

....

Question 6

Skill involved: 253a: Factorise by taking a common numeric factor out.

Factorise fully $10x - 25$

....

Question 7

Skill involved: 253a: Factorise by taking a common numeric factor out.

Factorise completely $35q - 7$

....

Question 8

Skill involved: 253b: Factorise by taking an algebraic factor out with single variable.

Factorise fully $16p + 4p^2$

....

Question 9

Skill involved: 253b: Factorise by taking an algebraic factor out with single variable.

Tenzin is given this question.   Here is his answer.

Factorise fully.

$2x^2 + 6x$

$2x^2 + 6x = x(2x + 6)$

Explain why Tenzin's answer is not correct.

Question 10

Skill involved: 253c: Factorise by taking a common algebraic factor out involving index laws.

Factorise completely

    $3x^2y^2 + 18xy^3z^2$

....

Preparing for Year 10 - Foundation. Algebra. Solving Equations

Question 1

Skill involved: 199b: Solve a one-step linear equation.

Solve:

$$b + 6 = 11$$

$$b = \ldots\ldots\ldots$$

Question 2

Skill involved: 199b: Solve a one-step linear equation.

Solve:

$$\frac{x}{7} = 3$$

$$x = \ldots\ldots\ldots$$

Question 3

Skill involved: 199e: Solve a general linear equation where the solution may be written as a terminating decimal or a fraction.

Solve for a:

$$3a - 8 = 6$$

$$a = \ldots\ldots\ldots$$

Question 4

Skill involved: 199d: Solve a two-step equation where the solution is a negative integer.

Solve for a:

$$-41 = -6 + 5a$$

$$a = \ldots\ldots\ldots$$

Question 5

Skill involved: 199f: Solve a linear equation requiring simplification, with the variable on one side.

Solve for x:

$$x + x + x + 5 + x + x = 35$$

$$x = \ldots\ldots\ldots$$

Question 6

Skill involved: 199h: Solve a linear equation with possible negative coefficient of the unknown.

Solve for x:

$$9 - 6x = -27$$

$$x = \ldots\ldots\ldots$$

Question 7

Skill involved: 254a: Solve a linear equation with brackets and positive integer only solutions.

Solve for x:

$$96 = 12(4 + x)$$

$$x = \ldots\ldots\ldots$$

dfm 2

Preparing for Year 10 - Foundation. Algebra. Solving Equations

Question 8

Skill involved: 254d: Solve an equation with brackets and requiring simplification, with the variable on one side.

Solve for y:

$$2 + 6(3y + 4) = 26$$

$$y = \ldots\ldots\ldots$$

Question 9

Skill involved: 257a: Solve a linear equation with unknown on both sides.

Solve for x:

$$10x - 38 = 4x + 34$$

$$x = \ldots\ldots\ldots$$

Question 10

Skill involved: 199c: Solve a two-step equation where the solution is a positive integer.

This rule gives the cost, in euros, of hiring a bicycle for a number of days.

Cost in euros $= 8 \times$ (number of days) $+15$

Cyril hires a bicycle for a number of days.

The cost is 71 euros.

Work out the number of days.

$$\ldots\ldots\ldots\ldots\ldots\ldots \text{ days}$$

(2 marks)

Preparing for Year 10 – Foundation. Data. Averages

Question 1

Skill involved: 207a: Determine the mode from listed data.

Here are the masses, in grams, of ten pencils.

21, 10, 16, 22, 15, 12, 15, 21, 24, 15

Find the modal mass of these pencils.

.... grams

Question 2

Skill involved: 207b: Determine the median from listed data.

Here are the lengths, in cm, of ten pencils.

15.9, 4.7, 10.2, 6.1, 15.7, 8.7, 8.8, 12.8, 6.2, 10

Find the median length.

.... cm

Question 3

Skill involved: 207c: Calculate the range from listed data.

Here is a list of numbers.

-16, -6, -11, -6, -11, 15, -1, 15, 11, 13, 14

Find the range of the numbers in the list.

....

Question 4

Country	Gold Medals
Canada	7
France	10
Germany	10
Great Britain	22
Italy	10

Skill involved: 207d: Determine the median, mode and range from a table.

The table shows the number of gold medals won by five countries at the 2020 Olympics in Tokyo.

Work out the range of the numbers of gold medals won.

.... medals

Question 5

Skill involved: 208a: Determine an unknown value given the mean and the other listed values.

The mean of the 6 items below is 6.

$\quad$ 7 $\quad$ 3 $\quad$ x $\quad$ 7 $\quad$ 10 $\quad$ 3

Find the value of x.

$x = $ ....

Question 6

Skill involved: 207e: Determine the median, mode and range from a chart.

The chart below gives information about the number of points scored by each of 12 students in a game.
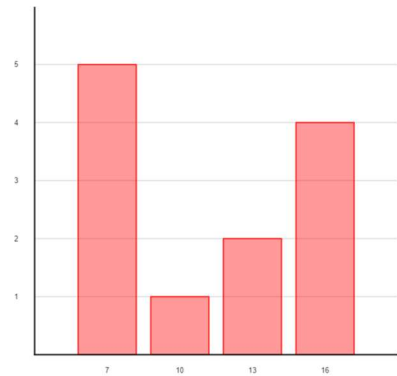
Find the range of the number of points.

.... points

Question 7

Skill involved: 207f: Select an appropriate average for a given context.

Emily records the number of miles she drives each day for one week.
The results are listed below.
$\quad$ 18, 16, 20, 19, 17, 76, 15
Which average is the most appropriate to use to represent this data?

$\quad$ Mode [ ] $\quad$ Median [ ] $\quad$ Mean [ ]

Question 8

Skill involved: 207k: Determine the median, mode and range from a list of algebraic data.

Here are five expressions.
$y^2 \quad 6y + 5 \quad 6(y + 1) \quad y + 6 \quad 6y$

Work out the value of the median when $y = 12$.

Preparing for Year 10 – Foundation. Data. Averages

Question 9

Skill involved: 207l: Determine a list of integers given information about their mean, median, range and mode.

Here are five cards.

There is a number on each card.

Two of the numbers are hidden.

<div align="center">

0   7   ?   ?   2

</div>

The median of the five numbers is 3.

The mode of the five numbers is 3.

Work out the two numbers that are hidden.

Question 10

Skill involved: 207l: Determine a list of integers given information about their mean, median, range and mode.

Five numbers are listed below.

3   3   6   13   15

Write down another set of five **positive whole** numbers such that

- all the numbers are **less than** 20,
- the median of the new set of numbers is greater than the median of the set shown above,
- the mean of the new set of numbers is less than the mean of the set shown above,
- the range of the new set of numbers is less than the range of the set shown above.

Preparing for Year 10 - Foundation. Data. Probability

Question 1

Skill involved: 248d: Place an event on a probability scale from 0 to 1.

Lucy throws a fair six-sided dice.

Select the letter that matches the probability of the dice landing on a number which is 3 or more.

A   B   C   D   E   F   G
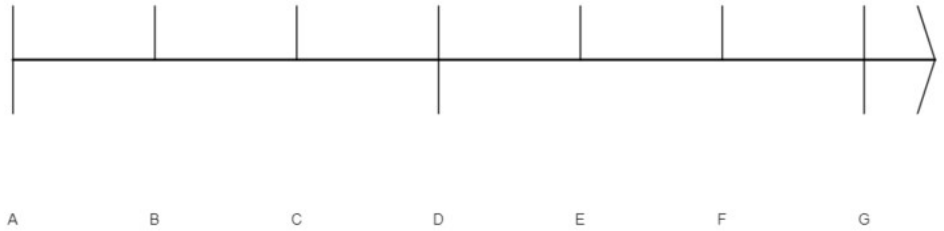
Question 2

Skill involved: 248d: Place an event on a probability scale from 0 to 1.

Rebecca throws a fair six-sided dice.

Select the letter that matches the probability of the dice landing on 9.

A   B   C   D   E   F   G
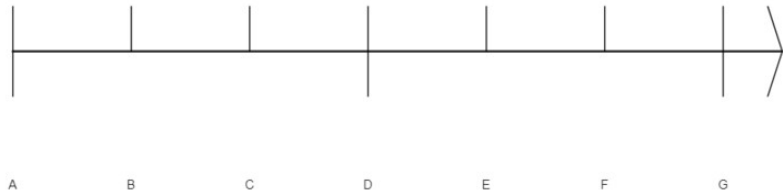
Question 3

Skill involved: 248a: Determine a single probability using counts.

Mohammed has a box with 5 green beads, 6 white beads and 9 black beads.
Mohammed takes a bead from the box at random.
Find the probability that Mohammed takes a green bead.

....

Question 4

Skill involved: 248e: Determine a probability using the total frequency in a two-way table.

66 people were asked if they prefer to go on holiday in France or in Croatia or in Greece.

The responses are shown in the two-way table below.

	France	Croatia	Greece	Total
Female	8	14	16	38
Male	13	5	10	28
Total	21	19	26	66

One of the people who said Croatia is chosen at random.

What is the probability that this person is female?

....

Preparing for Year 10 - Foundation. Data. Probability

Question 5

Skill involved: 248e: Determine a probability using the total frequency in a two-way table.

There are 250 students that attend a sixth form college.

The two-way table below summarises the year group and transport method of all students at the college.

	Walk	Cycle	Bus	Car	Total
Year 12	4	52	31	28	115
Year 13	41	16	30	48	135
Total	45	68	61	76	250

One of the students is chosen at random.

What is the probability that this student is in Year 13 and walks to college?

....

Question 6

Skill involved: 249b: List combined outcomes in a table, where one or both sets of outcomes are non-numeric.

Lisa throws a six-sided dice and a four-sided dice numbered -1, -2, -3 and -4 at the same time and multiplies the scores.

Complete the sample space diagram below.

	1	2	3	4	5	6
-1						
-2						
-3						
-4						

Question 7

Skill involved: 250d: Determine probabilities of mutually exclusive events in a table with a given relationship.

The sides of a spinner are labelled with colours.
The spinner is biased.

The table shows the probability that the spinner will land on each of the colours blue, red, white or yellow.

The probability for White is twice as likely as for Red.

Work out the probability the spinner will land on red.

Colour	Blue	Red	White	Yellow
Probability	0.15			0.4

Preparing for Year 10 - Foundation. Data. Probability

Question 8

Skill involved: 251a: Determine the relative frequency of an outcome from given data.

The sides of a spinner are labelled with colours. The spinner is biased.

Colour	White	Black	Yellow	Red	Blue
Frequency	25	25	20	25	5

Riley spins the spinner 100 times and records the number of times it lands on white, black, yellow, red or blue.

Work out the relative frequency of landing on white.

....

Question 9

Skill involved: 248b: Determine the probability of an event not occurring using counts.

The probability to roll a 4 on a biased dice is $\frac{4}{7}$.

Find the probability to get a number different to 4 when rolling the dice.

....

Question 10

Skill involved: 251e: Work out an expected value for a biased event, with a given number of repeated trials.

The table shows each of the probabilities that a counter taken at random will be green, red, purple, blue or yellow.

Colour	Green	Red	Purple	Blue	Yellow
Probability	0.35	0.3	0.1	0.2	0.05

Nick selects a counter at random 80 times.

Work out an estimate for the total number of times the counter will be green.

....

Preparing for Year 10 – Foundation. Geometry. Angles

Question 1

Skill involved: 63b: Identify pairs of perpendicular and parallel lines.

Select the word that describes the two lines drawn on the square grid.

Vertical [ ]   Horizontal [ ]   Perpendicular [ ]   Parallel [ ]
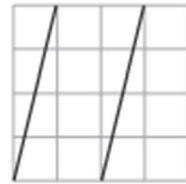
(1 mark)

Question 2

Skill involved: 76a: Identify the type of angle from drawn form.

One of the four angles marked in the diagrams above is an obtuse angle.

Write down the letter of the diagram in which the obtuse angle is marked.

....
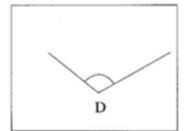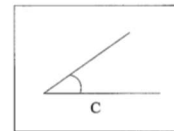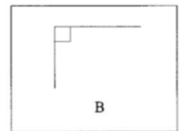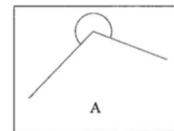
(1 mark)

Question 3

Skill involved: 110a: Know the properties of angles on a straight line.

Work out the size of the angle marked $x°$.
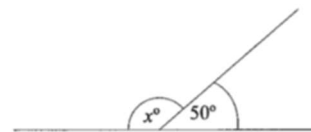
Diagram **NOT** accurately drawn

$x =$ .... $°$

(2 marks)

Question 4

Skill involved: 110b: Know the properties of angles about a point.

Work out the size of angle x.
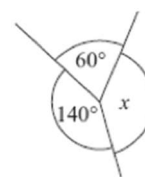
Diagram **NOT** accurately drawn

.... $°$

(2 marks)

Question 5

Skill involved: 110a: Know the properties of angles on a straight line.

Tom says,   "ABC **cannot** be a straight line."
Is Tom correct?
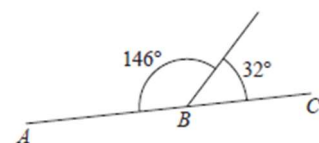
Yes [ ]

No [ ]

Preparing for Year 10 – Foundation. Geometry. Angles

Question 6

Skill involved: E110: Sum of the angles on a straight line and angles around a point

What angle does the hour hand of a clock turn through in one hour?

..............................°

Question 7

Skill involved: 112a: Estimate the size of a non-reflex angle.
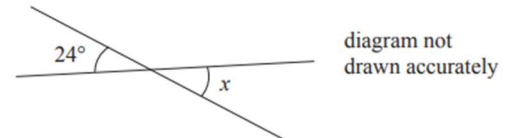
Estimate the size of the angle marked x.

..............................°
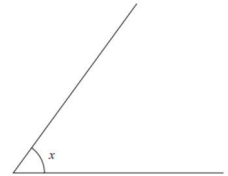
(1 mark)

Question 8

Skill involved: 147a: Identify a vertically opposite angle.

Work out the size of the missing angle in the diagram below.

diagram not drawn accurately

$x =$ ....°

(1 mark)

Question 9

Skill involved: 262b: Determine an angle using alternate angles on parallel lines.

The diagram shows a triangle ABC and a straight line CD.
AB is parallel to CD.

Write down the size of the angle marked y.

diagram not drawn accurately

..............................°
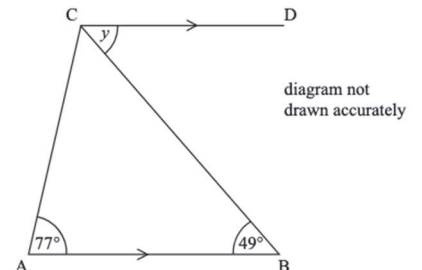
(1 mark)

Question 10

Skill involved: 262b: Determine an angle using alternate angles on parallel lines.

The diagram shows a triangle ABC and a straight line CD.
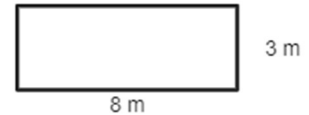AB is parallel to CD.

Give a reason why angle y is 49°.

diagram not drawn accurately

....
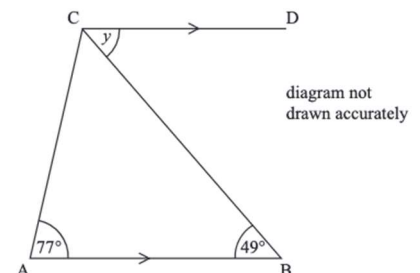
(1 mark)

Preparing for Year 10 - Foundation. Shape. Area and Perimeter

Question 1
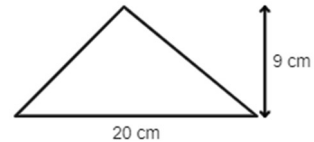
Skill involved: 138a: Calculate the area of a rectangle.

Find the area of the rectangle.

3 m

8 m

.... m ^{2}

Question 2

Skill involved: 140a: Find the area of a triangle.

Find the area of the triangle.

9 cm

20 cm

Area = ... cm ^{2}

Question 3

Skill involved: 180a: Find the perimeter of a composite rectilinear shape.
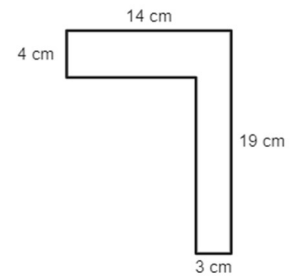
Work out the perimeter of the shape below.

14 cm

4 cm

19 cm

3 cm

Perimeter = ... cm

Question 4

Skill involved: 209a: Calculate the circumference of a full circle given its radius.
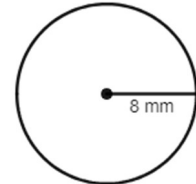
Work out the circumference of the circle.
Give your answer correct to 1 decimal place.

8 mm

.... mm

Question 5

Skill involved: 210a: Calculate the area of a full circle given its radius.
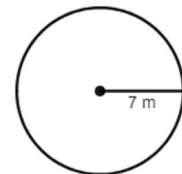
Find the area of the circle.
Give your answer correct to 1 decimal place.

7 m

.... m ^{2}

Question 6

Skill involved: 80b: Determine the area of rectilinear shapes by counting squares.
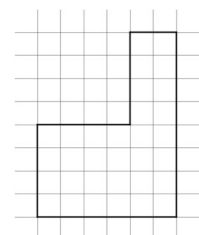
The rectilinear shape below is drawn on a centimetre grid.
Find the area of the shape.

.... cm ^{2}

Preparing for Year 10 - Foundation. Shape. Area and Perimeter

Question 7

Skill involved: 79c: Calculate the perimeter of a rectangle.
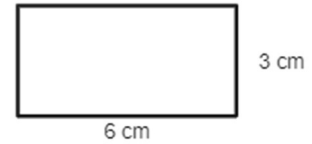
Find the perimeter of the rectangle drawn below.

3 cm

6 cm

.... cm

Question 8

Skill involved: 138f: Calculate a cost based on the area of a rectangle.

Here is a diagram of a wall.

Halima wants to cover all of the wall with tiles.

The tiles are squares with sides of length 20 cm.

The tiles are sold in packs.
There are 10 tiles in each pack.
Each pack of tiles costs £34.99

Halima only has £1000.

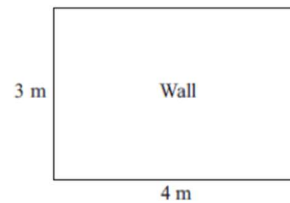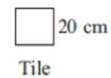How much would it cost Halima to tile the whole wall?

Diagram **NOT** accurately drawn

3 m   Wall

4 m

20 cm

Tile

£ ....

(6 marks)

Question 9

Skill involved: 184a: Calculate the area of a trapezium.

Here is a trapezium drawn on a centimetre grid.
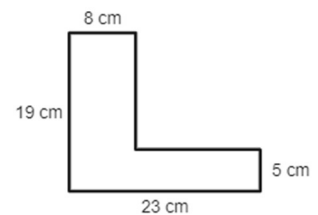
What is the area of the trapezium?

.... cm ^{2}

(2 marks)

Question 10

Skill involved: 181a: Find the area of a composite rectilinear shape.

Work out the area of the shape below.

8 cm

19 cm

5 cm

23 cm

Area = ... cm ^{2}

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