TGMT

# THE ULTIMATE REVISION GUIDE FOR GCSE MATHS

Everything you need to pass your GCSE maths exam

## FOUNDATION TIER

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# Everything You Need to Pass GCSE Maths Foundation Revision Guide

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### Instructions!

Every question has a QR code that can be scanned or clicked (if using the online version) to bring up a full lesson

**Try it out!**

### Revision Videos

Everything you need to get a Grade 5 (Higher & Foundation)

Everything you need to get a Grade 6-9 (Higher Only)

## Multiplying Decimals

Work out $54.6 \times 4.3$

Full Lesson Here

.....  **3 marks**

Answer: 234.78

## Product of Prime Factors

Express 56 as the product of its prime factors.

Full Lesson Here

.....  **2 marks**

Answer: $2 \times 2 \times 2 \times 7$ or $2^3 \times 7$

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## Highest Common Factor

Find the Highest Common Factor (HCF) of 84 and 180

Full Lesson Here

Answer 12

..... **2 marks**

## Lowest Common Multiple

Find the lowest common multiple (LCM) of 40 and 56

Full Lesson Here

Answer 280

..... **2 marks**

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## Laws of Indices

Work out the value of $\dfrac{3^7 \times 3^{-2}}{3^3}$

Full Lesson Here

.....  **2 marks**

Answer: 6

## Negative and Fractional Indices

(a) Write down the value of $36^{\frac{1}{2}}$

(b) Write down the value of $23^0$

Full Lesson Here

.....  **2 marks**

Answer: a) 6 b) 1

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## Simplifying Expressions

(a) Simplify $5f - f + 2f$

(b) Simplify $2 \times m \times n \times 8$

(c) Simplify $t^2 + t^2$

..... **3 marks**

Full Lesson Here

Answer
a) $6f$
b) $16mn$
c) $2t^2$

## Expanding Single Brackets

(a) Expand $5(2m - 3)$

(b) Expand $2x(3 - x)$

..... **2 marks**

Full Lesson Here

Answer
a) $10m - 15$
b) $6x - 2x^2$

## Expanding Single Brackets 2

Expand and simplify $5(p + 3) - 2(1 - 2p)$

Full Lesson Here

Answer: 9p+13

..... **2 marks**

## Factorise Expressions

(a) Factorise $5 - 10m$

(b) Factorise fully $2a^2b + 6ab^2$

Full Lesson Here

Answer: a) 5(1-2m) b) 2ab(a+3b)

..... **3 marks**

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## Substitution

$P = 7r + 3q$

Work out the value of $P$ when $r = 5$ and $q = -4$

Full Lesson Here

..... **2 marks**

Answer
P = 23

## Laws of Indices

(a) Simplify $m^3 \times m^4$

(b) Simplify $(5np^3)^3$

(c) Simplify $\dfrac{32q^9r^4}{4q^3r}$

Full Lesson Here

..... **5 marks**

Answer
a) $m^7$
b) $125n^3p^9$
c) $8q^6r^3$

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## Changing the Subject 1

Make $t$ the subject of the formula $w = 3t + 11$

Full Lesson Here

..... **2 marks**

Answer $t = \frac{w - 11}{3}$

## Changing the Subject 2

Make $s$ the subject of $v^2 = u^2 + 2as$

Full Lesson Here

..... **2 marks**

Answer $s = \frac{v^2 - u^2}{2a}$

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## Two Way Tables

60 people were asked if they prefer to go on holiday in Britain or in Spain or in Italy.

38 of the people were male.
11 of the 32 people who said Britain were female.
8 males said Italy.
12 people said Spain.

One of the females is chosen at random.

What is the probability that this female said Spain?

Full Lesson Here

.....

**4 marks**

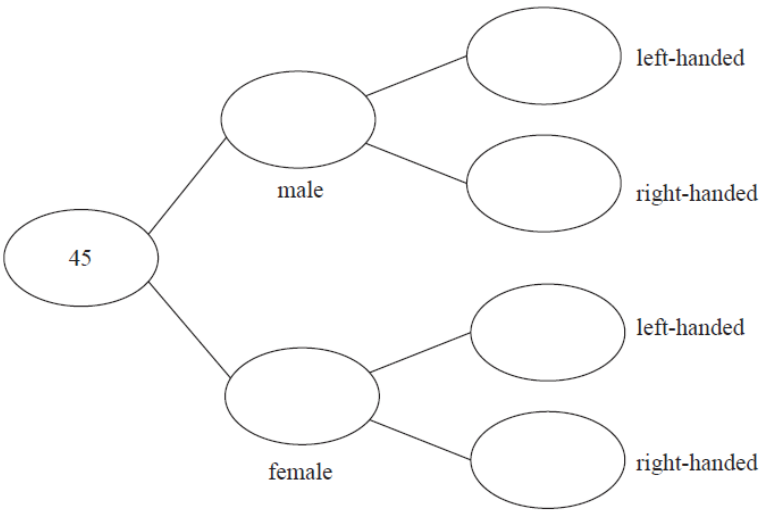
Answer: $\frac{3}{22}$

## Frequency Trees

Each worker in a factory is either left-handed or right-handed.

22 of the 45 workers are male.
16 of the 34 right-handed workers are female.

Complete the frequency tree for this information.




Full Lesson Here

**3 marks**

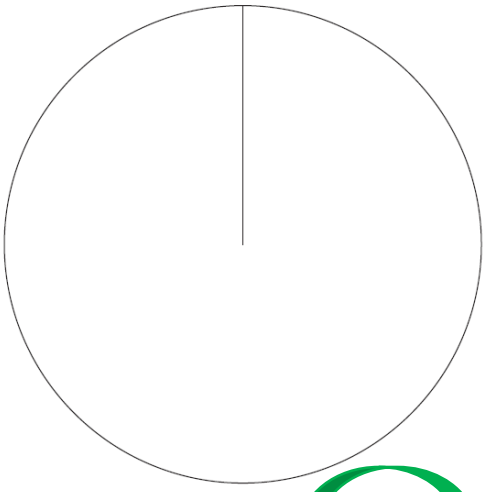
Answer: 22, 23, 4, 18, 7, 16

## Pie Charts

A group of football fans were asked what their half time snack was.

The table below gives information about their answers.

| Snack | Number of fans |
|---|---|
| burger | 11 |
| pie | 17 |
| hot dog | 8 |



Draw an accurate pie chart for this information.

Full Lesson Here

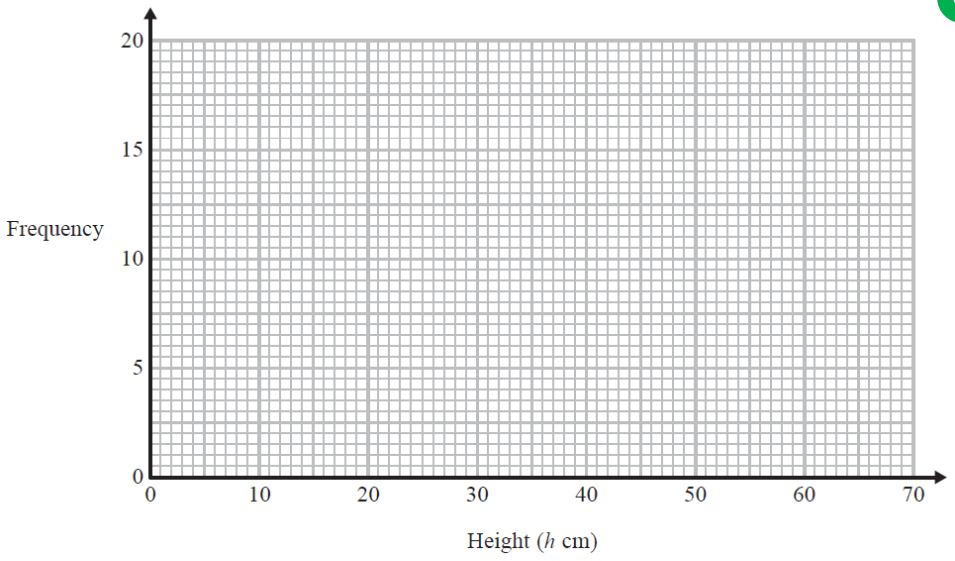
Answer: x=1.5 or $\frac{3}{2}$

..... **3 marks**

## Frequency Polygons

On the grid, draw a frequency polygon for the information in the table.

| Height ($h$ cm) | Frequency |
|---|---|
| $10 < h \leqslant 20$ | 7 |
| $20 < h \leqslant 30$ | 13 |
| $30 < h \leqslant 40$ | 14 |
| $40 < h \leqslant 50$ | 12 |
| $50 < h \leqslant 60$ | 16 |
| $60 < h \leqslant 70$ | 18 |




Full Lesson Here

Answer: Diagram drawn using midpoints and connected via straight lines

..... **2 marks**

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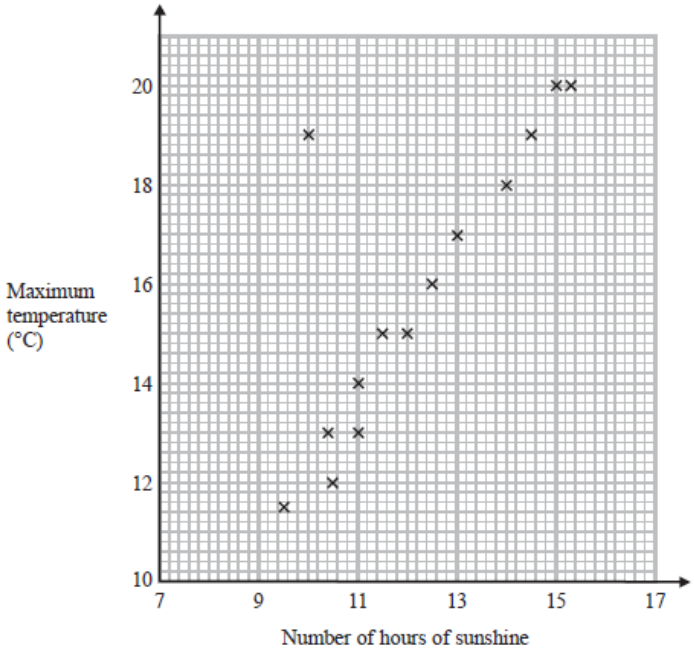
## Scatter Graphs 1




One of the points is an outlier.
Write down the coordinates

For all the other points write down the type of correlation.

On the same day, in another British town, the maximum temperature was 16.4 °C.

Estimate the number of hours of sunshine in this town on this day.

Full Lesson Here

Answer a) (10,19)
b) Positive
c) 12-13

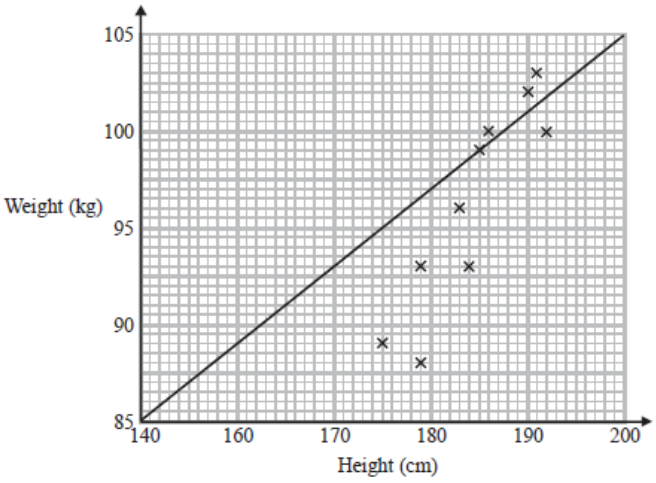
..... **4 marks**

## Scatter Graphs 2

Sean has information about the height, in cm, and the weight, in kg, of each of ten rugby players.

He is asked to draw a scatter graph and a line of best fit for this information.

Here is his answer.




Sean has plotted the points accurately.

Write down two things that are wrong with his answer.

Full Lesson Here

Answer 1) Line of best fit not accurate
2) Scale on y-axis not accurate

..... **2 marks**

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## Fractions of an Amount

$\frac{4}{5}$ of a number is 32

Find the number.

Full Lesson Here

..... **2 marks**

Answer: 40

## Converting Fractions, Decimals and Percentages

Write these numbers in order of size.
Start with the smallest number.

35%  $\frac{3}{10}$  0.32  $\frac{2}{5}$  0.25

Full Lesson Here

..... **2 marks**

Answer: $0.25, \frac{3}{10}, 0.32, 35\%, \frac{2}{5}$

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## Percentages of an Amount

Work out 15% of 80

Full Lesson Here

.....

**2 marks**

Answer 12

## Increase by a Percentage

Azmol is paid £1500 per month.
He is going to get a 3% increase in the amount of money he is paid.

Work out how much money Azmol will be paid per month after the increase.

Full Lesson Here

.....

**2 marks**

Answer £1545

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## Decrease by a Percentage

A television has a normal price of £675
In a sale the price is reduced by 32%.

Work out the price of the television in the sale.

Full Lesson Here

..... **3 marks**

Answer £459

## Calculating Percentage Changes

Renee buys 5 kg of sweets to sell.
She pays £10 for the sweets.

Renee puts all the sweets into bags.
She puts 250 g of sweets into each bag.
She sells each bag of sweets for 65p.

Renee sells all the bags of sweets.

Work out her percentage profit.

Full Lesson Here

..... **4 marks**

Answer 30%

## Solving Equations with Unknowns on One Side

Solve $3(m-4)=21$

Full Lesson Here

Answer m=11

..... **2 marks**

## Solving Equations with an Unknown Both Sides

Solve $5x-6=3(x-1)$

Full Lesson Here

Answer x=1.5 or $\frac{3}{2}$

..... **3 marks**

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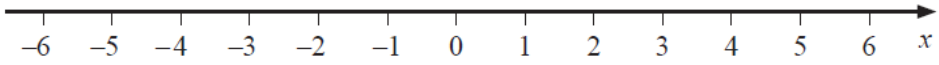
## Solving Inequalities and Number Lines

(a) Solve $14n > 11n + 6$

(b) On the number line below, show the set of values of $x$ for which $-2 < x + 3 \leqslant 4$




Full Lesson Here

**4 marks**

Answer
a) n > 2
b) Open circle above -5, closed circle above 1 and a line connecting them.

## Error Intervals

A number, $y$, is rounded to 2 significant figures.

The result is 0.46

Write down the error interval for $y$.

Full Lesson Here

**2 marks**

Answer
0.455 ≤ x < 0.465

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## Error Intervals with Truncation

Kiera used her calculator to work out the value of a number $x$.
She wrote down the first two digits of the answer on her calculator.

She wrote down 7.3

Write down the error interval for $x$.

Full Lesson Here

Answer: $6.3 \leq x < 7.4$

..... **2 marks**

## Finding the nth Term of Sequences

Here are the first four terms of an arithmetic sequence.

5 11 17 23

Write down an expression, in terms of $n$, for the $n$th term of the sequence.

Full Lesson Here

Answer: $6n - 1$

..... **2 marks**

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## Using the nth Term

Here are the first four terms of an arithmetic sequence.

6 10 14 18

(a) Write an expression, in terms of $n$, for the $n$th term of this sequence.

The $n$th term of a different arithmetic sequence is $3n + 5$

(b) Is 108 a term of this sequence?
Show how you get your answer.

Full Lesson Here

.....

**4 marks**

Answer
a) $4n + 2$
b) No, $(108 - 5) \div 3$ is not an integer

## Fibonacci Sequences

Here are the first six terms of a Fibonacci sequence.

1 1 2 3 5 8

The rule to continue a Fibonacci sequence is,

the next term in the sequence is the sum of the two previous terms.

(a) Find the 9th term of this sequence.

The first three terms of a different Fibonacci sequence are

$a$ $b$ $a + b$

(b) Show that the 6th term of this sequence is $3a + 5b$

Full Lesson Here

.....

**3 marks**

Answer
a) 21
b) $a+2b$, $2a+3b$, $3a+5b$

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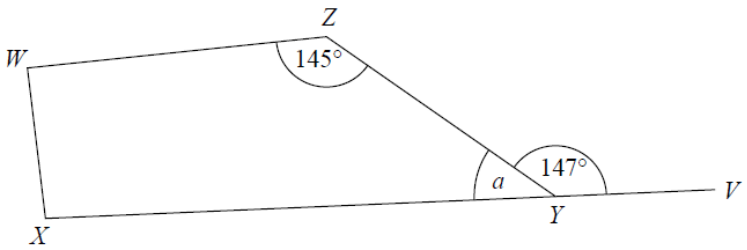
## Missing Angles in Quadrilaterals




*WXYZ* is a quadrilateral.
*XYV* is a straight line.

(a) (i) Find the size of the angle marked *a*.

(ii) Give a reason for your answer.

Angle *ZWX* = angle *WXY*

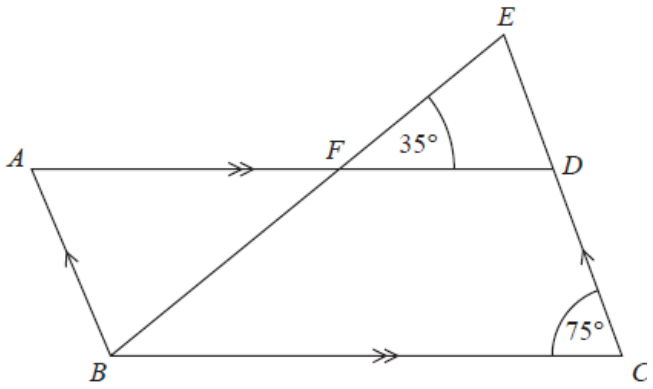
(b) Work out the size of angle *ZWX*.

..... **4 marks**

Full Lesson Here

Answer
a) i) 33°
ii) Angles on a straight line sum to 180° c) 91°

## Missing Angles in Triangles and Quadrilaterals




*ABCD* is a parallelogram.
*EDC* is a straight line.
*F* is the point on *AD* so that *BFE* is a straight line.

Angle *EFD* = 35°
Angle *DCB* = 75°

Show that angle *ABF* = 70°
Give a reason for each stage of your working.

..... **4 marks**

Full Lesson Here

Answer
Reasoning shown.
Option: AFB=35 (vertically opposite angles are equal), BAF=75 (opposite angles in a parallelogram are equal) ABF = 180 – (35+75) = 70 (angles in a triangle – 180.

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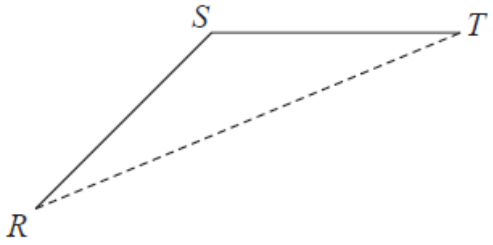
## Angles in Polygons




*RS* and *ST* are 2 sides of a regular 12-sided polygon.
*RT* is a diagonal of the polygon.

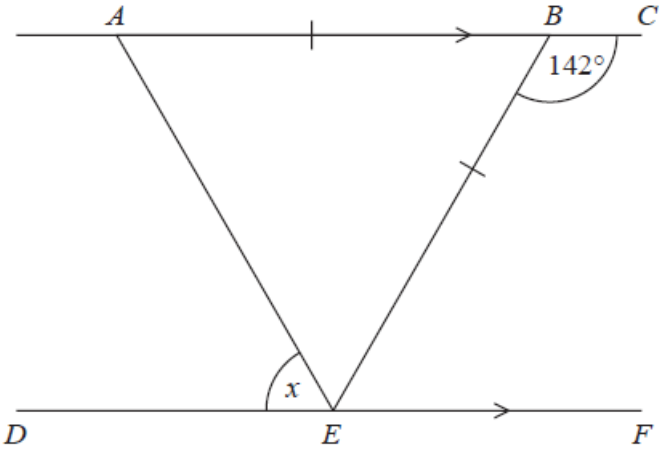
Work out the size of angle *STR*.
You must show your working.

Full Lesson Here

.....  **3 marks**

Answer: 15°

## Angles in Parallel Lines




*ABC* and *DEF* are parallel straight lines.
*ABE* is an isosceles triangle with *AB* = *BE*.
Angle *CBE* = 142°

Work out the size of angle *x*.
Give a reason for each stage in your working.

Full Lesson Here

.....  **5 marks**

Answer: 71° Reasons including: Base angles in an isosceles are equal, angles ion straight line = 180 and alternate angles are equal.

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## Reverse Means

There are 10 boys and 20 girls in a class.
The class has a test.

The mean mark for all the class is 60
The mean mark for the girls is 54

Work out the mean mark for the boys.

Full Lesson Here

.....  **3 marks**

Answer 72

## Averages from a Table

Work out an estimate for the mean of the weekly earnings.

| Weekly earnings (£$x$) | Frequency |
|---|---|
| $150 < x \leqslant 250$ | 1 |
| $250 < x \leqslant 350$ | 11 |
| $350 < x \leqslant 450$ | 5 |
| $450 < x \leqslant 550$ | 0 |
| $550 < x \leqslant 650$ | 3 |

Full Lesson Here

.....  **3 marks**

Answer £365

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## Averages from a Stem and Leaf

The table shows the heights of a group of students in year 9.

| | |
|---|---|
| least height | 150 cm |
| median | 165 cm |
| greatest height | 170 cm |

The stem and leaf shows the heights of some students in year 12.

| | |
|---|---|
| 15 | 8 9 9 |
| 16 | 4 5 7 7 8 |
| 17 | 0 3 4 4 7 |
| 18 | 0 2 |

Key: 15 \| 8 represents 158 cm

Compare the distribution of heights for the year 9 students with the year 12 students.

..... **3 marks**

Full Lesson Here

Answer
Median: Yr9 (165) < Yr12 (168)
Range: Yr9 (20) < Yr12 (24)

## Sampling and Bias

Hannah is planning a day trip for 195 students.

She asks a sample of 30 students where they want to go.
Each student chooses one place.

The table shows information about her results.

| Place | Number of students |
|---|---|
| Theme Park | 10 |
| Theatre | 5 |
| Sports Centre | 8 |
| Seaside | 7 |

(i) Work out how many of the 195 students you think will want to go to the Theme Park.

(ii) State any assumption you made **and** explain how this may affect your answer.

..... **3 marks**

Full Lesson Here

Answer
a) 65
b) The sample is representative
it could be more or less.

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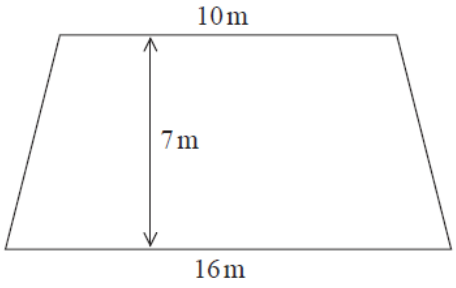
## Area of Triangles, Parallelograms and Trapezia

The diagram shows a floor in the shape of a trapezium.



John is going to paint the floor.

Each 5 litre tin of paint costs £16.99
1 litre of paint covers an area of 2 $m^2$

John has £160 to spend on paint.

Has John got enough money to buy all the paint he needs?
You must show how you get your answer.

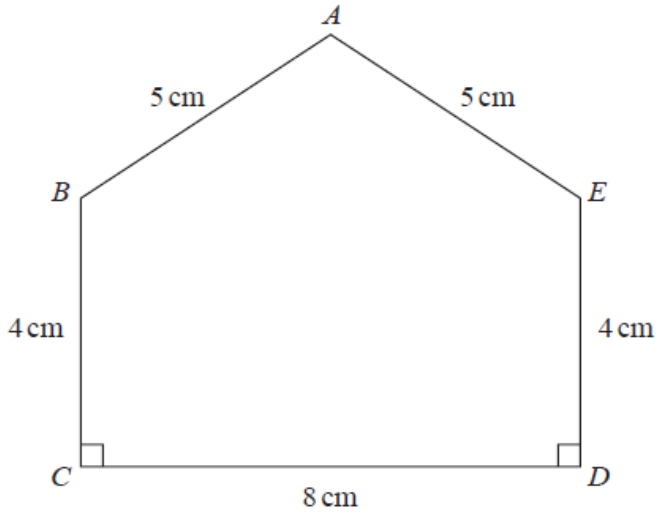
..... **5 marks**

Full Lesson Here

Answer
No, £169.90 or 90$m^2$

## Area of Compound Shapes

*ABCDE* is a pentagon.




Work out the area of *ABCDE*.

..... **5 marks**

Full Lesson Here

Answer
44$cm^2$

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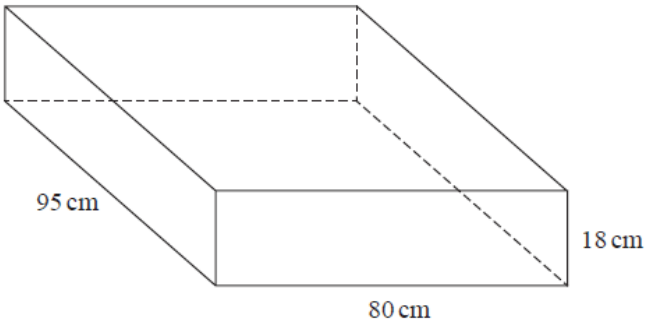
## Surface Area of Prisms

A sofa has 6 identical cushions.
Each cushion is a cuboid 18 cm by 80 cm by 95 cm.




The cushions are covered with a protective spray.
The protective spray is in cans.

The label on each can has this information.

| Spray in this can covers 4 m$^2$ |
|---|

Work out how many cans are needed to cover the 6 cushions with protective spray.

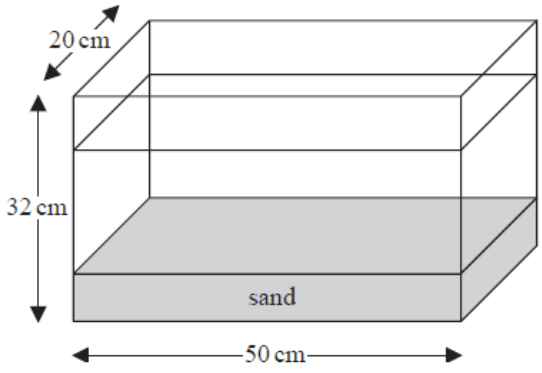
..... **5 marks**

Full Lesson Here

Answer: 4

## Volume of Prisms

The diagram shows a fish tank in the shape of a cuboid.




The dimensions of the tank are 50 cm by 32 cm by 20 cm.

The tank is $\frac{3}{4}$ full of water and sand.

The ratio of the volume of water to the volume of sand is 5 : 1

Work out the number of litres of water in the tank.
You must show all your working.

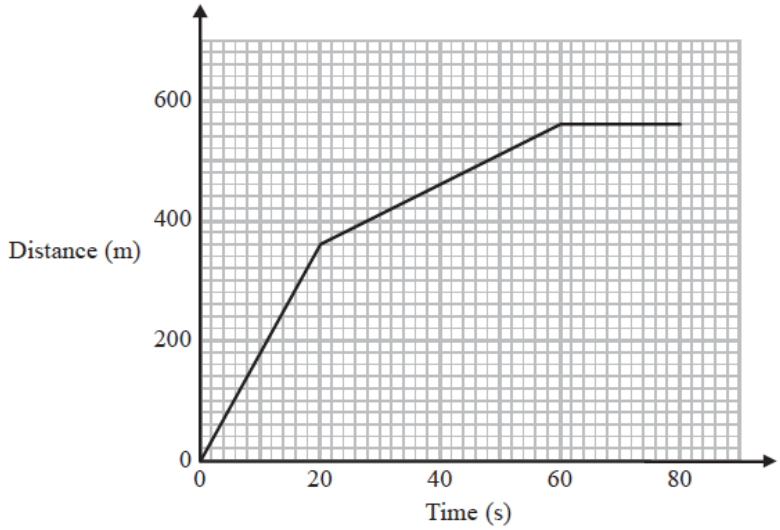
..... **5 marks**

Full Lesson Here

Answer: 20

## Distance-Time Graphs

Here is part of a distance-time graph for a car's journey.




(a) Between which two times does the car travel at its greatest speed?
Give a reason for your answer.

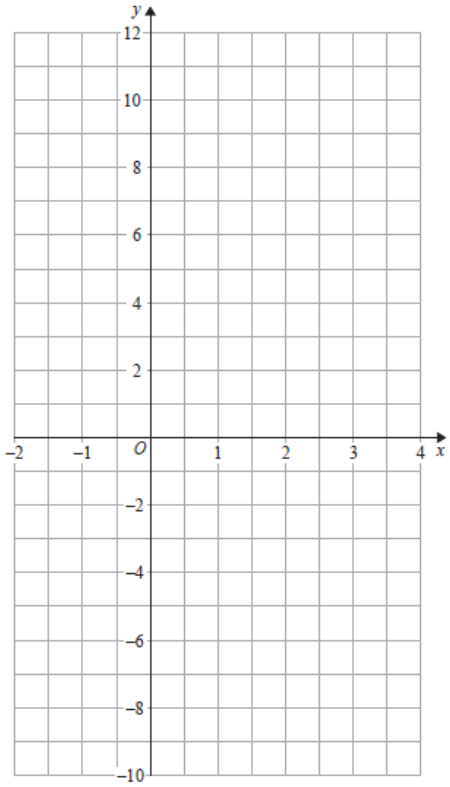
(b) Work out this greatest speed.

..... **3 marks**

Full Lesson Here

Answer a) 0-20 has the highest gradient

## Drawing Linear Graphs




On the grid, draw the graph of $y = 3x - 2$ for values of $x$ from $-2$ to 4

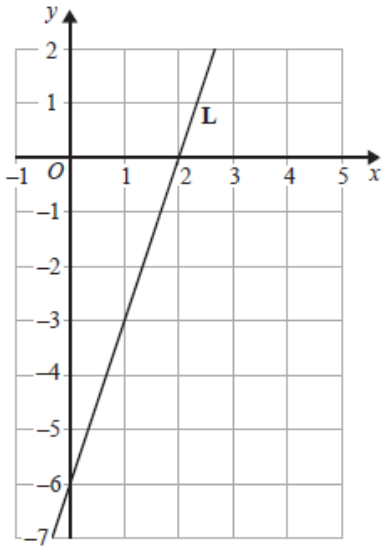
**3 marks**

Full Lesson Here

Answer $x = -2\ -1\ 0\ 1\ 2\ 3\ 4$ $y = -8\ -5\ -2\ 1\ 4\ 7\ 10$

## Find the Equation of a Line

The line **L** is shown on the grid.




Find an equation for **L**.

..... **3 marks**

Full Lesson Here

Answer: $y = 3x - 6$

## Gradient of a Line

$A$ is the point with coordinates $(5, 9)$
$B$ is the point with coordinates $(d, 15)$

The gradient of the line $AB$ is 3

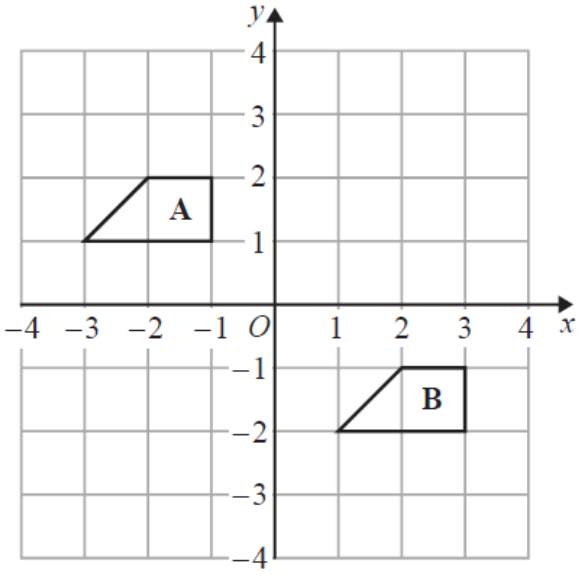
Work out the value of $d$.

..... **3 marks**

Full Lesson Here

Answer: 7

## Translations



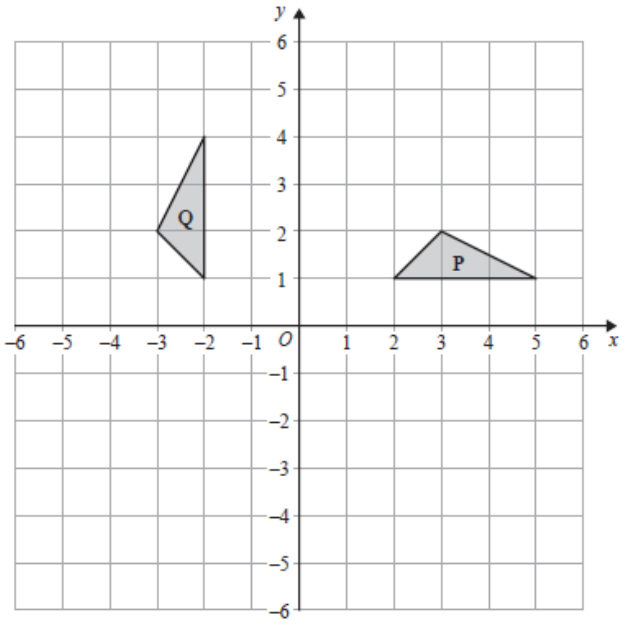

Describe the single transformation that maps shape **A** onto shape **B**.

**2 marks**

Full Lesson Here

Answer: Translation by the vector $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$

## Rotations




Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

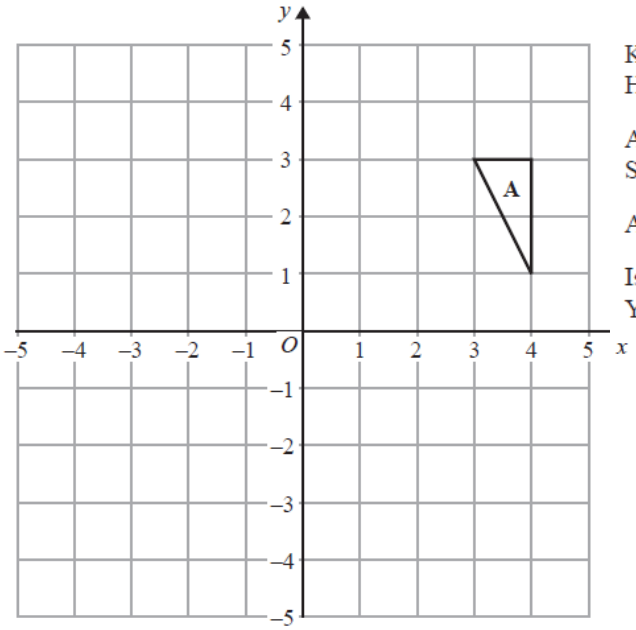
.....

**2 marks**

Full Lesson Here

Answer: Rotation, 90°, Anti-Clockwise, Centre (0,-1)

## Reflections




Kyle reflects triangle **A** in the $x$-axis to get triangle **B**.
He then reflects triangle **B** in the line $y = x$ to get triangle **C**.

Amy reflects triangle **A** in the line $y = x$ to get triangle **D**.
She is then going to reflect triangle **D** in the $x$-axis to get triangle **E**.

Amy says that triangle **E** should be in the same position as triangle **C**.

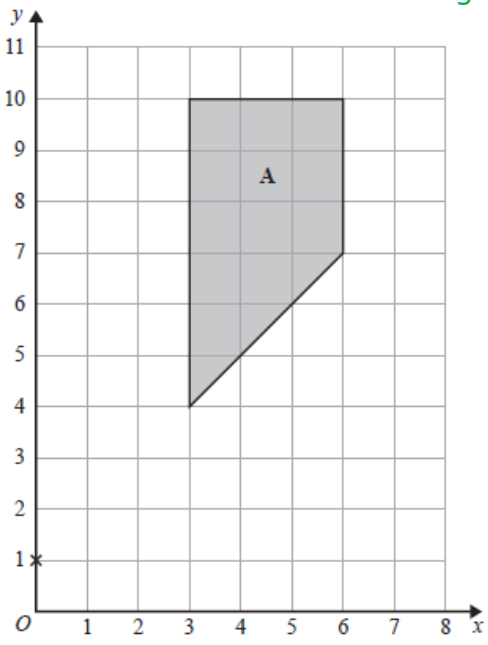
Is Amy correct?
You must show how you get your answer.

**3 marks**

Full Lesson Here

Answer
No, C is a rotation of 90° anti-clockwise about O

## Enlargements




Enlarge shape **A** by scale factor $\frac{1}{3}$ centre (0, 1)

**2 marks**

Full Lesson Here

Answer
Correct enlargement at (1,2), (2,3), (2,4), (1,4)

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## Sharing in a Ratio

The perimeter of a right-angled triangle is 72 cm.
The lengths of its sides are in the ratio 3 : 4 : 5

Work out the area of the triangle.

Full Lesson Here

..... **4 marks**

Answer: 216cm²

## Ratio, Fractions and Percentage Problems

Daniel bakes 420 cakes.
He bakes only vanilla cakes, banana cakes, lemon cakes and chocolate cakes.

$\frac{2}{7}$ of the cakes are vanilla cakes.

35% of the cakes are banana cakes.

The ratio of the number of lemon cakes to the number of chocolate cakes is 4 : 5

Work out the number of lemon cakes Daniel bakes.

Full Lesson Here

..... **5 marks**

Answer: 89

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## Combining Ratios

In a village

the number of houses and the number of flats are in the ratio 7 : 4
the number of flats and the number of bungalows are in the ratio 8 : 5

There are 50 bungalows in the village.

How many houses are there in the village?

Full Lesson Here

Answer 140

..... **3 marks**

## Direct Proportion in Context

Jack is building a wall.

He uses 300 bricks to build part of the wall.
This part of the wall is 5 metres long and 1.5 metres high.

The complete wall will be 8 metres long and 1.5 metres high.

How many more bricks does Jack need to complete the wall?

Full Lesson Here

Answer 180

..... **3 marks**

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## Inverse Proportion in Context

It would take 120 minutes to fill a swimming pool using water from 5 taps.

(a) How many minutes will it take to fill the pool if only 3 of the taps are used?

(b) State one assumption you made in working out your answer to part (a).

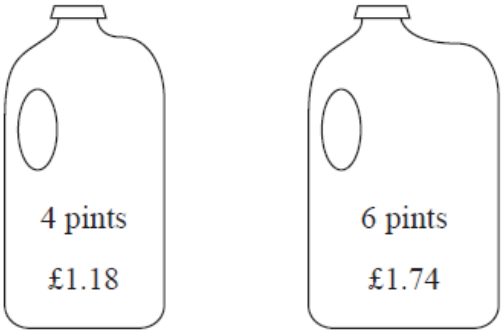
Full Lesson Here

Answer a) 200
b) The taps are running at the same rate/speed

..... **3 marks**

## Best Buys

Milk is sold in two sizes of bottle.




A 4 pint bottle of milk costs £1.18
A 6 pint bottle of milk costs £1.74

Which bottle of milk is the best value for money?
You must show all your working.

Full Lesson Here

Answer 6 pints

..... **3 marks**

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## Exchange Rates

Gina finds out the price of a CD box set in three different countries.

The price is

£98 in the UK
$134.99 in the USA
€139.99 in Germany

The exchange rates are

£1 = $1.43
€1 = £0.73

Gina wants to pay the cheapest price for the box set.

(a) From which country should Gina buy the box set?
You must show how you get your answer.

Gina lives in the UK.

(b) Why might your answer to (a) **not** be the best country for Gina to buy the box set from?

..... **4 marks**

Full Lesson Here

Answer
a) USA
b) Postage costs

## Recipes

Deon needs 50 g of sugar to make 15 biscuits.

She also needs

three times as much flour as sugar
two times as much butter as sugar

Deon is going to make 60 biscuits.

(a) Work out the amount of flour she needs.

Deon has to buy all the butter she needs to make 60 biscuits.
She buys the butter in 250 g packs.

(b) How many packs of butter does Deon need to buy?

..... **5 marks**

Full Lesson Here

Answer
a) 600
b) 2

## Pythagoras Theorem

Triangle $ABC$ has perimeter 20 cm.

$AB = 7$ cm.
$BC = 4$ cm.

By calculation, deduce whether triangle $ABC$ is a right-angled triangle.

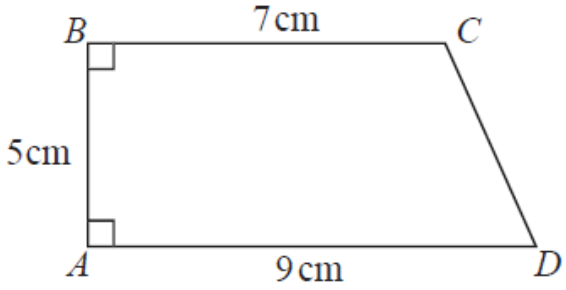
..... **4 marks**

Full Lesson Here

Answer No, AC=9cm
$4^2+7^2=65$
$\sqrt{65} \neq 9$cm

## Pythagoras Theorem Problems

$ABCD$ is a trapezium.




A square has the same perimeter as this trapezium.

Work out the area of the square.
Give your answer correct to 3 significant figures.

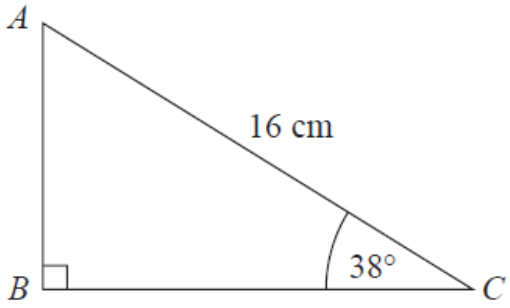
..... **5 marks**

Full Lesson Here

Answer 43.5cm

## Trigonometry (Side Lengths)

*ABC* is a right-angled triangle.




Calculate the length of *AB*.
Give your answer correct to 2 decimal places.

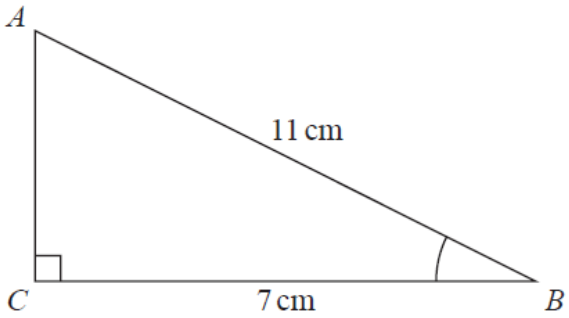
Full Lesson Here

Answer 9.85cm

..... **2 marks**

## Trigonometry (Angles)

*ABC* is a right-angled triangle.




Work out the size of angle *ABC*.
Give your answer correct to 1 decimal place.

Full Lesson Here

Answer 50.5°

..... **2 marks**

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## Probability from a Table

There are only blue cubes, red cubes and yellow cubes in a box.

The table shows the probability of taking at random a blue cube from the box.

| **Colour** | blue | red | yellow |
|---|---|---|---|
| **Probability** | 0.2 | | |

The number of red cubes in the box is the same as the number of yellow cubes in the box.

(a) Complete the table.

There are 12 blue cubes in the box.

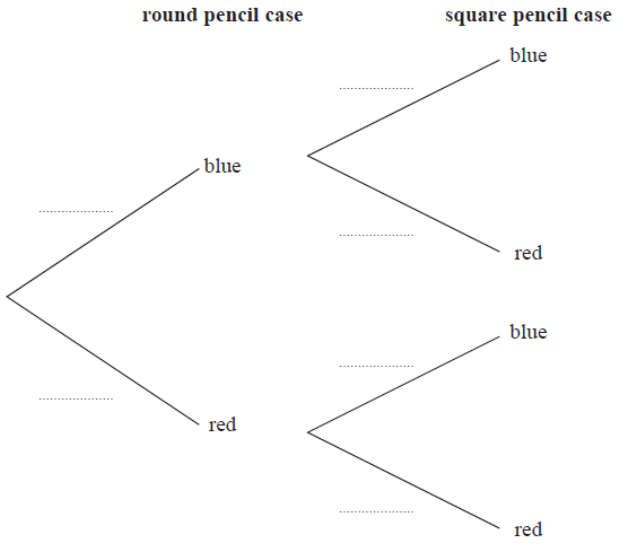
(b) Work out the total number of cubes in the box.

..... **4 marks**

Full Lesson Here

Answer
a) 0.4, 0.4
b) 60

## Probability Trees (Independent) 1




Sameena has a round pencil case and a square pencil case.

There are 4 blue pens and 3 red pens in the round pencil case.
There are 3 blue pens and 5 red pens in the square pencil case.

Sameena takes at random one pen out of each pencil case.

(a) Complete the probability tree diagram.

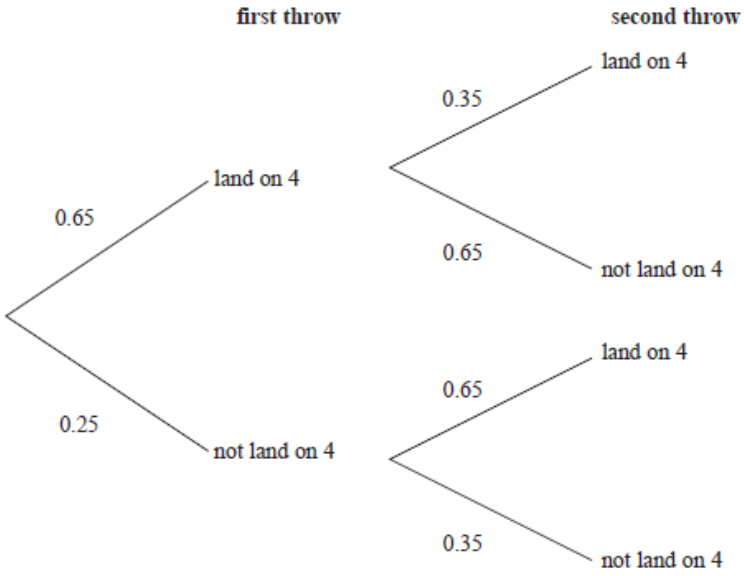
(b) Work out the probability that the pens Sameena takes are both red.

..... **4 marks**

Full Lesson Here

Answer
a) Round: $\frac{4}{7}, \frac{3}{7}$
Square: $\frac{3}{8}, \frac{5}{8}, \frac{3}{8}, \frac{5}{8}$ b) $\frac{15}{56}$

## Probability Trees (Independent) 2




When a biased 6-sided dice is thrown once, the probability that it will land on 4 is 0.65
The biased dice is thrown twice.

Amir draws this probability tree diagram.
The diagram is **not** correct.

Write down **two** things that are wrong with the probability tree diagram.

..... **2 marks**

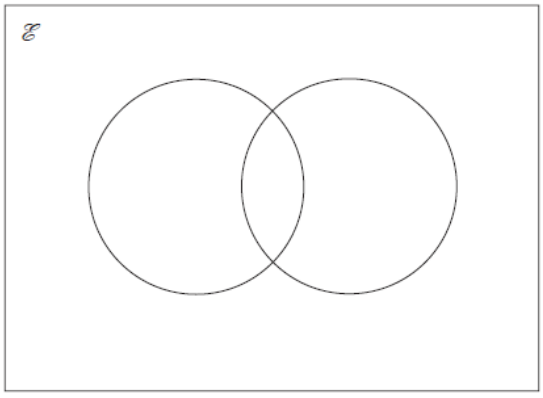
Full Lesson Here

Answer
1) probabilities should sum to 1
2) 0.35 and 0.65 swapped over

## Venn Diagrams and Set Theory

$\mathscr{E}$ = {odd numbers less than 30}
$A$ = {3, 9, 15, 21, 27}
$B$ = {5, 15, 25}

(a) Complete the Venn diagram to represent this information.

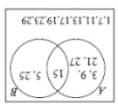



A number is chosen at random from the universal set, $\mathscr{E}$.

(b) What is the probability that the number is in the set $A \cup B$?

..... **6 marks**

Full Lesson Here

Answer a)


b) $\frac{7}{15}$

## Compound Interest

Katy invests £200 000 in a savings account for 4 years.
The account pays compound interest at a rate of 1.5% per annum.

Calculate the total amount of interest Katy will get at the end of 4 years.

Full Lesson Here

Answer
£12,272.70
£12,272.72

..... **3 marks**

## Compound Interest (Non-Calculator)

Toby invested £7500 for 2 years in a savings account.
He was paid 4% per annum compound interest.

How much money did Toby have in his savings account at the end of 2 years?

Full Lesson Here

Answer
£8112

..... **2 marks**

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## Depreciation

Natalia pays £13 995 for a car.
Lauren pays £14 495 for a car.

Assume that
the rate of depreciation for Natalia's car is 12% per annum
and the rate of depreciation for Lauren's car is 13% per annum.

(a) Work out whose car will have the greater value at the end of 3 years.
You must show all your working.

The rate of depreciation assumed for Natalia's car was too low.

(b) How does this affect the value of her car at the end of 3 years?

Full Lesson Here

.....

**5 marks**

Answer
a) Lauren
b) Her car will be worth less

## Reverse Percentages

Jules buys a washing machine.

20% VAT is added to the price of the washing machine.
Jules then has to pay a total of £600

What is the price of the washing machine with **no** VAT added?

Full Lesson Here

.....

**2 marks**

Answer
£500

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## Density, Mass and Volume

A gold bar has a mass of 12.5 kg.

The density of gold is 19.3 g/cm³

Work out the volume of the gold bar.
Give your answer correct to 3 significant figures.

Full Lesson Here

Answer 648cm³

..... **3 marks**

## Density Mixtures

The density of apple juice is 1.05 grams per cm³.

The density of fruit syrup is 1.4 grams per cm³.

The density of carbonated water is 0.99 grams per cm³.

25 cm³ of apple juice are mixed with 15 cm³ of fruit syrup and
280 cm³ of carbonated water to make a drink with a volume of 320 cm³.

Work out the density of the drink.
Give your answer correct to 2 decimal places.

Full Lesson Here

Answer 1.01g/cm³

..... **4 marks**

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## Speed, Distance and Time

Olly drove 56 km from Liverpool to Manchester.
He then drove 61 km from Manchester to Sheffield.

Olly's average speed from Liverpool to Manchester was 70 km/h.
Olly took 75 minutes to drive from Manchester to Sheffield.

Work out Olly's average speed for his total drive from Liverpool to Sheffield.

Full Lesson Here

.....

**4 marks**

Answer 57.1km/h

## Speed, Distance and Time (Non-Calculator)

Gary drove from London to Sheffield.
It took him 3 hours at an average speed of 80km/h.

Lyn drove from London to Sheffield.
She took 5 hours.

Assuming that Lyn
drove along the same roads as Gary
and did not take a break,

(a) work out Lyn's average speed from London to Sheffield.

(b) If Lyn did **not** drive along the same roads as Gary, explain how this could affect your answer to part (a).

Full Lesson Here

.....

**4 marks**

Answer a) 48km/h
b) She may drive a different distance / have a different average speed

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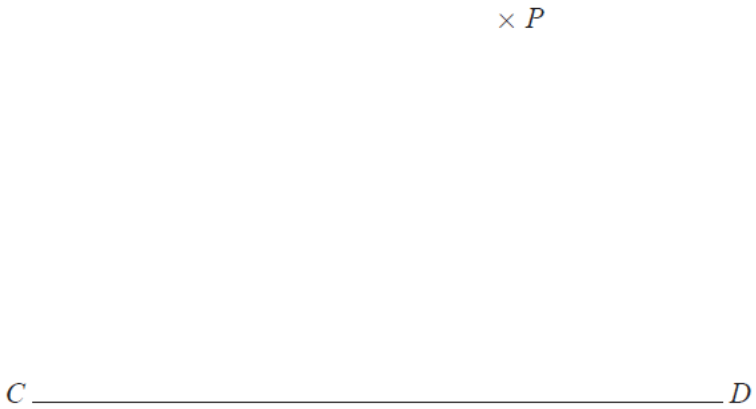
## Perpendicular Bisector

Use a ruler and compasses to construct the line from the point $P$ perpendicular to the line $CD$.
You must show **all** construction lines.



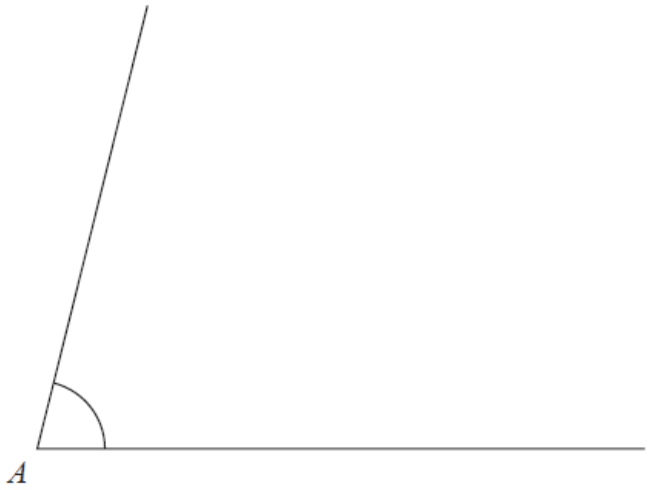

..... **2 marks**

Full Lesson Here

Answer
Perpendicular line constructed through P

## Angle Bisector

Use ruler and compasses to bisect the angle at $A$.
You must show all your construction lines.




..... **2 marks**

Full Lesson Here

Answer
2.5cm circle around A and a perpendicular bisector of BC

## Constructing Triangles

Draw accurately an isosceles triangle with side lengths, 8cm, 7cm and 7cm.
One side of the triangle has been drawn for you.

8 cm

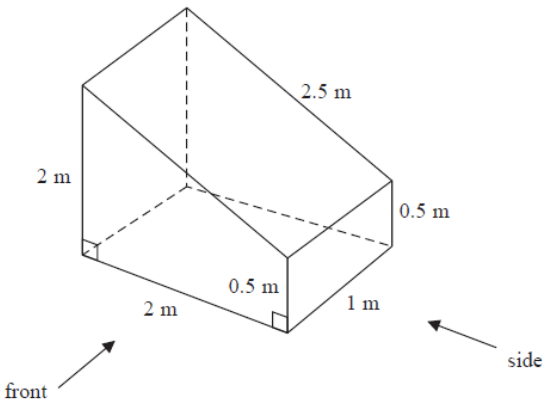
..... **2 marks**

Full Lesson Here

Answer
Accurate triangle drawn

## Plans and Elevations

The diagram shows a prism with a cross section in the shape of a trapezium.




On the centimetre grid below, draw the front elevation and the side elevation of the prism.
Use a scale of 2 cm to 1 m.

..... **4 marks**

Full Lesson Here

Answer
Side: 4x2 rectangle
with a line drawn 1cm from the 2cm edge. Front: Trapezium base 4cm, parallel sides 1cm and 4cm

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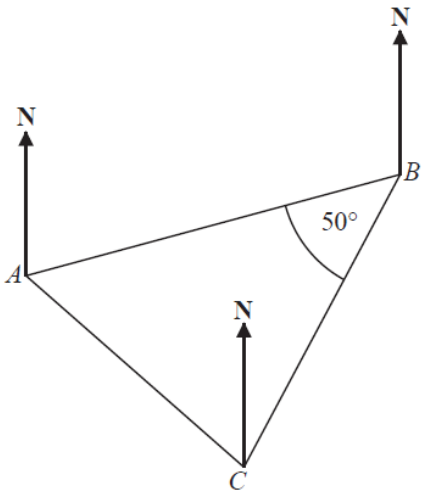
## Bearings




The bearing of $B$ from $A$ is 070°

Angle $ABC$ is 50°
$AB = CB$

Work out the bearing of $C$ from $A$.

..... **3 marks**

Full Lesson Here

Answer
135°

## Loci Problems

Point $T$ is 250 metres from point $A$.
Point $T$ is equidistant from point $B$ and point $C$.

On the map, show one of the possible positions for point $T$.

$B$ ×

$A$ ×

× $C$

1 cm represents 100 metres.

Note: The image is scaled down so it will be different but you can still do it!

..... **3 marks**

Full Lesson Here

Answer
2.5cm circle around A and a perpendicular bisector of BC

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## Expanding Double Brackets

Expand and simplify $(5x + 2)(2x - 3)$

Full Lesson Here

Answer: $10x^2 - 11x - 6$

..... **2 marks**

## Factorising Quadratics

Factorise $x^2 + 4x + 3$

Full Lesson Here

Answer: $(x+1)(x+3)$

..... **2 marks**

GCSE MATHS TUTOR
Click here to go back to the first page!

## Solving Quadratic Equations by Factorising

Solve $x^2 + 5x - 24 = 0$

.....

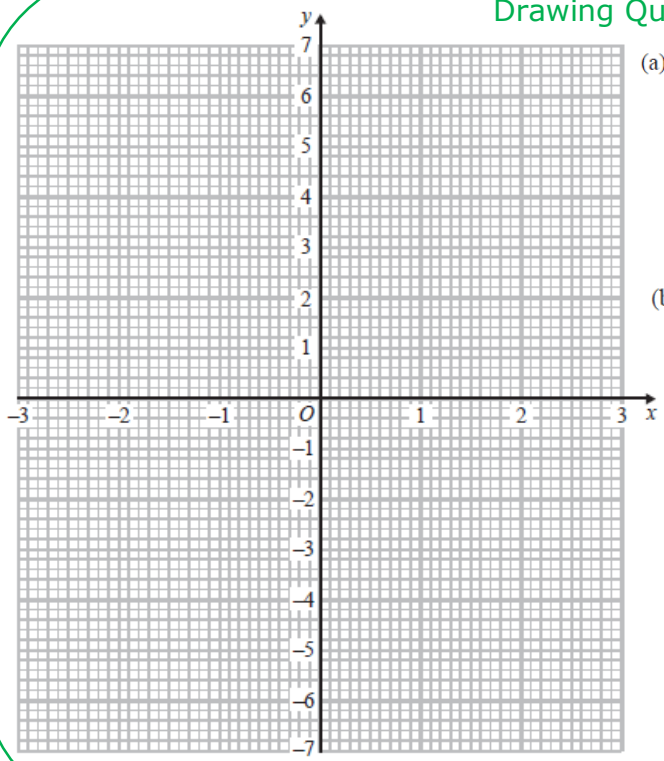
**3 marks**

Full Lesson Here

Answer

x = -8 and x = 3

## Drawing Quadratic Graphs




(a) Complete the table of values for $y = x^2 - x - 6$

| $x$ | –3 | –2 | –1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| $y$ | 6 | | | – 6 | | | |

(b) On the grid, draw the graph of $y = x^2 - x - 6$ for values of $x$ from –3 to 3

.....

**4 marks**

Full Lesson Here

Answer

a) 0, -4, -6, -4, 0

b) Graph drawn

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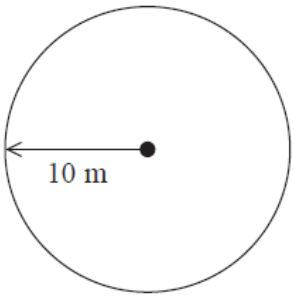
## Area and Circumference of a Circle (Non-Calculator)

Balena has a garden in the shape of a circle of radius 10 m.
He is going to cover the garden with grass seed to make a lawn.




Grass seed is sold in boxes.
Each box of grass seed will cover 46 $m^2$ of garden.

Balena wants to cover all the garden with grass seed.

(a) Work out an estimate for the number of boxes of grass seed Balena needs.
You must show your working.

(b) Is your estimate for part (a) an underestimate or an overestimate?
Give a reason for your answer.

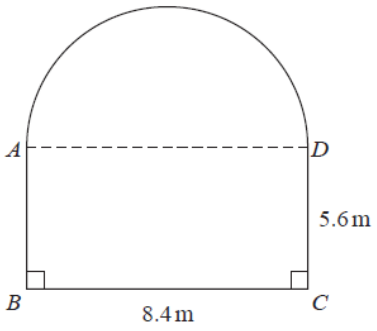
..... **5 marks**

Full Lesson Here

Answer
a) 6-8
b) Underestimate as true area is greater so could need more boxes

## Area and Circumference of a Circle

A garden is in the shape of a rectangle, *ABCD*, and a semicircle.
*AD* is the diameter of the semicircle.




Carol is going to cover the garden with fertiliser.

A box of fertiliser costs £4.99
Carol has been told that one box of fertiliser will cover 12 $m^2$ of garden.

(a) Work out the cost of buying enough fertiliser to cover the garden completely.

Carol finds out that one box of fertiliser will cover more than 12 $m^2$ of garden.

(b) Explain how this might affect the number of boxes she needs to buy.

..... **6 marks**

Full Lesson Here

Answer
a) $n > 2$
b) Open circle above -5, closed circle above 1 and a line connecting them.

## Cones

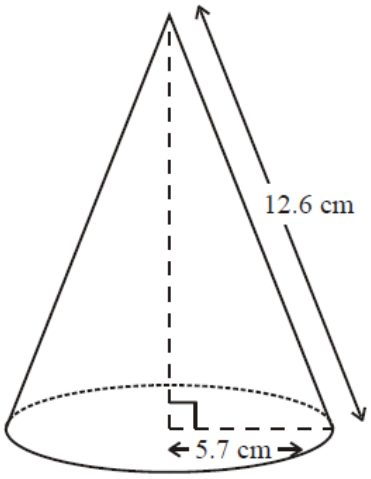
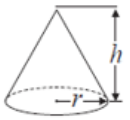



Diagram **NOT** accurately drawn

Volume of cone = $\frac{1}{3}\pi r^2 h$




The radius of the base of a cone is 5.7 cm.
Its slant height is 12.6 cm.

Calculate the volume of the cone.
Give your answer correct to 3 significant figures.

..... **4 marks**

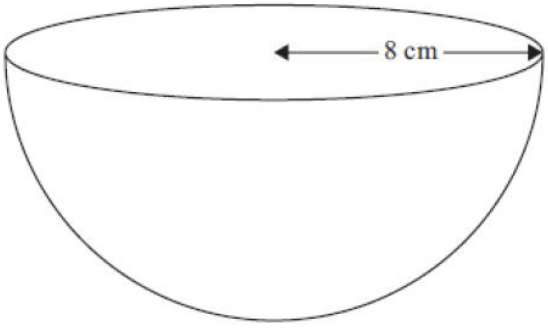
Full Lesson Here

Answer $382cm^3$

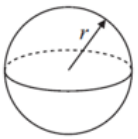
## Probability from a Table

The diagram shows a solid hemisphere of radius 8 cm.

Diagram **NOT** accurately drawn




Volume of sphere = $\frac{4}{3}\pi r^3$
Surface area of sphere = $4\pi r^2$




Work out the total surface area of the hemisphere.
Give your answer correct to 3 significant figures.

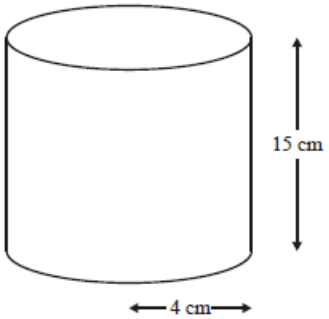
..... **3 marks**

Full Lesson Here

Answer $603cm^2$

## Volume of a Cylinder

A can of drink is in the shape of a cylinder.
The can has a radius of 4 cm and a height of 15 cm.




Calculate the volume of the cylinder.
Give your answer correct to 3 significant figures.

Full Lesson Here

Answer $754\text{cm}^3$

..... **3 marks**

## Surface Area of a Cylinder

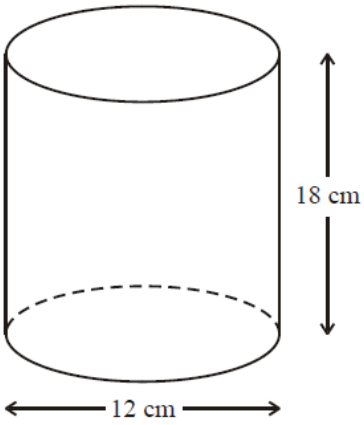



Diagram **NOT** accurately drawn

The diagram shows a solid cylinder.
The cylinder has a diameter of 12 cm and a height of 18 cm.

Calculate the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

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Answer $905\text{cm}^2$

..... **4 marks**

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## Fraction Calculations 1

(a) Work out $\frac{2}{7} + \frac{1}{5}$

(b) Work out $1\frac{2}{3} \div \frac{3}{4}$

Full Lesson Here

..... **4 marks**

Answer
a) $\frac{17}{35}$ b) $\frac{20}{9}$

## Fraction Calculations 2

(a) Work out $2\frac{1}{7} + 1\frac{1}{4}$

(b) Work out $1\frac{1}{5} \div \frac{3}{4}$

Give your answer as a mixed number in its simplest form.

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..... **4 marks**

Answer
a) $\frac{95}{28}$ or $3\frac{11}{28}$
b) $1\frac{3}{5}$

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## Standard Form Conversions

(a) Write 0.00562 in standard form.

(b) Write $1.452 \times 10^3$ as an ordinary number.

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.....  **2 marks**

Answer
a) $5.62 \times 10^{-3}$
b) 1452

## Standard Form Calculations

Work out $(13.8 \times 10^7) \times (5.4 \times 10^{-12})$
Give your answer as an ordinary number.

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.....  **2 marks**

Answer
0.0007452

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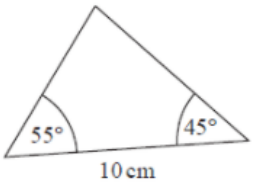
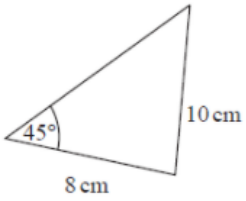
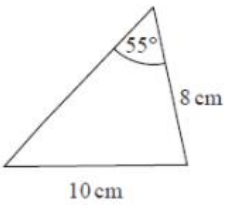
## Congruent Triangles



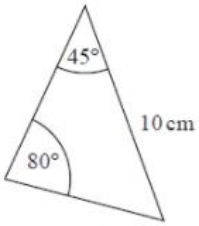
Triangle **A**



Triangle **B**



Triangle **C**



Triangle **D**

Two of these triangles are congruent.

Write down the letters of these two triangles.

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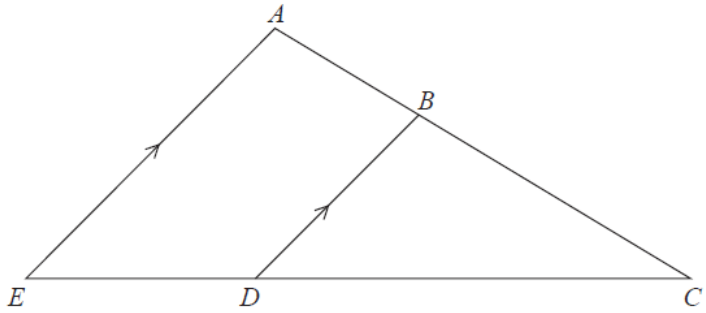
Answer
A and D

..... **1 mark**

## Similar Shapes




*ABC* and *EDC* are straight lines.
*EA* is parallel to *DB*.

*EC* = 8.1 cm.
*DC* = 5.4 cm.
*DB* = 2.6 cm.

(a) Work out the length of *AE*.

*AC* = 6.15 cm.

(b) Work out the length of *AB*.

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Answer
a) 3.9cm
b) 2.05cm

..... **4 marks**

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## Column Vectors 1

Shape **A** is translated by the vector $\begin{pmatrix} 4 \\ -7 \end{pmatrix}$ to make Shape **B**.

Shape **B** is then translated by the vector $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$ to make Shape **C**.

Describe the single transformation that maps Shape **A** onto Shape **C**.

..... **2 marks**

Answer: Translation by the vector $\begin{pmatrix} 1 \\ -9 \end{pmatrix}$

## Column Vectors 2

$\mathbf{a} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$

(a) Write down as a column vector

(i) $\mathbf{a} + \mathbf{b}$

(ii) $2\mathbf{a} + 3\mathbf{b}$

..... **3 marks**

Answer: a) $\begin{pmatrix} 4 \\ 6 \end{pmatrix}$ b) $\begin{pmatrix} 11 \\ 14 \end{pmatrix}$

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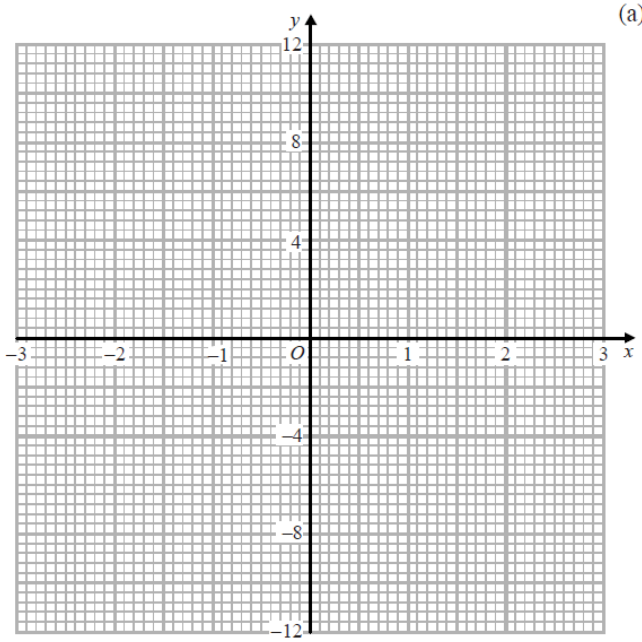
## Cubic Graphs




(a) Complete the table of values for $y = x^3 + x^2 - 2x + 1$

| $x$ | −3 | −2 | −1 | 0 | 1 | 2 |
|---|---|---|---|---|---|---|
| $y$ | | 1 | 3 | | 1 | |

(b) On the grid, draw the graph of $y = x^3 + x^2 - 2x + 1$ for values of $x$ from −3 to 2

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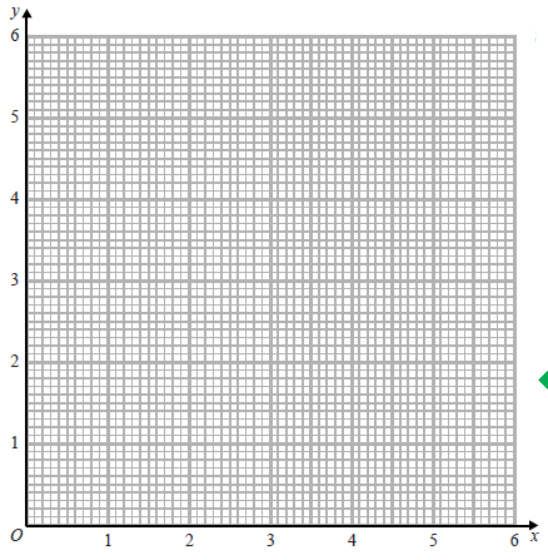
.....

**4 marks**

Answer
a) -11, 1, 9
b) Graph drawn

## Reciprocal Graphs




(a) Complete the table of values for $y = \frac{3}{x}$

| $x$ | 0.5 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| $y$ | | 3 | 1.5 | | 0.75 | | |

(b) On the grid, draw the graph of $y = \frac{3}{x}$ for values of $x$ from 0.5 to 6

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.....

**4 marks**

Answer
a) 6, 1, 0.6, 0.5
b) graph drawn

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## Simultaneous Equations 1

Solve the simultaneous equations

$$2x - 4y = 19$$
$$3x + 5y = 1$$

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.....  **4 marks**

Answer
x = 4.5
y = -2.5

## Simultaneous Equations 2

Solve the simultaneous equations

$$3x + y = -4$$
$$3x - 4y = 6$$

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.....  **3 marks**

Answer
$x = -\frac{2}{3}$, y = -2

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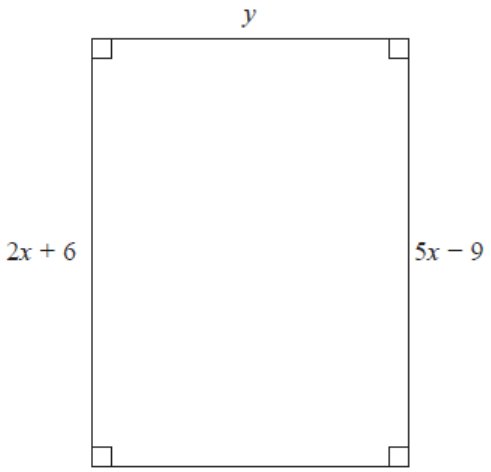
## Forming and Solving Equations 1

Here is a rectangle.




All measurements are in centimetres.

The area of the rectangle is 48 cm².

Show that $y = 3$

..... **4 marks**

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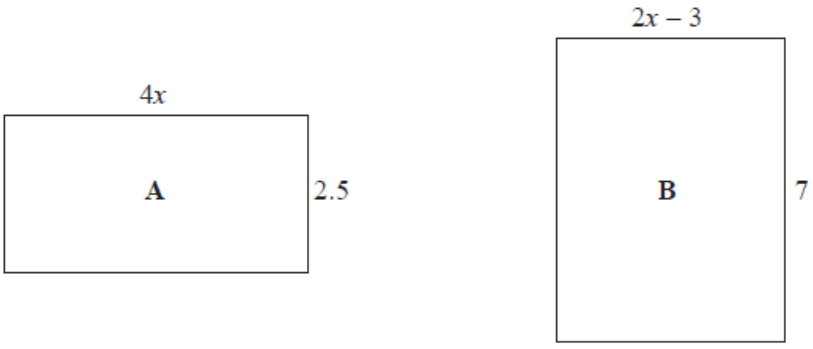
Answer $2x+6=5x-9$, $x=5$, $2(5)+6=16$

## Forming and Solving Equations 2

Here are two rectangles.




All measurements are in centimetres.

The area of rectangle **A** is equal to the area of rectangle **B**.

Work out the perimeter of rectangle **B**.

..... **5 marks**

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Answer 29cm

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