Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2022

Mathematics

StemUp Model Solution

Unit M6 Paper 1
(Non-Calculator)
Foundation Tier



[GMC61]

GMC61

MONDAY 13 JUNE, 9.15am–10.15am

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

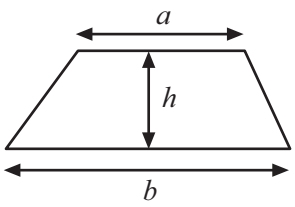
Write your Centre Number and Candidate Number in the spaces provided at the top of this page. **You are provided with Foundation Tier Additional Support Materials for use with this paper.**
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page, on blank pages or tracing paper.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all fourteen** questions.
All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

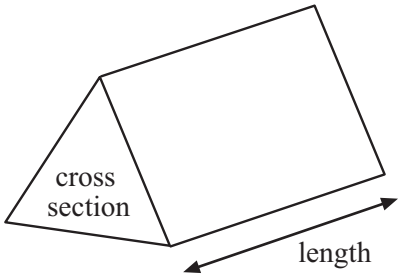
The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses and a protractor.
The Formula Sheet is on page 2.

Formula Sheet

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross section × length

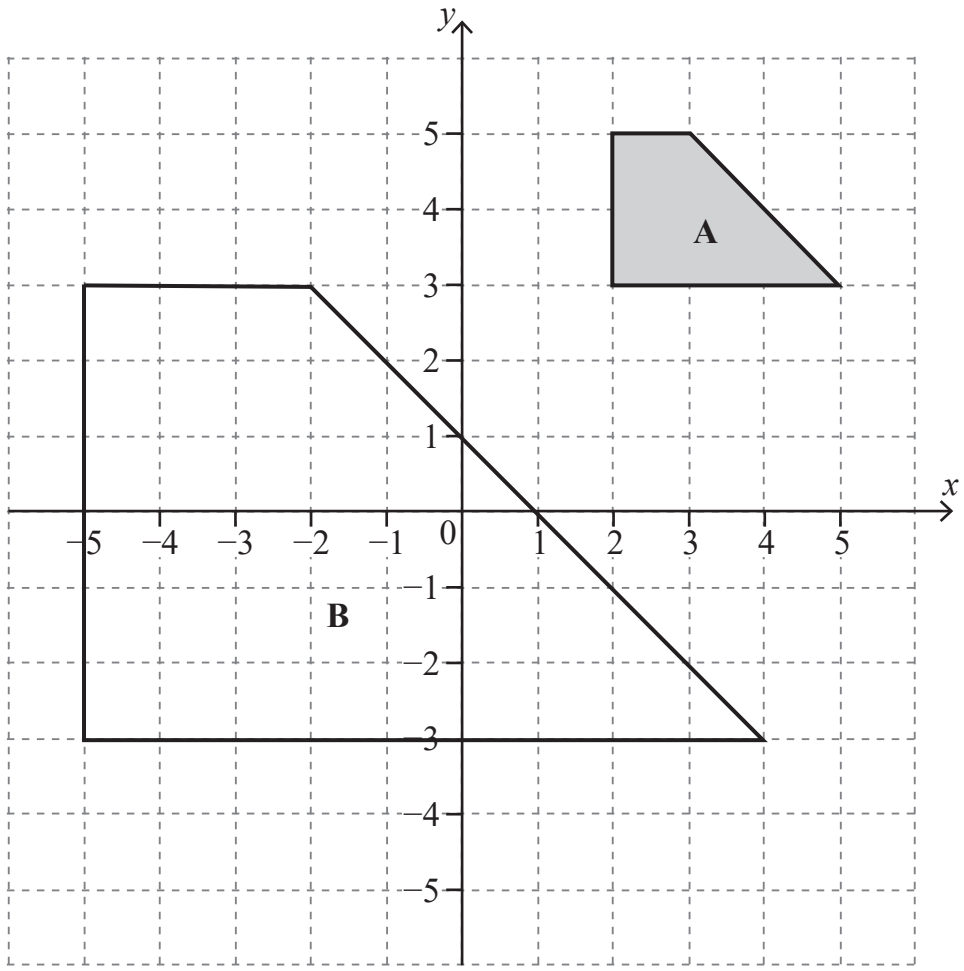


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1 Complete the following:

Shape **A** has been _____ *enlarged* _____ to make Shape **B**, using

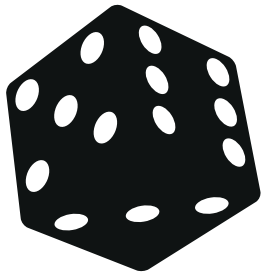
a scale factor of _____ *3* _____



[2]

[Turn over

2 A fair six-sided dice is rolled once.

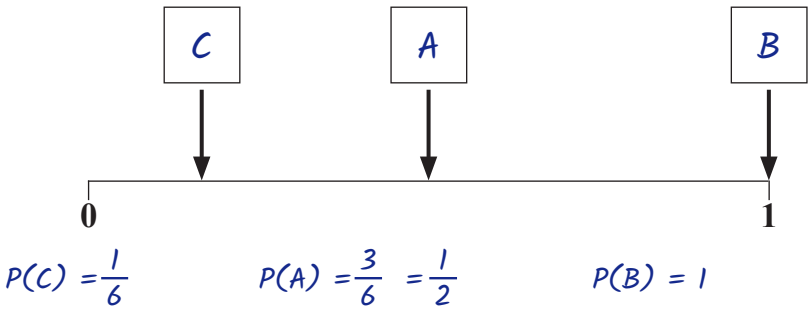


A: An even number is rolled.

B: A number greater than 0 is rolled.

C: A number less than 2 is rolled.

Label the boxes with the correct letter to show the probability of **A**, **B** and **C**.



[3]

3 Jon earns £9 per hour.

He worked 25 hours last week.

He saved $\frac{2}{5}$ of his earnings.

(a) How much did he save?

Earnings = 9 × 25 = £225

225 ÷ 5 = 45

$\frac{2}{5}$ of 225 = 45 × 2 = £90

Answer £ 90 [3]

When Jon is 21 years old he will get a 15% pay rise.

(b) How much **extra** will he earn per hour?

10% of £9 = 90p

5% of £9 = 45p

15% = 90p + 45p = 135p = £1.35

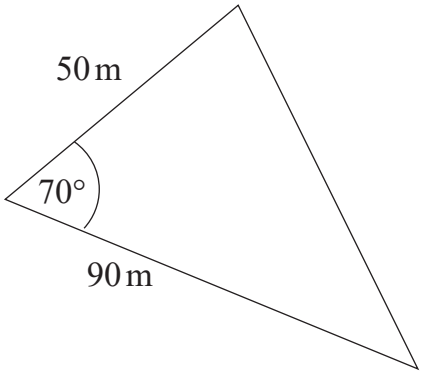
Answer £ 1.35 [2]

[Turn over

4 The sketch below shows a triangular field.

Two sides have lengths of 50 m and 90 m.

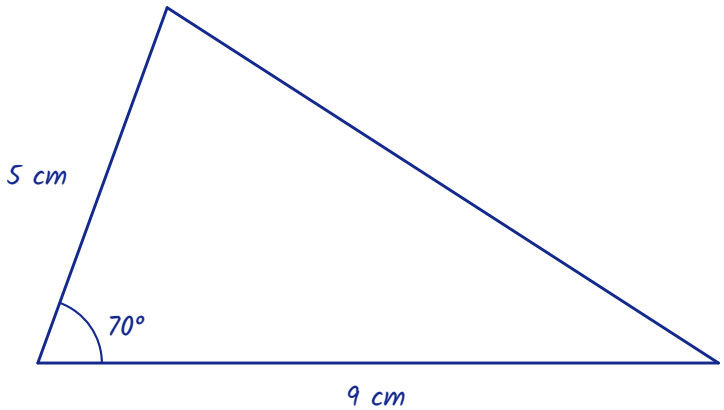
The angle between these two sides is 70°



Using a scale of 1 cm = 10 m, draw this triangular field in the space below. [3]

50 m → 5 cm

90 m → 9 cm



5 Below is a menu from Dillies Diner.

A two-course lunch is made up of one Starter and one Main course.

DILLIES DINER LUNCH MENU

Starter	Main Course
Soup Mushrooms Ribs	Plaice Beef Chicken Quiche

Work out the number of different two-course lunches that can be ordered from this menu.

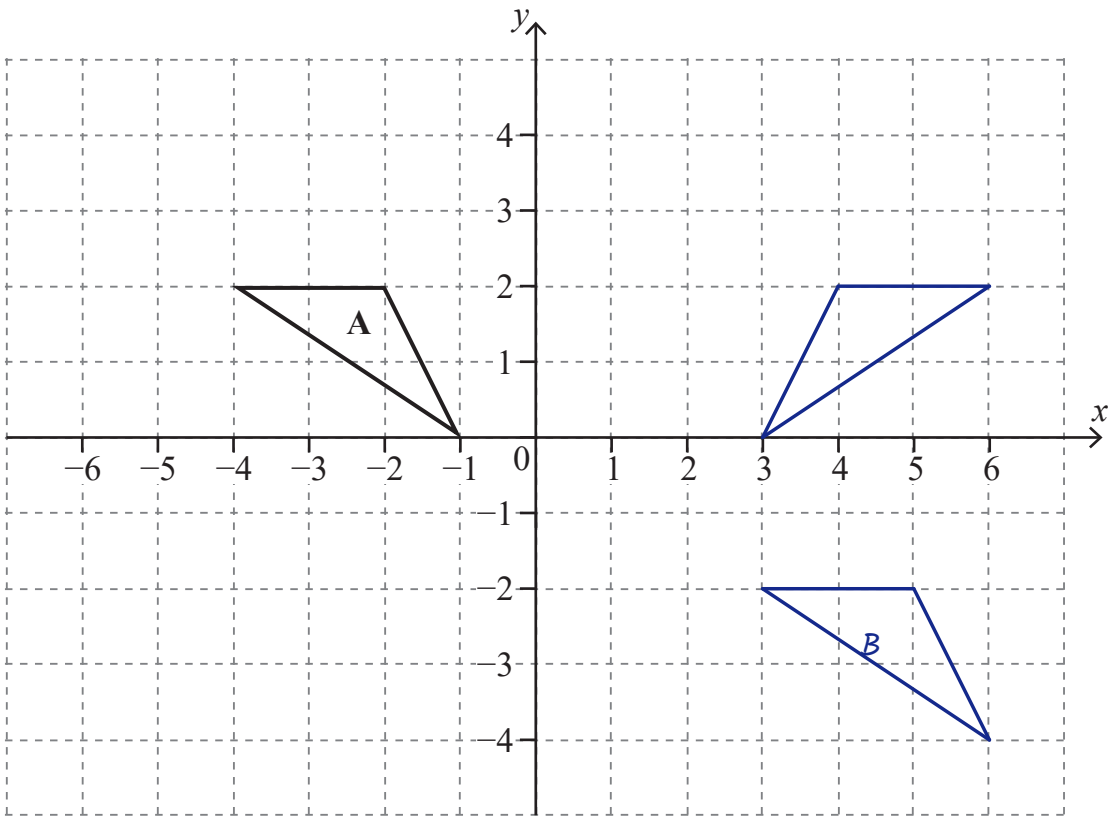
SP, SB, SC, SQ
MP, MB, MC, MQ
RP, RB, RC, RQ

3 × 4 = 12

Answer 12 lunches [2]

[Turn over

6



(a) (i) Translate triangle **A** 7 right and 4 down. Label your answer **B**. [2]

(ii) Describe the translation which maps **B** to **A**.

Answer 7 left and 4 up [1]

(b) Reflect triangle **A** in the line $x = 1$ [2]

7 Estimate $\dfrac{395 \times 9.88}{53}$

Show your method.

$\dfrac{395 \times 9.88}{53} \approx \dfrac{400 \times 10}{50}$

$= \dfrac{4000}{50} = 80$

Answer 80 [2]

8 Andrew cycles at a steady speed from his home to school for a meeting.

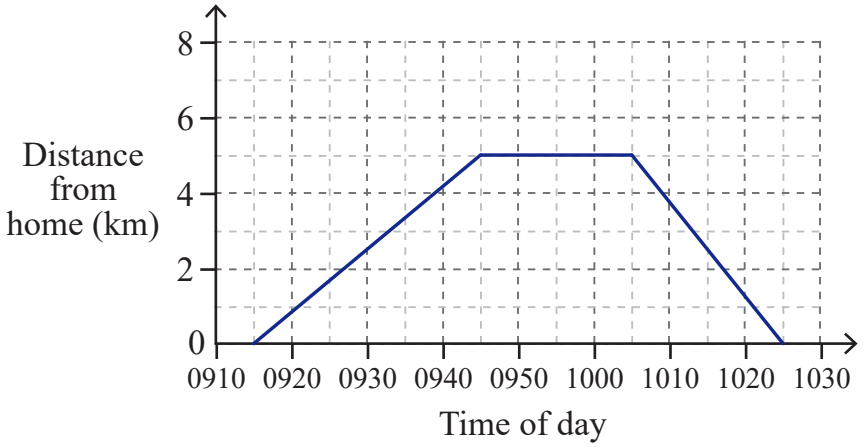
He leaves home at 0915 and arrives at school at 0945

The distance from his home to school is 5 km.

He spends 20 minutes at school before returning home again.

He arrives home at 1025

(a) On the grid below draw a distance–time graph for Andrew's complete journey.



[3]

(b) (i) Work out Andrew's average speed for his journey home.

5 km in 20 minutes

20 min = 1/3 hour, so speed = 5 × 3 = 15

Answer 15 km/hr [2]

(ii) Is this Andrew's fastest average speed during his journey?

Explain why.

Answer Yes because to school he went 5 km in 30 min = 10 km/hr, slower than 15 km/hr on the way home [1]

9 Beechgrove High School has 1200 pupils in total.

45% of the pupils are girls.

(a) Work out the number of girls in the school.

10% of 1200 = 120

5% of 1200 = 60

45% = 4 × 120 + 60 = 540

Answer 540 [2]

There are 240 pupils in Year 12

(b) What percentage of the pupils in the school are in Year 12?

$\frac{240}{1200} \times 100 = \frac{1}{5} \times 100 = 20$

Answer 20 % [2]

[Turn over

10 Students in a class were asked how many text messages they each sent in a particular week.

Number of text messages	0–19	20–39	40–59	60–79	80 or over
Number of students	1	3	13	8	3

A student was taken at random from the class.

(a) What is the probability that this student sent more than 59 messages?

Total = 1 + 3 + 13 + 8 + 3 = 28

More than 59: 8 + 3 = 11

Answer $\frac{11}{28}$ [2]

A student was taken at random from those who sent less than 60 messages.

(b) What is the probability that this student sent 40–59 messages?

Less than 60: 1 + 3 + 13 = 17

Answer $\frac{13}{17}$ [2]

11 **(a)** What is the main difference between the Binary number system and the Decimal number system?

Answer Binary is base 2 (only digits 0 and 1), decimal is base 10 [1]

(b) Write the binary number 111111 as a decimal number.

32 16 8 4 2 1

1 1 1 1 1 1

32 + 16 + 8 + 4 + 2 + 1 = 63

Answer 63 [1]

(c) Write the decimal number 87 as a binary number.

87 = 64 + 16 + 4 + 2 + 1

64 32 16 8 4 2 1

1 0 1 0 1 1 1

Answer 1010111 [1]

[Turn over

12 **(a)** Simplify

(i) $w^3 \times w^2$

$w^{3+2} = w^5$

Answer w^5 [1]

(ii) $\frac{y^6}{y^2}$

$y^{6-2} = y^4$

Answer y^4 [1]

(b) Work out the n^{th} term of the sequence

7, 14, 21, 28, 35 …

goes up in 7s, $7 \times n$

Answer $7n$ [1]

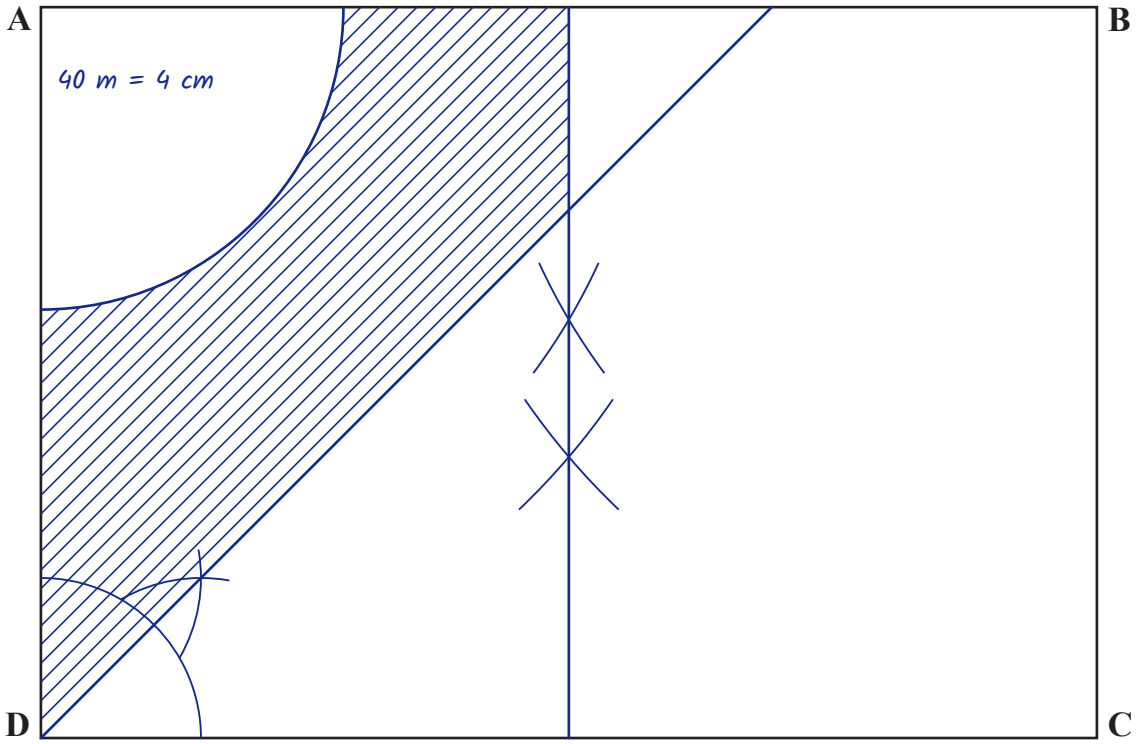
13 Toby walks his dog in the field **ABCD** so that he is always:

more than 40 m from **A**;

nearer to **A** than **B**;

nearer to **DA** than **DC**.

Shade the area where Toby walks his dog.



Scale of diagram: 1 cm = 10 m

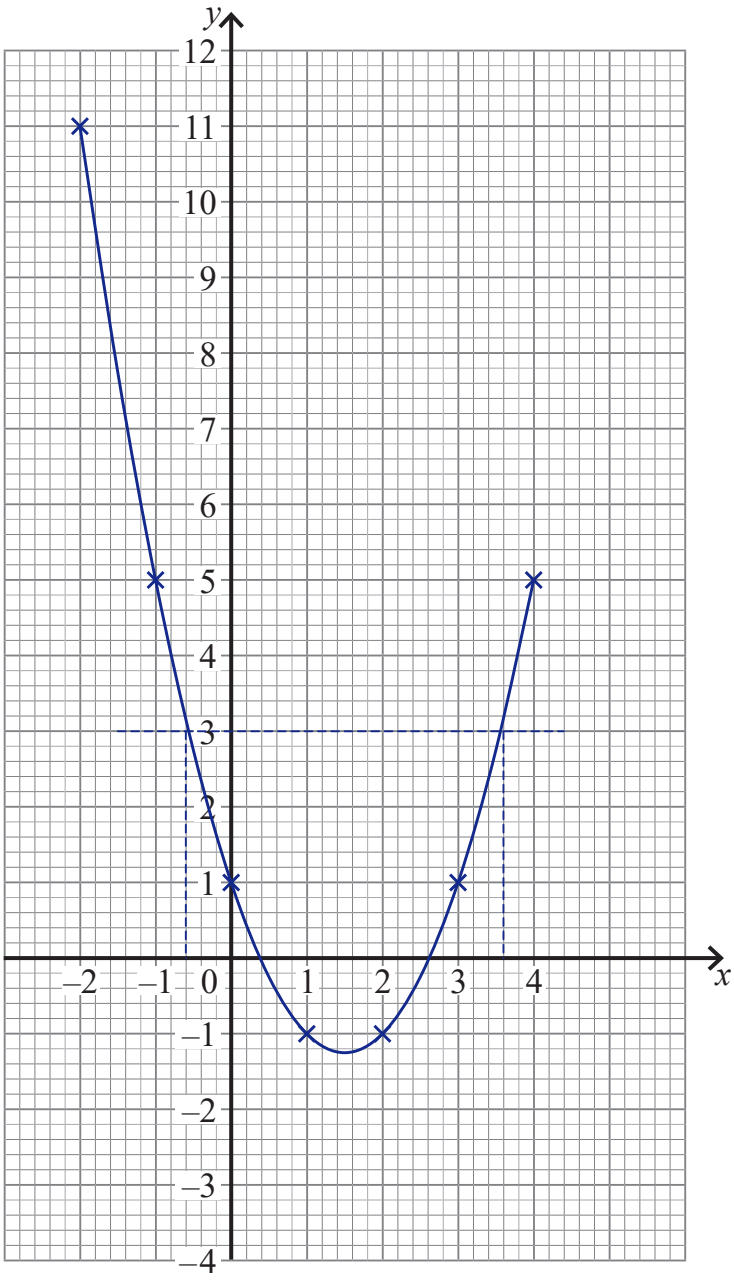
[4]

[Turn over

14 The following table gives some values for the quadratic equation $y = x^2 - 3x + 1$

x	–2	–1	0	1	2	3	4
y	11	5	1	–1	–1	1	5

(a) On the grid below, draw the graph of $y = x^2 - 3x + 1$ for values of x between –2 and 4



[2]

(b) Use your graph to estimate the values of x for which $y = 3$

Draw y = 3 on the graph: it crosses the curve at

x ≈ −0.6 and x ≈ 3.6

Answer $x =$ *−0.6 and 3.6* [2]

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Question Number	**Marks**
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14	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
Summer 2022

GCSE Mathematics

FOUNDATION TIER
ADDITIONAL SUPPORT MATERIALS
(For use in Summer 2022)

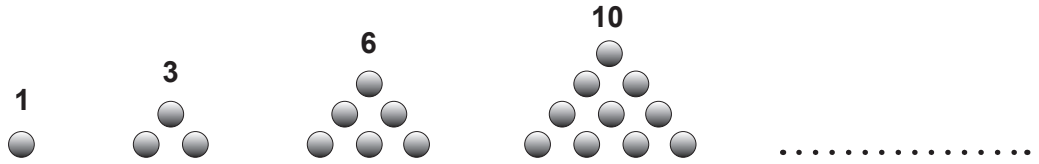
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FOUNDATION TIER ADDITIONAL SUPPORT MATERIALS (Summer 2022)

Numbers

Lowest common multiple (LCM): The lowest common multiple is the lowest multiple shared by 2 or more numbers.

Triangular numbers – are a pattern of numbers which form triangles. Each number in the sequence adds a new row of dots to the triangle.



Trial and Improvement

This is a method of trying different values in an equation until you get a suitable solution (e.g to 1 decimal place).

Measures

Conversion from metric to imperial units

1 kg = 2.2 pounds (lb)

Metric units

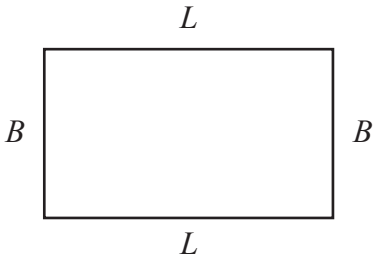
1 ml = 1 cm^3

Compound Measures

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Average Speed} = \frac{\text{Distance}}{\text{Time}}$$

Perimeter and Volume



The perimeter of a rectangle is the distance around the outside of the rectangle. It is found by adding the lengths of the 4 sides of the rectangle.

$P = 2L + 2B$ where P is perimeter, L is length and B is breadth.

The volume of a cuboid is found by multiplying the length by the breadth by the height of the cuboid.

$V = L \times B \times H$ where V is volume, L is length, B is breadth and H is height.

The circumference (perimeter) of a circle is $C = 2\pi r$ where r is the radius of the circle. An alternative formula is $C = \pi d$ where d is the diameter of the circle.

Geometry and Angles

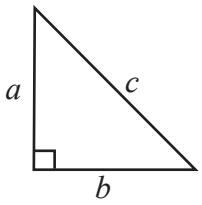
There are 180° on a straight line.
There are 180° inside a triangle.
An isosceles triangle is a triangle with 2 equal sides and 2 equal angles.
The sum of all the angles inside a polygon is given by $180(n - 2)$ where n is the number of sides in the polygon.

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Pythagoras' Theorem

If *a, b* and *c* are the sides of a right angled triangle shown below, then

$$a^2 + b^2 = c^2$$



Range

The range of a set of data is the difference between the largest value and the smallest value in the data set.

Mean

The mean of a set of data is the sum of all the data values divided by the number of data values.

Estimate for the mean of a grouped frequency distribution

Estimated mean = sum of (mid interval values multiplied by their frequency) divided by the sum of all the frequencies.

Pie Chart

In a pie chart, the total angle that corresponds to the entire data set is 360°

Probability

The sum of the probabilities of all outcomes equals 1

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