



- 1 Ravi writes 56 000 as 56×10^3 .

Is this in standard form? Give a reason, and write 56 000 correctly in standard form.

(2 marks)

First number must be between 1 and 10

56 is too big, so not standard form

$$5.6 \times 10^4$$

- 2 An L-shape is made by joining a rectangle 8 cm by 5 cm to a rectangle 4 cm by 3 cm. The two rectangles do not overlap.

Work out the total area of the L-shape.

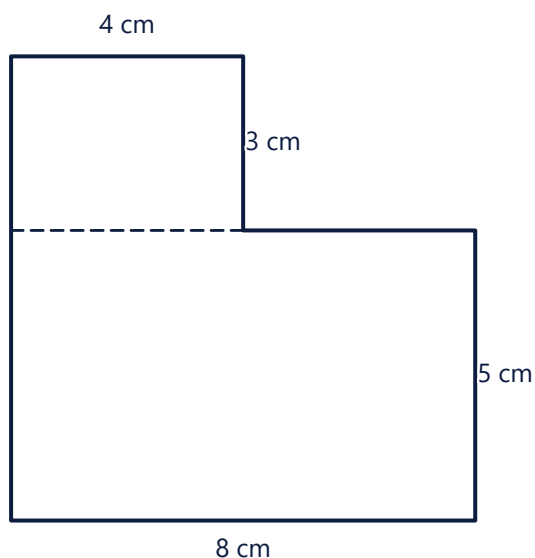


Diagram NOT accurately drawn

(2 marks)

$$\text{Area of the first rectangle} = 8 \times 5 = 40 \text{ cm}^2$$

$$\text{Area of the second rectangle} = 4 \times 3 = 12 \text{ cm}^2$$

$$\text{Total area} = 40 + 12 = 52 \text{ cm}^2$$

$$52 \text{ cm}^2$$

- 3 A cuboid measures 6 cm by 4 cm by 3 cm.

Work out the volume of the cuboid.

State the units of your answer.

(2 marks)

Volume of a cuboid = length $\times$ width $\times$ height

$$\text{Volume} = 6 \times 4 \times 3 = 72 \text{ cm}^3$$

$$\boxed{72 \text{ cm}^3}$$

- 4 A ship sails 24 km due north and then 10 km due east.

Work out the straight-line distance of the ship from its starting point.

(3 marks)

North and east make a right angle

$$d^2 = 24^2 + 10^2$$

$$d^2 = 576 + 100 = 676$$

$$d = \sqrt{676} = 26$$

$$\boxed{26 \text{ km}}$$

- 5 A pupil is constructing a 60° angle at point P on a straight line. She puts the compass point on P , sets the radius to 5 cm and draws an arc that crosses the line at Q . She keeps the compasses at 5 cm, puts the point on Q and draws a second arc that crosses the first arc at R .

Explain why angle RPQ is 60° .

(2 marks)

$PQ = 5 \text{ cm}$ (first arc)

$PR = 5 \text{ cm}$ (first arc)

$QR = 5 \text{ cm}$ (second arc)

All sides equal: equilateral triangle

$$\boxed{\text{Each angle} = 60^\circ}$$

6

The table shows the heights, h cm, of 20 plants.

Height (h cm)	Frequency
$140 \leq h < 150$	3
$150 \leq h < 160$	8
$160 \leq h < 170$	6
$170 \leq h < 180$	3

- a. Work out an estimate for the mean height.
b. Explain why your answer to part (a) is only an estimate.

(3 marks)

a) midpoint $\times$ frequency

$$145 \times 3 = 435$$

$$155 \times 8 = 1240$$

$$165 \times 6 = 990$$

$$175 \times 3 = 525$$

$$\text{total} = 3190$$

$$3190 \div 20 = 159.5$$

b)

Exact values not known, midpoints assumed

$$\boxed{\text{a) } 159.5 \text{ cm}}$$

7

Priya invests £1500 in a savings account for 4 years.

The account pays simple interest at a rate of $R\%$ per year.

At the end of 4 years, Priya has received a total of £180 in interest.

Work out the value of R .

(3 marks)

Interest received each year

$$180 / 4 = 45 \text{ pounds}$$

$$45 \text{ as a percentage of } 1500 \text{ is } 45 / 1500 = 0.03$$

$$0.03 = 3\%, \text{ so } R = 3$$

$$\boxed{3}$$

- 8 Amber runs 15.6 km in 1 hour 30 minutes.

Work out her average speed in km/h.

(3 marks)

Convert the time to hours

$$1 \text{ hour } 30 \text{ minutes} = 1.5 \text{ hours}$$

$$\text{Use speed} = \text{distance} \div \text{time}$$

$$\text{Speed} = 15.6 \div 1.5 = 10.4 \text{ km/h}$$

$$10.4 \text{ km/h}$$

- 9 Work out the value of $(3^5 \times 3^{-2}) \div 3$

(2 marks)

$$3^5 \times 3^{-2} = 3^{(5-2)} = 3^3$$

$$3^3 \text{ divided by } 3 = 3^{(3-1)} = 3^2$$

$$3^2 = 9$$

$$9$$

- 10 Is 97 a prime number? Show how you know.

(2 marks)

Only test primes up to 7 ($11^2 = 121 > 97$)

Not even

$$9 + 7 = 16, \text{ not a multiple of } 3$$

Does not end in 0 or 5

$$7 \times 13 = 91, 7 \times 14 = 98, \text{ so not a multiple of } 7$$

97 is prime

- 11 Complete the table of values for $y = x^2 - 2$

x	-2	-1	0	1	2
y	2		-2		2

(2 marks)

$$\text{When } x = -1: y = (-1)^2 - 2 = 1 - 2 = -1$$

$$\text{When } x = 1: y = 1^2 - 2 = -1$$

12

Work out $5 - 2\frac{3}{8}$

Give your answer as a mixed number.

(2 marks)

Write the 5 as 4 and eight eighths

$$5 = 4 \frac{8}{8}$$

$$4 \frac{8}{8} - 2 \frac{3}{8}$$

$$4 - 2 = 2$$

$$\frac{8}{8} - \frac{3}{8} = \frac{5}{8}$$

$$\boxed{2 \frac{5}{8}}$$

13

Here are the first four terms of an arithmetic sequence.

20 17 14 11

Find an expression, in terms of n , for the n th term of the sequence.

(2 marks)

The common difference is -3, so the n th term contains $-3n$ The sequence $-3n$ gives -3, -6, -9, -12, which is 23 less than each termThe n th term is $23 - 3n$

Check

$$\text{when } n = 2, 23 - 6 = 17$$

$$\boxed{23 - 3n}$$

14

In a sale a pair of boots is reduced by 30%. The sale price is £42.

Work out the original price of the boots.

(3 marks)

$$100\% - 30\% = 70\%$$

$$70\% = £42$$

$$10\% = 42 \div 7 = 6$$

$$100\% = 6 \times 10 = 60$$

$$\boxed{£60}$$

15 Triangle A has vertices at (2, 2), (4, 2) and (2, 6).

Triangle B has vertices at (1, 1), (2, 1) and (1, 3).

Triangle C has vertices at (-1, 1), (-2, 1) and (-1, 3).

a. Describe fully the single transformation that maps triangle A onto triangle B.

b. Describe fully the single transformation that maps triangle B onto triangle C.

(4 marks)

Every vertex of B is exactly half the matching vertex of A: (2, 2) maps to (1, 1), (4, 2) maps to (2, 1), (2, 6) maps to (1, 3)

So A to B is an enlargement, scale factor $\frac{1}{2}$, centre the origin

(0, 0)

Every vertex of C has the same y-coordinate as the matching vertex of B with the sign of the x-coordinate changed

So B to C is a reflection in the y-axis (the line $x = 0$)

16 Find the lowest common multiple (LCM) of 15 and 18

(3 marks)

$$15 = 3 \times 5 \text{ and } 18 = 2 \times 3^2$$

Take the highest power of every prime that appears: 2, 3^2 and 5

$$\text{LCM} = 2 \times 9 \times 5 = 90$$

A common multiple must contain enough prime factors to be divisible by both numbers. Taking the larger power of each prime provides exactly enough, giving the lowest such multiple

90

17 Find the value of n in each of these.

a. $7^n \times 7^4 = 7^{10}$

b. $3^8 \div 3^n = 3^5$

(2 marks)

a)

$$\begin{array}{rcl} n + 4 & = & 10 \\ -4 & & -4 \\ \hline n & = & 6 \end{array}$$

$n = 6$

b)

$$\begin{array}{rcl} 8 - n & = & 5 \\ +n & & +n \\ \hline 8 & = & 5 + n \\ -5 & & -5 \\ \hline 3 & = & n \end{array}$$

$n = 3$

18 The exchange rate is £1 = €1.14.

Nadia changes £250 into euros.

Work out how many euros she gets.

(2 marks)

Each pound is worth 1.14

$$250 \times 1.14 = 285$$

Nadia gets 285

€285

19 A school buys pens in packs of 12 and pencils in packs of 20.

The ratio of the number of packs of pens to the number of packs of pencils bought is 5 : 2.

Show that the ratio of the number of pens to the number of pencils bought is 3 : 2.

(4 marks)

Take 5 packs of pens and 2 packs of pencils

$$\text{Pens} = 5 \times 12 = 60. \text{ Pencils} = 2 \times 20 = 40$$

Pens

$$\text{pencils} = 60 : 40$$

Divide both parts by 20 to get 3 : 2, as required

20

The probability that a bus is late is 0.12.

Tamsin catches the bus on 250 days. Work out how many days you would expect the bus to be late.

(2 marks)

$$0.12 \times 250$$

$$= 30$$

30 days