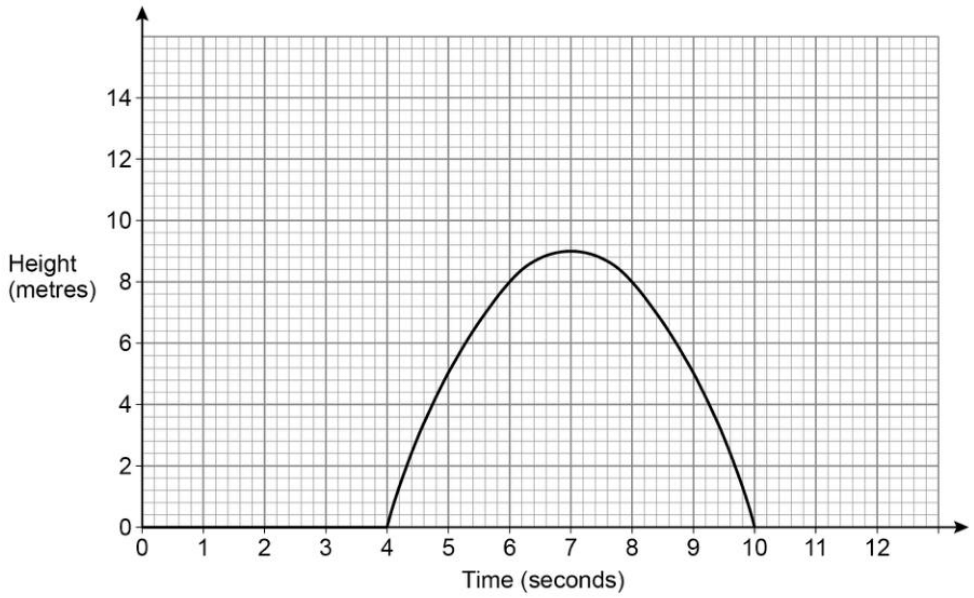
19 The graph shows the height above ground of a toy rocket for 10 seconds.

box



19 (a) For how long is the rocket in the air?

Circle your answer.

[1 mark]

10 seconds 9 seconds 6 seconds 4 seconds

19 (b) Using the graph, estimate the speed of the rocket after 6 seconds.

box

State the units of your answer.

[3 marks]

Answer _____

Do not write outside the box

20 $(x-9)=\dfrac{2(6-x^2)}{x+3}$ and $x=\dfrac{d\pm\sqrt{e}}{f}$

Work out one set of possible values for d, e and f.

[4 marks]

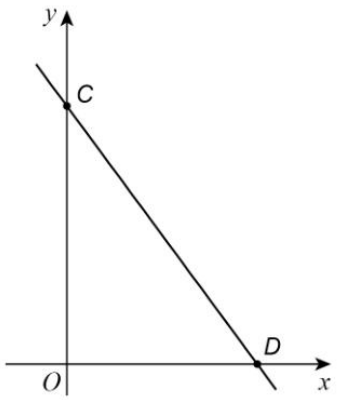
$d=$ _____

$e=$ _____

$f=$ _____

Do not write outside the box

5 (a) Here is a sketch of the graph $y = -2x + 6$

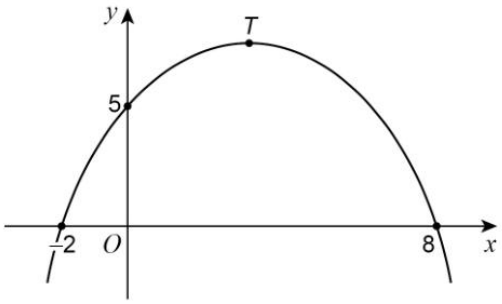


Complete the coordinates of *C* and *D*.

[2 marks]

C (0 , _____) *D* (_____ , 0)

5 (b) Here is a sketch of a quadratic graph.



Complete the following statements.

[2 marks]

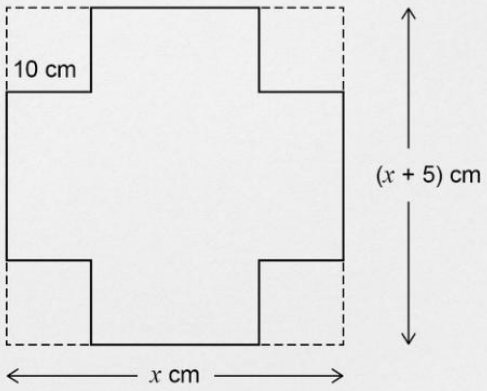
The value of the ***y*-intercept** is _____

The ***x*-coordinate** of the turning point, *T*, is _____

18 Kate has the following question for homework. box

The net of a box is made by cutting four squares from a piece of cardboard.
The cardboard is a rectangle with width x cm and length $(x + 5)$ cm
Each square has side length 10 cm
The area of the net is 1000 cm^2
Work out the value of x.

Not drawn accurately



18 (a) Show that Kate can form the equation $x^2 + 5x - 1400 = 0$

[3 marks]

18 (b) Kate correctly factorises the equation to get $(x + 40)(x - 35) = 0$ box

Her answer to the homework question is $x = -40$ or $x = 35$

Is her answer correct?
Tick a box.

☐ Yes ☐ No

Give a reason for your answer.

[1 mark]

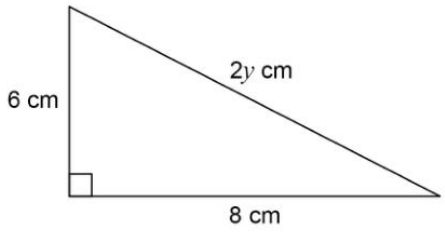
15 Rearrange $y = \sqrt{w^3}$ to make w the subject.

Circle your answer.

[1 mark]

$w = y^6$ $\quad$ $w = \sqrt[3]{y^2}$ $\quad$ $w = \sqrt{y^3}$ $\quad$ $w = y^5$

15 Sami is trying to work out the exact value of y using Pythagoras' theorem.



Not drawn accurately

Here is her working.

$$(2y)^2 = 6^2 + 8^2$$

$$2y^2 = 36 + 64$$

$$2y^2 = 100$$

$$y^2 = 100 \div 2$$

$$y^2 = 50$$

$$y = \sqrt{50}$$

15 (a) What error has she made in her working?

[1 mark]

15 (b) Kai works out that $y = 5$

Mel says,

"y cannot be 5 because the hypotenuse should be the longest side and the other sides are longer than 5 cm"

Is Mel correct?

Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

11 Write these numbers in **descending** order.

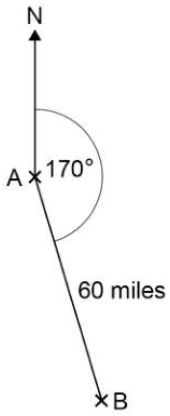
9563 9.56×10^3 9.56×3^{10}

[2 marks]

Answer _____ , _____ , _____

24 B is 60 miles from A on a bearing of 170°

Not drawn accurately



A ship sails from A on a bearing of 247°

It travels at a constant speed of 23 mph for $1\frac{1}{2}$ hours.

Is the ship now closer to B than it was when it left A?

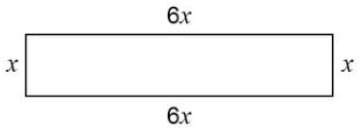
You **must** show your working.

[5 marks]

DOX

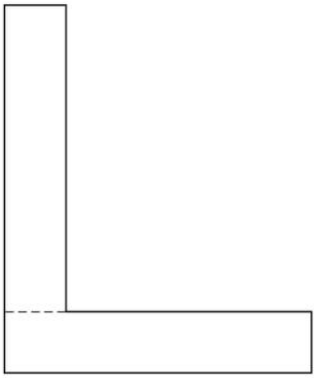
12 The length of this rectangle is 6 times the width.

box



Not drawn accurately

Two of these rectangles are joined, with no overlap, to make this L-shape.



Not drawn accurately

The perimeter of the L-shape is 98.8 cm

Work out the value of the perimeter of **one** of the rectangles.

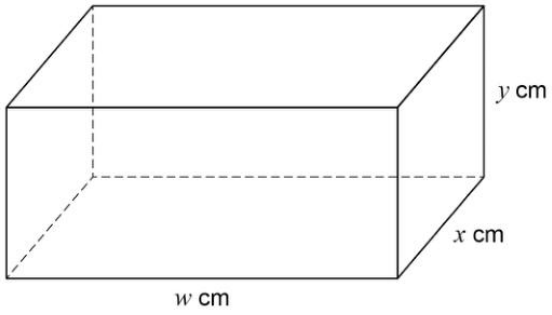
[4 marks]

Answer _____ cm

8 (a) Here is a cuboid.

box

w, x and y are **different** whole numbers.



The total length of **all** the edges of the cuboid is 80 cm

The volume is **greater** than 200 cm^3

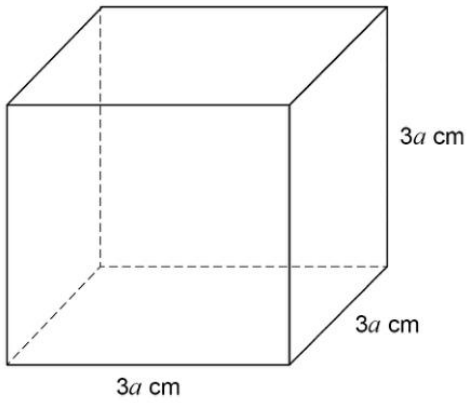
Work out one possible set of values for w, x and y.

[2 marks]

$w =$ _____ $x =$ _____ $y =$ _____

8 (b) Here is a solid cube.

box



Circle the expression for the **total** surface area in cm^2

[1 mark]

$36a$ $54a$ $36a^2$ $54a^2$

5 Written as the product of prime factors,

$12\,600 = 2^3 \times 3^2 \times 5^2 \times 7$

and

$14\,112 = 2^5 \times 3^2 \times 7^2$

Work out the highest common factor (HCF) of 12 600 and 14 112

Give your answer as an integer.

[2 marks]

Answer

22 Liam is trying to remember a 3-digit code.

He knows the rule that

the first digit is a cube number

the second digit is a factor of 16

the third digit is an odd number.

Liam tries at random a code that matches the rule.

Work out the probability that this is the correct code.

[4 marks]

box

Answer _____

13 A factory packs x boxes of teabags per hour.

Each box contains 80 teabags.

Show that the factory packs $\frac{4x}{3}$ teabags per minute.

[2 marks]

14 The population of butterflies in a park is 4200

14 (a) Assume that the population increases by 12% each day.

Show that after 20 days the population would be greater than 40 000

[2 marks]

14 (b) In fact, the population

increases by 13% each day for 19 days

then

decreases by 8% for 1 day.

After the 20 days, is the actual population greater than 40 000 ?

Tick a box.

☐ Yes ☐ No

Show working to support your answer.

[2 marks]

14 (c) The expected number of visitors to the park each day depends on the temperature.

Temperature	Expected number of visitors each day
Less than 21°C	700
21°C or more	900

On each of the 30 days in June

the park is open

the probability that the temperature is less than 21°C is 0.4

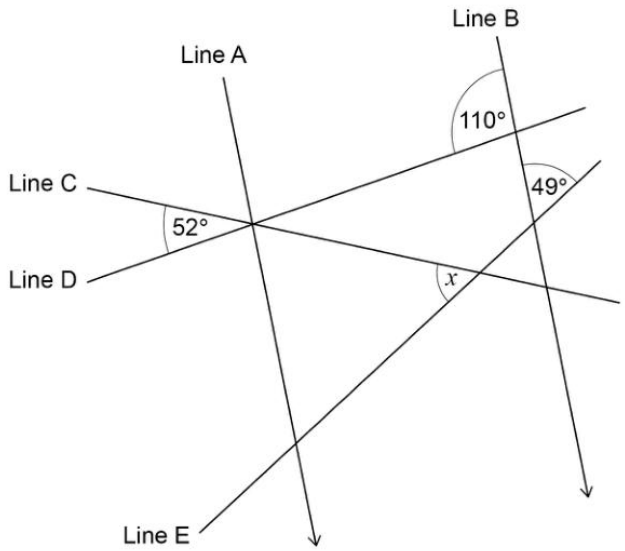
Work out the **total** number of expected visitors to the park in June.

[3 marks]

Answer _____

6 Lines A, B, C, D and E intersect as shown.

Lines A and B are parallel.



Not drawn accurately

Work out the size of angle x.

[3 marks]

Answer _____ degrees

11 An approximation for the value of π is given by

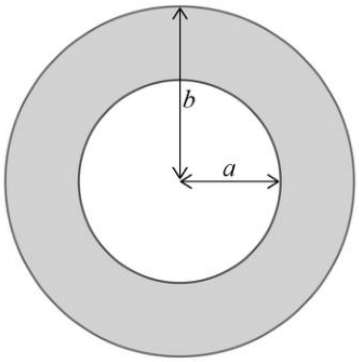
$$4\left(1-\frac{22}{57}+\frac{22}{85}-\frac{22}{105}+\frac{22}{117}-\frac{22}{242}\right)$$

Use your calculator to show that this approximation is within 0.1 of 3.14

[2 marks]

20 Here is an inflated swimming ring with dimensions in centimetres.

box



The volume of the ring, V cm^3, is given by

$$V = 0.25\pi^2(b - a)^2(b + a)$$

Work out the volume when $a = 20$ and $b = 30$

Give your answer to 3 significant figures.

[3 marks]

Answer _____ cm^3

8 Theo starts with savings of £18
James starts with no savings.

Each week from now,

Theo will save £4.50 and James will save £4

In how many weeks will Theo and James have savings in the ratio 15 : 8 ?

[3 marks]

box

Answer _____

15 Mirek invests £6000 at a compound interest rate of 1.5% per year.
He wants to earn more than £1000 interest.

Work out the **least** time, in whole years, that this will take.

[3 marks]

Answer _____ years

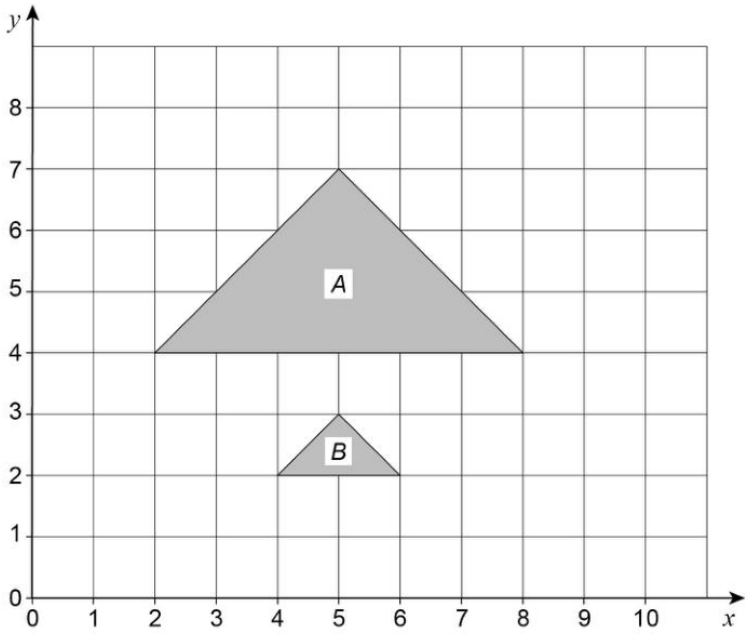
10 Work out the next term of this quadratic sequence.

[2 marks]

5 8 14 23 .....

Answer

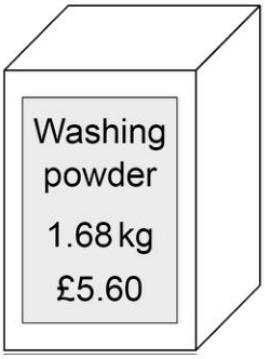
7 Describe fully the **single** transformation that maps triangle *A* to triangle *B*.



[3 marks]

20 A company makes and sells boxes of washing powder.

DOX



The company wants to increase the amount of money it receives **per kg** of powder.

To get the required increase it can

increase the price to £5.88

or

reduce the mass of powder in the box by $x\%$

Work out the value of x to 2 decimal places.

[4 marks]

$x =$

Answer **all** questions in the spaces provided.

Do not write outside the box

1 Circle the fraction that is equal to 1.25%

[1 mark]

$\frac{1}{8}$ $\frac{1}{25}$ $\frac{1}{80}$ $\frac{1}{125}$

2 Circle the expression that means the probability of A and **not** B.

[1 mark]

P(A' U B) P(A U B') P(A' ∩ B) P(A ∩ B')

3 Circle the triangular number.

[1 mark]

9 12 15 18

14 A company has 123 employees.

Information about their hourly rates of pay is shown in the table.

Hourly rate, £p	Number of employees
$10 \leqslant p < 14$	66
$14 \leqslant p < 20$	32
$20 \leqslant p < 40$	15
$40 \leqslant p < 100$	10
	Total = 123

The owner of the company uses the data to make two statements.

Statement A

"Over 30% of employees have an hourly rate that is more than £17"

Statement B

"The average hourly rate of pay is more than £20"

14 (a) Show working that supports **Statement A**.

[3 marks]

14 (b) Why might **Statement A not** be true?

[1 mark]

14 (c) Work out an estimate of the mean to support **Statement B**.

[3 marks]

14 (d) Why is the mean **not** the best average to represent the data?

[1 mark]