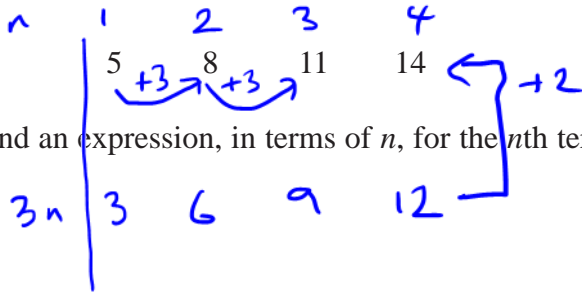


Leave blank

6. Here are the first four terms of an arithmetic sequence.



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

$3n+2$

$3n+2$ ✓

(Total 2 marks)

Q6

2

7. The equation

$$x^3 + 2x = 26$$

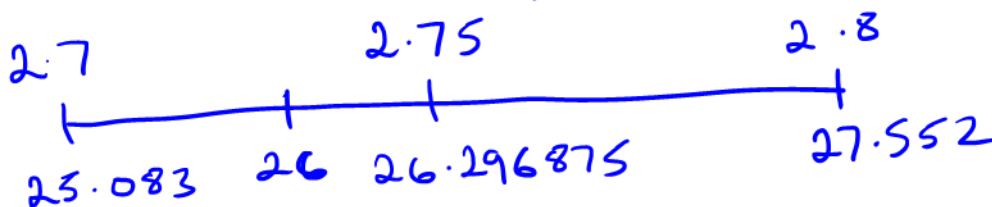
has a solution between 2 and 3

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show all your working.

x	x^3	$2x$	$x^3 + 2x$	too high / too low
2	8	4	12	too low
3	27	6	33	too high
2.7	19.683	5.4	25.083	too low
2.8	21.952	5.6	27.552	too high
2.75	20.797	5.5	26.296875	too high



$x = 2.7$ ✓

(Total 4 marks)

Q7

4

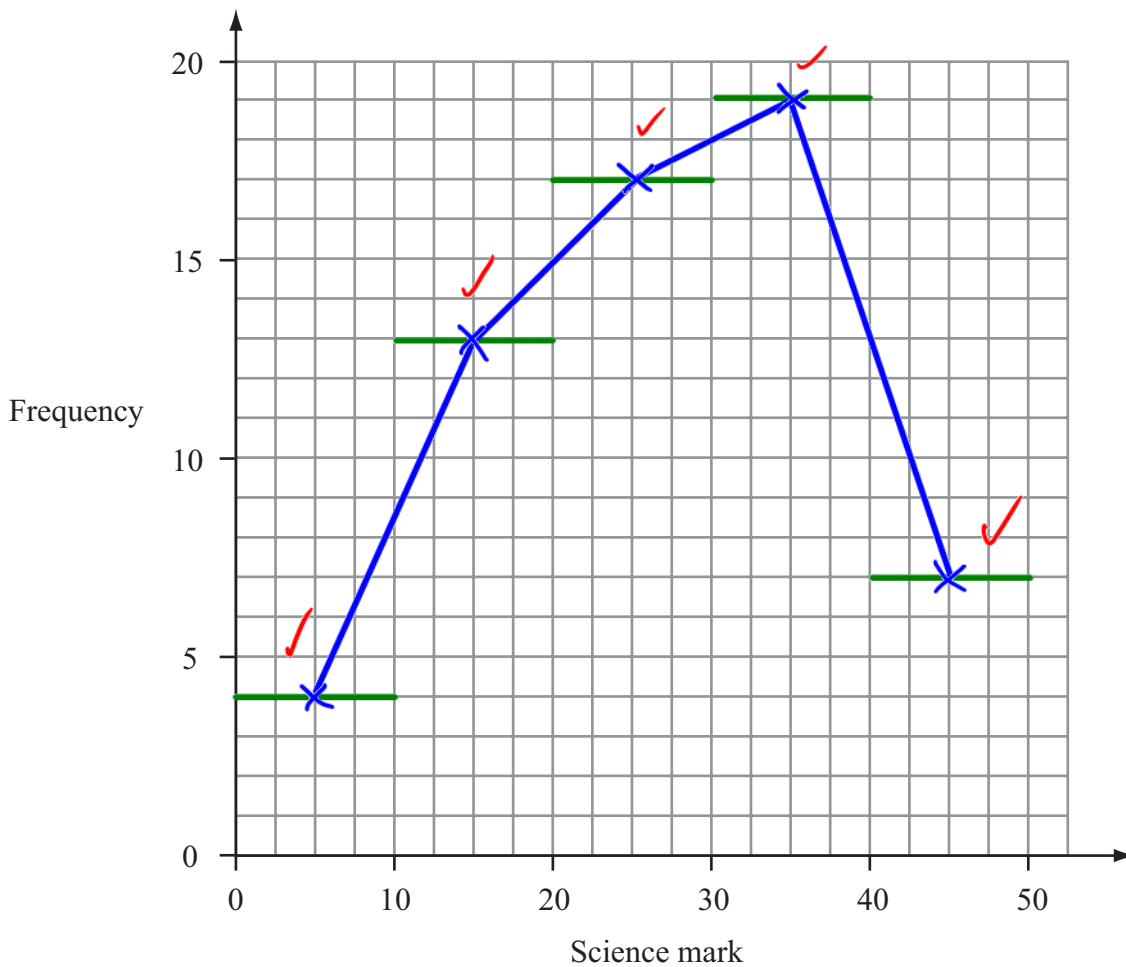


8. 60 students take a science test.
The test is marked out of 50.

This table shows information about the students' marks.

Science mark	0-10	11-20	21-30	31-40	41-50
Frequency	4	13	17	19	7

On the grid, draw a frequency polygon to show this information.



(Total 2 marks)

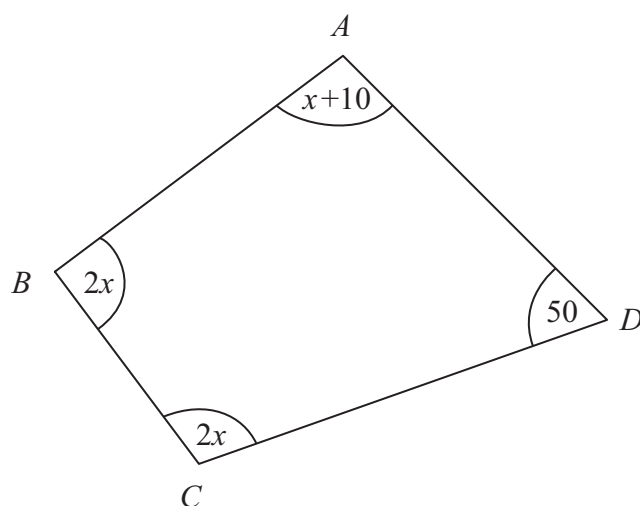
Q8

2

TIP: mark the centre of where the tops of the bars would be if you were drawing a bar chart



9.

Diagram **NOT**
accurately drawn

In this quadrilateral, the sizes of the angles, in degrees, are

$x + 10$
 $2x$
 $2x$
 50

(a) Use this information to write down an equation in terms of x .

$$2x + 2x + x + 10 + 50 = 360^\circ$$

$$5x + 60^\circ = 360^\circ$$

$$5x = 300^\circ$$

.....
(2)

2

(b) Work out the value of x .

$$x = 300 \div 5$$

$$= 60^\circ$$

$$x = 60^\circ \checkmark$$

.....
(3)

3

(Total 5 marks)

Q9

5



10. A garage sells British cars and foreign cars.

The ratio of the number of British cars sold to the number of foreign cars sold is 2 : 7

The garage sells 45 cars in one week.

(a) Work out the number of British cars the garage sold that week.

$$2+7=9 \text{ shares}$$

$$1 \text{ share} = 45 \div 9 = 5$$

$$2 \text{ shares} = 5 \times 2 = 10$$

10 cars ✓

(2)

2

A car tyre costs £80 plus VAT at $17\frac{1}{2}\%$.

(b) Work out the total cost of the tyre.

$$17\frac{1}{2}\% = 0.175$$

Percentage multiplier to add 17.5%
= $1 + 0.175 = 1.175$

$$= 1 + 0.175 = 1.175$$

$$£80 \times 1.175 = £94$$

£ 94 ✓

(3)

3

The value of a new car is £12000

The value of the car depreciates by 20% per year.

(c) Work out the value of the car after 2 years.

$$20\% = 0.2$$

Percentage multiplier to DECREASE by 20%

$$= 1 - 0.2 = 0.8$$

→ 2 years

$$£12,000 \times 0.8^2$$

$$= £7680$$

£ 7680 ✓

(3)

3

(Total 8 marks)

Q10

8



Leave blank

11. (a) Simplify $4a + 3c - 2a + c$

$$4a - 2a + 3c + c =$$

$$2a + 4c$$

(1)

(b) $S = \frac{1}{2}at^2$

Find the value of S when $t = 3$ and $a = \frac{1}{4}$

$$S = \frac{1}{2} \times \frac{1}{4} \times 3^2$$

$$= 1.125$$

← type this in your calculator!

$$S = 1.125$$

(2)

(c) Factorise $x^2 - 5x$

Highest Common Factor is x

$$x(x - 5)$$

$$x(x - 5)$$

(2)

(d) Expand and simplify $(x + 3)(x + 4)$

F	x^2
D	$4x$
I	$3x$
L	12
S	$x^2 + 7x + 12$

$$x^2 + 7x + 12$$

(2)

(e) Factorise $y^2 + 8y + 15$

1×15
 3×5 (circled)
 $(y + 3)(y + 5)$

$$(y + 3)(y + 5)$$

(2)

(Total 9 marks)

Q11

9



12. A shop sells mobile phones.

The table shows the number of mobile phones sold each month from January to May.

Jan	Feb	Mar	Apr	May
70	64	73	85	91

(a) Work out the percentage increase in the number of mobile phones sold from April to May.

Give your answer correct to 3 significant figures.

$$\text{Percentage change} = \frac{\text{change}}{\text{original}} \times 100\% = \frac{6}{85} \times 100\%$$

$$= 7.06\% \quad (3)$$

(b) Work out the 3-month moving averages for the information in the table.
The first one has been worked out for you.

$$64 + 73 + 85 = 222 \quad 222 \div 3 = 74$$

$$73 + 85 + 91 = 249 \quad 249 \div 3 = 83$$

$$\begin{array}{r} \dots 69 \dots \\ \dots 74 \dots \\ \dots 83 \dots \end{array} \quad (2)$$

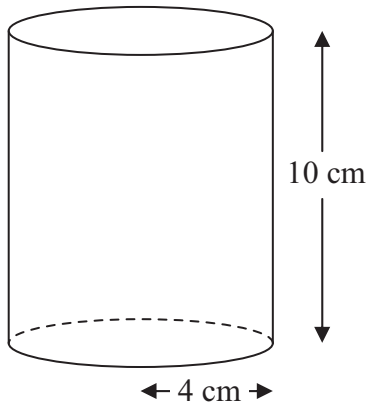
(Total 5 marks)

Q12

5



13.

Diagram **NOT**
accurately drawn

A solid cylinder has a radius of 4 cm and a height of 10 cm.

- (a) Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.

$$\begin{aligned}
 \text{Volume of cylinder} &= \pi r^2 h \\
 &= \pi \times 4^2 \times 10 \\
 &= 160\pi \\
 &= 503 \checkmark
 \end{aligned}$$

..... cm³
(2) 2

The cylinder is made from wood.
The density of the wood is 0.6 grams per cm³.

- (b) Work out the mass of the cylinder.
Give your answer correct to 3 significant figures.

$$\begin{aligned}
 \text{each cm}^3 \text{ weighs } &0.6 \text{ grams} \\
 \text{so mass} &= 503 \times 0.6 \\
 &= 302 \text{ g (3sf)} \checkmark
 \end{aligned}$$

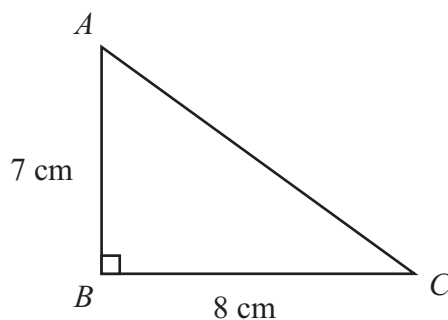
..... grams
(2) 2

(Total 4 marks) 4

Q13



14.

Diagram **NOT**
accurately drawn ABC is a right-angled triangle. $AB = 7$ cm, $BC = 8$ cm.

(a) Work out the area of the triangle.

$$\begin{aligned} \text{Area } \triangle &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 8 \times 7 \\ &= 28 \text{ cm}^2 \end{aligned}$$

..... 28 ✓ cm^2
(2)

2

(b) Work out the length of AC .

Give your answer correct to 2 decimal places.

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

$$AC^2 = 7^2 + 8^2$$

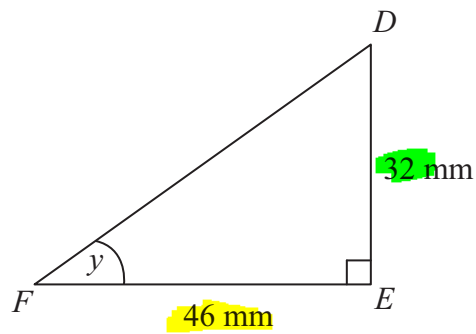
$$= 49 + 64 = 113$$

$$AC = \sqrt{113} = 10.63$$

..... 10.63 ✓ cm
(3)

3



Leave
blankDiagram **NOT**
accurately drawn DEF is another right-angled triangle. $DE = 32$ mm, $FE = 46$ mm.

S O H C A H T O A

- (c) Calculate the size of angle y .
Give your answer correct to 1 decimal place.

$$\tan y^\circ = \frac{32}{46}$$

$$y = \tan^{-1}\left(\frac{32}{46}\right) = 34.8^\circ$$

$$34.8^\circ$$

(3)

(Total 8 marks)

3

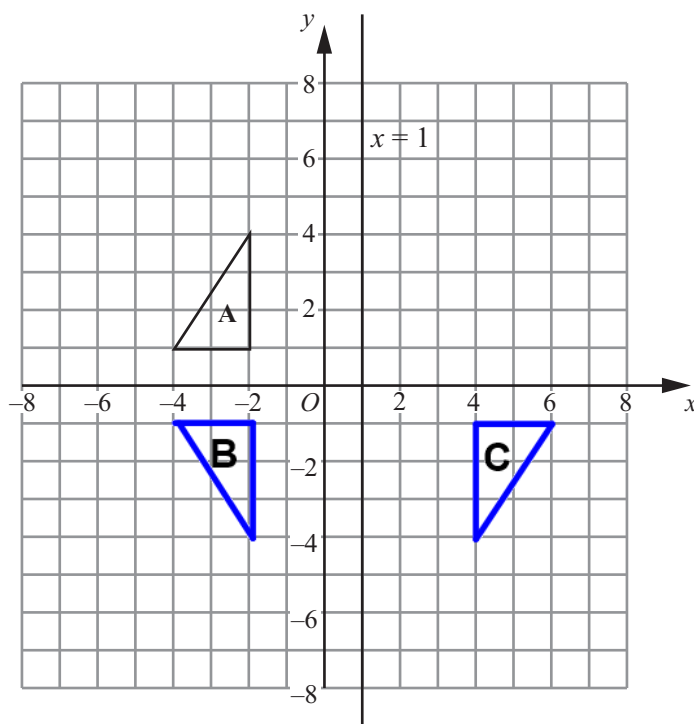
Q14

8



H 3 1 0 2 2 A 0 1 5 2 8

15.



Triangle **A** is reflected in the x -axis to give triangle **B**.
Triangle **B** is reflected in the line $x = 1$ to give triangle **C**.

Describe the **single** transformation that takes triangle **A** to triangle **C**.

ROTATION of 180° with centre $(1, 0)$

(Total 3 marks)

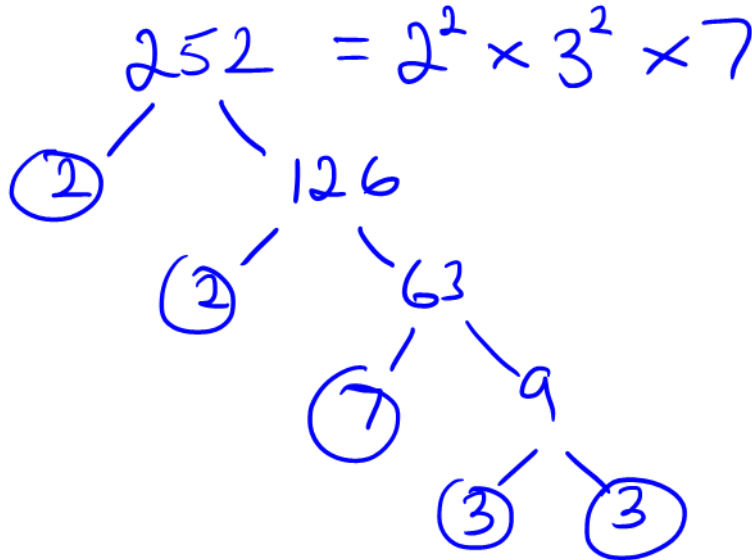
Q15

3



Leave blank

16. (a) Express 252 as a product of its prime factors.



$$\underline{2^2 \times 3^2 \times 7}$$

(3)

3

James thinks of two numbers.

He says "The Highest Common Factor (HCF) of my two numbers is 3
The Lowest Common Multiple (LCM) of my two numbers is 45"

(b) Write down two numbers that James could be thinking of.

HCF is 3 LCM 45
 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45
 9, 18, 27, 36, 45
 15, 30, 45

9 ✓ and 15 ✓
 and
 (3)

3

(Total 6 marks)

Q16
6

17. The number of atoms in one kilogram of helium is 1.51×10^{26}

Calculate the number of atoms in 20 kilograms of helium.
Give your answer in standard form.

$$20 \times 1.51 \times 10^{26} = 3.02 \times 10^{27}$$

↑
type this into your calculator!

$$\underline{3.02 \times 10^{27}}$$

2

(Total 2 marks)

Q17
2

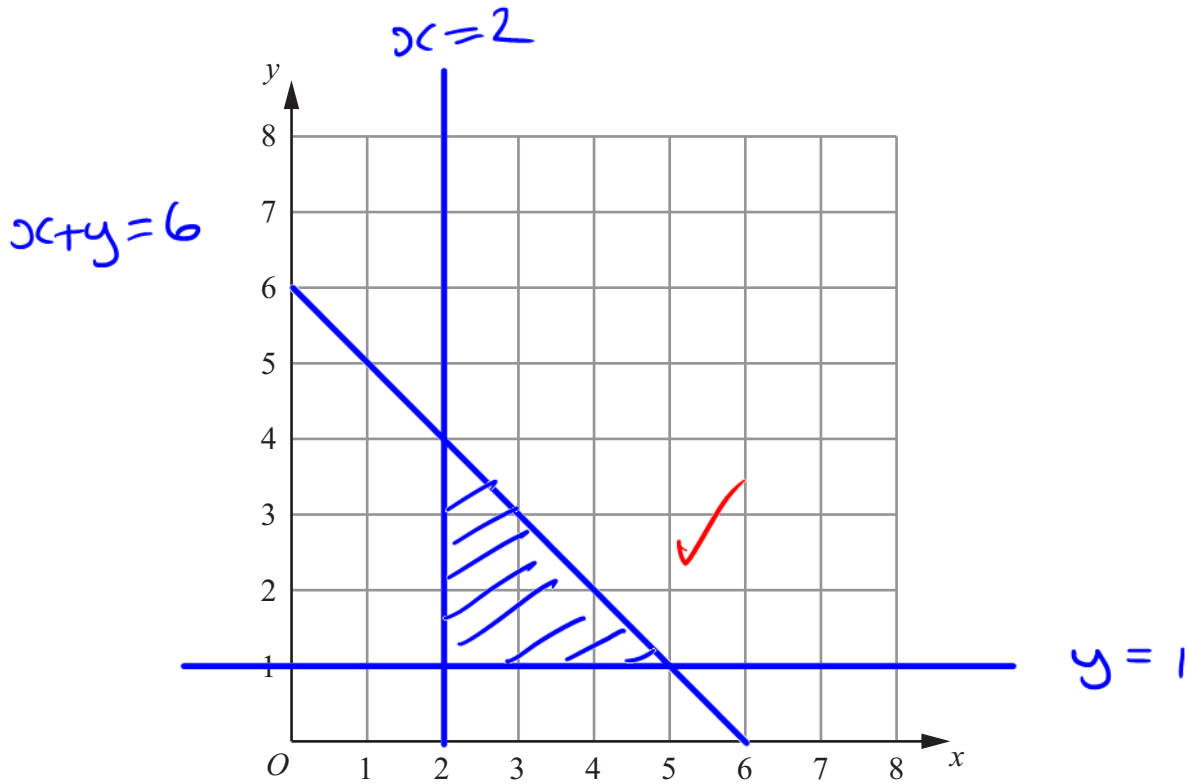


Leave blank

18. The region **R** satisfies the inequalities

$$x \geq 2, \quad y \geq 1, \quad x + y \leq 6$$

On the grid below, draw straight lines and use shading to show the region **R**.



(Total 3 marks)

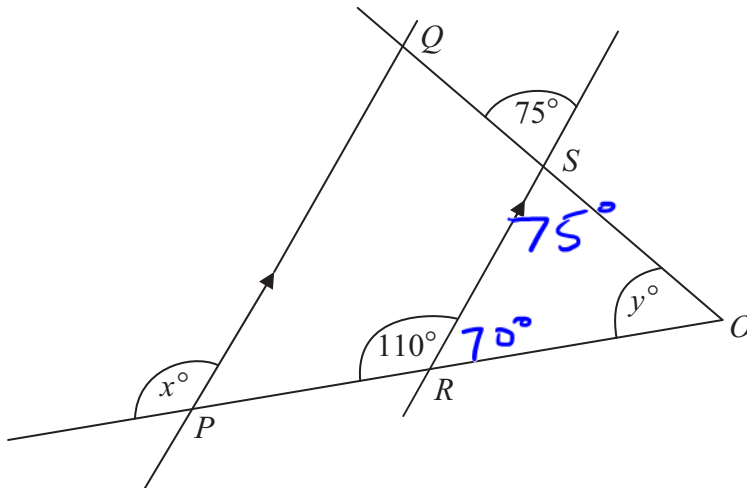
Q18
3



Leave blank

7.

Diagram NOT accurately drawn



PQ is parallel to RS .

OSQ and ORP are straight lines.

(a) (i) Write down the value of x .

$x = 110^\circ$ ✓

(ii) Give a reason for your answer.

x° is a corresponding angle to 110° ✓

(2)

(b) Work out the value of y .

$$y^\circ = 180^\circ - (70^\circ + 75^\circ)$$

$$= 180^\circ - 145^\circ$$

$$= 35^\circ$$

$y = 35^\circ$ ✓

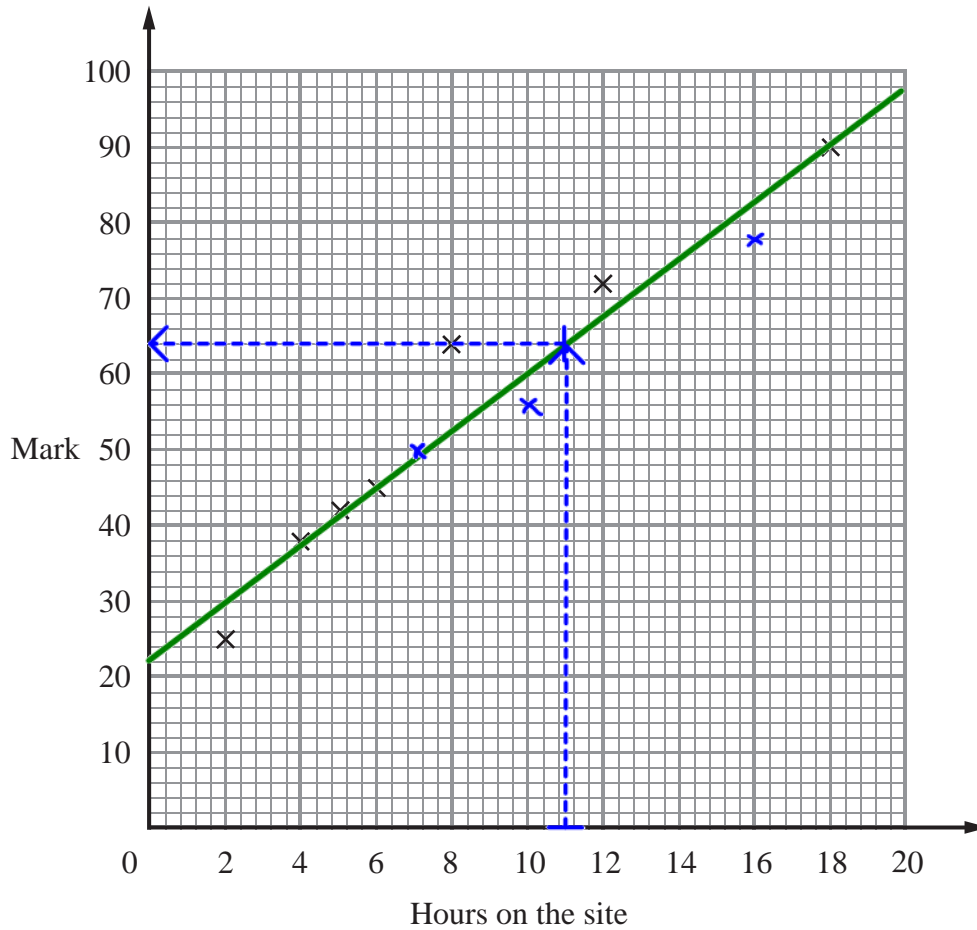
(2)

(Total 4 marks)

Q7
4



8. Some students revised for a mathematics exam. They used an internet revision site. The scatter graph shows the times seven students spent on the internet revision site and the marks the students got in the mathematics exam.



Here is the information for 3 more students.

Hours on the site	7	10	16
Mark	50	56	78

- (a) Plot this information on the scatter graph. (1)
- (b) What type of correlation does this scatter graph show?
POSITIVE ✓
(1)
- (c) Draw a line of best fit on the scatter graph. (1)



A student spent 11 hours on the internet revision site.

(d) Use the line of best fit to estimate this student's mathematics exam mark.

62-67
64 ✓

Leave blank

1

Q8

4

(1)

(Total 4 marks)

9. Jack invests £3000 for 2 years at 4% per annum compound interest.

Work out the value of the investment at the end of 2 years.

$4\% = 0.04$

Multiplier = 1.04

$£3000 \times 1.04^2 = 3244.80$

£ 3244.80 ✓

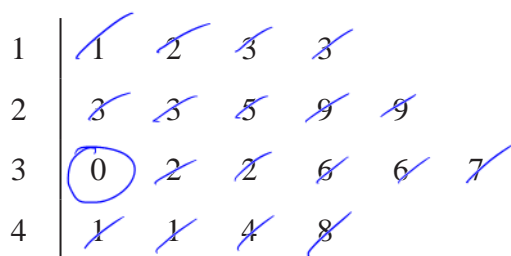
Q9

3

(Total 3 marks)

10. Jason collected some information about the heights of 19 plants.

This information is shown in the stem and leaf diagram.



Key 4|8 means 48 mm

Find the median.

30 ✓
..... mm

Q10

2

(Total 2 marks)



Leave blank

11. (a) Complete the table of values for $y = x^2 - 4x - 2$

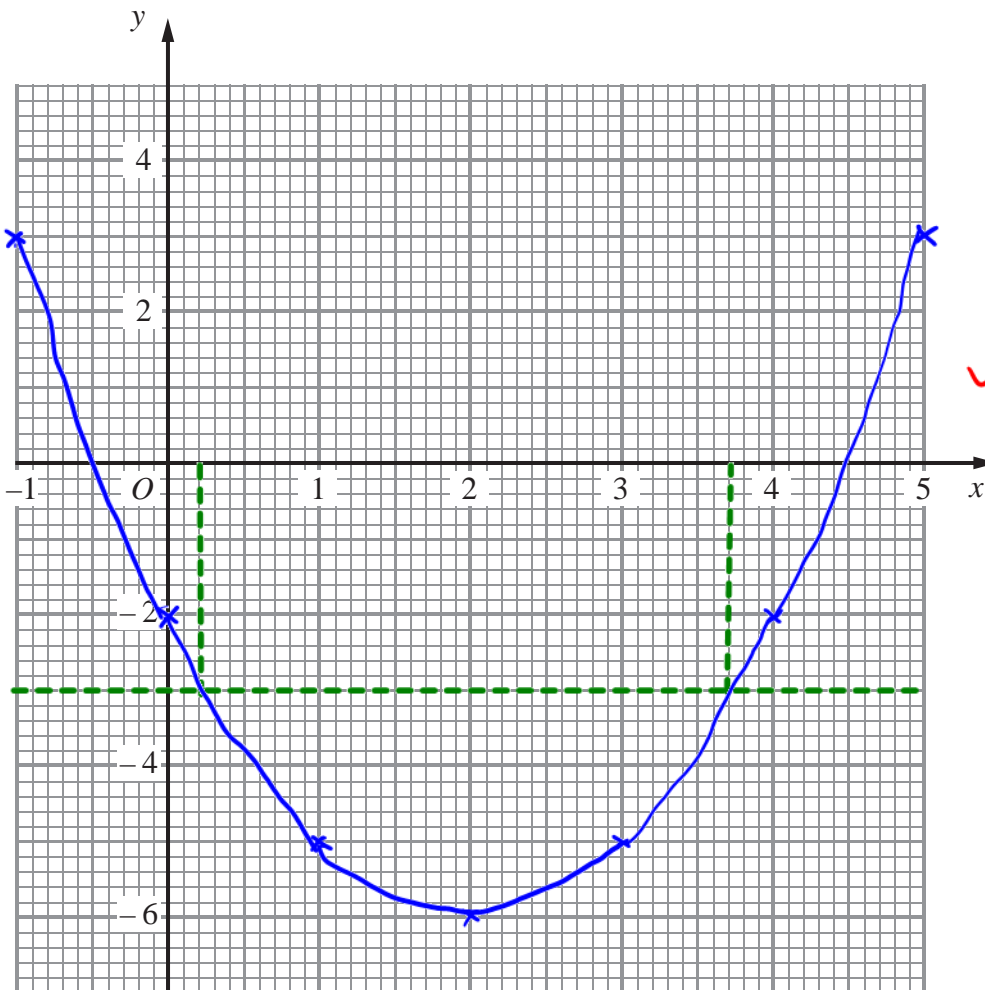
x	-1	0	1	2	3	4	5
y	3 ✓	-2	-5	-6 ✓	-5 ✓	-2	3

x^2	1	0	1	4	9	16	25
$-4x$	4	0	-4	-8	-12	-16	-20
-2	-2	-2	-2	-2	-2	-2	-2

(2)

2

(b) On the grid, draw the graph of $y = x^2 - 4x - 2$



✓

2

(2)

(c) Use your graph to estimate the values of x when $y = -3$

$0.2 - 0.4$
 0.2 ✓
 $x = \dots\dots\dots$
 3.7 ✓
 $x = \dots\dots\dots$
 $3.6 - 3.8$ (2)

2

Q11
6

(Total 6 marks)



12. (a) Draw the locus of all points which are equidistant from the points A and B .

$A \times$

$\times B$

(2)

(b) Draw the locus of all points that are exactly 3 cm from the line PQ .

P

Q

(2)

Q12

(Total 4 marks)



Leave
blank

13. Find the Lowest Common Multiple (LCM) of 24 and 36

$$24, 48, 72$$

$$36, 72$$

$$72 \checkmark$$

(Total 2 marks)

Q13

2

14. (a) Expand and simplify $3(x + 4) + 5(2x + 1)$

$$3(x + 4) + 5(2x + 1)$$

$$= 3x + 12 + 10x + 5$$

$$= 13x + 17$$

$$13x + 17 \checkmark$$

(2)

2

(b) Simplify $t^4 \times t^6$

$$t^4 \times t^6 = t^{4+6} = t^{10}$$

$$t^{10} \checkmark$$

(1)

1

(c) Simplify $p^8 \div p^5$

$$p^8 \div p^5 = p^{8-5} = p^3$$

$$p^3 \checkmark$$

(1)

1

(d) Simplify $(x^4)^3$

$$(x^4)^3 = x^{4 \times 3} = x^{12}$$

$$x^{12} \checkmark$$

(1)

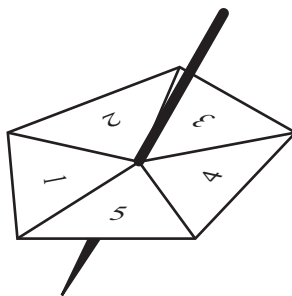
Q14

5

(Total 5 marks)



15. Here is a 5-sided spinner.



The sides of the spinner are labelled 1, 2, 3, 4 and 5

The spinner is biased.

The probability that the spinner will land on each of the numbers 1, 2, 3 and 4 is given in the table.

Number	1	2	3	4	5
Probability	0.15	0.05	0.2	0.25	x

Work out the value of x .

$$\begin{array}{r}
 0.15 \\
 0.05 \\
 0.20 \\
 0.25 \\
 \hline
 0.65 \\
 1
 \end{array}$$

$$\begin{aligned}
 x &= 1 - 0.65 \\
 &= 0.35
 \end{aligned}$$

$$x = 0.35 \checkmark$$

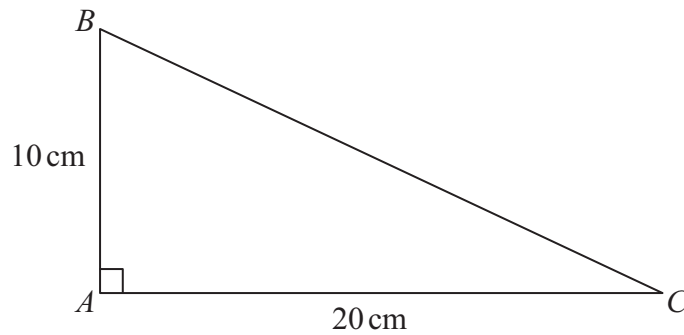
Q15

2

(Total 2 marks)



16.

Diagram NOT
accurately drawnIn triangle ABC ,

$$AB = 10 \text{ cm}$$

$$AC = 20 \text{ cm}$$

$$\text{angle } BAC = 90^\circ$$

Work out the length of BC .

Give your answer correct to 3 significant figures.

You must state the units in your answer.

PYTHAGORAS

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

$$c^2 = 10^2 + 20^2$$

$$c^2 = 100 + 400$$

$$c^2 = 500$$

$$c = \sqrt{500}$$
$$= 22.4$$

22.4

cm

(Total 4 marks)

Q16

4



17. Majid carried out a survey of the number of school dinners 32 students had in one week.

The table shows this information.

Number of school dinners	Frequency	fx
0	0	0
1	8	8
2	12	24
3	6	18
4	4	16
5	2	10

Calculate the mean.

TOTAL 32 76

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{76}{32} = 2.375$$

2.375 ✓

(Total 3 marks)

Q17

3

18. The value of a car depreciates by 35% each year.

At the end of 2007 the value of the car was £5460

Work out the value of the car at the end of 2006

REVERSE PERCENTAGE

$$2006 \text{ PRICE} \times 0.65 = 5460$$

$$\therefore 2006 \text{ PRICE} = \frac{5460}{0.65} = \underline{8400}$$

$$35\% = 0.35$$

$$\text{multiplier} = 1 - 0.35$$

$$= 0.65$$

£ 8400 ✓

(Total 3 marks)

Q18

3

