AQA

Practice Paper 2

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname Answers

Forename(s)

Candidate signature

GCSE Mathematics

H

Higher Paper 2 Calculator

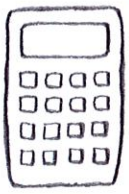
Summer 2018

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to the answer book.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
3	
4 - 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22 – 23	
TOTAL	

Teacher	Class

8300/MissB/2H

Practice Paper Overview

Q	Topic	Mark	Total
1	Algebraic Multiples		1
2	Algebraic Factors		1
3	Scalar and Resultant Vectors		1
4	Congruence		2
5	Frequency Tree		4
6	Dimensional Analysis		3
7	Reverse Percentage and Percentage Increase		3
8	Error Interval – Truncation		2
9	Scatter Graph		3
10	Construction		2
11	Expanding Brackets		3
12	Percentage Problem		3
13	Angles in Polygons Problem		3
14	Product of Prime Factors		2
15	Right Angled Trigonometry		2
16	Quadratic Sequence		3
17	Proportion		3
18	Area of a sector problem		5
19	Perpendicular Lines		1
20	Product Rule for Counting		1
21	Identities		3
22	3D Pythagoras		3
23	Combined Transformation		3
24	Circle Theorem Proof		3
25	Mean from a Table		3
26	Percentage Change		4
27	Area Underneath a Curve		4
28	Functions		6
29	Similarity		3
	Total		**80**

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

Do not write outside the box

1 Circle the lowest common multiple (LCM) of $6x^2y$ and $12x^4y^3$

[1 mark]

$2xy$ $\quad$ $3x^2y$ $\quad$ $6xy$ $\quad$ $12x^4y^3$ $\quad$ $12x^6y^4$ $\quad$ $24x^4y^3$

	LCM
6 and 12	12.
x^2 $\quad$ x^4	x^4
y $\quad$ y^3	y^3

2 Circle the highest common factor (HCF) of $6xy^2$ and $12x^4y$

[1 mark]

$2xy$ $\quad$ $3x^2y$ $\quad$ $6xy$ $\quad$ $12x^4y^3$ $\quad$ $12x^6y^4$ $\quad$ $24x^4y^3$

		HCF
6	12	6
x	x^4	x
y^2	y	y

3

$$\boldsymbol{a} = \begin{pmatrix} 3 \\ -2 \end{pmatrix} \text{ and } \boldsymbol{b} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$$

Circle the vector $2\boldsymbol{a} + \mathbf{b}$.

$\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $\quad$ $\begin{pmatrix} 4 \\ 9 \end{pmatrix}$ $\quad$ $\begin{pmatrix} 8 \\ 1 \end{pmatrix}$ $\quad$ $\begin{pmatrix} 4 \\ 1 \end{pmatrix}$ $\quad$ $\begin{pmatrix} 4 \\ -9 \end{pmatrix}$

$$2\begin{pmatrix} 3 \\ -2 \end{pmatrix} + \begin{pmatrix} -2 \\ 5 \end{pmatrix}$$

$$\begin{pmatrix} 6 \\ -4 \end{pmatrix} + \begin{pmatrix} -2 \\ 5 \end{pmatrix} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$$

[1 mark]

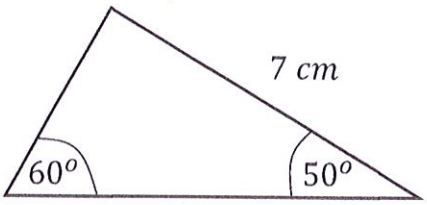
3

Do not write outside the box

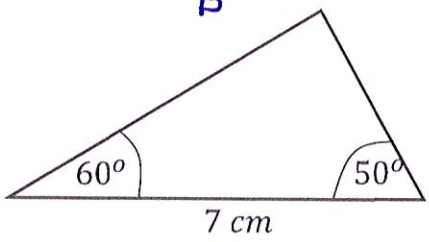
4 Here are four triangles

Not drawn accurately

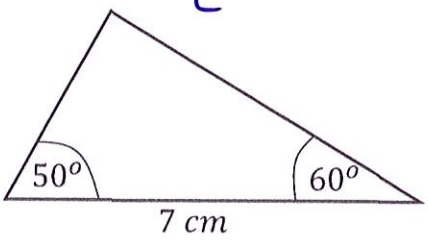
A



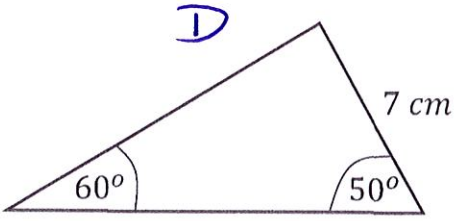
B



C



D



4 (a) Which two triangles are congruent? Circle your answers.

[1 mark]

A B C D

4 (b) Circle the reason for your answer to part (a).

[1 mark]

SSS ASA SAS RHS

Do not write outside the box

5 200 adults are surveyed at random in at a bingo hall.

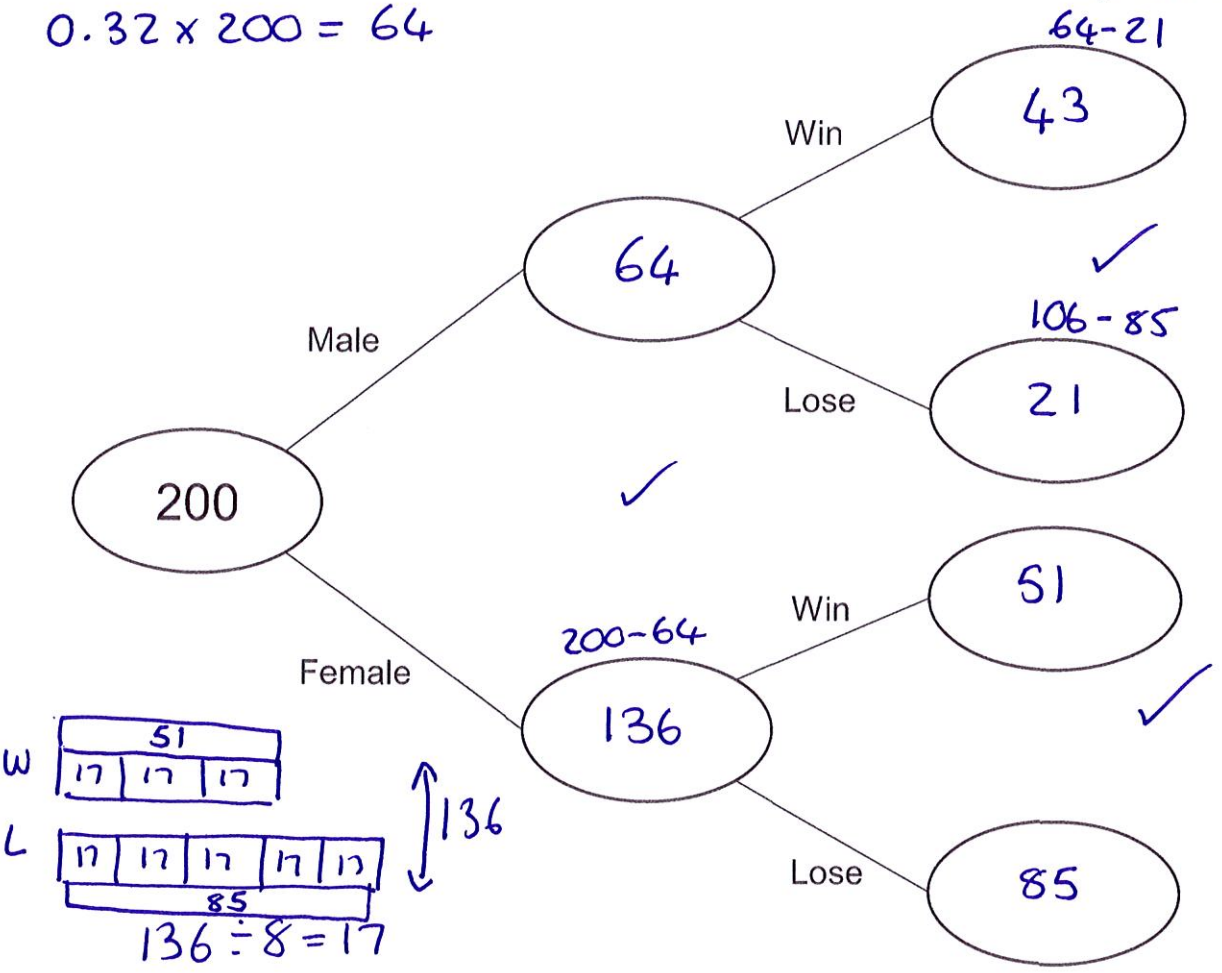
32% of the customers are male.

106 out of the 200 adults have never won.

The females claimed to have won and lost in the ratio of 3:5.

5 (a) Complete the frequency tree.

[3 marks]



5 (b) A person is selected at random.

Given that the person selected is male. → 64

Calculate the probability that ~~they~~ he will win.

[1 mark]

Answer 43/64 ✓

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6 There are three novelty golf balls in a cuboid shaped box.

Each golf ball has a diameter of 4.2cm

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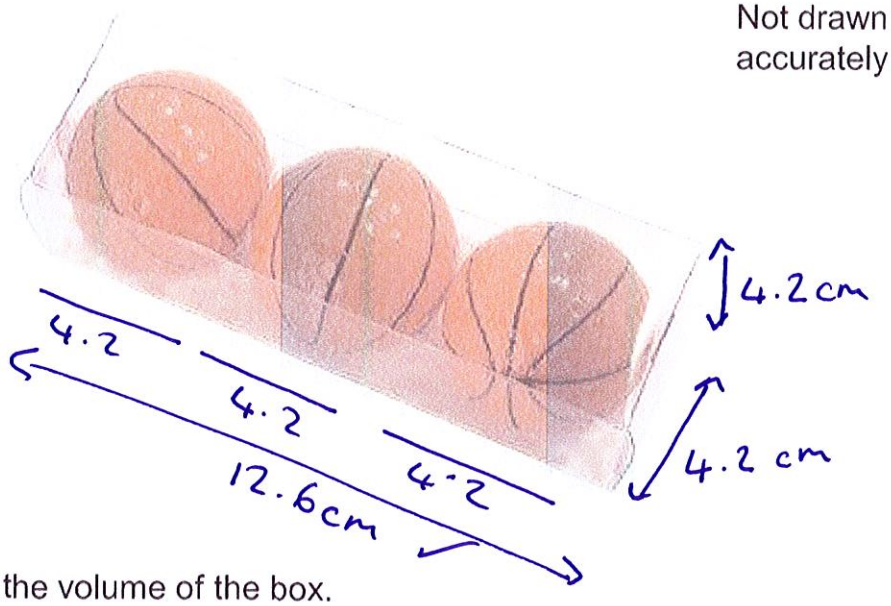


Calculate the volume of the box.

Give your answer correct to 1 decimal place.

[3 marks]

$V = 12.6 \times 4.2 \times 4.2$ ✓

$= 222.3 cm^3$ ✓

Answer $222.3 cm^3$

Do not write outside the box

7 Joe sells caricature portraits.

He currently adds 28% profit to the cost price. → 100% + 28% = 128%

He sells the portraits for £256 each.

He wants to ~~increase~~ decrease the profit to ~~25~~ 35% of the cost price. 100% + 35% = 135%

How much should he sell each picture for?

[3 marks]

÷128 (128% = £256) ÷128 ✓

1% = 2

100% = £200 ← cost price ✓

200 × ~~1.25~~ 1.35 = £270

Answer £270 ✓

8 Komal truncates a number, x, to one decimal place. → cuts off not rounded

The result is 9.2

Write down the error interval for x.

[2 marks]

9.2 ⋮ _____

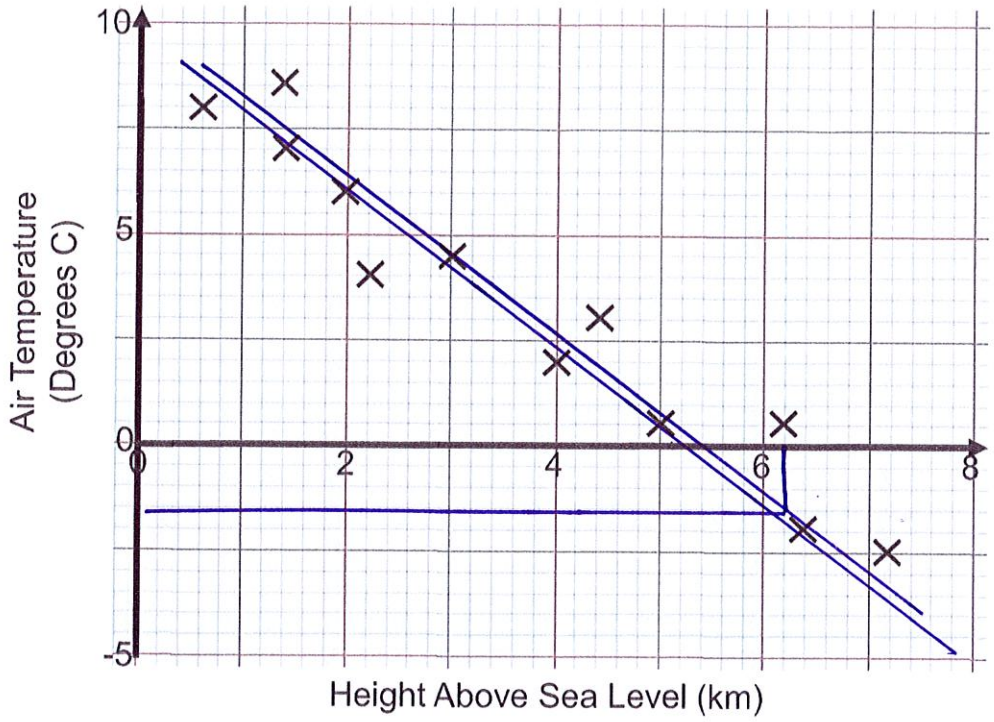
LB

UB 9.2 ⋮ 9999999...

$9.2 \leq x < 9.3$

Do not write outside the box

9



9 (a) Describe the relationship between the air temperature and the height above sea level.

[1 mark]

- The higher you are above sea level the colder the air temperature is. ✓
(Negative correlation.)

9 (b) Find an estimate of the height above sea level when the air temperature is $-1.5^{o}C$.

[2 marks]

Line of best fit seen. ✓

Using LOBF.

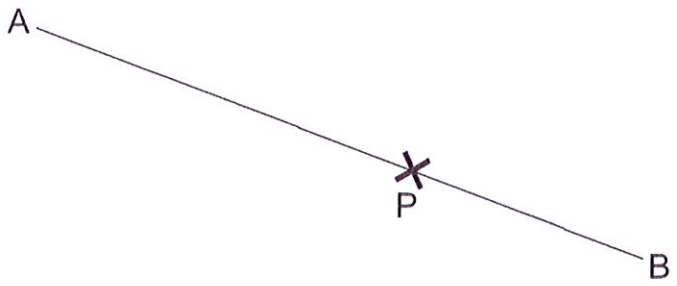
Answer 6.0 to 6.4 (inclusive)

Do not write outside the box

10 Use the ruler and compasses to **construct** the perpendicular to the line segment AB that passes through the point P.

You **must** show all construction lines.

[2 marks]



11 Show that

$$(2x-1)(x+3)(x-5) = 2x^3 - 5x^2 - 28x + 15$$

for all values of x.

$= (2x-1)(x^2-2x-15)$ ✓

$=$

[3 marks]

	x	-5
x	x^2	$-5x$
$+3$	$3x^2$	-15

	x^2	$-2x$	-15
$2x$	$2x^3$	$-4x^2$	$-30x$
-1	$-x^2$	$+2x$	$+15$

LHS $= (2x-1)(x^2-2x-15)$ ✓ ✓

$= 2x^3 - 4x^2 - 30x - x^2 + 2x + 15$

$= 2x^3 - 5x^2 - 28x + 5 = RHS$ ✓

Answer _____

8

Do not write outside the box

12 In a school, 70% of the students are male. → 30% female.

30% of the girls don't get school dinners.

20% of the boys don't get school dinners.

What percentage of the students get school dinners?

[3 marks]

M F
70 : 30

20% of 70 = 14% don't ✓

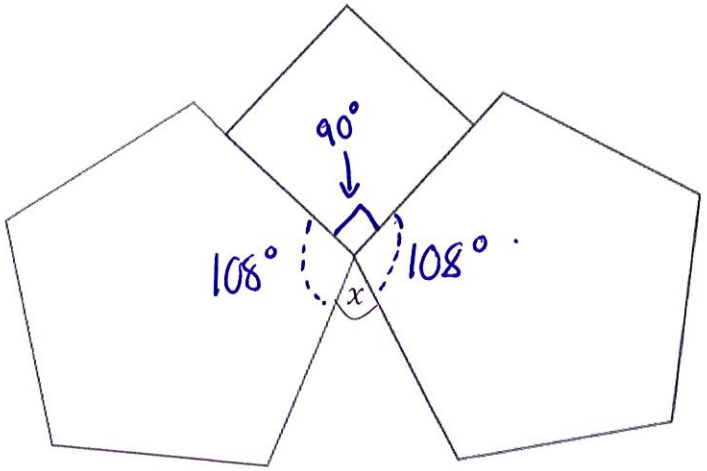
30% of 30 = 9% don't ✓

don't = 14% + 9% = 23%

do = 100% - 23% = 77%

Answer 77% ✓

13 The diagram shows two regular pentagons and a square.



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Work out the size of the angle marked x.

[3 marks]

	Ext	Int
Pentagon	$\frac{360}{5} = 72$	$180 - 72 = 108°$ ✓

360 - (108 + 108 + 90) ✓

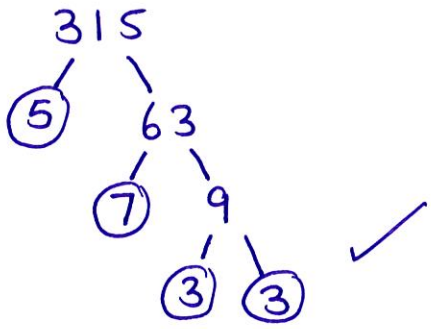
360 - 306

Answer $x = 54°$ ✓

Do not write outside the box

14 Express 315 as a product of its prime factors in index form.

[2 marks]

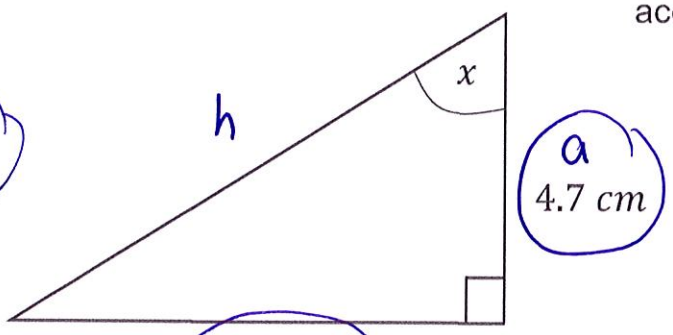


$3 \times 3 \times 5 \times 7$ ✓

Answer $3^2 \times 5 \times 7$ ✓

15 Calculate the size of the angle marked x.

Not drawn accurately



SOH CAH TOA

[2 marks]

$\tan x = \frac{6.2}{4.7}$ ✓

$x = \tan^{-1}\left(\frac{6.2}{4.7}\right)$

Answer $x = 52.8°$ ✓ cm

10

Do not write outside the box

16 Here is a quadratic sequence. $n^2 = 1, 4, 9, 16, 25 \ldots$

5 14 27 44

The expression for the nth term of this sequence is $pn^2 + qn$.

Find the value of p and the value of q. $2n^2 + 3n$

[3 marks]

1st diff 5, 14, 27, 44

9 13 17

2nd diff 4 4

$\frac{4n^2}{2} = 2n^2$. ✓

~~2n²~~ 5, 14 27 44 −

$2n^2$ 2 8 18 32

3 6 9 12 ← 3n ✓

1st diff 3 3 3

$p =$ 2 $q =$ 3 ✓

17 (a) It takes 3 men 12 hours to build a shed. → 3 × 12 = 36 hours ✓

How long would it take 4 men to build the shed?

[2 marks]

36 hours ÷ 4 = 9 hours

Answer 9 hours ✓

17(b) Comment on an assumption you made in part (a) and the impact this could have on the length of time taken to build the shed. ✓

[1 mark]

- Assumed all men work at the same pace.
- If some men work faster the shed will be finished quicker

or

- If some men work slower the shed will take longer to build.

18 A path is placed around a circular section of grass on the edge of a lakes dock.

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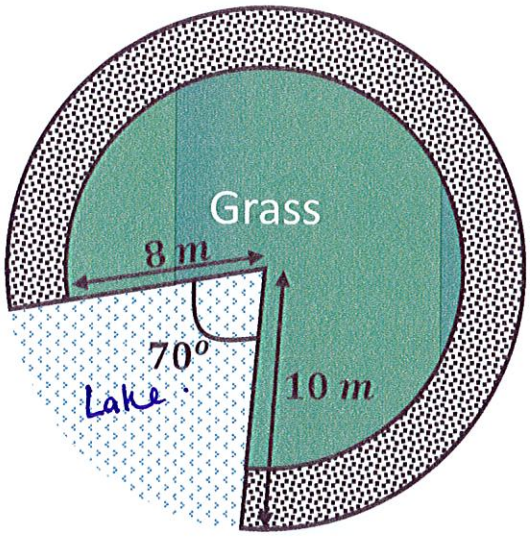

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Andrea wants to cover the path with gravel. **[5 marks]**

Each bag of gravel covers $5m^2$ and costs £3.99.

How much will it cost to cover the path in gravel?

360 − 70 = 290°.

Area grass = $\frac{290}{360} \times \pi \times 8^2$ = 161.96655... ✓

Area Large sector = $\frac{290}{360} \times \pi \times 10^2$ = 253.07274...

Area of path = 253.07274... − 161.96655

= 91.106 cm². ✓

Bags needed = 91.106cm² ÷ 5 = 18.2 bags ✓

So need to buy 19 bags. ✓

cost 19 × £3.99 = 75.81

Answer £75.81 ✓

Do not write outside the box

19 Circle the equation of a line that is perpendicular to $y = 2x - 5$

[1 mark]

$y = 5x - 2$ $\quad$ $y = \frac{1}{2}x - 5$ $\quad$ $y = 2x + 6$

$y = -2x + 5$ $\quad$ $y = 5 - \frac{1}{2}x$

$m = 2$ so perpendicular $m = -\frac{1}{2}$

gradients multiply to make -1

20 A menu has a choice of 4 starters, 3 mains and 2 desserts.

How many different choices of 3 course meals are there?

Circle your answer. $4 \times 3 \times 2 = 12 \times 2 = 24$

[1 mark]

9 $\quad$ 12 $\quad$ 14 $\quad$ 24 $\quad$ 48 $\quad$ 96

21 Find the solution for a and b by equating the coefficients.

$$x^2 + 12x + 9 \equiv (x + a)^2 + b$$

Complete the square

[3 marks]

H

I $\quad = (x+6)^2 - 36 + 9$

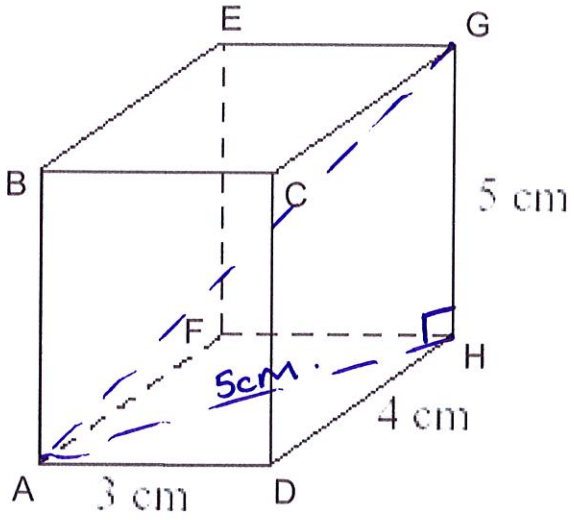
S $\quad = (x+6)^2 - 27$

S

$a =$ 6 $\quad$ $b =$ -27

Do not write outside the box

22 The diagram represents a cuboid ABCDEFGH..



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Find the length of AG.

Give your answer correct to 3 significant figures.

[3 marks]

$AH = \sqrt{3^2+4^2} = 5\text{cm}$ ✓

$AG = \sqrt{5^2+5^2}$

$= \sqrt{50}$ ✓

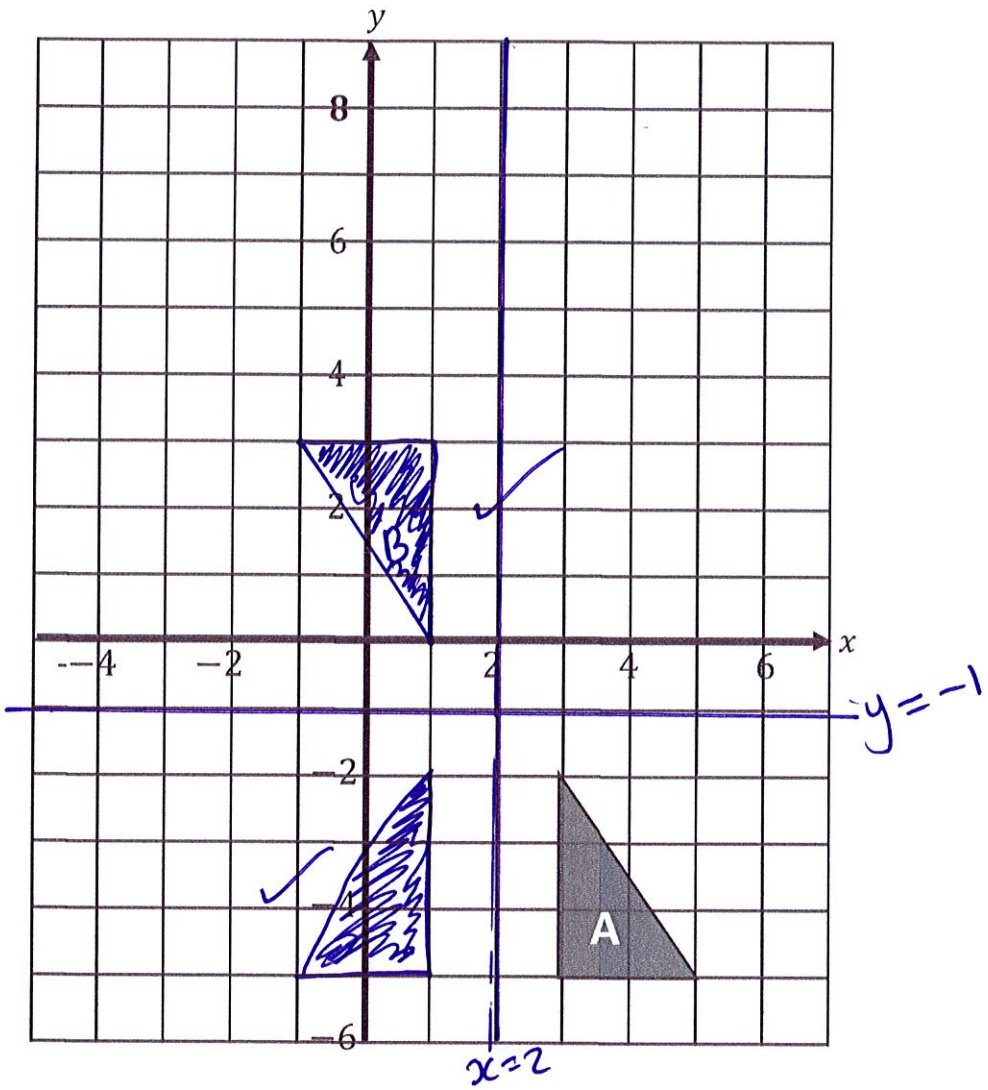
$= 7.07106\ldots$

Answer 7.07 ✓ cm

8

Do not write outside the box

23



Triangle **A** is drawn on a coordinate grid.

The triangle **A** is reflected in the line $x = 2$ and

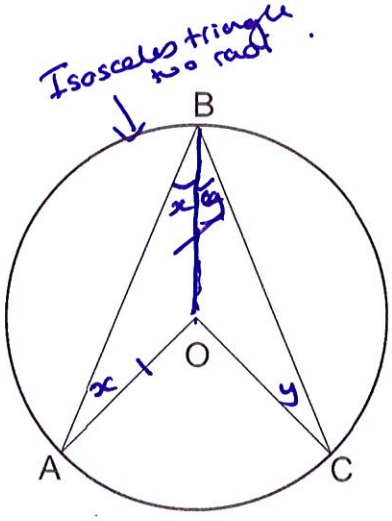
then reflected in the line $y = -1$ to give triangle **B**.

Describe fully the single transformation which maps triangle **A** onto triangle **B**.

[3 marks]

Rotated 180° clockwise or anticlockwise from the centre (2, −1) ✓

24



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Do not write outside the box

A, B and C are points on the circumference of a circle, centre O.

Prove that angle AOC is twice the size of angle ABC.

[3 marks]

Consider AOB and BOC triangles as shown

AO = BO = CO all (Radii) making two Isosceles triangles.

Let BAO = x and BCO = y

∴ angle AOB = $180 - 2x$ (angles in triangle)

angle BOC = $180 - 2y$

AOC = $360 - (180 - 2y + 180 - 2x)$

$= 360 - (360 - 2y - 2x)$

$= 2y + 2x$

AOC = $2(y + x)$

ABC = $x + y$ and AOC = $2(x + y)$

∴ AOC = 2(ABC)

6

Do not write outside the box

25 The heights of 60 trees in New Forest were recorded in the table below.

Height (h, cm)	~~Number of babies~~ No. of trees
$h < 2$	0
$2 \leq h < 4$	13
$4 \leq h < 8$	17
$8 \leq h < 16$	21
$16 \leq h < 20$	9
	60

MP1 Fac1

0 trees so doesn't matter

x 3 =	39
x 6 =	102
x 12 =	252
x 18 =	162 ✓
	555

Calculate an estimate for the mean height of the trees.

[3 marks]

$\frac{555}{60}$ ✓ = 9.25 m

Answer 9.25m ✓

Do not write outside the box

26 Jake sells fish.

In March, he sold 800 fish.

In April, Jake said he sold 30% more fish than in march. 100% + 30% = 130%

In May, Jake said he sold 10% fewer fish than in April. 100% − 10% = 90%

Jake claims his sales have increased by 20% in total since March.

Comment on Jakes Claim.

[4 marks]

March 800

April $800 \times 1.3 = 1040$ ✓

may $1040 \times 0.9 = 936$ ✓

$$\% \text{ change} = \frac{\text{Change}}{\text{original}} \times 100$$

$800 - 936 = -136$.

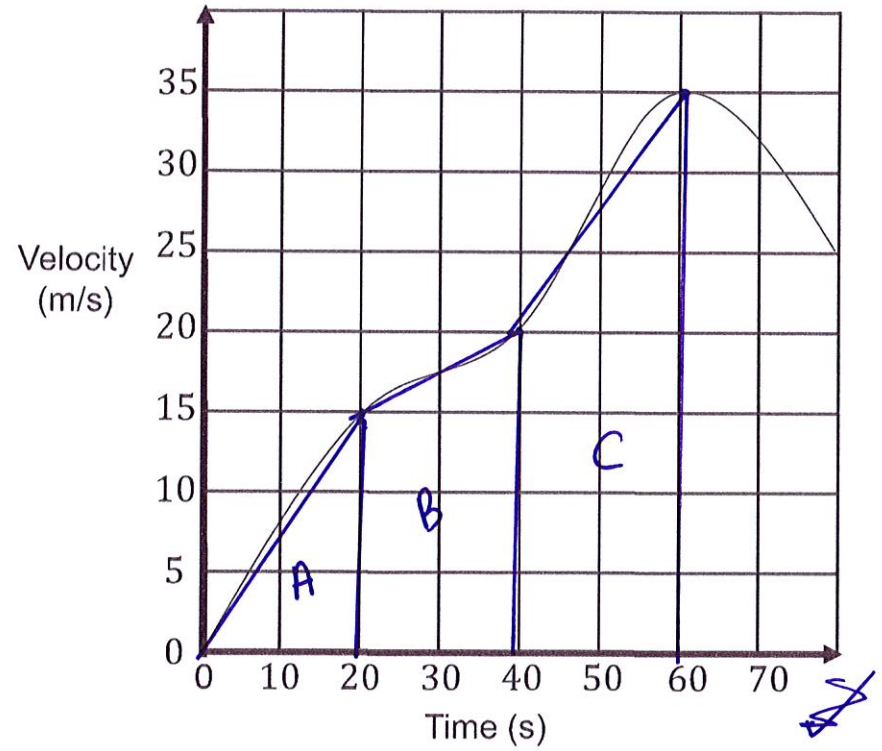
$$= \frac{136}{800} \times 100$$

$= 17\%$ increase

Jake is incorrect. It was only a 17% increase in sales.

Do not write outside the box

27 Here is a velocity-time graph for a bike journey.



↗ Area.

27 (a) Work out an estimate for the total distance travelled in the first 60 seconds.

[3 marks]

Area A = $\frac{20 \times 15}{2}$ = 150 m ✓

Area B = $\frac{15+20}{2} \times 20$ = 350m

Area C = $\frac{20+35}{2} \times 20$

= 550m

150 + 350 + 550 ✓

Answer = 1050m ✓

27 (b) Is your answer to (a) an underestimate or an overestimate of the actual distance?

Give a reason for your answer.

[1 mark]

☑ Underestimate ☐ Overestimate

As all the shapes used to find the area are slightly under underneath the curve.

Do not write outside the box

28 For all values of x,

$$f(x) = 4 - x$$

$$g(x) = x^2 - 2$$

28 (a) Find $g^{-1}(x)$

[2 marks]

$x \rightarrow$ Sq $\rightarrow -2 \rightarrow g(x)$

$g^{-1}(x) \leftarrow \sqrt{\ } \leftarrow +2 \leftarrow x$ ✓

Answer $\sqrt{x+2}$ ✓

28 (b) Solve the equation

$$gf(x) = 26$$

$g(x) = x^2 - 2$

[4 marks]

$gf(x) = g(4-x) = (4-x)^2 - 2$ ✓

$= (4-x)(4-x) - 2$

$= 16 - 8x + x^2 - 2$

$gf(x) = 6$ $gf(x) = x^2 - 8x + 14$ ✓

$x^2 - 8x + 14 = 6$ ✓

$x^2 - 8x + 20 = 0$

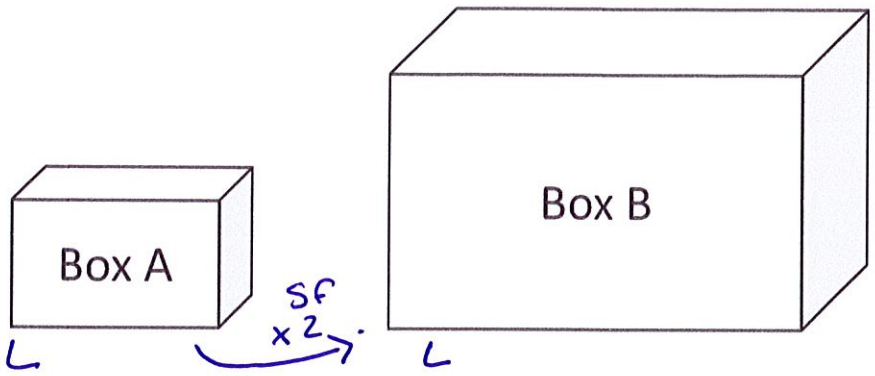
$(x - 10)(x + 2) = 0$

Answer $x = 10$ and $x = -2$ ✓

Do not write outside the box

29 There are two similar boxes.

Not drawn accurately



$V = 200cm^3$ $V = ?$

Box A has a volume of 200 cm^3

Box B has sides double the length of Box A.

What is the volume of Box B?

[3 marks]

length S.F = 2.

$V = 2^3 = 8$ scale factor ✓

$200 \times 8 = 1600$ ✓

Answer $1600cm^3$ ✓

End of Questions

3

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ANSWER IN THE SPACES PROVIDED

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