AQA

Practice Paper 1

Please write clearly in block capitals.

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

Surname Answers.

Forename(s)

Candidate signature

GCSE Mathematics

H

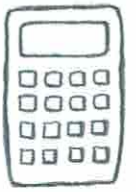
Higher Paper 2 Calculator

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	Resultant Vectors		1
2	Geometric Progression		1
3	Bearings		1
4	Gradient of a Line		1
5	Factorise and Solve		2
6	Reverse Percentage		3
7	Form and Solve Equations		3
8	Venn Diagram Problem		5
9	Right-Angled Trigonometry		2
10	Identities		4
11	Volume of a Cone		5
12	Probability Tree		3
13	Quadratic Graphs		5
14	Reverse Averages		2
15	Functions		3
16	Ratio Problem		3
17	Regional Inequality Graphs		3
18	Area of Sector and Pythagoras' Theorem		4
19	Compound and Successive Interest		5
20	Histogram – Draw and Interpret		5
21	Circle Theorems		4
22	Recognise a reciprocal graph		1
23	Averages from a Table		3
24	Equations of a Circle		1
25	Transformations		1
26	Travel Graphs – Acceleration		3
27	Iteration		3
28	Rearranging Formulae		3
	Total		**80**

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

Do not write outside the box

1 Work out

$$\begin{pmatrix}-3\\-5\end{pmatrix}-\begin{pmatrix}-2\\4\end{pmatrix}=\begin{pmatrix}-3--2\\-5-4\end{pmatrix}=\begin{pmatrix}-3+2\\-9\end{pmatrix}=\begin{pmatrix}-1\\-9\end{pmatrix}$$

[1 mark]

Circle your answer.

$\begin{pmatrix}-5\\1\end{pmatrix}$ $\begin{pmatrix}1\\1\end{pmatrix}$ $\begin{pmatrix}-5\\-9\end{pmatrix}$ $\begin{pmatrix}-1\\1\end{pmatrix}$ $\begin{pmatrix}-1\\-9\end{pmatrix}$

2 Circle the geometric progression.

→ multiplying previous term by same number e.g. doubling

[1 mark]

$2x^2$

2 8 18 32

Quadratic

2 4 8 16

×2 ×2 ×2

1 8 27 64

x^3

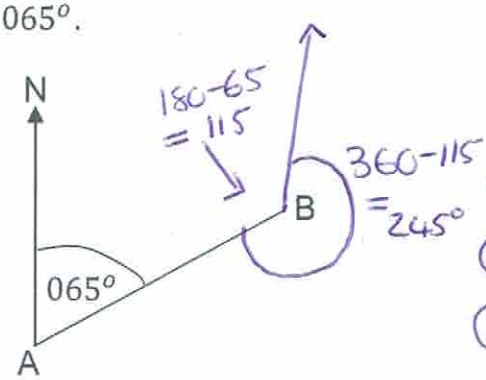
Cube Numbers

2 8 14 20

+6 +6 +6

6n - 4 Linear.

3 The bearing of B from A is 065°.



Not drawn accurately

① clockwise
② North
③ 3-Fig.

Circle the bearing of A from B.

[1 mark]

245° 115° 295° 265°

3

Do not write outside the box

$y = mx + c$

4 Circle the gradient of the straight line

$3y + 2x - 5 = 0$ $\quad y = \frac{5 - 2x}{3}$ **[1 mark]**

$3y + 2x = 5$

$3y = 5 - 2x$.

2 $\quad \frac{2}{3} \quad \frac{3}{2} \quad -\frac{2}{3}$

5 Factorise and solve

$x^2 - 5x - 24 = 0$ **[2 marks]**

TEAM (-24) (-5)

24

1 x 24
2 x 12
3 x 8
4 x 6

Answer $(x + 3)(x - 8) = 0$ ✓

So $x = -3$ and $x = 8$ ✓

6 In a sale, the original price of a TV was reduced by $\frac{1}{8} = 0.125$ 12.5%.

The sale price of the TV is £332.50

Work out the original price.

[3 marks]

$100\% - 12.5\% = 87.5\%$ ✓m1 or 0.875 ✓m1

÷87.5 ($87.5\% = 332.5$ ÷87.5 $\quad \frac{332.50}{0.875}$ ✓m1

$1\% = 3.8$ ✓m1 or

×100 ↳ $100\% = £380$ ↲ ×100 $\quad = £380$

Answer £380 ✓A1

either method.

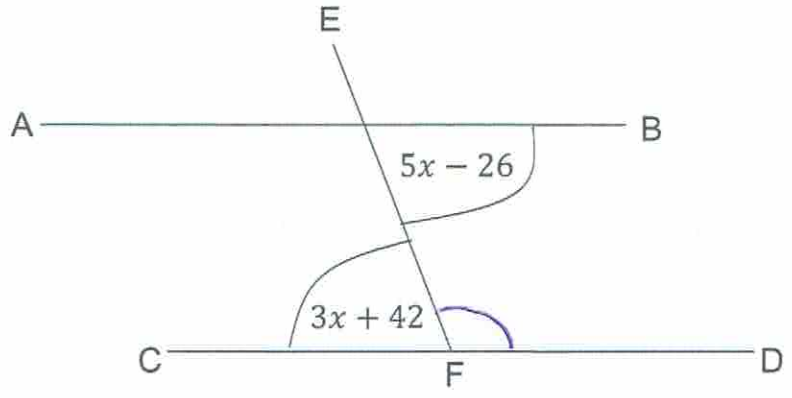
Do not write outside the box

7 AB, CD and EF are straight lines.

AB is parallel to CD.

All angles are in degrees.

Not drawn accurately



Find the size of angle EFD

[3 marks]

Alternate angles are equal so

$5x - 26 = 3x + 42$

$-3x \quad -3x$

$2x - 26 = 42$

$+26 \quad +26$

$2x = 68$

$x = 34$ ✓m1

$3x + 42 = 3(34) + 42 = 144$ ✓m1

$180 - 144 = 36°$

Answer $EFD = 36°$ ✓A1

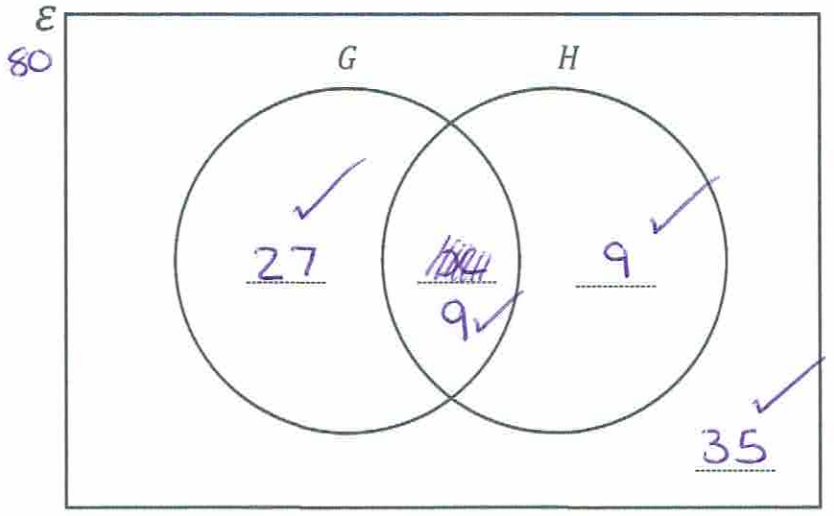
Do not write outside the box

8 In the Venn diagram

$\varepsilon = 80$ students

G = students who take Geography

H = students who take History



45% of the students study only Geography or History. 45% = 36 students

Students who only study Geography or History are in the ratio of 3 : 1.

27 9

The number of students that study geography is double the number that study History.

Complete the Venn diagram.

[5 marks]

0.45 × 80 = 36 students

G | 9 | 9 | 9 | ↕ 36

H | 9 |

36 ÷ 4 = 9

only geography 3 × 9 = 27

history 1 × 9 = 9

$27 + x = 2(x + 9)$

$x + 27 = 2x + 18$

$-x \quad -x$

$27 = x + 18$

$-18 \quad -18$

$9 = x$.

9 students study both.

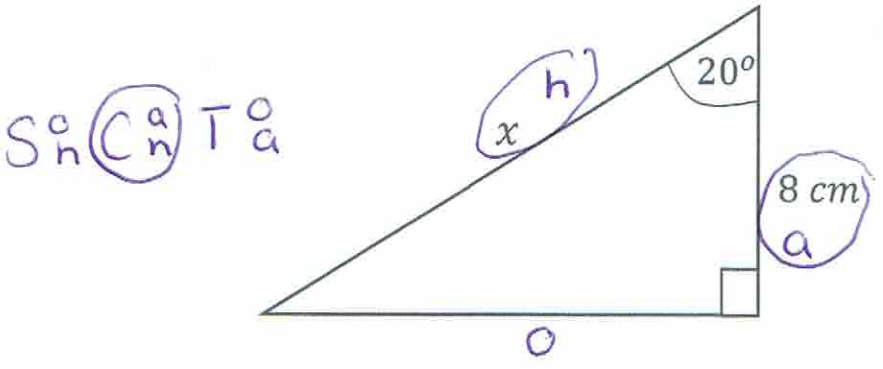
80 − (27 + 9 + 9)

= 80 − 45 = 35 students study neither

Do not write outside the box

9 Work out the length x.

Not drawn accurately



SOH CAH TOA

h
a
O

[2 marks]

$\cos(20) = \frac{8}{x}$

$x = \frac{8}{\cos(20)}$ ✓m1

Answer 8.51 ✓A1 cm

10 Work out the values of a and b in the identity.

$$4(x + 5) - 2(ax - 7) \equiv b - 2x$$

Or double negative. **[4 marks]**

$4x + 20 - 2ax + 14 \equiv b - 2x$ ✓m1

$4x - 2ax + 34 \equiv b - 2x$

So $34 = b$

and $4x - 2ax = -2x$ ✓

$-2ax = a = -3$

$a =$ −3 ✓ $b =$ 34 ✓

10

Do not write outside the box

11 An ice cream cone has a diameter of 56 mm and height of 128 mm.

Volume of a Cone $\frac{1}{3}\pi r^2 h$

r = 28mm.

Not drawn accurately

It is filled at a rate of 3.8 ml per second.

$1\ ml = 1000\ mm^3$

Assume the cones are filled continuously in a factory.

11 (a) How many cones could be filled with ice cream in 5 minutes?

You must show your working out.

5 x 60 = 300 seconds

[4 marks]

Volume = $\frac{1}{3}$ x π x 28^2 x 128

= 105088.3687 ✓

ml inside cone = 105088.3687 ÷ 1000

= 105.0883687 ✓

Seconds to fill = 105.0883687 ÷ 3.8 ✓

= 27.65 => 28 seconds.

Cones in 5mins = 300 ÷ 28 = 10.7

Answer 10 ✓ cones

11 (b) If the cones needed to be manually placed underneath the ice cream machine each time. What affect would this have on the amount of cones that are filled with ice cream within 5 minutes?

[1 mark]

It would take more time between filling the cones. Therefore less cones would be filled within the 5 minutes.

Do not write outside the box

12 On Saturday, Bradley takes part in a javelin competition.

He has to throw at least 80 metres to qualify for the final on Sunday.

He has three throws to qualify.

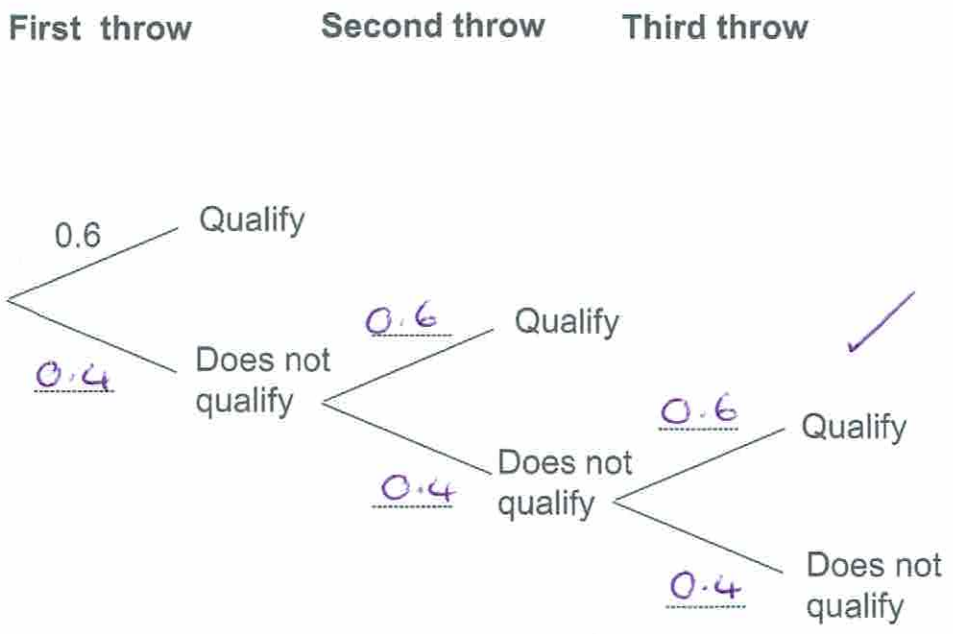
If he throws at least 80 metres he will not have to throw again on Saturday.

Each time Bradley throws, the probability he throws at least 80 metres is 0.6.

Assume each throw is independent.

12 (a) Complete the tree diagram.

[1 marks]



12 (b) Work out the probability that he will need the third throw to qualify.

[2 marks]

P(doesn't qualify, doesn't qualify)

$= 0.4 \times 0.4$ ✓

$= 0.16$ ✓

Answer _____

8

Do not write outside the box

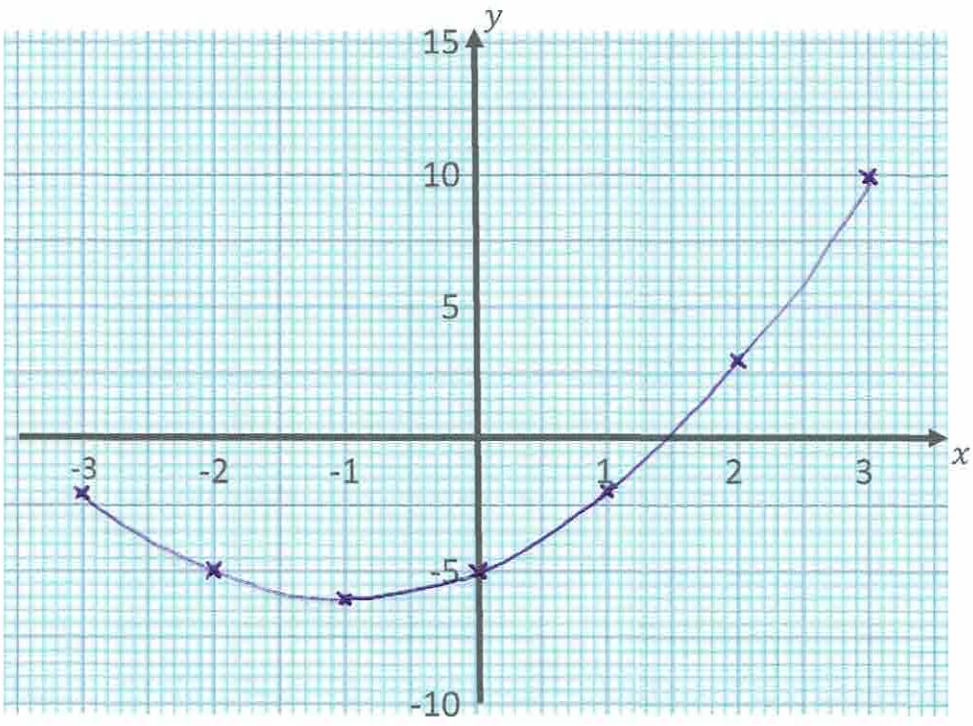
13 (a) Complete the table of values for $y = x^2 + 2x - 5$. **[2 marks]**

x	−3	−2	−1	0	1	2	3
y	−2	−5	-6	−5	-2	3	10

✓ ✓

13 (b) On the gird, draw the graph of $y = x^2 + 2x - 5$.

[2 marks]



✓points

✓Smooth curve

13 (c) Circle the coordinates of the turning point of the curve.

[1 mark]

$(0, -5)$ $(-1, -6)$ $(1.4, 0)$ $(-6, -1)$

Do not write outside the box

14 In a brass band, the mean age of 24 players is 48 years.

Rachel joins the band.

The mean age of all 25 players is now 47 years.

Work out the age of Rachel.

[2 marks]

Original Band Total Age

$24 \times 48 = 1152$ ✓m1

New Band Total Age

$25 \times 47 = 1175$

$1175 - 1152$

$= 23$

Answer 23 years old

15 The functions f and g are such that

$$f(x) = 2x + 4$$

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

15 (a) Circle the value of $f^{-1}(x)$.

[1 mark]

$\frac{x}{2} - 4$ $\quad$ $2(x-4)$ $\quad$ $\frac{1}{2x+4}$ $\quad$ (circled) $\frac{x-4}{2}$

$x \rightarrow \times 2 \rightarrow +4 \rightarrow f(x)$

$f^{-1}(x) \leftarrow \div 2 \leftarrow -4 \leftarrow x$

15 (b) Show that $gf(x) = 4x^2 + 16x + 14$

[2 marks]

$g(2x+4) = (2x+4)^2 - 2$ } ✓m1

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

$= 4x^2 + 16x + 16 - 2$ ✓m1

$= 4x^2 + 16x + 14$

↑ must show final line.

	$2x$	$+4$
$2x$	$4x^2$	$+8x$
$+4$	$+8x$	$+16$

10

Do not write outside the box

16 Mustafa, Abdul and Mo share sweets in the ratio 3:5:6.

Mo Got 21 more sweets than Mustafa.

Work out the total number of sweets they shared.

[3 marks]

Mu | | | ← 21 → 21 ÷ 3 = 7 ✓

Mo | | | 7 | 7 | 7 | Mu = 7 × 3 = 21 +

A | | | | | | Mo = 7 × 6 = 42 + ✓
A = 7 × 5 = 35

98

Answer 98 sweets ✓

17 On the grid, shade the region that satisfies all these inequalities.

$x > -1$ $x + y \leq 5$ $y \geq 2x - 1$

0 + 0 ≤ 5 ✓ 0 ≥ 2(0) − 1 ✓ Test (0,0)

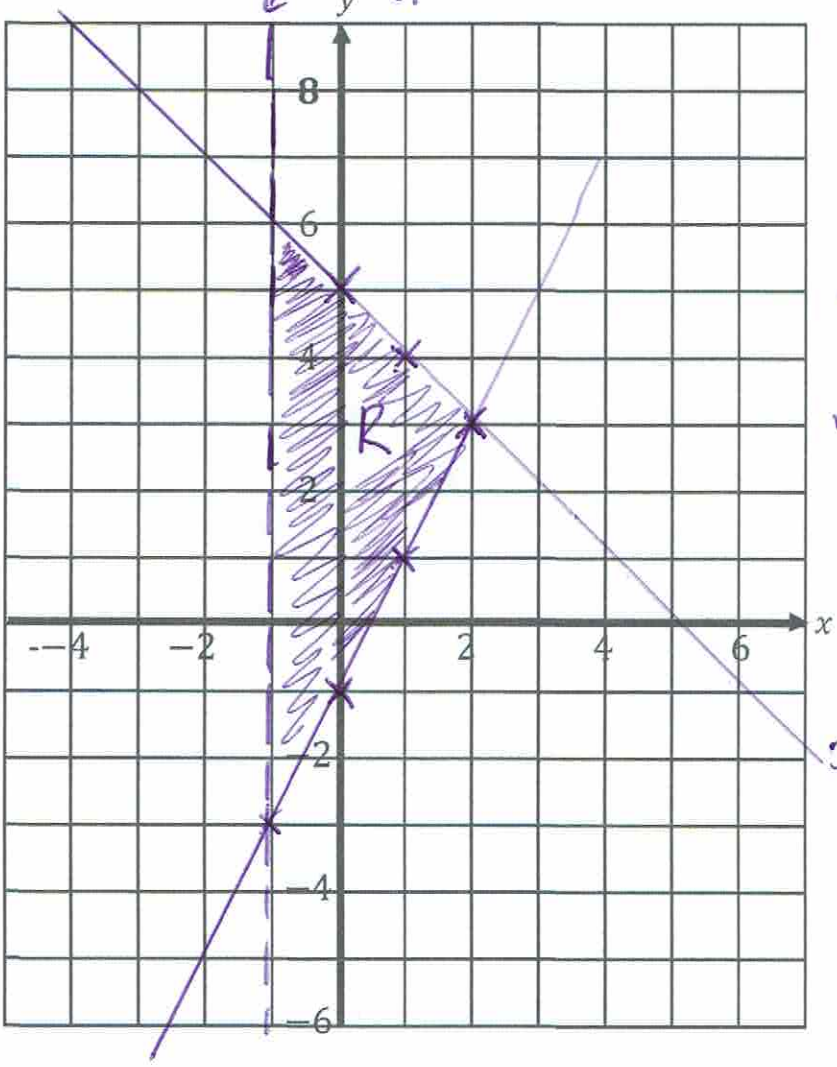
$y \leq 5 - x$

x	0	1	2
y	5	4	3

x	0	1	2
y	−1	1	3

Label the region R. **[3 marks]**

x = 1 dashed line



✓ Region

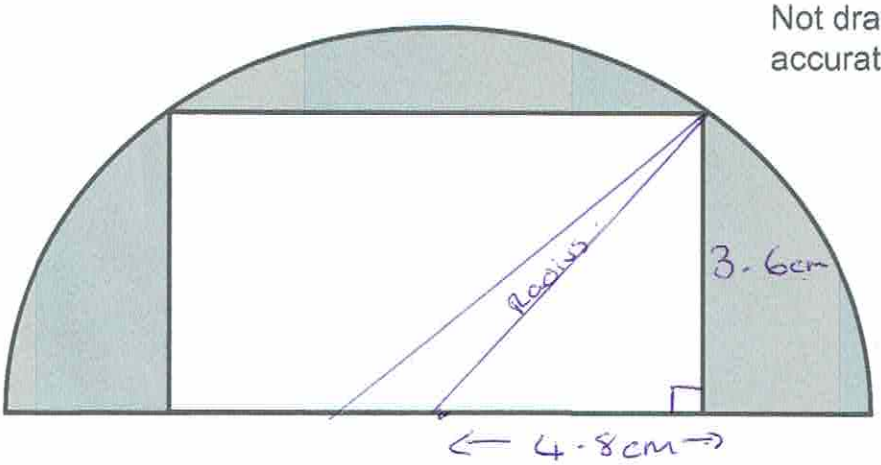
✓ dashed $x > -1$ line

✓ one other line correct.

$x + y = 5$.

Do not write outside the box

18 The diagram shows a rectangle inside a semicircle.



The rectangle has dimensions 9.6 *cm* by 3.6 cm.

Work out the shaded area.

Give your answer correct to 3 significant figures. **[4 mark]**

$9.6 \div 2 = 4.8cm$

radius $= \sqrt{4.8^2 + 3.6^2}$

$= \sqrt{36} = 6cm.$

Area Rectangle $= 9.6 \times 3.6$

$= 34.56\ cm^2$

Area of circle $= 6^2 \times \pi$

$= 36\pi = 113.0973355.$

Area of Semi circle $= 36\pi \div 2 = 18\pi$

$= 56.54866776$

$18\pi - 34.56$

$= 21.98866776$

Answer 22.0 cm^2

Do not write outside the box

19 Here are the interest rates for two accounts.

Account A	Account B
Interest: 4% for the first year 1.04 2% for the second year 1.02 1% for the third year 1.01	Interest: → 1.024 2.4% per year compound interest.
Withdrawals allowed at any time.	No withdrawals allowed until the end of three years.

Daniel has £20 000 he wants to invest.

19 (a) Calculate which account would give him the most money if he invests his money for 3 years. **[4 marks]**

Account A = 20 000 × 1.04 × 1.02 × 1.01 ✓

= £21428.16 ✓

Account B = 20000 × 1.024^3 ✓

= £21474.84

21474.84 − 21428.16 = £30.84 more

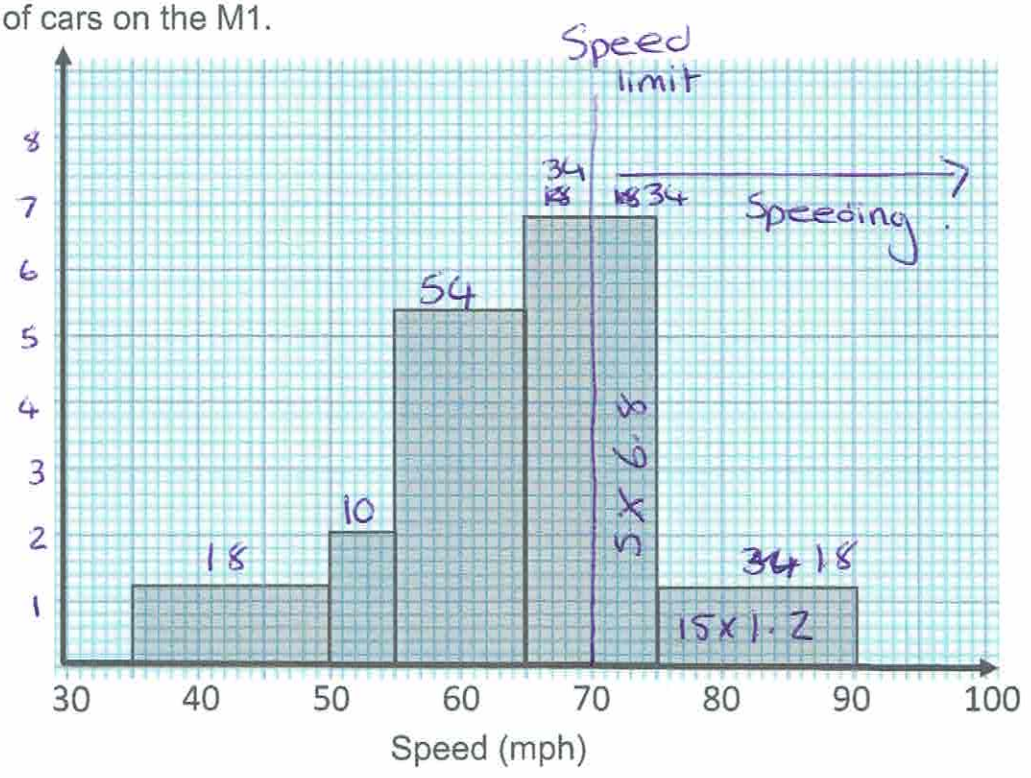
Answer Account B ✓

19 (b) Explain why he might not want to use Account B. **[1 mark]**

You can only withdraw at the end of the third year. If he needs access to his money before year 3 he is better off selecting Account A.

Do not write outside the box

20 The incomplete table and histogram give some information about the speed of cars on the M1.



On a Friday evening a speed camera van measured the speed of the cars which passed the van.

CW = 15

There were 18 cars measured as travelling in the range $35 \leq speed < 50$.

On the M1 motorway the speed limit is 70 miles per hour.

Work out the proportion of cars that were caught speeding.

[5 marks]

Fd = 18 ÷ 15 = 1.2 of $35 \leq speed < 50$

Scale of 0.2 per little square. ✓

70 to 75 = 5 x 6.8 = 34 cars ✓

75 to 90 = 15 x 1.2 = 18 cars ✓

34 + 18 = 52 cars Speeding ✓

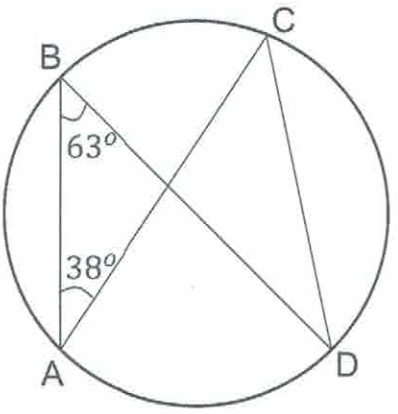
Total cars 18 + 10 + 54 + 34 + 34 + 18 = 168

Answer $\frac{52}{168}$ or $\frac{13}{42}$ ✓

10

Do not write outside the box

21



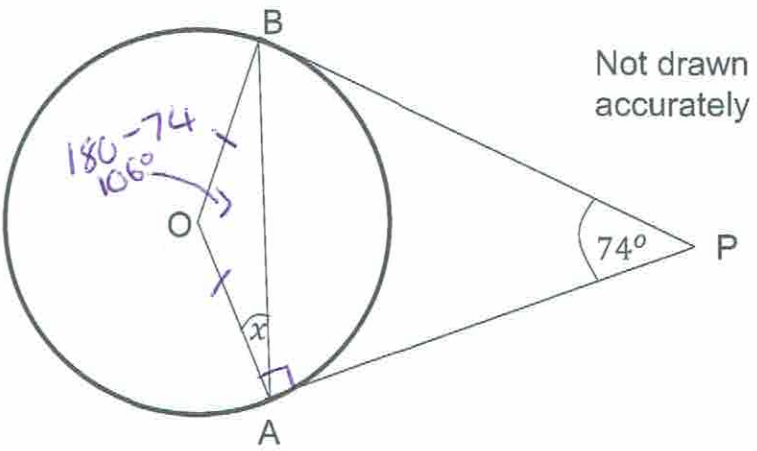
Not drawn accurately

21 (a) Circle the size of angle ACD.

[1 mark]

76^o 63^o 117^o 38^o 126^o

21 (b)



Not drawn accurately

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

PA and PB are tangents to the circle.

Angle APB is 74^o. ✓Reasons.

Work out the size of the angle marked x.

[3 marks]

Tangents meet at Right angle

Tangents from same point opp angles total 180°

BOA = 180 - 74 = 106° ✓

Isosceles triangle (Two Radi) 180 - 106 = 74 74 ÷ 2 = 37°

Answer $x = 37^o$ ✓

Do not write outside the box

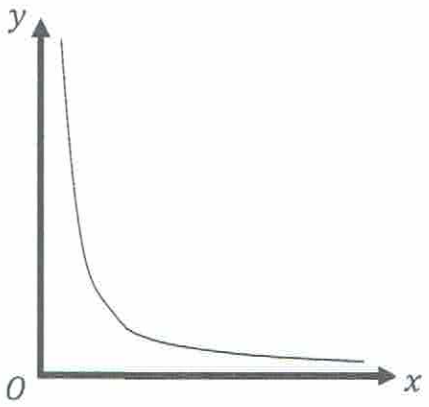
22 y is directly proportion to x.

Which graph shows this?

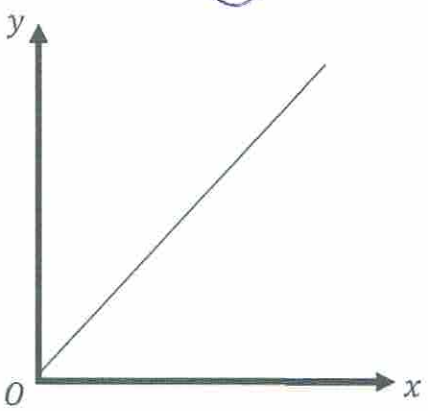
Circle the correct letter.

[1 mark]

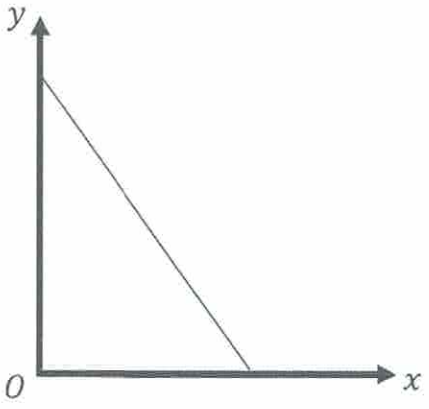
A



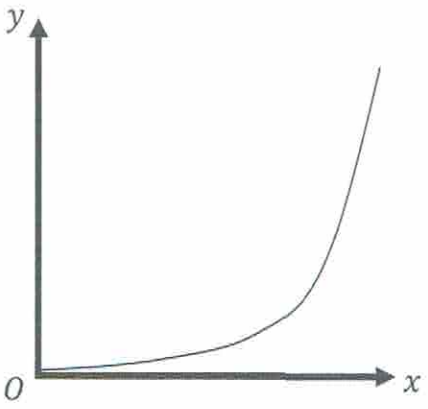
B



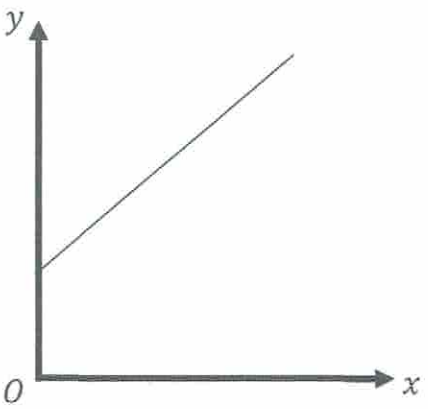
C



D



E



5

Do not write outside the box

23 The table shows some information about the heights of 120 adults.

Height (h, cm)	Number of adults	CF
$150 \leq h < 155$	12	12
$155 \leq h < 160$	26	38
$160 \leq h < 170$	31	69 ← median
$170 \leq h < 175$	37	
$175 \leq h < 200$	14	

Less than 160cm

23 (a) In which class interval is the median? $\frac{120+1}{2} = 60.5$

Circle your answer.

[1 mark]

$150 \leq h < 155$ $155 \leq h < 160$ $160 \leq h < 170$

$170 \leq h < 175$ $175 \leq h < 200$

23 (b) Kenan says

"30% of the adults measured are under 160cm tall."

Does the data support this statement?

You must show your working.

☐ Yes ☑ No

[2 marks]

30% of 120 = 0.3 × 120 = 36 adults.

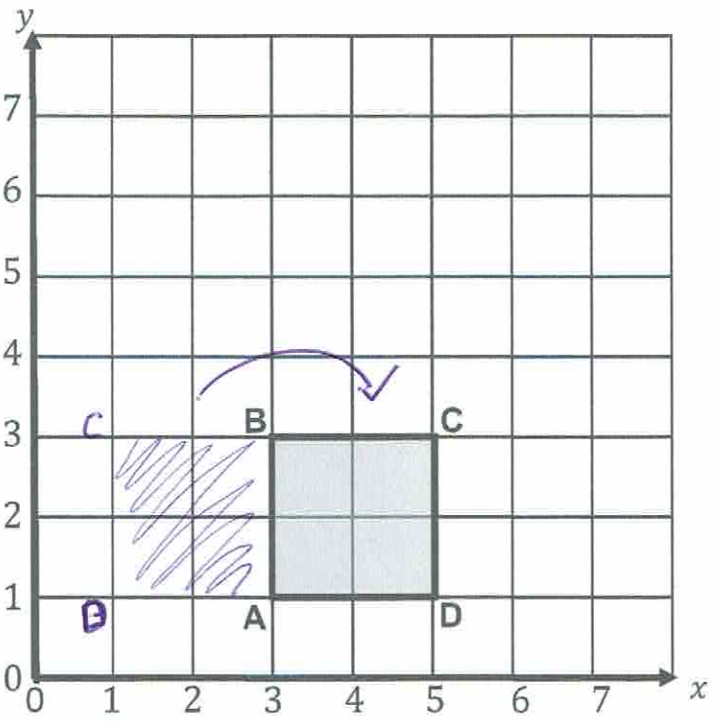
less than 160cm

12 + 26 = 38 adults So no two more people

or proportion under 160cm is $\frac{38}{120} \times 100 = 31.7\%$

Do not write outside the box

24 A square ABCD is drawn on a centimetre grid.



ABCD is reflected in the line $x = 3$ and

then rotated 90^o clockwise from the centre $(3,1)$.

Circle the number of invariant points.

[1 mark]

0 1 (2) 3 4

A and C

25 A circle has the equation

$$x^2 + y^2 = \frac{1}{16}$$

$x^2+y^2=r^2$

$\sqrt{\frac{1}{16}} = \frac{1}{4}$

Circle the length of its radius.

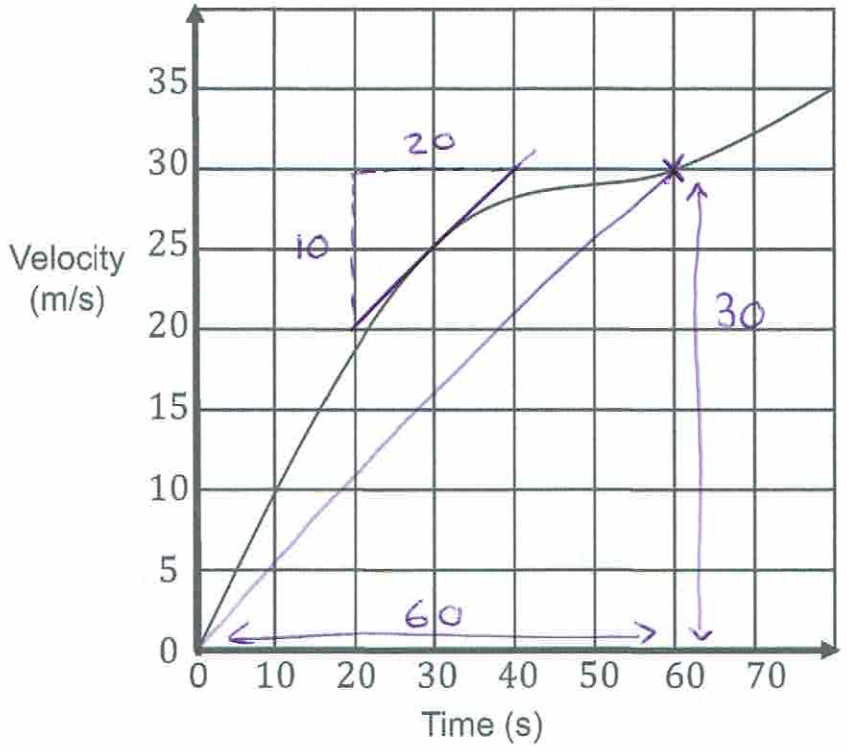
[1 mark]

$\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{16}$ $\frac{1}{32}$

5

Do not write outside the box

26 Here is a velocity-time graph for a car journey.



26 (a) Work out the average acceleration during the first 60 seconds.

[1 mark]

Average. Average = $\frac{30}{60} = \frac{1}{2}$

Answer 1/2 ✓ m/s^2

26 (b) Estimate the instantaneous rate of acceleration at 30 seconds.

[2 marks]

acceleration = $\frac{\text{Rise}}{\text{Run}}$ of (tangent at 30) ✓

$= \frac{10}{20} = \frac{1}{2}$ ✓

Answer 1/2 m/s^2

Do not write outside the box

27 An approximate solution to the equation $x^3 - 10x - 5 = 0$ is found using this iterative process.

$$x_{n+1} = \frac{(x_n^3 - 5)}{10} \qquad \frac{ans^3 - 5}{10}$$

Use this iterative process to find a solution to 3 decimal places of $x^3 - 10x - 5 = 0$

Start with the value $x_1 = 2$ (2 = ans) **[3 marks]**

$x_1 = 2$

$x_2 = 0.3$ ✓

$x_3 = -0.4973$

$x_4 = -0.51229\ldots$

$x_5 = -0.51344\ldots$

$x_6 = -0.513535\ldots$

$x_7 = -0.5135429\ldots$ ✓

Answer $x = -0.514$ to 3dp ✓

28 Rearrange **[3 marks]**

$$y = \frac{r - px}{(x - p)}$$

to make x the subject.

$y(x-p) = r - px$ ✓

$yx - yp = r - px$

$yx + px = r + yp$

$x(y+p) = r + yp$ ✓

$x = \frac{r + yp}{y+p}$ ✓

Answer _____

End of Questions