Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Monday 10 November 2025

Morning (Time: 1 hour 30 minutes)

Paper reference **1MA1/3H**

Mathematics

PAPER 3 (Calculator)
Higher Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB or B pencil, eraser, calculator, Formulae Sheet (enclosed). Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 7 8 2 4 0 A 0 1 2 4

Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) (i) Work out the value of $\sqrt{\dfrac{93 - 8.1}{34 + 7.7}}$

Write down all the figures on your calculator display.

1·426874635

(2)

(ii) Write your answer to part (i) correct to 3 significant figures.

1·43

(1)

(b) Work out the value of the reciprocal of 1.25

$\frac{1}{2.5} = \frac{2}{5}$

0·4

(1)

(Total for Question 1 is 4 marks)

2 Two numbers are in the ratio 5 : 3
The difference between the two numbers is 18

(a) Find the two numbers.

5 − 3 = 2

2 : 18 ÷2 → 1 : 9 ×3 → 3 : 27

1 : 9 ×5 → 5 : 45

27 , 45

(2)

Three numbers are in the ratio 4 : 7 : 2
The largest number is 210

(b) Find the sum of these three numbers.

7 : 210 ÷7 → 1 : 30 ×13 → 13 : 390

4 + 7 + 2 = 13

390

(3)

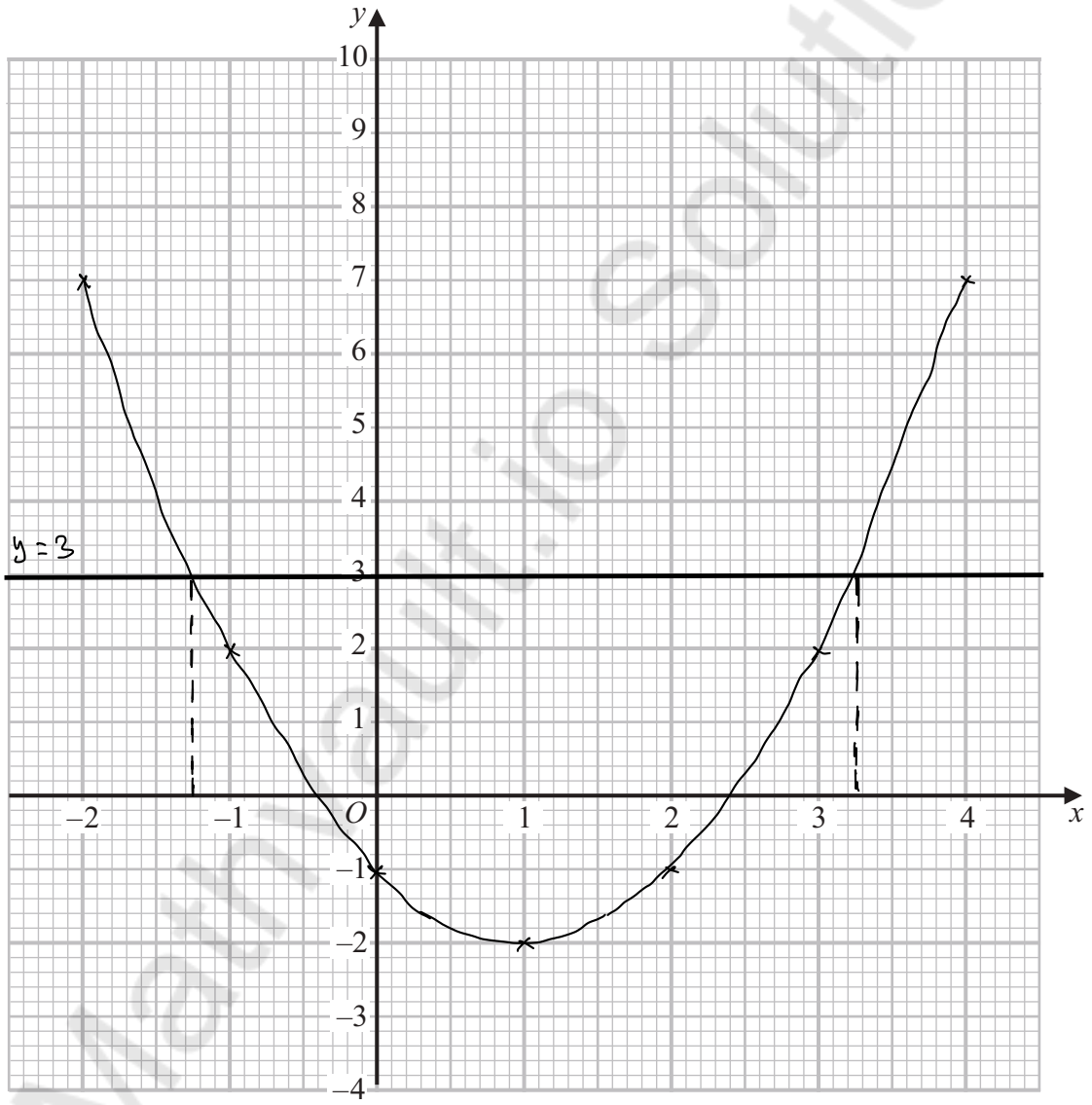
(Total for Question 2 is 5 marks)

3 (a) Complete the table of values for $y = x^2 - 2x - 1$

x	–2	–1	0	1	2	3	4
y	7	2	–1	–2	–1	2	7

(2)

(b) On the grid, draw the graph of $y = x^2 - 2x - 1$ for values of x from –2 to 4



(2)

(c) Use your graph to find estimates for the solutions of $x^2 - 2x - 1 = 3$

At $y = 3$ $x^2 - 2x - 1 = y$

$x = -1.25$ $x = 3.25$

(2)

(Total for Question 3 is 6 marks)

4 (a) Calculate the value of $\dfrac{8.4 \times 10^4}{3.2 \times 10^5}$

Give your answer in standard form.

$(8.4 \div 3.2) \times 10^{4-5}$

2.625×10^{-1}

2.625×10^{-1}

(2)

$y = 0.83$ correct to 2 decimal places.

(b) Complete the error interval for y.

$0.82 \quad 0.83 \quad 0.84$

$0.825 \leq y < 0.835$

$0.825 \leqslant y < 0.835$

(2)

(Total for Question 4 is 4 marks)

5 Eric buys a car for £19950
Every year the car loses 5% of the value it had at the start of the year.

Eric works out the value of his car 4 years after he bought it.

Here is Eric's working.

$$4 \times 5\% = 20\%$$
$$0.2 \times 19950 = 3990$$
$$19950 - 3990 = 15960$$

Eric's method is wrong.

(a) Explain why.

Value of Car decreases by 5% of new value each year (Compound depreciation)

(1)

(b) Work out the difference between Eric's answer of £15960 and the real value of the car 4 years after he bought it.

$100\% - 5\% = 95\% = 0.95$

$19950 \times 0.95^4 = £16249.40$

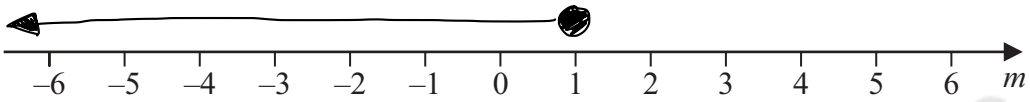
$16249.4 - 15960 = £289.40$

£ 289.40

(4)

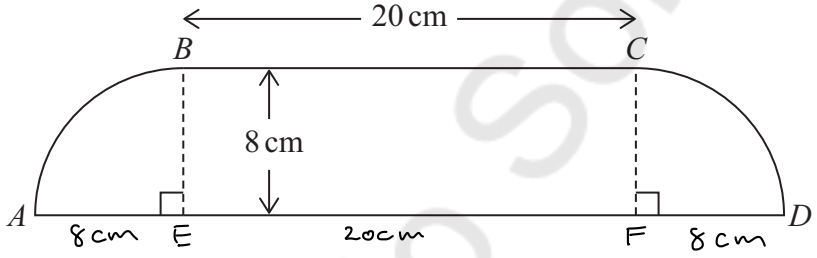
(Total for Question 5 is 5 marks)

6 On the number line below, show the inequality $m \leqslant 1$



(Total for Question 6 is 1 mark)

7 In the diagram, *AB* and *CD* are quarter circles of radius 8 cm.
AD is a straight line.
BC = 20 cm



Work out the perimeter of shape *ABCD*.
Give your answer correct to 3 significant figures.

AE = FD = 8cm

EF = 20cm = BC

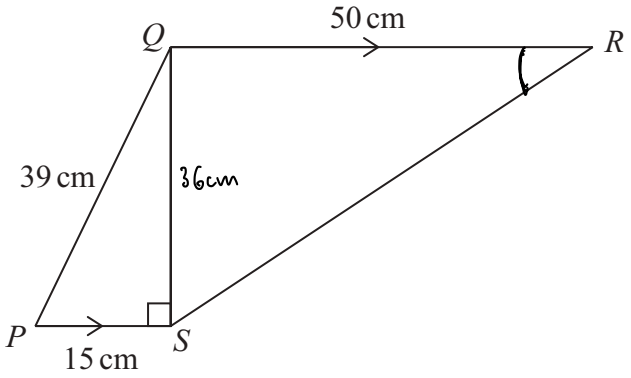
$\overset{\frown}{AB} = \frac{2\pi \times 8}{4} = \overset{\frown}{CD} = 4\pi$ cm

Perimeter = $20 + 20 + 8 + 8 + 4\pi + 4\pi = (56 + 8\pi)$ cm

81.1 cm

(Total for Question 7 is 3 marks)

8 In the diagram, QR is parallel to PS.



Work out the size of angle QRS.
Give your answer correct to 1 decimal place.

$QS = \sqrt{39^2 - 15^2} = 36\text{ cm}$

$\tan \hat{QRS} = \frac{36}{50}$

$\hat{QRS} = \tan^{-1}\left(\frac{36}{50}\right)$

$\hat{QRS} \approx 35.754^\circ$

35·8 °

(Total for Question 8 is 4 marks)

9 The students in class X and the students in class Y did the same science test.

Here are the marks of the students in class X.

LQ — Median

30 31 33 37 40 **42** 43 43 45 46 46 **48**

50 52 53 53 55 **56** 58 63 66 68 69

UQ

(a) Complete the table below to show information about the marks of the students in class X.

Median	48
Range	39
Interquartile range	14

69 - 30

UQ - LQ
56 - 42

(3)

Here is some information about the marks of the students in class Y.

Median	45
Range	41
Interquartile range	16

Tanya says that the information in the tables shows that class X did better in the test than class Y.

(b) Is Tanya correct?
You must give a reason for your answer.

Yes the median for class X is greater than for class Y

(1)

Amar says that the information in the tables shows that the marks of class X vary more than the marks of class Y.

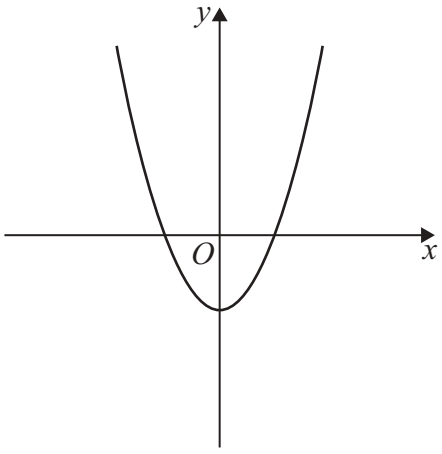
(c) Is Amar correct?
You must give a reason for your answer.

No the range for class X is lower than for class Y

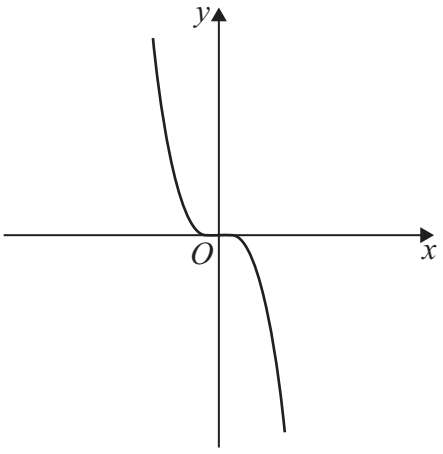
(1)

(Total for Question 9 is 5 marks)

10 Here are five graphs.



A



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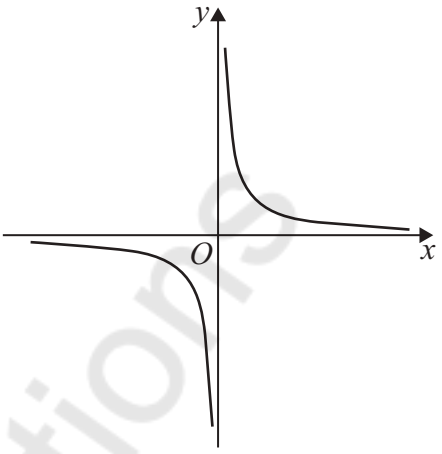

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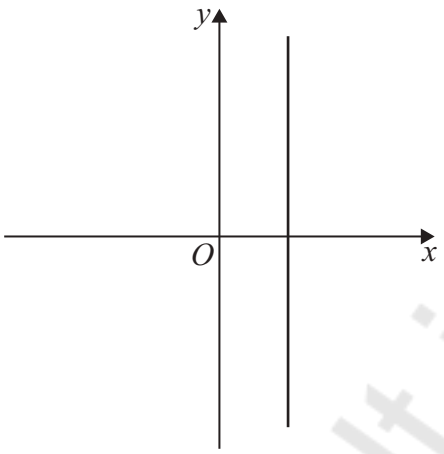

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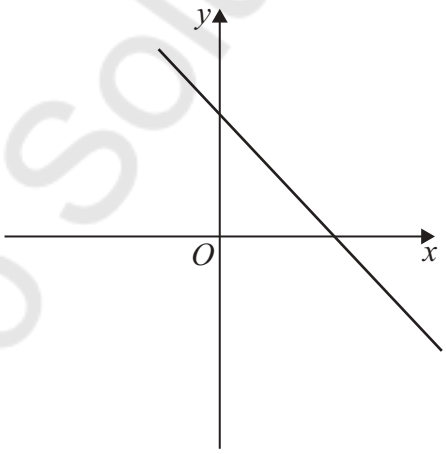


E

The equation of each of these graphs is given in the table.

Equation	Graph
$y = \frac{1}{x}$	C
$x + y = 6$	E
$y = -x^3$	B
$y = x^2 - 2$	A
$x = 3$	D

Reciprocal

negative gradient (linear) → $y = -x + 6$

Negative cubic

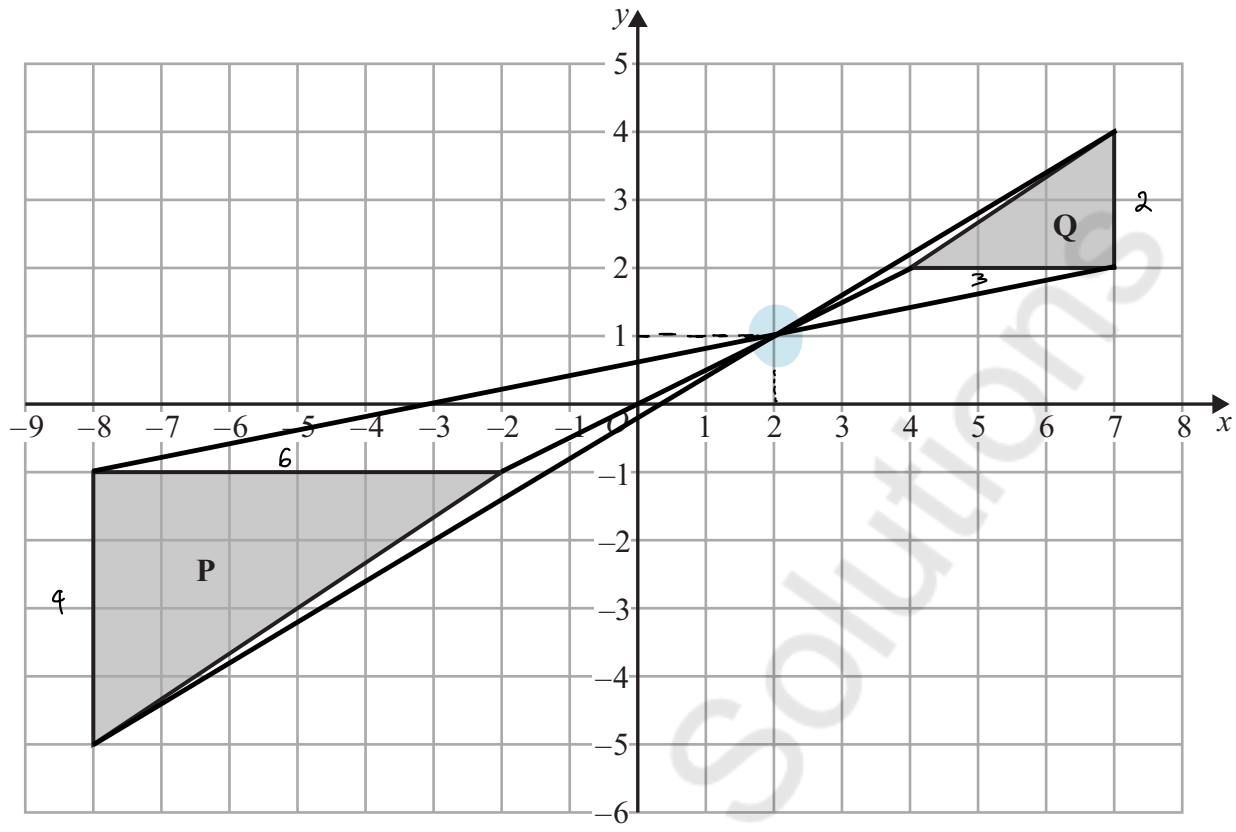
Positive quadratic

Vertical line

Match the letter of each graph to its equation.

(Total for Question 10 is 3 marks)

11



Shape **P** can be transformed to shape **Q** by an enlargement with scale factor s and centre (a, b)

Find the value of s, the value of a and the value of b.

Scale factor = $-\frac{1}{2}$

$(2, 1)$

$s =$ $-\frac{1}{2}$

$a =$ 2

$b =$ 1

(Total for Question 11 is 2 marks)

12 (a) Prove that, for any integer m, where $m > 0$

$$(5m + 2)^2 - (5m - 2)^2 \quad \text{is a multiple of 20}$$

$25m^2 + 20m + 4 - [25m^2 - 20m + 4]$

$25m^2 + 20m + 4 - 25m^2 + 20m - 4$

$40m$

$20[2m]$

Hence where $m>0$, $(5m+2)^2 - (5m-2)^2$ is a multiple of 20.

(3)

Ali says,

"80 is a factor of $(5m + 2)^2 - (5m - 2)^2$ for any integer m, where $m > 0$"

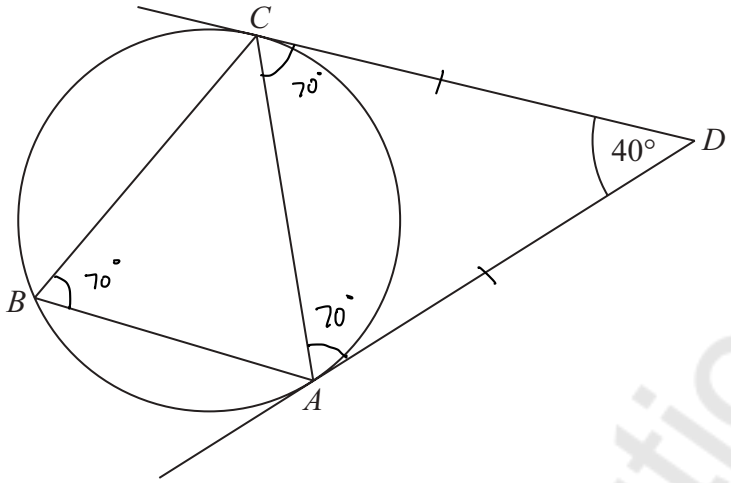
(b) Is Ali correct?
You must give a reason for your answer.

If $m=1$, $40m = 40$ and 80 is not a factor of 40 so Ali is not correct.

(1)

(Total for Question 12 is 4 marks)

13 A, B and C are three points on a circle.



CD and AD are tangents to the circle.

Find the size of angle ABC.
You must give a reason for each stage of your working.

CD = AD Tangents from an external point are equal in length.

ΔACD is an isosceles triangle.

$A\hat{C}D = C\hat{A}D = \frac{1}{2}(180 - 40) = 70^\circ$

$A\hat{B}C = 70^\circ$ (Alternate Segment theorem)

70 °

(Total for Question 13 is 4 marks)

14 $w = 3x - y$

$x = 8.71$ correct to 3 significant figures.
$y = 24.3$ correct to 3 significant figures.

Work out the lower bound for the value of w.
You must show all your working.

$w_{min} = 3x_{min} - y_{max}$

8·70 ⋮ 8·71 ⋮ 8·72

$8.705 \leq x < 8.715$

$\downarrow$

x_{min}

24·2 ⋮ 24·3 ⋮ 24·4

$24.25 \leq y < 24.35$

$\downarrow$

y_{max}

$w_{min} = 3(8.705) - 24.35$

$w_{min} = \underline{1}.765$

$\underline{1}.765$

(Total for Question 14 is 3 marks)

15 There are only blue counters and red counters in a box.
There are 5 times as many blue counters as red counters.

Ashley takes at random one counter from the box.
He records the colour of the counter, then puts the counter back in the box.
Ashley does this 3 times.

(a) Find the probability that Ashley takes a counter of the same colour all 3 times.

Red = r Blue = 5r Total = 6r

$P(\text{same colour}) = P(RRR) + P(BBB)$

$= \left(\frac{r}{6r} \times \frac{r}{6r} \times \frac{r}{6r}\right) + \left(\frac{5r}{6r} \times \frac{5r}{6r} \times \frac{5r}{6r}\right)$

$= \frac{1}{216} + \frac{125}{216}$

$P(\text{Same Colour}) = \frac{126}{216}$

$\frac{126}{216}$

(3)

The number of blue counters in the box is doubled.
The number of red counters in the box is doubled.

Ashley takes 3 counters in the same way as in part (a).

Ashley thinks that the probability that he takes a counter of the same colour all 3 times is the same as the answer in part (a).

(b) Is Ashley correct?
Give a reason for your answer.

Ashley is correct because doubling red counters and doubling blue counters does not change the ratio of red to blue counters. R : B = r : 5r = 2r : 10r = 1 : 5

(1)

(Total for Question 15 is 4 marks)

16 (a) Show that the equation $2x^3 + x - 8 = 0$ has a solution between $x = 1$ and $x = 2$

At $x = 1$

$2(1)^3 + (1) - 8 = -5$

At $x = 2$

$2(2)^3 + (2) - 8 = 10$

change of sign therefore solution is between $x = 1$ and $x = 2$

(1)

(b) Show that the equation $2x^3 + x - 8 = 0$ can be written in the form $x = \sqrt[3]{\frac{8-x}{2}}$

$2x^3 + x = 8$

$2x^3 = 8 - x$

$x^3 = \frac{8-x}{2}$

$x = \sqrt[3]{\frac{8-x}{2}}$

(1)

(c) Starting with $x_0 = 1.5$ use the iteration formula $x_{n+1} = \sqrt[3]{\frac{8-x_n}{2}}$ three times to find an estimate for a solution of $2x^3 + x - 8 = 0$ correct to 3 decimal places.

$x_0 = 1.5$

$x_1 = \sqrt[3]{\frac{8-1.5}{2}} = 1.481248034$

$x_2 = \sqrt[3]{\frac{8-x_1}{2}} = 1.482671093$

$x_3 = \sqrt[3]{\frac{8-x_2}{2}} = 1.482563195$

1.483

(3)

(Total for Question 16 is 5 marks)

17 Given that

$$y : x^2 = 6 : 1 \quad \text{and} \quad x + y = 1$$

find the possible values of x and y.

$\frac{y}{x^2} = \frac{6}{1}$

$y = 6x^2$

$x + y = 1$

$x + 6x^2 = 1$

$6x^2 + x - 1 = 0$

$(3x - 1)(2x + 1) = 0$

$\therefore x = \frac{1}{3} \quad x = -\frac{1}{2}$

$y = 6\left(\frac{1}{3}\right)^2 \quad y = 6\left(-\frac{1}{2}\right)^2$

$y = \frac{2}{3} \quad y = \frac{3}{2}$

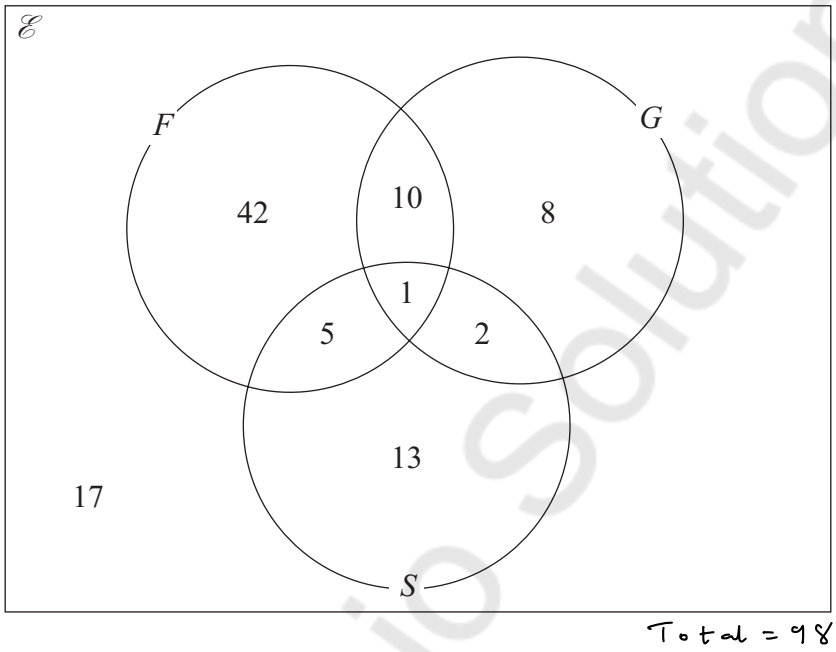
$x = \frac{1}{3}, y = \frac{2}{3} \quad x = -\frac{1}{2} \quad y = \frac{3}{2}$

(Total for Question 17 is 5 marks)

18 Imran asks 100 people if they speak French or German or Spanish.
He draws a Venn diagram to give information about his results.

Here is Imran's diagram.

$\mathscr{E}$ = {all 100 people}
F = {people who speak French}
G = {people who speak German}
S = {people who speak Spanish}



The diagram is not fully correct.

(a) Explain why the diagram cannot be fully correct.

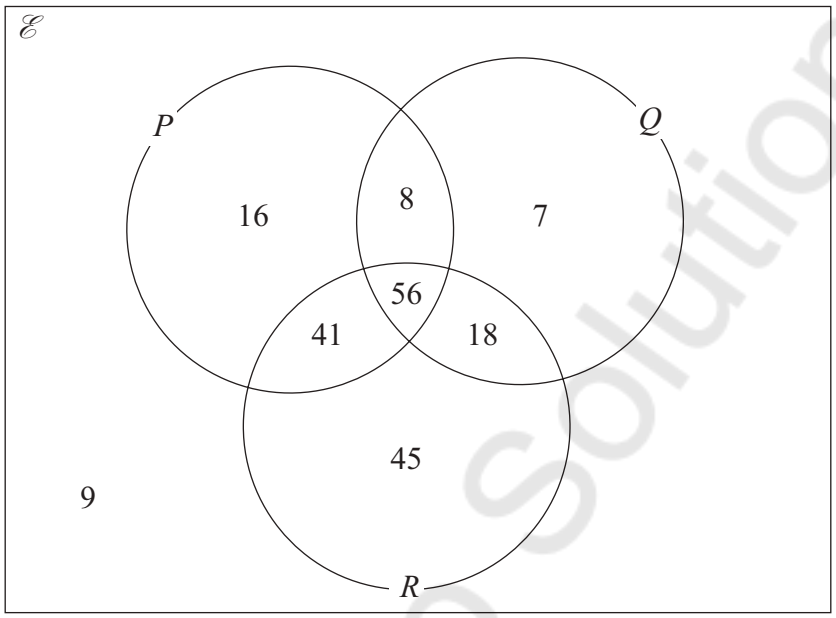
Total in the diagram is 98 but it should be 100

(1)

Jodie asks 200 people which of the social network sites, P, Q and R they use.

The Venn diagram gives information about her results.

$\mathscr{E}$ = {all 200 people}
P = {people who use site P}
Q = {people who use site Q}
R = {people who use site R}



Given that a person selected at random from the 200 people uses site Q,

(b) find the probability that this person also uses site P.

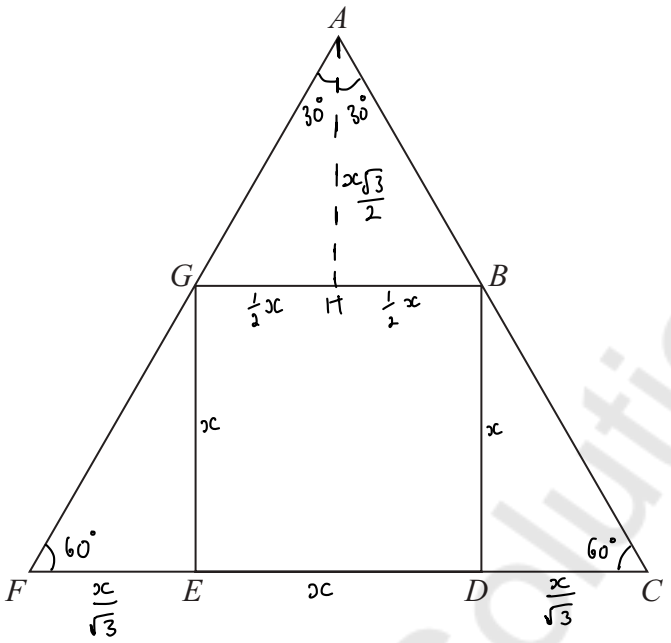
$$P(P \mid Q) = \frac{P(P \cap Q)}{P(Q)} = \frac{8+56}{8+56+7+18}$$

$\frac{64}{89}$

(2)

(Total for Question 18 is 3 marks)

19 In the diagram, ABG and ACF are equilateral triangles.
$GBDE$ is a square of side x cm.



Find

area ABG : area ACF

Give your answer in the form $a : b + c\sqrt{d}$ where a, b, c and d are integers.
You must show all your working.

$\tan 30 = \frac{\frac{1}{2}x}{AH}$

$AH = \frac{0.5x}{\tan 30}$

$AH = \frac{0.5x}{\sqrt{3}/3}$

$AH = \frac{x\sqrt{3}}{2}$

Area of $\Delta ABG = x \times x\frac{\sqrt{3}}{2} \times \frac{1}{2}$

Area of $\Delta ABG = x^2\frac{\sqrt{3}}{4}$

$\Delta ABG : \Delta ACF$

$x^2\frac{\sqrt{3}}{4} : \frac{x^2(7+4\sqrt{3})}{4\sqrt{3}}$

$3 : 7 + 4\sqrt{3}$

$\tan 60 = \frac{x}{FE}$

$FE = \frac{x}{\tan 60}$

$FE = \frac{x}{\sqrt{3}} = CD$

Area of $\Delta ACF = \frac{1}{2} \times \left(x + \frac{2x}{\sqrt{3}}\right) \times \left(x + x\frac{\sqrt{3}}{2}\right)$

Area of $\Delta ACF = \frac{1}{2}\left[\frac{x(2+\sqrt{3})}{\sqrt{3}}\right]\left[\frac{x(2+\sqrt{3})}{2}\right]$

Area of $\Delta ACF = \frac{x^2}{4\sqrt{3}}(2+\sqrt{3})^2$

Area of $\Delta ACF = \frac{x^2(4+4\sqrt{3}+3)}{4\sqrt{3}}$

Area of $\Delta ACF = \frac{x^2(7+4\sqrt{3})}{4\sqrt{3}}$

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$3 : 7 + 4\sqrt{3}$

(Total for Question 19 is 5 marks)

Turn over for Question 20

20 The functions f and g are such that

$$f(x) = 3x - 6 \qquad g(x) = \frac{2x^2}{x^2 + 1}$$

(a) Find $f^{-1}(9)$

.....

(2)

(b) Find $fg(x)$
Give your answer as a single fraction in its simplest form.

.....

(3)

(Total for Question 20 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

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