

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)

Time 1 hour 30 minutes

Paper
reference**1MA1/1H****Mathematics****PAPER 1 (Non-Calculator)****Higher Tier**

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **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 not be used.**

**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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Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 (a) Work out 3.67×4.2

$$\begin{array}{r}
 \times 3.67 \\
 4.20 \\
 \hline
 00.280 \\
 02.400 \\
 + 12.000 \\
 00.014 \\
 00.120 \\
 00.600 \\
 \hline
 15.414 \\
 11
 \end{array}$$

$$15.414$$

(3)

- (b) Work out $59.84 \div 1.6$

$$\begin{array}{r}
 037.4 \\
 16 \overline{) 598.4} \\
 \underline{48} \\
 118 \\
 \underline{112} \\
 64 \\
 \underline{64} \\
 0
 \end{array}$$

$$37.4$$

(3)

(Total for Question 1 is 6 marks)



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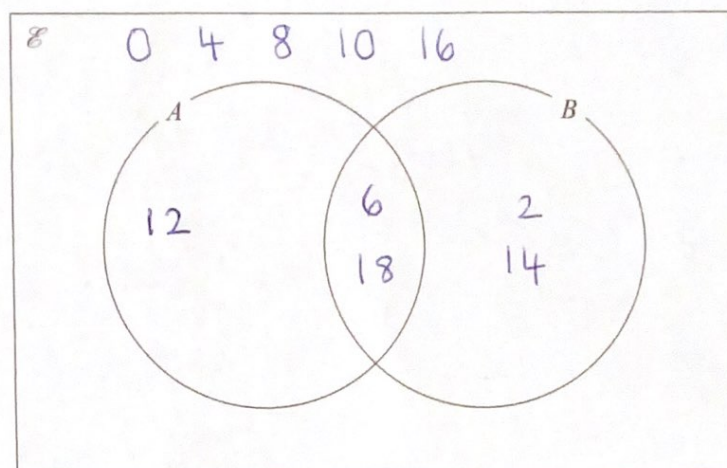
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- 2 $\mathcal{E} = \{\text{even numbers less than 19}\}$

$$A = \{6, 12, 18\}$$

$$B = \{2, 6, 14, 18\}$$

Complete the Venn diagram for this information.



(Total for Question 2 is 3 marks)

- 3 Work out $4\frac{1}{5} - 2\frac{2}{3}$

Give your answer as a mixed number.

$$\begin{aligned} 4\frac{1}{5} - 2\frac{2}{3} &= \frac{21}{5} - \frac{8}{3} \\ &= \frac{63}{15} - \frac{40}{15} \\ &= \frac{23}{15} \\ &= 1\frac{8}{15} \end{aligned}$$

$$1\frac{8}{15}$$

(Total for Question 3 is 3 marks)



- 4 At the end of 2017
the value of Tamara's house was £220 000
the value of Rahim's house was £160 000

At the end of 2019
the value of Tamara's house had decreased by 20%
the value of Rahim's house had increased by 30%

At the end of 2019, whose house had the greater value?
You must show how you get your answer.

$$0.2 \times 220\,000 = 22\,000 \times 2 = 44\,000$$
$$\begin{array}{r} \text{Value of Tamara's house} = 220\,000 \\ - 44\,000 \\ \hline 176\,000 \end{array}$$

$$0.3 \times 160\,000 = 16\,000 \times 3 = 48\,000$$
$$\begin{array}{r} \text{Value of Rahim's house} = 160\,000 \\ + 48\,000 \\ \hline 208\,000 \end{array}$$

At the end of 2019 Rahim's house had the greater value, with £208 000 > £176 000

(Total for Question 4 is 4 marks)

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- 5 Rosie, Matilda and Ibrahim collect stickers.

number of stickers : number of stickers : number of stickers
Rosie has : Matilda has : Ibrahim has = 4:7:15

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.

How many more?

$$24 \div 8 = 3$$

so 1 part = 3 stickers

$$15 - 4 = 11$$

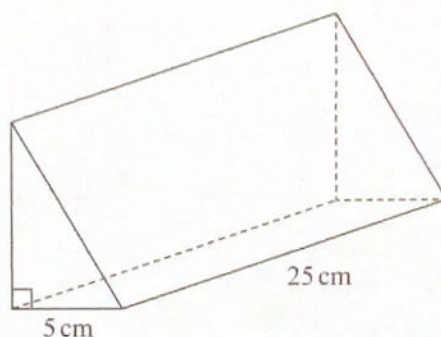
$$11 \times 3 = 33 \text{ stickers}$$

33

(Total for Question 5 is 3 marks)



- 6 The diagram shows a prism.



The cross section of the prism is a right-angled triangle.
The base of the triangle has length 5 cm

The prism has length 25 cm
The prism has volume 750 cm^3

Work out the height of the prism.

$$\begin{aligned} \text{Volume} &= \frac{1}{2} \times b \times h \times L \\ \Rightarrow 750 &= \frac{1}{2} \times 5 \times h \times 25 \\ \Rightarrow 750 &= 62.5h \\ \Rightarrow h &= \frac{750}{62.5} = 12 \text{ cm} \end{aligned}$$

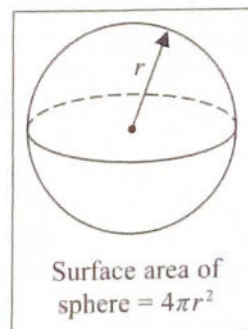
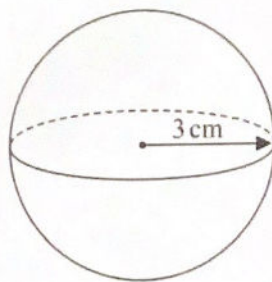
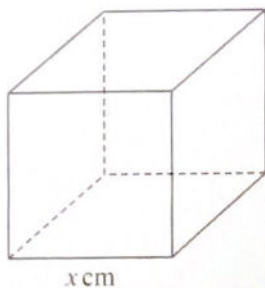
12

cm

(Total for Question 6 is 3 marks)



- 7 The diagram shows a cube with edges of length x cm and a sphere of radius 3 cm.



The surface area of the cube is equal to the surface area of the sphere.

Show that $x = \sqrt{k\pi}$ where k is an integer.

$$\text{SA of the cube} = 6x^2$$

$$\text{SA of the sphere} = 4\pi \times 3^2 = 36\pi$$

$$6x^2 = 36\pi$$

$$x^2 = 6\pi$$

$$x = \sqrt{6\pi}$$

$$\therefore k = 6$$

(Total for Question 7 is 4 marks)



8 Solve $x^2 = 5x + 24$

$$x^2 - 5x - 24 = 0$$

$$(x - 8)(x + 3) = 0$$

$$x = 8 \text{ and } x = -3$$

$$x = 8 \text{ and } x = -3$$

(Total for Question 8 is 3 marks)

9 (a) Write down the value of 7^0

1

(1)

(b) Find the value of $3 \times 3^6 \times 3^{-6}$

3

(1)

(c) Find the value of 2^{-4} $\frac{1}{16}$

(1)

(d) Find the value of $27^{\frac{1}{3}}$

3

(1)

(Total for Question 9 is 4 marks)



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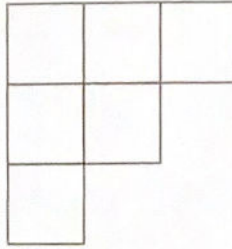
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- 10 The diagram shows a shape made from 6 identical squares.



The total area of the shape is 5406 cm^2

- (a) Find an estimate for the length of one side of each square.
Give your answer correct to the nearest whole number.

$$\begin{array}{r} 0901 \\ 6 \overline{) 5406} \end{array}$$

$$\text{side length} = \sqrt{901} \approx 30$$

$$(30^2 = 900)$$

30

cm

(3)

- (b) Is your answer to part (a) an underestimate or an overestimate?
You must give a reason for your answer.

Underestimate as $30^2 = 900$, so $\sqrt{901}$ will be

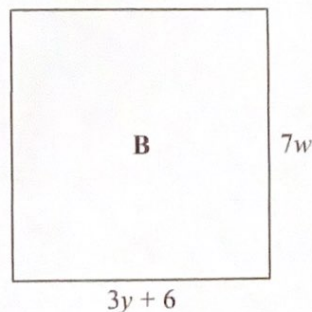
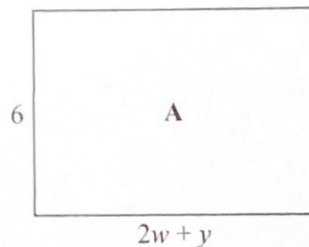
slightly larger.

(1)

(Total for Question 10 is 4 marks)



11 The diagram shows two rectangles, A and B.



All measurements are in centimetres.

The area of rectangle A is equal to the area of rectangle B.

Find an expression for y in terms of w .

$$6(2w + y) = 7w(3y + 6)$$

$$\Rightarrow 12w + 6y = 21wy + 42w$$

$$\Rightarrow 6y - 21wy = 30w$$

$$\Rightarrow y(6 - 21w) = 30w$$

$$\Rightarrow y = \frac{30w}{6 - 21w}$$

$$\Rightarrow y = \frac{10w}{2 - 7w}$$

$$y = \frac{10w}{2 - 7w}$$

(Total for Question 11 is 4 marks)



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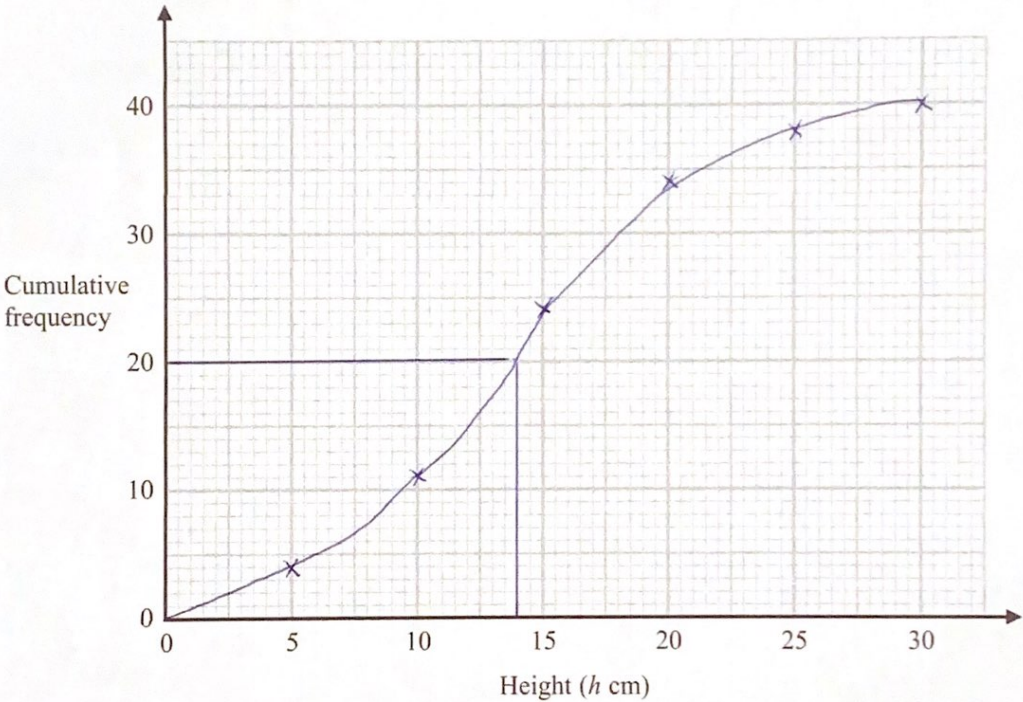
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12 The cumulative frequency table gives information about the heights, in cm, of 40 plants.

Height (h cm)	Cumulative Frequency
$0 < h \leq 5$	4
$0 < h \leq 10$	11
$0 < h \leq 15$	24
$0 < h \leq 20$	34
$0 < h \leq 25$	38
$0 < h \leq 30$	40

(a) On the grid, draw a cumulative frequency graph for this information.



(2)

(b) Use the graph to find an estimate for the median height of the plants.

13 cm
(1)

(Total for Question 12 is 3 marks)



13 Ted is trying to change $0.\dot{4}\dot{3}$ to a fraction.

Here is the start of his method.

$$x = 0.\dot{4}\dot{3}$$

$$10x = 4.\dot{3}\dot{4}$$

$$10x - x = 4.\dot{3}\dot{4} - 0.\dot{4}\dot{3}$$

Evaluate Ted's method so far.

Ted should have used $100x$ instead of $10x$.

(Total for Question 13 is 1 mark)

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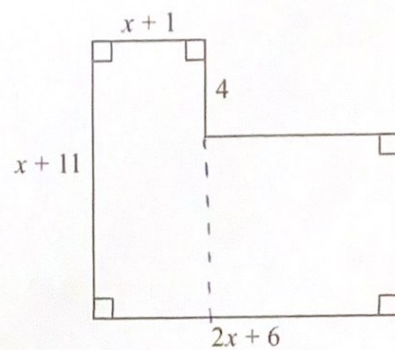


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14 Here is a shape with all its measurements in centimetres.



The area of the shape is $A \text{ cm}^2$

Show that $A = 2x^2 + 24x + 46$

$$\begin{aligned}
 \text{Area} &= (x+1)(x+11) + (x+5)(x+7) \\
 &= (x^2 + 12x + 11) + (x^2 + 12x + 35) \\
 A &= 2x^2 + 24x + 46
 \end{aligned}$$

(Total for Question 14 is 3 marks)



15 Show that $\frac{4x+3}{2x} + \frac{3}{5}$ can be written in the form $\frac{ax+b}{cx}$ where a , b and c are integers.

$$\begin{aligned}\frac{4x+3}{2x} + \frac{3}{5} &= \frac{5(4x+3)}{10x} + \frac{6x}{10x} \\&= \frac{20x+15+6x}{10x} \\&= \frac{26x+15}{10x}\end{aligned}$$

(Total for Question 15 is 3 marks)



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- 16 There are only 3 red counters and 5 yellow counters in a bag.

Jude takes at random 3 counters from the bag.

Work out the probability that he takes exactly one red counter.

$$\text{red first : } \frac{3}{8} \times \frac{3}{7} \times \frac{5}{6} = \frac{60}{336}$$

$$\text{red second : } \frac{5}{8} \times \frac{3}{7} \times \frac{4}{6} = \frac{60}{336}$$

$$\text{red third : } \frac{5}{8} \times \frac{4}{7} \times \frac{3}{6} = \frac{60}{336}$$

$$3 \left(\frac{60}{336} \right) = \frac{180}{336}$$

$$\frac{180}{336}$$

(Total for Question 16 is 4 marks)



17 On the grid show, by shading, the region that satisfies all of these inequalities.

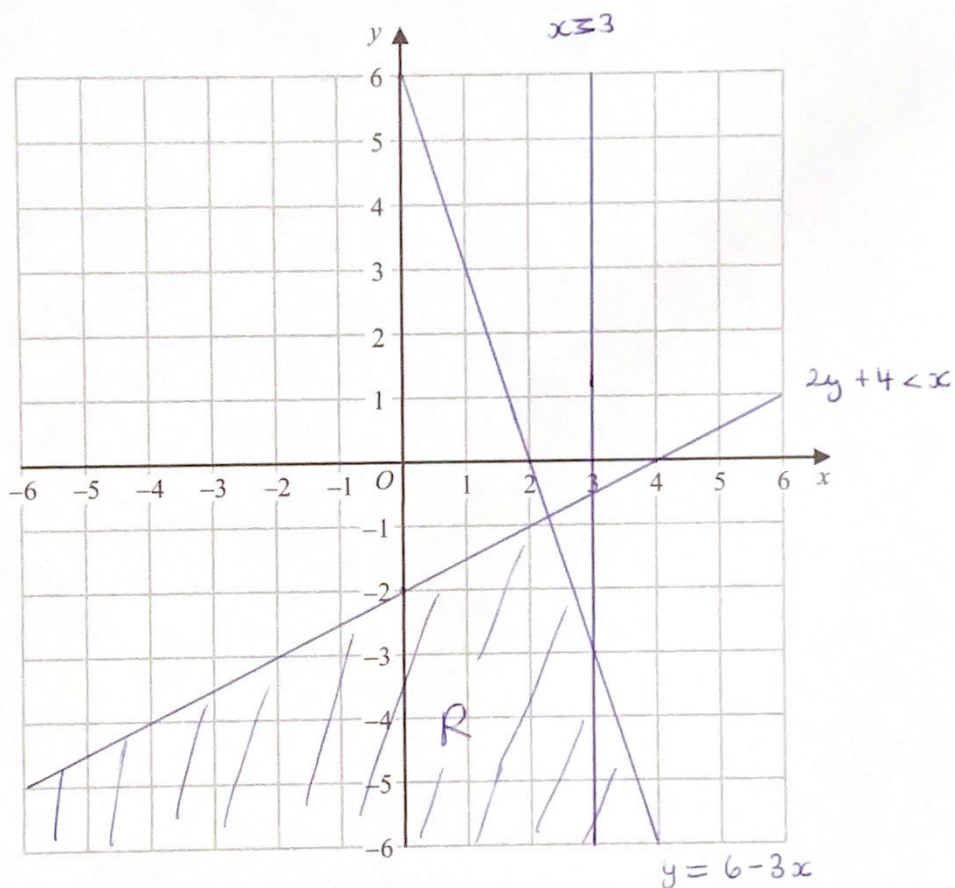
$$2y + 4 < x$$

$$x < 3$$

$$y < 6 - 3x$$

Label the region **R**.

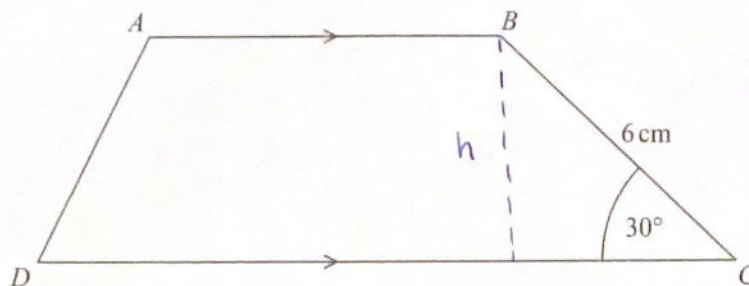
$$2y < x - 4$$
$$y < \frac{1}{2}x - 2$$



(Total for Question 17 is 3 marks)



18 Here is trapezium $ABCD$.



The area of the trapezium is 66 cm^2

the length of AB : the length of $CD = 2:3$

Find the length of AB .

$$\sin 30 = \frac{h}{6}$$

$$\Rightarrow h = 6 \times \sin 30 = 3 \text{ cm}$$

$$\frac{1}{2} \times (AB + CD) \times 3 = 66$$

$$\Rightarrow AB + CD = 44$$

$$44 \div 5 = 8.8$$

$$AB = 8.8 \times 2 = 17.6$$

17.6 cm

(Total for Question 18 is 5 marks)



19 Show that $\frac{8+\sqrt{12}}{5+\sqrt{3}}$ can be written in the form $\frac{a+\sqrt{3}}{b}$, where a and b are integers.

$$\begin{aligned}\frac{8+\sqrt{12}}{5+\sqrt{3}} \times \frac{5-\sqrt{3}}{5-\sqrt{3}} &= \frac{40-8\sqrt{3}+5\sqrt{12}-6}{25-3} \\ &= \frac{34-8\sqrt{3}+10\sqrt{3}}{22} = \frac{34+2\sqrt{3}}{22} = \frac{17+\sqrt{3}}{11}\end{aligned}$$

(Total for Question 19 is 4 marks)

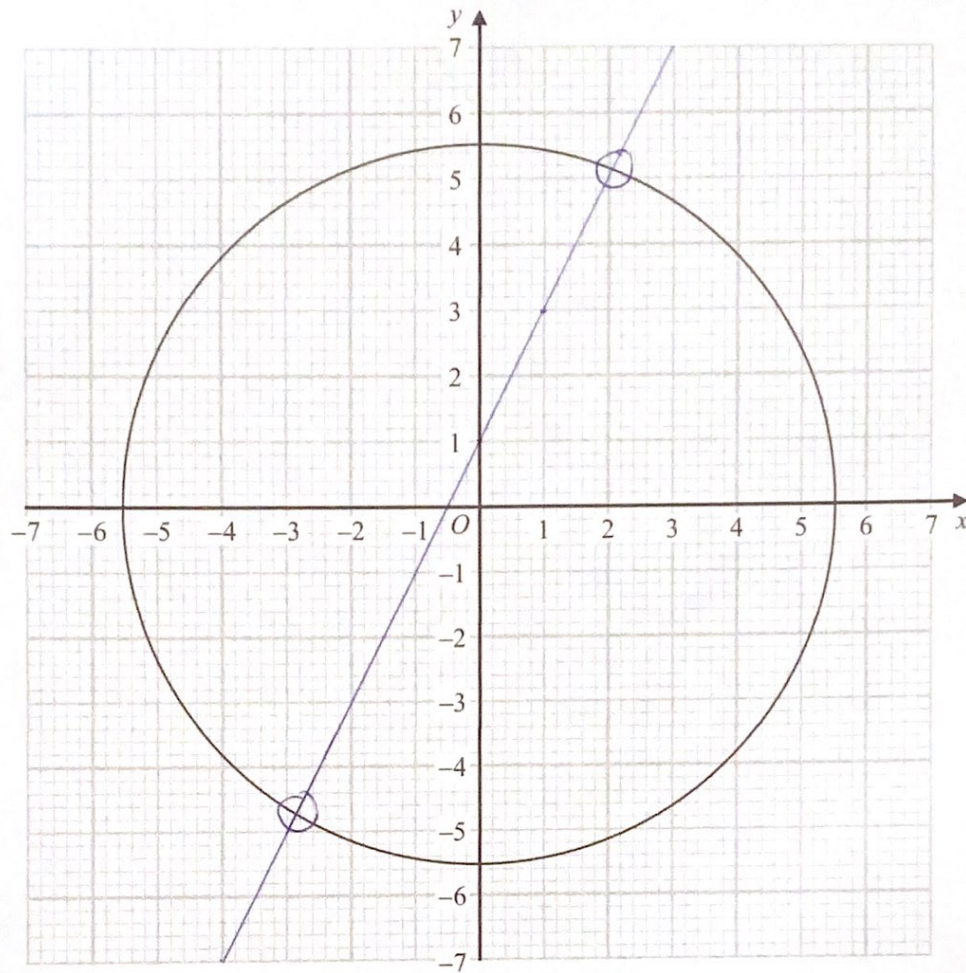
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20 The diagram shows the graph of $x^2 + y^2 = 30.25$



Use the graph to find estimates for the solutions of the simultaneous equations

$$\begin{aligned} x^2 + y^2 &= 30.25 \\ y - 2x &= 1 \end{aligned}$$

$$\begin{aligned} x &= 2.1, y = 5.1 \\ x &= -2.9, y = -4.7 \end{aligned}$$

(Total for Question 20 is 3 marks)



21 The functions f and g are such that

$$f(x) = 3x^2 + 1 \quad \text{for } x > 0 \quad \text{and} \quad g(x) = \frac{4}{x^2} \quad \text{for } x > 0$$

(a) Work out $gf(1)$

$$f(1) = 3 \times 1^2 + 1 = 4$$

$$g(4) = \frac{4}{4^2} = \frac{1}{4}$$

$$\frac{1}{4}$$

(2)

The function h is such that $h = (fg)^{-1}$

(b) Find $h(x)$

$$\begin{aligned} fg(x) &= 3 \times \left(\frac{4}{x^2}\right)^2 + 1 \\ &= \frac{48}{x^4} + 1 \end{aligned}$$

$$h(x) = \sqrt[4]{\frac{48}{x^4} - 1}$$

$$\text{let } y = \frac{48}{x^4} + 1$$

$$\Rightarrow y - 1 = \frac{48}{x^4}$$

$$\Rightarrow x^4 = \frac{48}{y - 1}$$

$$\Rightarrow x = \sqrt[4]{\frac{48}{y - 1}}$$

$$h(x) = \sqrt[4]{\frac{48}{\frac{x}{4} - 1}}$$

(4)

Notes

(Total for Question 21 is 6 marks)



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- 22 Find the coordinates of the turning point on the curve with equation $y = 9 + 18x - 3x^2$
You must show all your working.

$$\begin{aligned}
 y &= 3(3 + 6x - x^2) \\
 &= -3(x^2 - 6x - 3) \\
 &= -3[(x-3)^2 - 12] \\
 &= -3(x-3)^2 + 36
 \end{aligned}$$

Turning point = (3, 36)

(3 , 36)

(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

