

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.

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Turn over ►



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

$$\begin{array}{r} 367 \\ \times 42 \\ \hline 734 \\ 14680 \\ \hline 15414 \end{array}$$

15.414

(3)

(b) Work out $59.84 \div 1.6$

$$\begin{array}{r} 037.4 \\ 16 \overline{) 598.4} \\ \underline{48} \\ 118 \\ \underline{112} \\ 60 \\ \underline{64} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

16
32
48
64
80
96
112

37.4

(3)

(Total for Question 1 is 6 marks)



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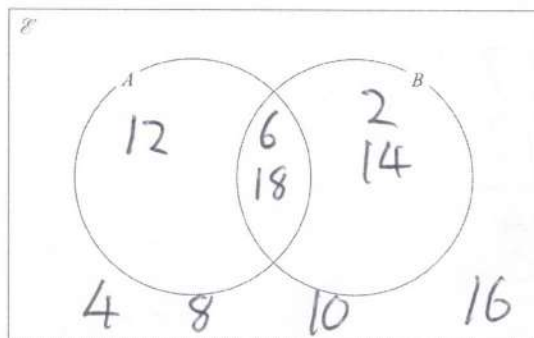
Nov 21 P1

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

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

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

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.

$$\frac{21}{5} - \frac{8}{3}$$

$$\frac{63}{15} - \frac{40}{15} = \frac{23}{15}$$

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

(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.

$$\begin{array}{r} T \\ 10\% = 22000 \\ 20\% = 44000 \\ \hline 220000 \\ - 44000 \\ \hline 176000 \end{array}$$

$$\begin{array}{r} R \\ 10\% = 16000 \\ 30\% = 48000 \\ \hline 160000 \\ + 48000 \\ \hline 208000 \end{array}$$

Rahim > Tamara

(Total for Question 4 is 4 marks)



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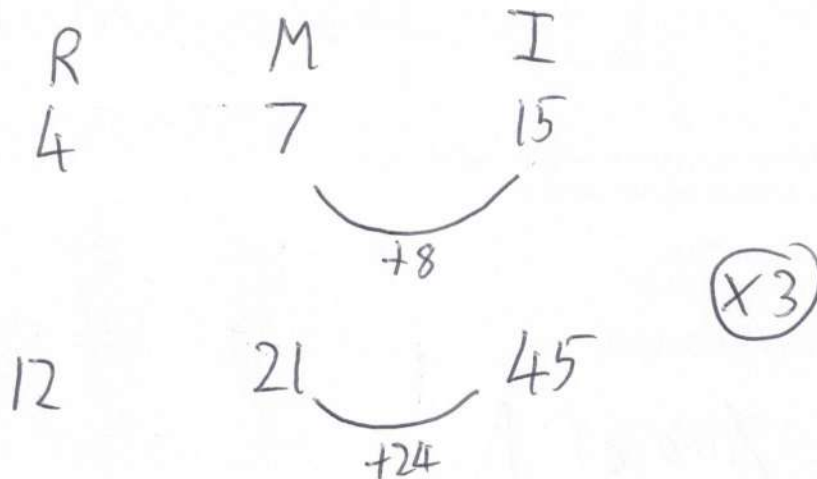
5 Rosie, Matilda and Ibrahim collect stickers.

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

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.

How many more?



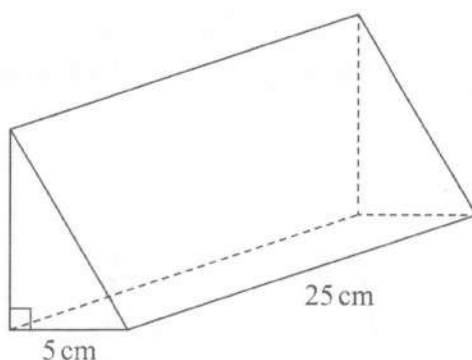
$$45 - 12 = 33$$

(Total for Question 5 is 3 marks)



P 6 4 6 3 0 A 0 5 2 4

- 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.

$$\frac{V}{L} = \text{Area of } \Delta$$

$$\frac{750}{25} = \frac{1}{2} \times 5 \times h$$

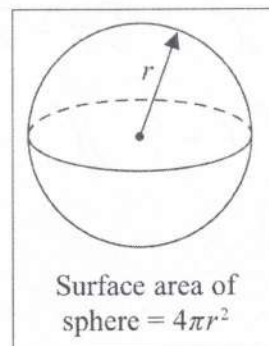
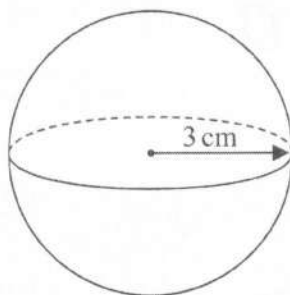
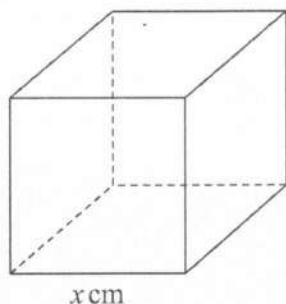
$$30 = \frac{5h}{2}$$

$$h = \frac{30 \times 2}{5} = 12 \text{ cm}$$

(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.

$$\begin{aligned} \text{SA Cube} &= 6 \times x \times x = 6x^2 \\ \text{SA Sphere} &= \frac{4}{1} \times \pi \times 3^2 = 36\pi \end{aligned}$$

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

$$x^2 = 6\pi$$

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

$$k = 6$$

(Total for Question 7 is 4 marks)



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

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

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

$$x = 8, -3$$

(Total for Question 8 is 3 marks)

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

$$1$$

(1)

(b) Find the value of $3^1 \times 3^6 \times 3^{-6}$

$$1 + 6 - 6 = 1$$

$$3$$

(1)

(c) Find the value of 2^{-4}

$$= \frac{1}{2^4}$$

$$\frac{1}{16}$$

(1)

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

$$\sqrt[3]{27}$$

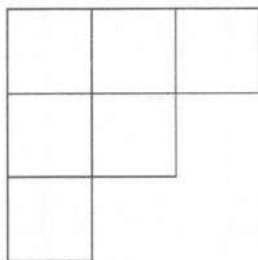
$$3$$

(1)

(Total for Question 9 is 4 marks)



- 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.

$$\begin{array}{r} 901 \\ 6 \overline{) 5406} \end{array}$$

$$\sqrt{901} \approx 30$$

30

(3)

cm

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

Underestimate due to rounding down

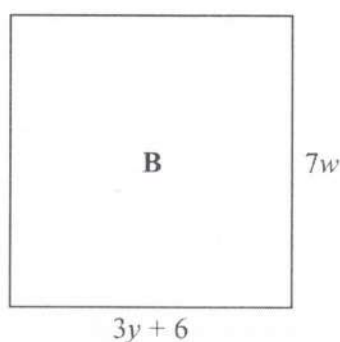
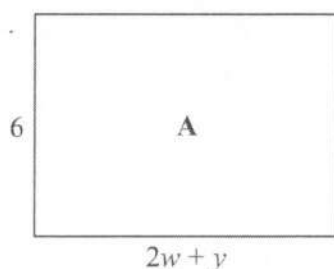
(1)

(Total for Question 10 is 4 marks)



P 6 4 6 3 0 A 0 9 2 4

- 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 .

$$A = 6(2w + y) = 12w + 6y$$

$$B = 7w(3y + 6) = 21wy + 42w$$

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

$$6y - 21wy = 42w - 12w$$

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

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

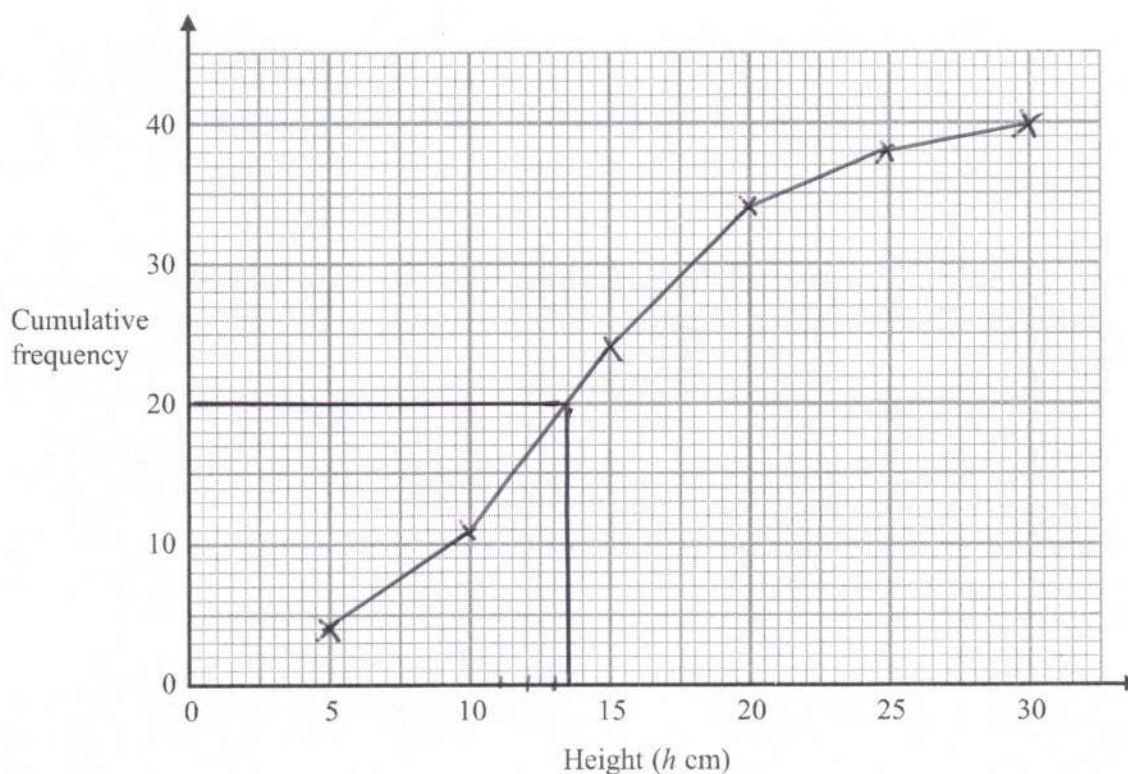
(Total for Question 11 is 4 marks)



- 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.

20th ish

13.5 cm
(1)

(Total for Question 12 is 3 marks)



P 6 4 6 3 0 A 0 1 1 2 4

- 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.

Incorrect, needs $100x$ to cancel the $0.\dot{4}\dot{3}$

(Total for Question 13 is 1 mark)

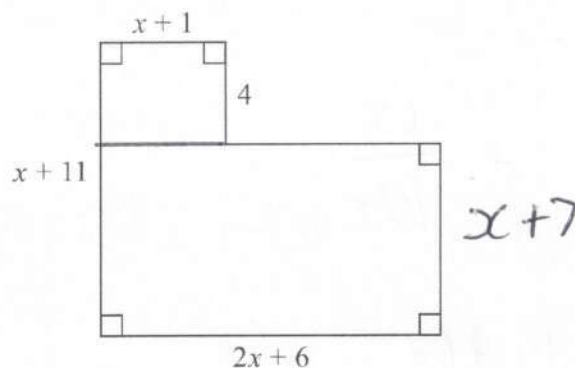
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14 Here is a shape with all its measurements in centimetres.



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

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

$$\begin{aligned}
 A &= 4(x+1) + (2x+6)(x+7) \\
 &= \underline{4x} + \underline{4} + \underline{2x^2} + \underline{42} + \underline{6x} + \underline{14x} \\
 &= 2x^2 + 24x + 46
 \end{aligned}$$

as reqd

(Total for Question 14 is 3 marks)



P 6 4 6 3 0 A 0 1 3 2 4

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.

$$= \frac{20x+15}{10x} + \frac{6x}{10x}$$

$$= \frac{20x+15+6x}{10x}$$

$$= \frac{26x+15}{10x}$$

(Total for Question 15 is 3 marks)



- 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.

$$3 \times RYY$$

$$= 3 \times \frac{3}{8} \times \frac{5}{7} \times \frac{4}{6}$$

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

(Total for Question 16 is 4 marks)



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

$$2y + 4 < x$$

$$x < 3$$

$$y < 6 - 3x$$

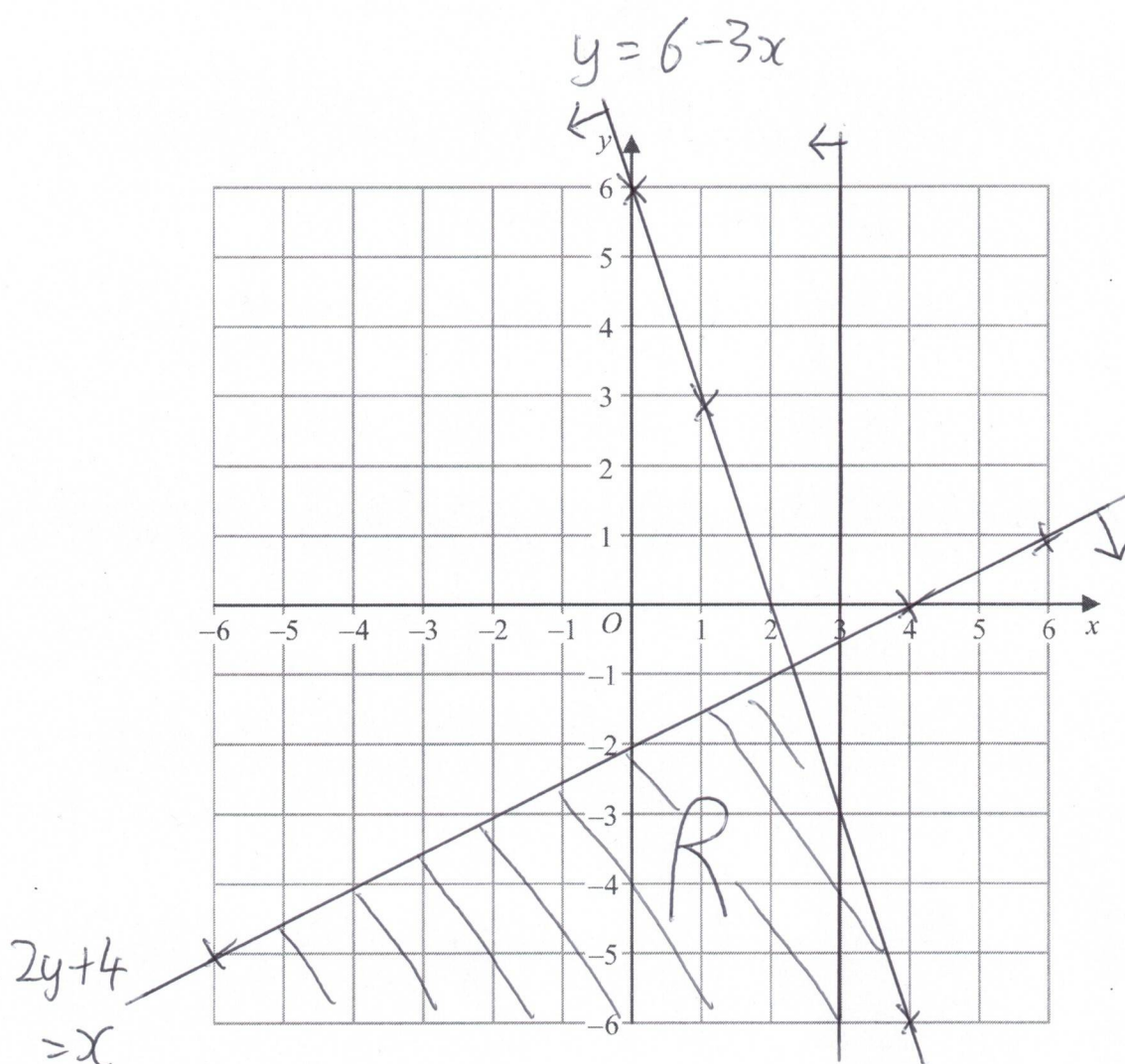
$$y = 6 - 3x$$

Label the region R.

$$2y + 4 = x$$

x	4	6
y	0	1

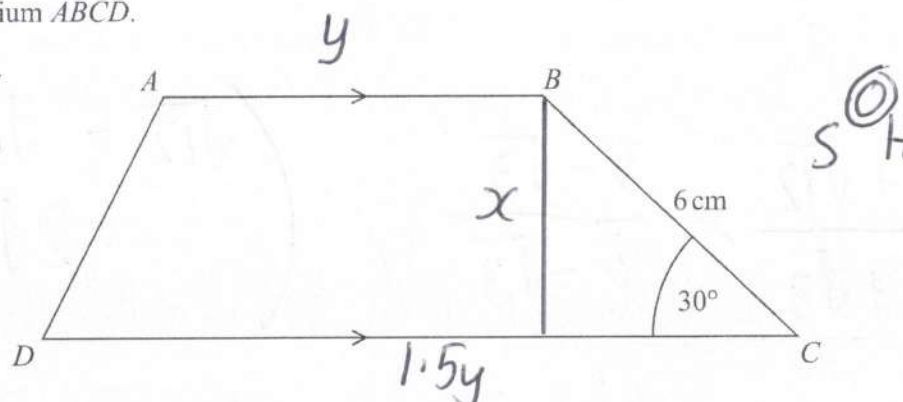
x	0	1
y	6	3



(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 .

$$x = 6 \times \sin 30 = 6 \times \frac{1}{2} = 3$$

$$A = \frac{1}{2}(y + 1.5y) \times 3$$

$$= \frac{3}{2} \times \frac{5}{2}y$$

$$= \frac{15y}{4} = 22$$

$$y = \frac{88}{5}$$

$$5 \overline{) 88.0} \begin{array}{r} 17.6 \\ 85 \\ \hline 30 \\ 30 \\ \hline 0 \end{array}$$

17.6

cm

(Total for Question 18 is 5 marks)



P 6 4 6 3 0 A 0 1 7 2 4

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.

$$\left(\begin{aligned} \sqrt{12} &= \sqrt{4}\sqrt{3} \\ &= 2\sqrt{3} \end{aligned} \right)$$

$$\frac{8+\sqrt{12}}{5+\sqrt{3}} \times \frac{5-\sqrt{3}}{5-\sqrt{3}}$$

$$= \frac{40 - 8\sqrt{3} + 5\sqrt{12} - \sqrt{36}}{25-3}$$

$$= \frac{40-6 \quad - 8\sqrt{3} + 10\sqrt{3}}{22} = \frac{34+2\sqrt{3}}{22} = \frac{17+\sqrt{3}}{11}$$

(Total for Question 19 is 4 marks)

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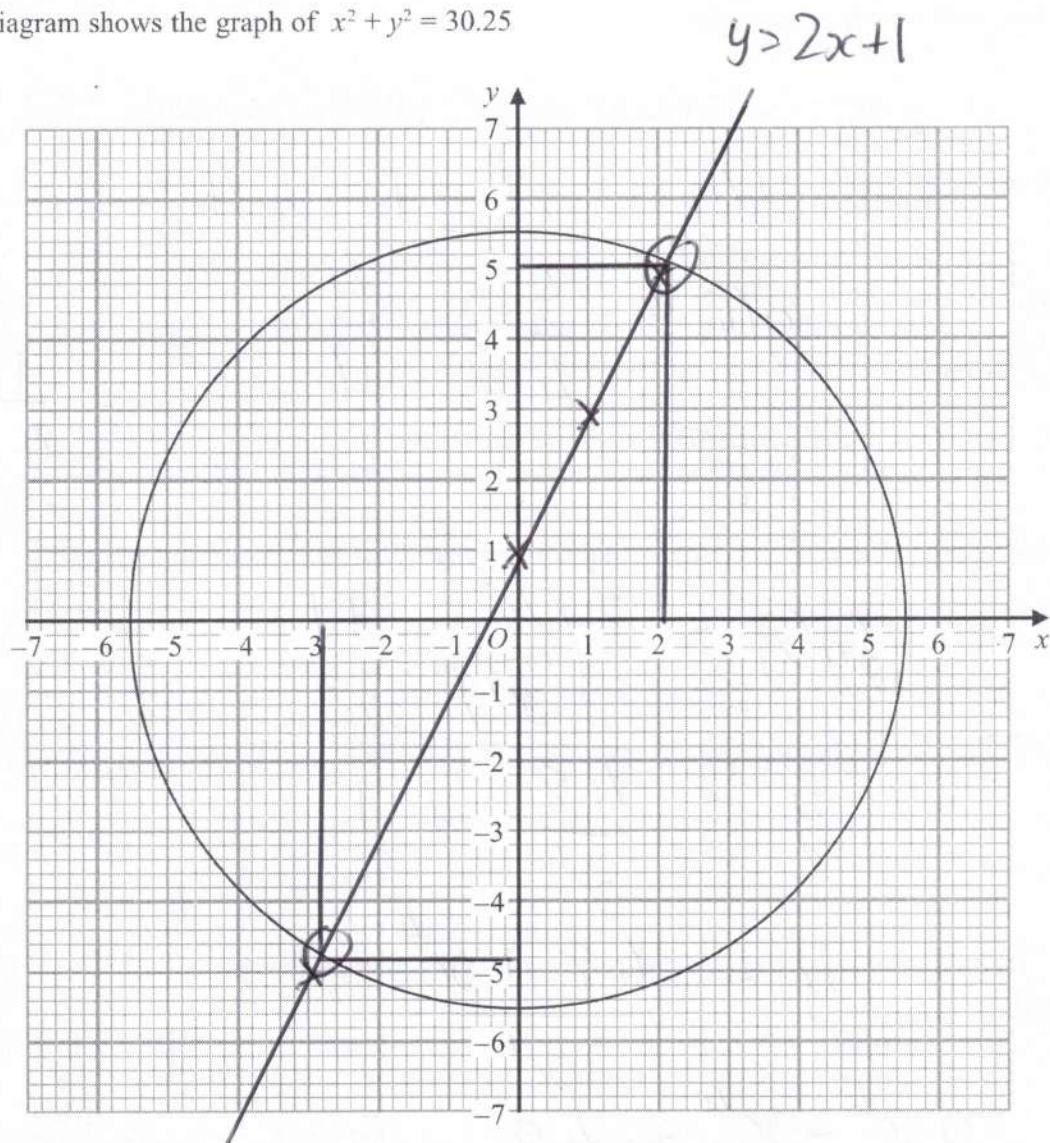


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20 The diagram shows the graph of $x^2 + y^2 = 30.25$



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

$$y = 2x + 1 \quad \leftarrow \begin{cases} x^2 + y^2 = 30.25 \\ y - 2x = 1 \end{cases}$$

$$(-2.9, -4.8), (2.1, 5.1)$$

(Total for Question 20 is 3 marks)

$$(2 \rightarrow 2.2, 5 \rightarrow 5.2)$$

$$(-2.8 \rightarrow -3, -4.6 \rightarrow -4.8)$$



21 The functions f and g are such that

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

(a) Work out $gf(1)$

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

$$g(4) = \frac{4}{4^2} = \frac{4}{16}$$

$$= \frac{1}{4} \quad (2)$$

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

(b) Find $h(x)$

$$fg(x) = 3\left(\frac{4}{x^2}\right)^2 + 1$$

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

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

$$yx^4 - x^4 = 48$$

$$x^4(y-1) = 48$$

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

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

(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.

$$y = -3[x^2 - 6x - 3]$$

$$y = -3[(x-3)^2 - 9 - 3]$$

$$y = -3[(x-3)^2 - 12]$$

$$y = -3(x-3)^2 + 36$$

(3 , 36)

(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS



P 6 4 6 3 0 A 0 2 1 2 4