WORKED SOLUTION

MARKSCHEME

Write your name here

Surname	Other names

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

Centre Number

Candidate Number

Mathematics

Paper 1 (Non-Calculator)

Higher Tier

Thursday 24 May 2018 – Morning
Time: 1 hour 30 minutes

Paper Reference
1MA1/1H

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

Total Marks

HA023481691

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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P48861A

6/7/7/7/8/7/1/

P 4 8 8 6 1 A 0 1 2 0

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 $2\frac{1}{7} + 1\frac{1}{4}$ $= 3\frac{1}{7} + \frac{1}{4}$

$= 3\ \frac{4}{28} + \frac{7}{28}$ m1

$= 3\ \frac{11}{28}$

$3\ \frac{11}{28}$ a1

(2)

(b) Work out $1\frac{1}{5} \div \frac{3}{4}$

Give your answer as a mixed number in its simplest form.

$\frac{6}{5} \div \frac{3}{4} = \frac{6}{5} \times \frac{4}{3}$ P1

$= \frac{24}{15}$

$= \frac{8}{5}$ a1

$1\ \frac{3}{5}$

(2)

(Total for Question 1 is 4 marks)

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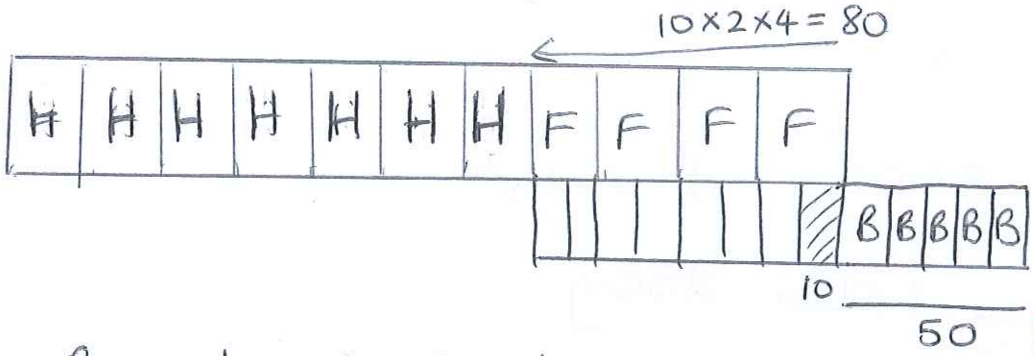
2 In a village

the number of houses and the number of flats are in the ratio 7 : 4
the number of flats and the number of bungalows are in the ratio 8 : 5

There are 50 bungalows in the village.

How many houses are there in the village?



P1

Bungalow is 5 parts = 50 bungalows
1 part = 10 bungalows

Flats are 8 parts = 80 flats a1

$$H : F$$
$$7 : 4$$
$$\times 20 \quad \times 20$$
$$140 : 80$$

There are 140 house in the village

a1

140 houses

(Total for Question 2 is 3 marks)

P 4 8 8 6 1 A 0 3 2 0

Turn over ▶

3 Renee buys 5 kg of sweets to sell.
She pays £10 for the sweets.

Renee puts all the sweets into bags.
She puts 250 g of sweets into each bag.
She sells each bag of sweets for 65p.

Renee sells all the bags of sweets.

Work out her percentage profit.

5 kg = 5000g of sweets.

Each bag holds 250g

So $\frac{5000}{250}$ = 20 bags of sweets. m1

Sold for 65p each

Sold for 0.65×20 = £13 a1

% Profit = $\frac{13-10}{10}$ m1 × 100

= $\frac{3}{1\cancel{0}} \times 10\cancel{0}$

= 30

30 a1 ....%

(Total for Question 3 is 4 marks)

4 A cycle race across America is 3069.25 miles in length.

Juan knows his average speed for his previous races is 15.12 miles per hour.
For the next race across America he will cycle for 8 hours per day.

(a) Estimate how many days Juan will take to complete the race.

Expect to travel about 15 miles per hour

Travels about 3070 miles

Hours to complete race $\approx \frac{3070}{15} \approx 204$ hours M1

$\frac{204}{8} = \frac{102}{4} = \frac{51}{2}$ days M1

(24 – 28)

A1

26 days

(3)

Juan trains for the race.
The average speed he can cycle at increases.
It is now 16.27 miles per hour.

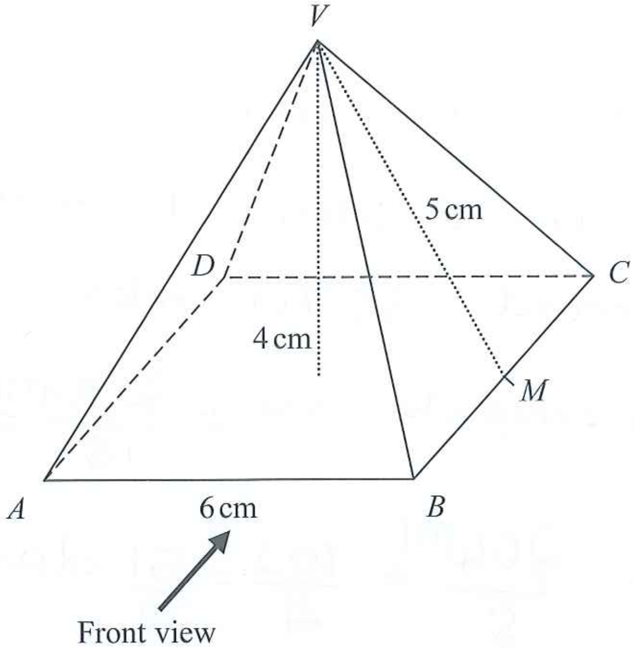
(b) How does this affect your answer to part (a)?

He cycles faster so reduces the number of hours/days he takes A1

(1)

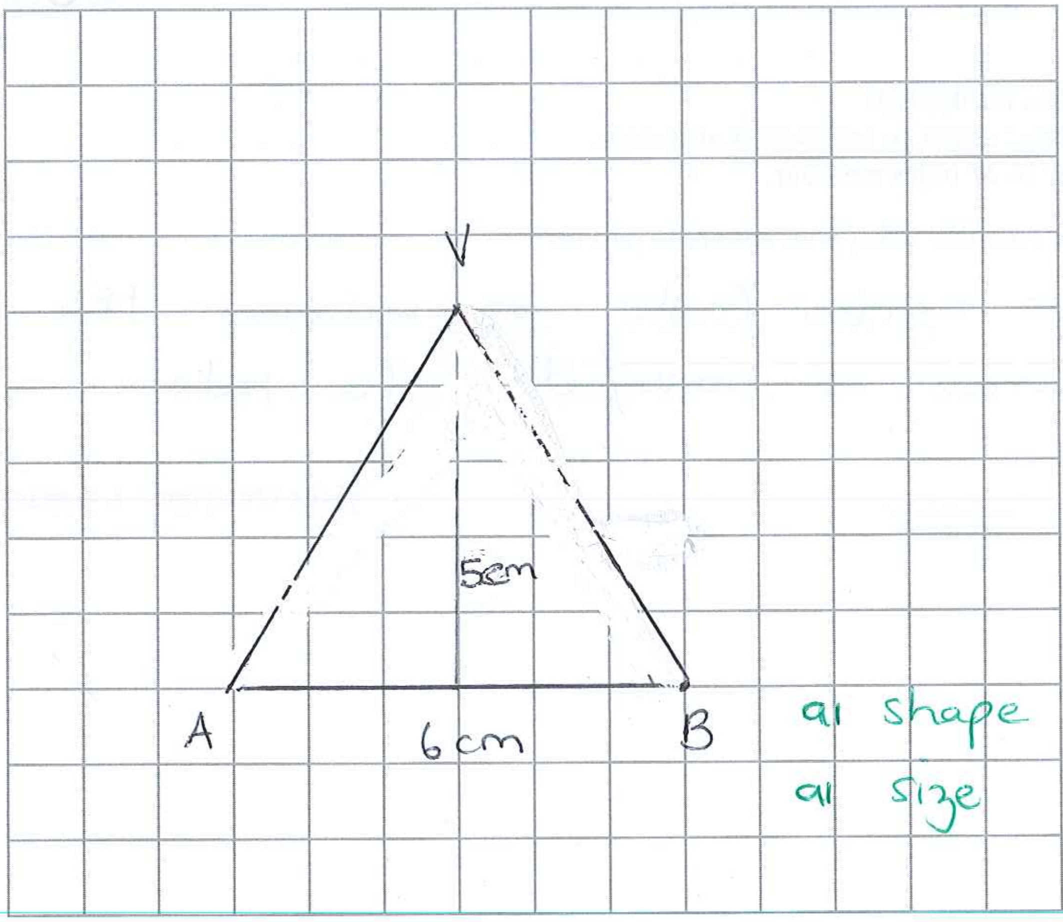
(Total for Question 4 is 4 marks)

5 Here is a solid square-based pyramid, *VABCD*.



The base of the pyramid is a square of side 6 cm.
The height of the pyramid is 4 cm.
M is the midpoint of *BC* and *VM* = 5 cm.

(a) Draw an accurate front elevation of the pyramid from the direction of the arrow.



(2)

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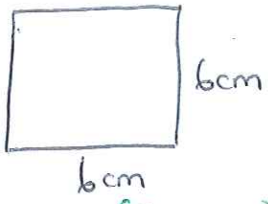
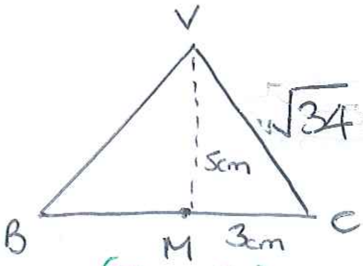
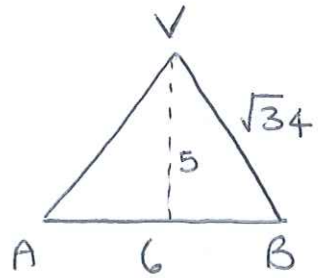
(b) Work out the total surface area of the pyramid.







(Square) M1 (Triangle) M1

$$TSA = 6\times 6 + \left(\tfrac{1}{2}\times 3\times 5\right)\times 4$$

$$= 36 + 30$$

$$= 56\text{cm}^2$$

a1

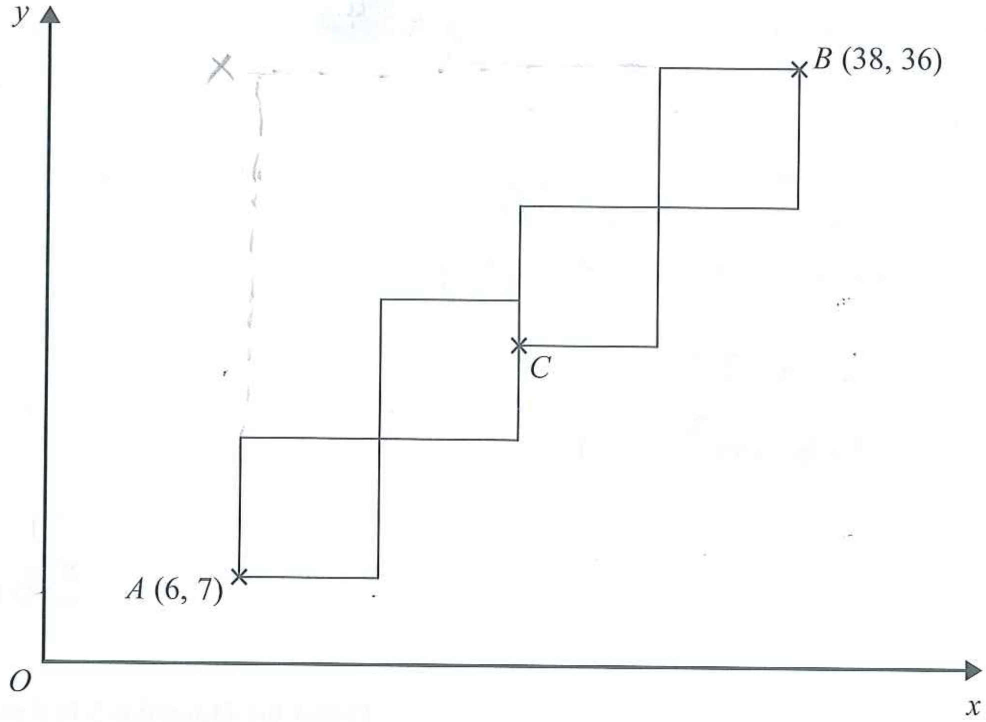
56cm^2 a1

(4)

(Total for Question 5 is 6 marks)

6 A pattern is made from four identical squares.

The sides of the squares are parallel to the axes.



Point A has coordinates (6, 7)
Point B has coordinates (38, 36)
Point C is marked on the diagram.

Work out the coordinates of C.

AX = 36 − 7 = 29

XB = 38 − 6 = 32 P1

Each square is 32 ÷ 4 = 8 units
a1

Y coord C is 36 − 8 − 8 = 20 a1
m1 (either)

X coord C is 38 − 8 − 8 = 22 a1

(22 , 20)

(Total for Question 6 is 5 marks)

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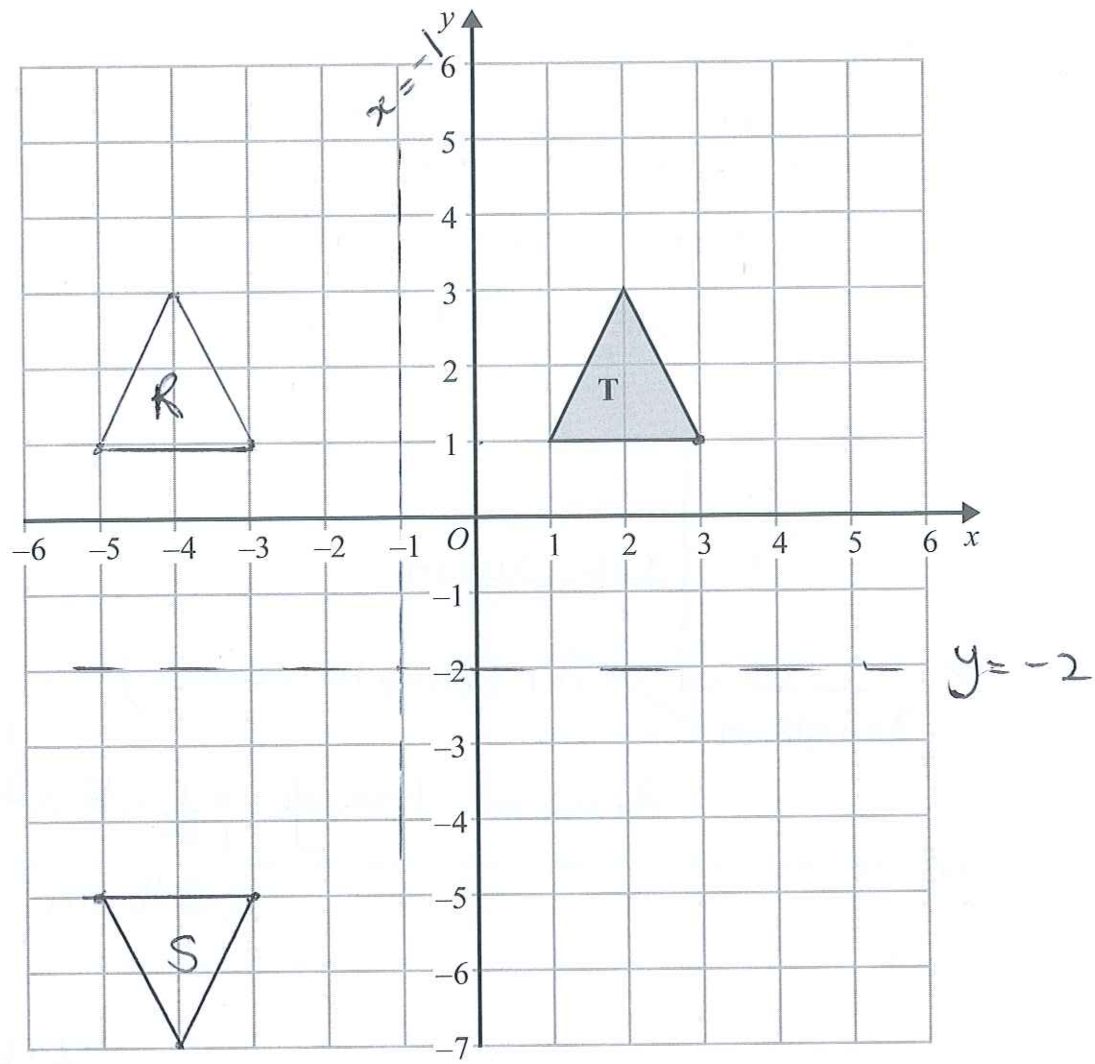
7



Shape **T** is reflected in the line $x = -1$ to give shape **R**.
Shape **R** is reflected in the line $y = -2$ to give shape **S**.

Describe the **single** transformation that will map shape **T** to shape **S**.

Rotation (of 180°) about (–1, –2)

a1

both a1

(Total for Question 7 is 2 marks)

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8 The perimeter of a right-angled triangle is 72 cm.
The lengths of its sides are in the ratio 3 : 4 : 5

Work out the area of the triangle.

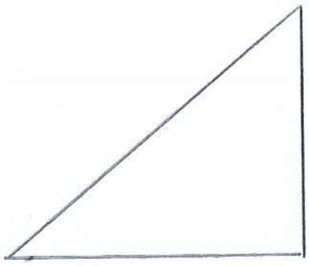
P1

$3+4+5$ parts $= 72$cm

12 parts $=$ 72cm

1 part $= \frac{72}{12} = 6$cm

A1



$4 \times 6 = 24$cm

M1 (ratio to measure)

$3 \times 6 = 18$cm

Area of triangle $= \frac{1}{\cancel{2}_1} \times 18 \times \cancel{24}^{12}$

$= 216\text{cm}^2$

216 A1 cm^2

(Total for Question 8 is 4 marks)

9 (a) Write down the value of $36^{\frac{1}{2}}$

$\sqrt{36}$

(Ignore signs)

$(\pm)\ 6$ a1

(1)

(b) Write down the value of 23^0

1 b1

(1)

(c) Work out the value of $27^{-\frac{2}{3}}$

$\frac{1}{27^{\frac{2}{3}}} = \frac{1}{\sqrt[3]{27}^2}$ m1

$= \frac{1}{3^2}$

$= \frac{1}{9}$

a1 $\frac{1}{9}$

(2)

(Total for Question 9 is 4 marks)

P48861A01120

Turn over

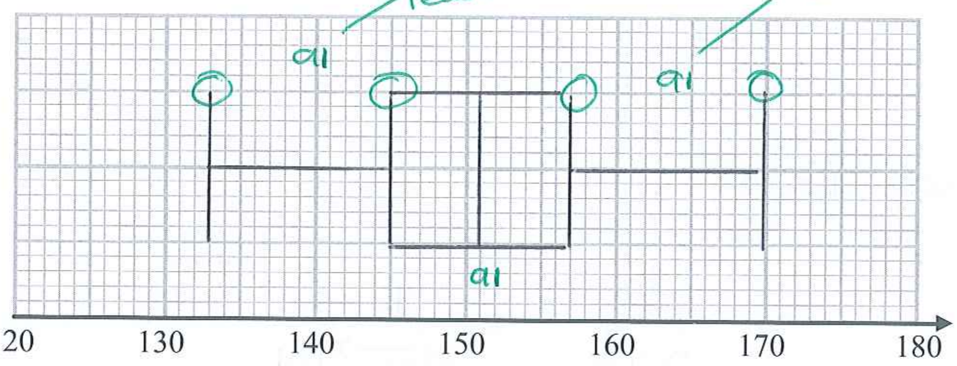
10 The table gives some information about the heights of 80 girls.

Least height	133 cm
Greatest height	170 cm
Lower quartile	145 cm
Upper quartile	157 cm
Median	151 cm

(a) Draw a box plot to represent this information.

least + LQ

UQ and greatest



(3)

(b) Work out an estimate for the number of these girls with a height between 133 cm and 157 cm.

Upper Quartile $= \frac{3}{4}(80+1) = 60\frac{3}{4}$th girl

M1

$= 61^{st}$ girl

So number of girls from least height to upper quartile $= 61$

61 a1

(accept 60) (2)

(Total for Question 10 is 5 marks)

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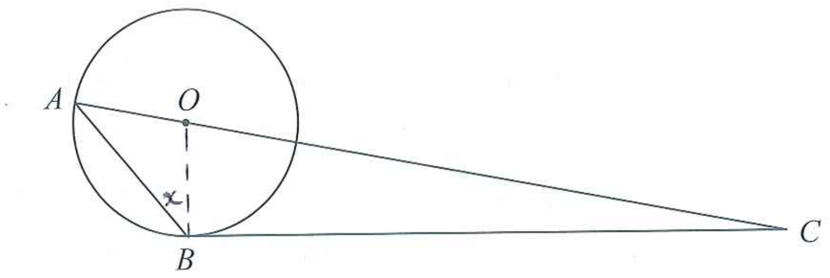
11



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

BC is a tangent to the circle.
AOC is a straight line.
Angle $ABO = x°$.

Find the size of angle ACB, in terms of x.
Give your answer in its simplest form.
Give reasons for each stage of your working.

$C\hat{B}O = 90°$ (angle between M1 tangent and radius is $90°$)

$\triangle AOB$ is isosceles M1 since $AO = BO =$ radii

So $O\hat{A}B = x°$ A1

Angle $ACB = 180 - (2x + 90)$

$= 90 - 2x$ A1

(Angles in a M1 triangle equals $180°$)

(Total for Question 11 is 5 marks)

P 4 8 8 6 1 A 0 1 3 2 0

12 Prove that the square of an odd number is always 1 more than a multiple of 4

Let the odd number be $2x+1$ P1

$(2x+1)^2 = (2x+1)(2x+1) = 4x^2+4x+1$

M1 (Must refer to some

$= \underline{4(x^2+x)+1}$ this, possibly in words)

$4(x^2+1)$ is a multiple of 4

So $4(x^2+1)+1$ is 1 more than a multiple of 4 M1

Thus proving that the square of an odd number is always 1 more than a multiple of 4 A1

(Total for Question 12 is 4 marks)

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13 $\sqrt{5}(\sqrt{8}+\sqrt{18})$ can be written in the form $a\sqrt{10}$ where a is an integer.

Find the value of a.

M1

$\sqrt{5}(\sqrt{8}+\sqrt{18}) = \sqrt{40}+\sqrt{90}$

$= \sqrt{4\times10}+\sqrt{9\times10}$ P1 (simplifying surds)

$= 2\sqrt{10}+3\sqrt{10}$

$= 5\sqrt{10}$

$a =$ 5 A1

(Total for Question 13 is 3 marks)

14 y is inversely proportional to d^2
When $d = 10$, $y = 4$

d is directly proportional to x^2
When $x = 2$, $d = 24$

Find a formula for y in terms of x.
Give your answer in its simplest form.

$y = \frac{K}{d^2}$ M1

$d = 10 \quad y = 4$

$4 = \frac{K}{100}$

$K = 400$

$y = \frac{400}{d^2}$ —— ① A1

$d = kx^2$

$x = 2 \quad d = 24$

$24 = k(4)$

$6 = k$

$d = 6x^2$ —— ② A1

Substitute ② into ①

$y = \frac{400}{(6x^2)^2}$ P1

$y = \frac{400}{36x^4}$

$y = \frac{100}{9x^4}$

$y =$ $\frac{100}{9x^4}$ A1

(Total for Question 14 is 5 marks)

P48861A01520

Turn over

15 (a) Factorise $a^2 - b^2$ $\quad = (a+b)(a-b)$

a1

$(a+b)(a-b)$

(1)

(b) Hence, or otherwise, simplify fully $(x^2 + 4)^2 - (x^2 - 2)^2$

m1

$$\left((x^2+4)+(x^2-2)\right)\left((x^2+4)-(x^2-2)\right)$$

$$= (2x^2+2)(6)$$

a1

$$= 12x^2 + 12$$

$$= 12(x^2+1)$$

a1

$12(x^2+1)$

(3)

(Total for Question 15 is 4 marks)

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16 There are only red counters, blue counters and purple counters in a bag.
The ratio of the number of red counters to the number of blue counters is 3 : 17

Sam takes at random a counter from the bag.
The probability that the counter is purple is 0.2

Work out the probability that Sam takes a red counter.

3	17	x
R	B	P

P1

$3 + 17 + x = 20 + x$ parts

$$P(\text{Purple}) = \frac{x}{20+x} = 0.2$$

$$x = 0.2(20+x)$$

m1

$$x = 4 + 0.2x$$

$$x = 5$$

$$P(\text{Red}) = \frac{3}{25}$$

a1

$\frac{3}{25}$

(Total for Question 16 is 3 marks)

17 Simplify fully $\dfrac{3x^2 - 8x - 3}{2x^2 - 6x}$

$$= \frac{(3x+1)\cancel{(x-3)}}{2x\cancel{(x-3)}}$$

M1 M1

$$= \frac{3x+1}{2x}$$ a1

$\dfrac{3x+1}{2x}$

(Total for Question 17 is 3 marks)

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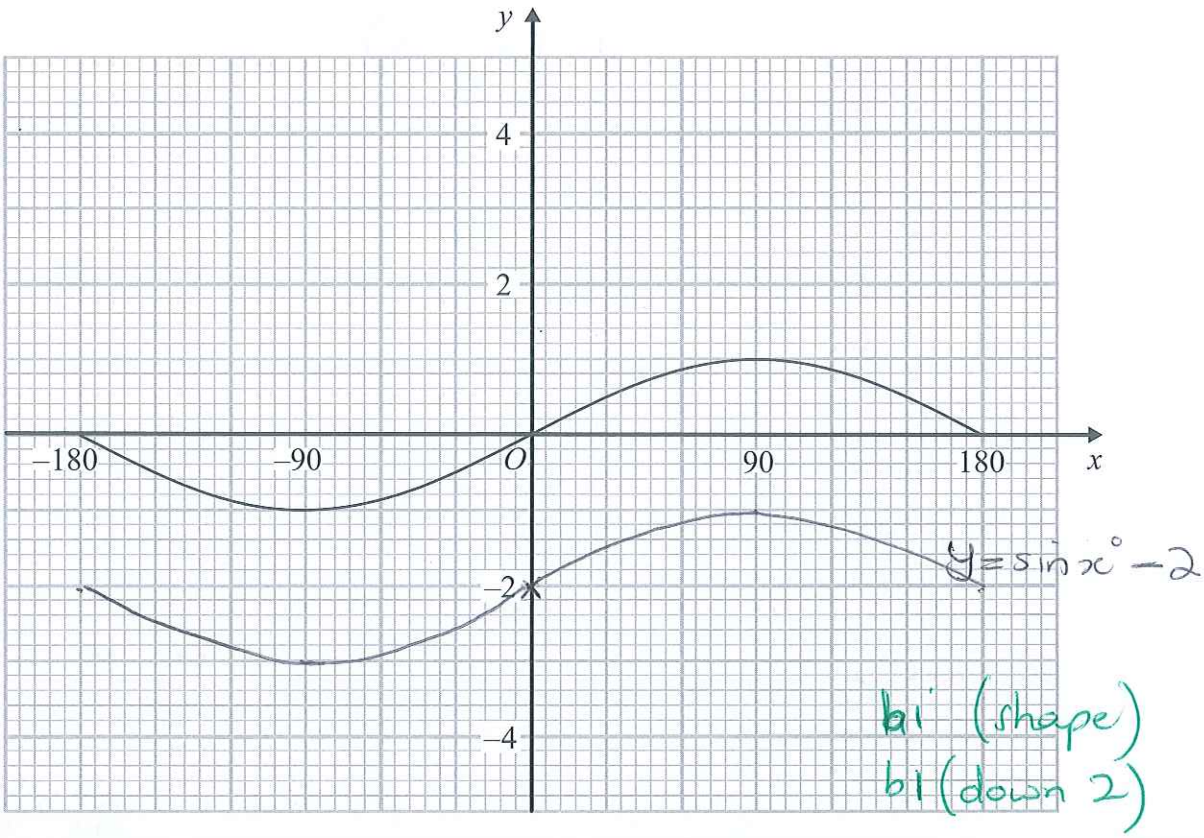
18 Here is the graph of $y = \sin x°$ for $-180 \leqslant x \leqslant 180$



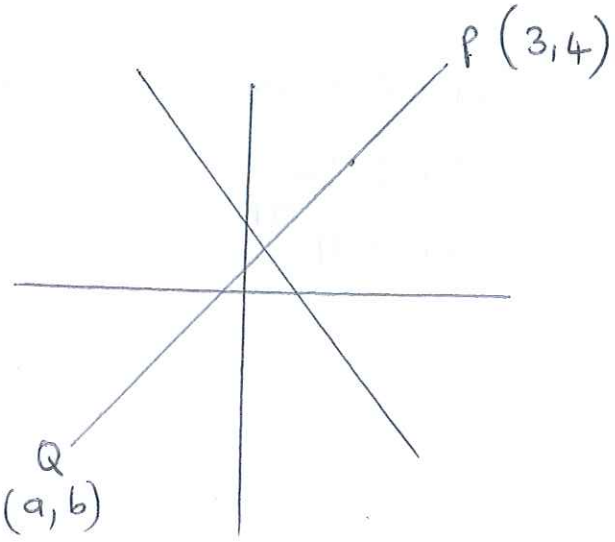
On the grid, sketch the graph of $y = \sin x° - 2$ for $-180 \leqslant x \leqslant 180$

(Total for Question 18 is 2 marks)

19 The point P has coordinates (3, 4)
The point Q has coordinates (a, b)

A line perpendicular to PQ is given by the equation $3x + 2y = 7$

Find an expression for b in terms of a.



$2y = -3x + 7$

$y = -\frac{3}{2}x + \frac{7}{2}$ m1

Gradient of $PQ = \frac{2}{3}$ a1

$\frac{4-b}{3-a} = \frac{2}{3}$ m1

$3(4-b) = 2(3-a)$

m1

$12 - 3b = 6 - 2a$

$3b = 6 + 2a$

$b = \frac{6+2a}{3}$

a1

$b = \frac{6+2a}{3}$ (oe)

(Total for Question 19 is 5 marks)

P 4 8 8 6 1 A 0 1 9 2 0

Turn over

20 n is an integer such that $3n + 2 \leqslant 14$ and $\dfrac{6n}{n^2 + 5} > 1$

Find all the possible values of n.

$3n + 2 \leq 14$

$3n \leq 12$

$n \leq 4$ a1

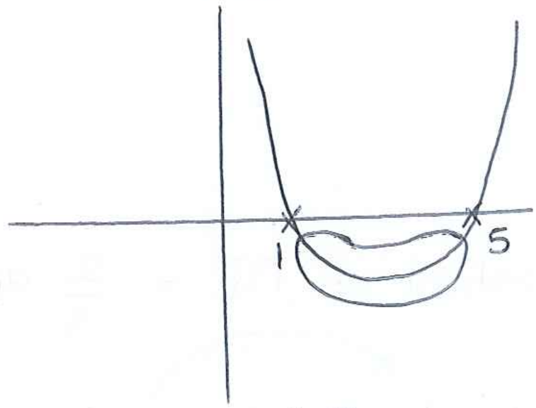
$6n > n^2 + 5$

p1 $(=0)$

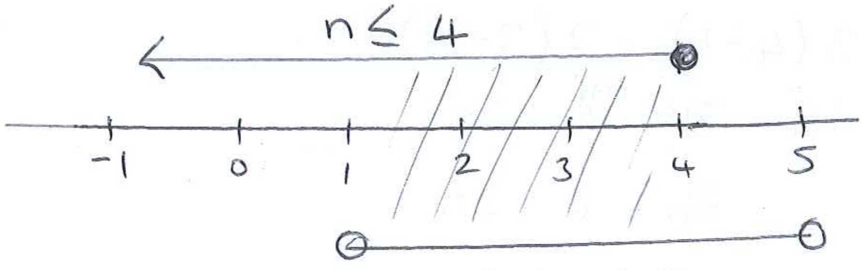
$0 > n^2 - 6n + 5$

$0 > (n-1)(n-5)$

m1



$1 < n < 5$



a1 a1

$2, 3, 4$

(Total for Question 20 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS