

Write your name here

Surname

Gre dow

Other names

Mohamed

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

Centre Number

1 0 6 5 8

Candidate Number

2 4 4 0

Mathematics

Paper 1 (Non-Calculator)

Higher Tier

Thursday 25 May 2017 – 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

36 36

HA022490003



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 ►

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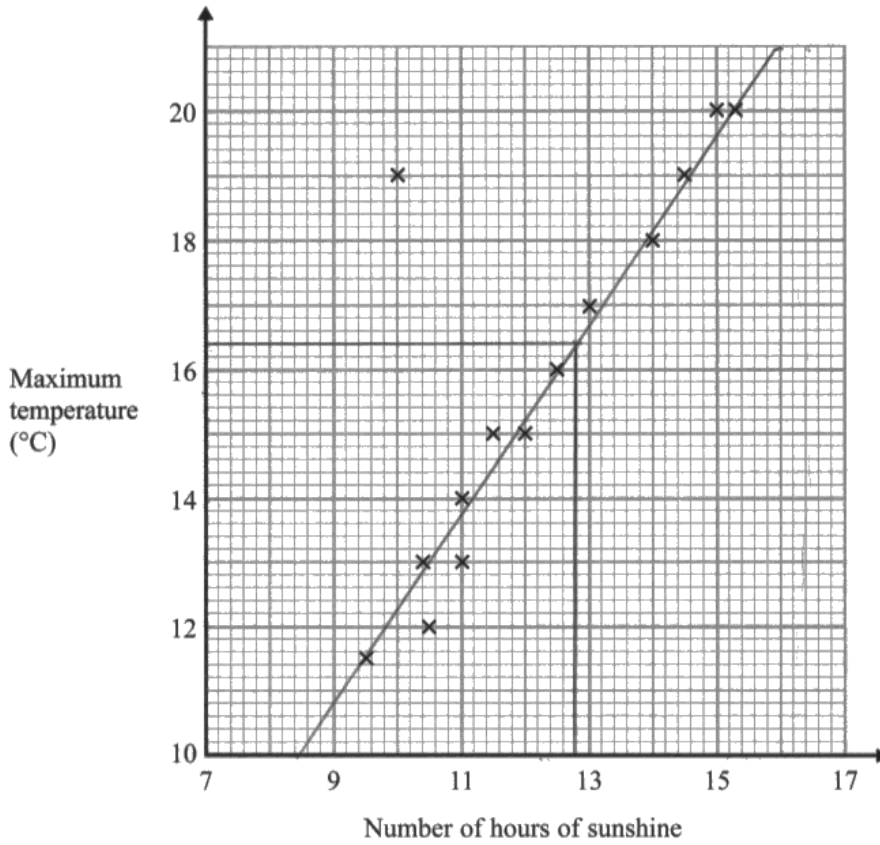
Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 The scatter graph shows the maximum temperature and the number of hours of sunshine in fourteen British towns on one day.



One of the points is an outlier.

- (a) Write down the coordinates of this point.

(10 , 19)
(1) 1 ✓

1 Q01a

- (b) For all the other points write down the type of correlation.

positive.
(1) 1 ✓

1 Q01b



On the same day, in another British town, the maximum temperature was 16.4°C .

(c) Estimate the number of hours of sunshine in this town on this day.

12.8 hours

Q01c

A weatherman says,

“Temperatures are higher on days when there is more sunshine.”

(d) Does the scatter graph support what the weatherman says?
Give a reason for your answer.

yes the higher the number of
hours of sunshine the higher the
maximum temperature

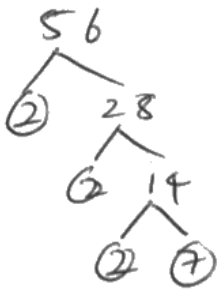
Q01d

(Total for Question 1 is 5 marks)

2 Express 56 as the product of its prime factors.

$\begin{array}{r} 28 \\ 2 \overline{)56} \end{array}$

Q02



$$2 \times 2 \times 2 \times 7 = 56$$

$$2^3 \times 7 = 56$$

$$2^3 \times 7$$

(Total for Question 2 is 2 marks)



3 Work out 54.6×4.3

3



3

Q03

$$\begin{array}{r} \overset{1}{5} \overset{1}{4} \overset{2}{.} 6 \\ \times \quad 4 \overset{1}{.} 3 \\ \hline + \quad 1638 \\ \hline 21840 \\ \hline 234.78 \end{array}$$

234.78

(Total for Question 3 is 3 marks)

3

3



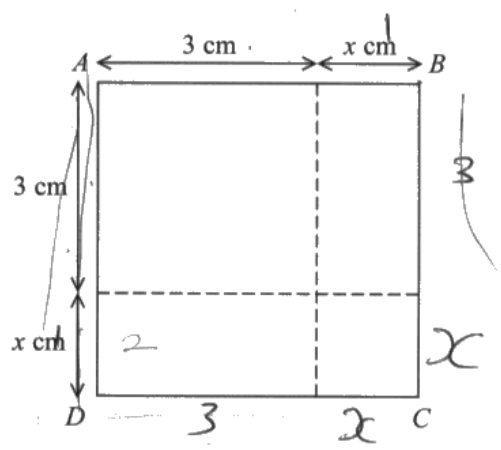
4

0



0

Q04



The area of square $ABCD$ is 10 cm^2 .

Show that $x^2 + 6x = 1$

$x = 1$

~~$12 + 4x = 10$~~

~~$4x = 4$~~

~~$1^2 + 1 \times 6 = 1$~~

~~$4x = 10 - 12$~~

~~$1^2 + 1 \times 6 = 1$~~

~~$4x = -2$~~

~~$x = \frac{-2}{4}$~~

~~$1 - 6 = 4x = -5$~~

~~$x = -0.5$~~

~~$3x \times 3x$~~

~~$x^2 + 6x$~~

~~$4x^2 = 10$~~

~~$x^2 + 2x = \frac{1}{6}$~~

(Total for Question 4 is 3 marks) 0 0



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5
Turn over ▶

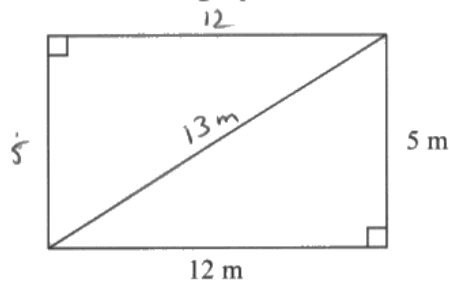
5 This rectangular frame is made from 5 straight pieces of metal.

5



5

Q05



$$\begin{array}{r} 144 \\ + 25 \\ \hline 169 \end{array}$$

$$\begin{array}{r} 34 \\ + 13 \\ \hline 47 \end{array}$$

The weight of the metal is 1.5 kg per metre.

Work out the total weight of the metal in the frame.

$$12^2 = 144$$

$$5^2 = 25$$

$$144 + 25 = 169$$

$$\sqrt{169} = 13$$

$$12 + 12 + 5 + 5 + 13 = 47 \text{ m}$$

$$1.5 \times 47 = 70.5$$

$$\begin{array}{r} 2 \\ 3 \\ 15 \\ \times 47 \\ \hline 105 \\ + 600 \\ \hline 705 \end{array}$$

$$70.5$$

~~$$\begin{array}{r} 12 \\ + 12 \\ + 5 \\ + 5 \\ + 13 \\ \hline 47 \end{array}$$

$$\begin{array}{r} 1.5 \\ \times 47 \\ \hline 105 \\ + 600 \\ \hline 705 \end{array}$$~~

$$70.5 \text{ kg}$$

(Total for Question 5 is 5 marks)

5

5



6 The equation of the line L_1 is $y = 3x - 2$
The equation of the line L_2 is $3y - 9x + 5 = 0$

1



1

Q06

Show that these two lines are parallel.

$$3y = -9x + 5$$

S

$$y = -3x + \frac{5}{3}$$

$$y = 3x - 2$$

(Total for Question 6 is 2 marks)

1

1



P 4 8 1 4 7 A 0 7 2 0

7

Turn over ▶

- 7) There are 10 boys and 20 girls in a class.
The class has a test.

The mean mark for all the class is 60
The mean mark for the girls is 54

Work out the mean mark for the boys.

$$40 + 54 = 94$$

$$\frac{1080}{94}$$

$$\begin{array}{r} 1680 \\ - 94 \\ \hline 146 \\ - 94 \\ \hline 520 \\ - 476 \\ \hline 440 \\ - 428 \\ \hline 120 \end{array}$$

1

✓

1

Q07

$$6 \overline{) 108}$$

$$10 + 20 = 30$$

$$54 \times 20 = 1080$$

~~$$1080 = 16$$~~

~~$$60$$~~

54

54

~~$$\frac{1080}{10}$$~~

~~$$60 \times 20 = 120$$~~

$$\frac{1080}{20} = 54$$

$$\frac{60}{30} = 2$$

$$2 \times 20 = 40$$

$$\frac{120}{10} = 12$$

$$\frac{1080}{10} = 108$$

40

(Total for Question 7 is 3 marks)

1

1

- 8 (a) Write 7.97×10^{-6} as an ordinary number.

$$0.00000797$$

$$0.00000797$$

1

✓

1

Q08a

- (b) Work out the value of $(2.52 \times 10^5) \div (4 \times 10^{-3})$
Give your answer in standard form.

$$\begin{array}{r} 2 \overline{) 2.52} \\ \underline{4} \\ 10 \overline{) 08} \end{array}$$

$$\begin{array}{r} 0.83 \\ 4 \overline{) 2.52} \\ \underline{32} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

$$0.83 \times 10^8$$

$$0.83 \times 10^8$$

2

1

1

Q08b

(Total for Question 8 is 3 marks)

2

2



9 Jules buys a washing machine.

2



2

Q09

20% VAT is added to the price of the washing machine.
Jules then has to pay a total of £600

What is the price of the washing machine with **no** VAT added?

$$\begin{aligned} \pounds 600 &= 120\% \div 6 \\ \pounds 100 &= 20\% \\ \pounds 500 &= 100\% \end{aligned}$$

$$\frac{120}{6} = 20$$

$$\frac{600}{6} = 100$$

$$20 \times 5 = 100$$

$$100 \times 5 = 500.$$

£ 500

(Total for Question 9 is 2 marks)

2

2

10 Show that $(x+1)(x+2)(x+3)$ can be written in the form $ax^3 + bx^2 + cx + d$
where a, b, c and d are positive integers.

3



3

Q10

$$\cancel{(x+1)} \cancel{(x+2)}$$

$$x^2 + 2x + x + 2$$

$$\cancel{(x^2 + 3x + 2)} \cancel{(x+3)}$$

$$x^3 + 3x^2 + 3x^2 + 9x + 2x + 6$$

$$x^3 + 6x^2 + 11x + 6$$

(Total for Question 10 is 3 marks)

3

3

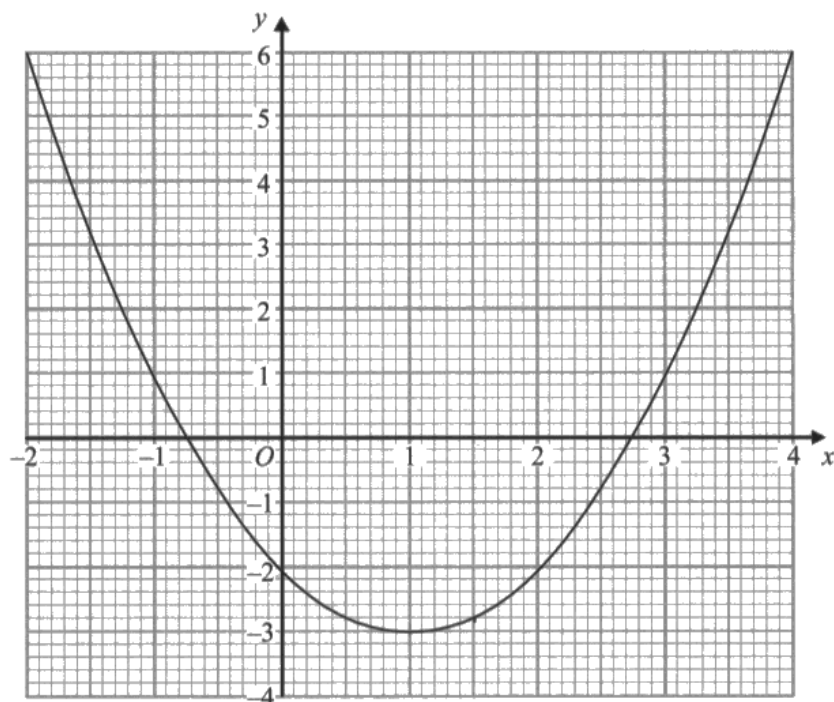


P 4 8 1 4 7 A 0 9 2 0

9

Turn over ▶

11 The graph of $y = f(x)$ is drawn on the grid.



(a) Write down the coordinates of the turning point of the graph.

(1, -3)

(1 1) ✓

1 Q11a

(b) Write down estimates for the roots of $f(x) = 0$

~~0.5~~
~~2.5~~

(1 0) ✓

0 Q11b

(c) Use the graph to find an estimate for $f(1.5)$

$f(2)$

~~0~~
~~0~~
~~0~~
-3

(1 0) ✓

0 Q11c

(Total for Question 11 is 3 marks)

1

1



12 (a) Find the value of $81^{-\frac{1}{2}}$

$$\frac{1}{81^{\frac{1}{2}}} = \frac{1}{9}$$

$$\frac{1}{9}$$

(2) ✓

2 Q12a

(b) Find the value of $\left(\frac{64}{125}\right)^{\frac{2}{3}}$

$$\left(\frac{\sqrt[3]{64}}{\sqrt[3]{125}}\right)^2 = \frac{4^2}{5^2} = \frac{16}{25}$$

$$\frac{16}{25}$$

(2) ✓

2 Q12b

(Total for Question 12 is 4 marks) 4 4

13 The table shows a set of values for x and y .

x	1	2	3	4
y	9	$2\frac{1}{4}$	1	$\frac{9}{16}$

y is inversely proportional to the square of x .

(a) Find an equation for y in terms of x .

$$y = \frac{9}{x}$$

~~$$y = \frac{k}{x^2}$$~~

~~$$y = \frac{k}{x}$$~~

~~$$9 = \frac{k}{1}$$

$$k = 9 \times 1 = 9$$~~

$$y = \frac{9}{x}$$

(1) ✓

1 Q13a

(b) Find the positive value of x when $y = 16$

$$16 = \frac{9}{x}$$

$$x = \frac{9}{16} = \frac{3}{4}$$

$$9 \overline{) 16} \\ \underline{-9} \\ 70 \\ \underline{-54} \\ 16$$

$$\frac{3}{4}$$

(0) ✓

0 Q13b

(Total for Question 13 is 4 marks) 1 1



14 White shapes and black shapes are used in a game.

Some of the shapes are circles.

All the other shapes are squares.

The ratio of the number of white shapes to the number of black shapes is 3:7

The ratio of the number of white circles to the number of white squares is 4:5

The ratio of the number of black circles to the number of black squares is 2:5

Work out what fraction of all the shapes are circles.

0



0

Q14

$$\frac{\cancel{3}}{\cancel{7}} \text{ white shapes}$$

$$7 + 5 + 5 = 17$$

$$\frac{\cancel{7}}{\cancel{17}} \text{ are white shapes}$$

$$17$$

$$\frac{\cancel{6}}{\cancel{17}} \text{ are circles}$$

$$\frac{6}{10} \text{ are circles}$$

$$\frac{4}{10} \text{ are white circles}$$

$$\frac{2}{10} \text{ are black circles}$$

(Total for Question 14 is 4 marks)

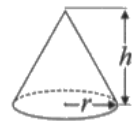
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0



- 15 A cone has a volume of 98 cm^3 .
The radius of the cone is 5.13 cm .

Volume of cone = $\frac{1}{3} \pi r^2 h$



- (a) Work out an estimate for the height of the cone.

$100 = \frac{1}{3} \times 3 \times 5^2 \times h \quad h = 4 \quad \frac{1}{3} \times \frac{75}{1} = \frac{75}{3} = 25$

$98 = \frac{1}{3} \times 75 \times h$

$98 = 25 \times h$

$\frac{98}{25} = h$

$\frac{100}{25} = h$

4

cm

Q15a

John uses a calculator to work out the height of the cone to 2 decimal places.

- (b) Will your estimate be more than John's answer or less than John's answer?
Give reasons for your answer.

my estimate will be more than
Johns because I rounded the
numbers up.

Q15b

(Total for Question 15 is 4 marks)

- 16 n is an integer greater than 1

Prove algebraically that $n^2 - 2 - (n - 2)^2$ is always an even number.

Q16

$n^2 - 2$

~~$(n - 2)(n - 2)$~~

$n^2 - 2n - 2n + 4$

$n^2 - 4n + 4$

$n^2 - 2 - n^2 - 4n + 4 =$

$-4n + 2$

$2(-2n + 1)$

(Total for Question 16 is 4 marks)



P 4 8 1 4 7 A 0 1 3 2 0

17 There are 9 counters in a bag.

1



1

Q17

7 of the counters are green.
2 of the counters are blue.

Ria takes at random two counters from the bag.

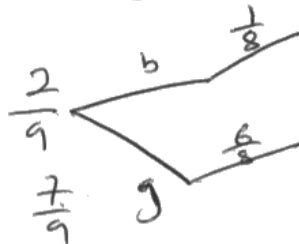
Work out the probability that Ria takes one counter of each colour.
You must show your working.

$\frac{2}{9}$ to pick a blue counter
 $\frac{7}{9}$ to pick a green counter

$$\frac{7}{9} \times \frac{2}{9} = \frac{14}{81}$$

$\frac{2}{9}$ to pick a blue counter

$\frac{7}{9}$ to pick a green counter



$$\frac{2}{9} \times \frac{6}{8} = \frac{12}{72} = \frac{1}{6}$$

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

(Total for Question 17 is 4 marks)

1

1



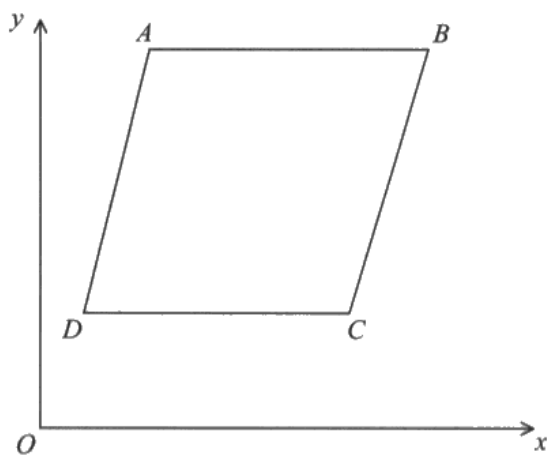
18

0



0

Q18



$ABCD$ is a rhombus.

The coordinates of A are $(5, 11)$

The equation of the diagonal DB is $y = \frac{1}{2}x + 6$

Find an equation of the diagonal AC .

(Total for Question 18 is 4 marks)

0

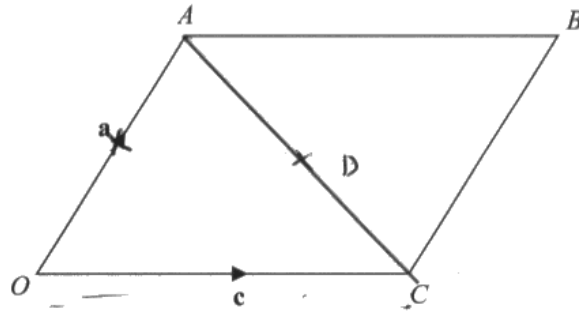
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P 4 8 1 4 7 A 0 1 5 2 0

15

Turn over ▶



$OABC$ is a parallelogram.

$$\vec{OA} = \mathbf{a} \text{ and } \vec{OC} = \mathbf{c}$$

X is the midpoint of the line AC .

OCD is a straight line so that $OC : CD = k : 1$

$$\text{Given that } \vec{XD} = -3\mathbf{c} - \frac{1}{2}\mathbf{a}$$

find the value of k .

$$\begin{aligned} \vec{OC} &= \mathbf{c} \\ \vec{CO} &= -\mathbf{c} \end{aligned}$$

$$AC = OB$$

$$CD = \frac{1}{2} AC$$

$$k = 2 : 1$$

$$BC = AO$$

$$k = 2$$

(Total for Question 19 is 4 marks)



20 Solve algebraically the simultaneous equations

0



0

Q20

$$\begin{aligned}x^2 + y^2 &= 25 \\ y - 3x &= 13\end{aligned}$$

$$\begin{aligned}x^2 + y^2 &= 25 \\ 3x - y &= 13 \\ x^2 + y^2 &= 25 \\ 3x^2 - y^2 &= 169\end{aligned}$$

$$2x^2 = 144$$

$$2x = 12$$

$$x = 6$$

$$\begin{array}{r}169 \\ - 25 \\ \hline 144\end{array}$$

$$\begin{array}{r}72 \\ 2\sqrt{144}\end{array}$$

$$y = 18 = 13$$

$$y = 13$$

$$3x - y = 13$$

$$18 - y = 13$$

$$13 - 18 = y$$

$$y = -5$$

$$6^2 = 36$$

$$-5^2 = 25$$

$$36$$

$$x = 6 \quad y = -5$$

(Total for Question 20 is 5 marks)

0

0



P 4 8 1 4 7 A 0 1 7 2 0

17

Turn over ▶

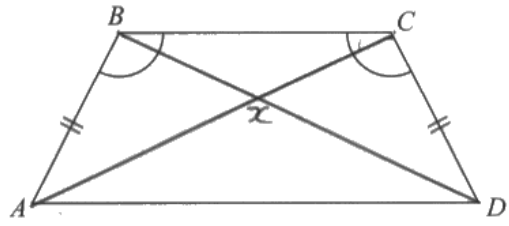
21 $ABCD$ is a quadrilateral.

1



1

Q21



$AB = CD$.
Angle $ABC =$ angle BCD .

Prove that $AC = BD$.

$BA = CD$

$\angle B = \angle C$

BC is half of AD

triangle BXC is similar to
triangle AxD

triangle BxA is equal to
triangle CxD .

(Total for Question 21 is 4 marks)

1

1



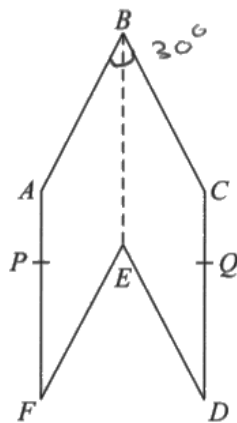
22 The diagram shows a hexagon $ABCDEF$.

0



0

Q22



$ABEF$ and $CBED$ are congruent parallelograms where $AB = BC = x$ cm.
 P is the point on AF and Q is the point on CD such that $BP = BQ = 10$ cm.

Given that angle $ABC = 30^\circ$,

prove that $\cos PBQ = 1 - \frac{(2 - \sqrt{3})}{200} x^2$

(Total for Question 22 is 5 marks)

0

0

TOTAL FOR PAPER IS 80 MARKS



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