

Write your name here

Surname

Other names

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

Centre Number

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Candidate Number

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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

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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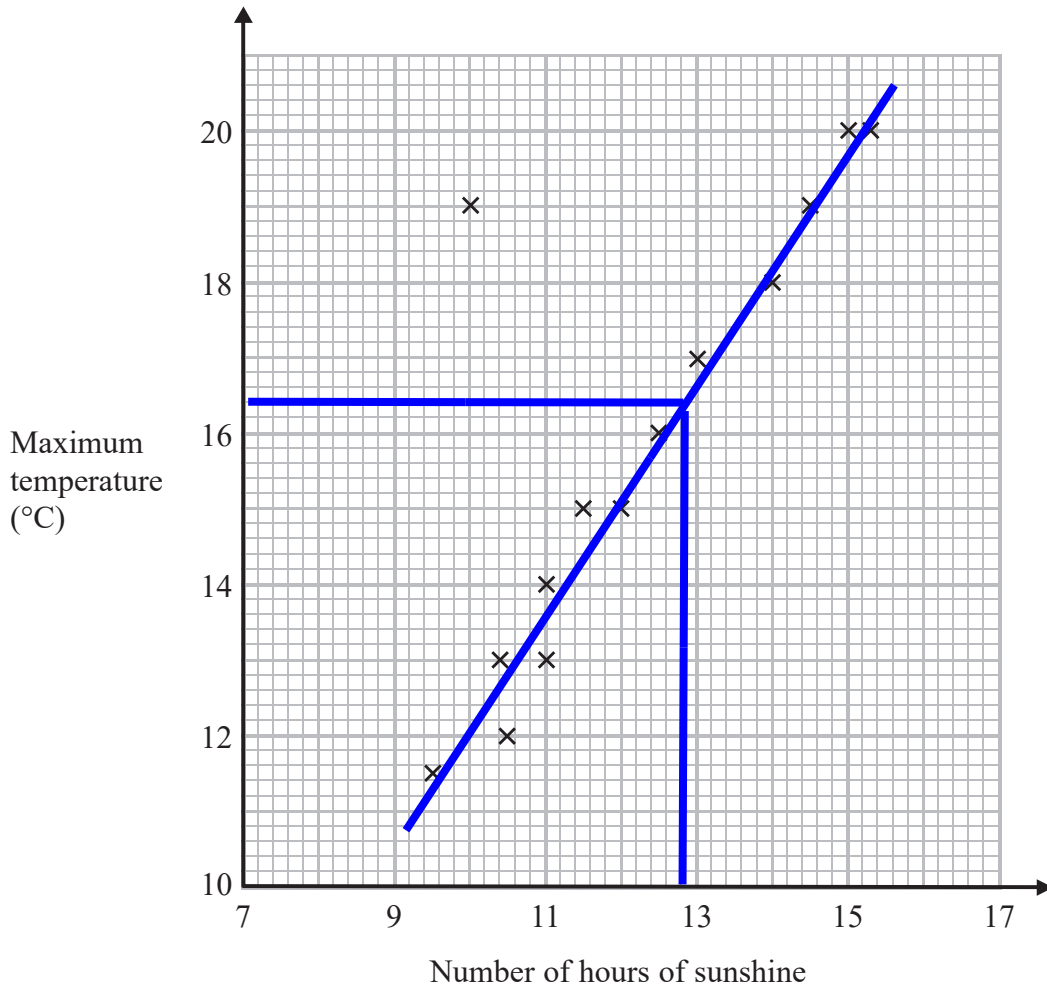
Pearson

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)

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

as hours increase,
so does temperature

positive
(1)

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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.

between 12 and 13
 based on line of best fit

12.8 hours
 (2)

A weatherman says,

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

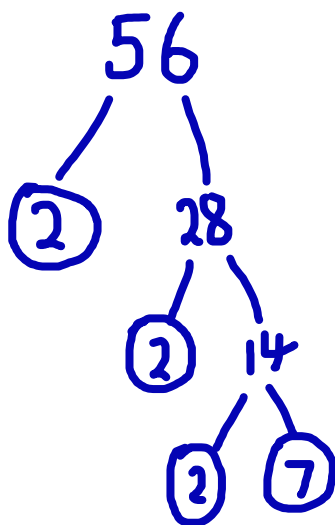
(d) Does the scatter graph support what the weatherman says?
 Give a reason for your answer.

yes, high temperature generally occurs
 on days with more sunshine

(1)

(Total for Question 1 is 5 marks)

2 Express 56 as the product of its prime factors.



$$2 \times 2 \times 2 \times 7$$

(Total for Question 2 is 2 marks)



3 Work out 54.6×4.3

$$54.6 \times 10 = 546$$
$$4.3 \times 10 = 43$$

$$(\times 10 \times 10 = \times 100)$$

×	5	4	6	
2	2	1	2	4
3	1	1	1	3
	4	7	8	

or any
method for
 546×23

$$23\ 478 \div 100$$
$$= 234.78$$

$$\underline{234.78}$$

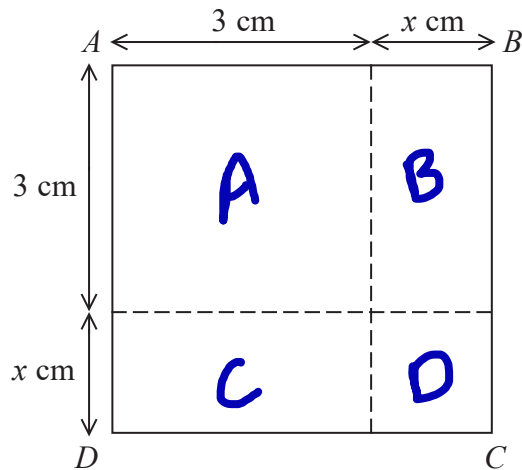
(Total for Question 3 is 3 marks)

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

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

$$A: 3 \times 3 = 9$$

$$B: 3 \times x = 3x$$

$$C: 3 \times x = 3x$$

$$D: x \times x = x^2$$

$$\underline{x^2 + 6x + 9} \quad (\text{Sum})$$

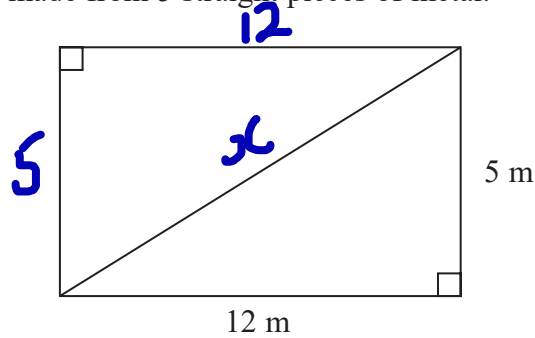
$$x^2 + 6x + 9 = 10$$

$$x^2 + 6x = 1 \quad (-9)$$

(Total for Question 4 is 3 marks)



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



The weight of the metal is 1.5 kg per metre.

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

Calculate x : $x^2 = 12^2 + 5^2$ (pythagoras)

$$x^2 = 169$$

$$x = 13 \quad (\text{sqrt})$$

Total length of metal:

$$12 + 5 + 12 + 5 + 13 = 47$$

$$\text{weight: } 47 \times 1.5 = 70.5$$

70.5 kg

(Total for Question 5 is 5 marks)



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

Show that these two lines are parallel.

$$L_2: y - 3x + \frac{5}{3} = 0 \quad (\div 3)$$
$$y = 3x - \frac{5}{3} \quad (\text{rearrange})$$

↑
gradients are the same
 \Rightarrow parallel

(Total for Question 6 is 2 marks)



- 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.

$$\text{Total mark} = 60 \times 30 = 1800$$

$$\text{Total girls mark} = 54 \times 20 = 1080 -$$

$$\underline{\underline{720}}$$

Total
boys
mark

$$720 \div 10 = 72 \text{ (average)}$$

72

(Total for Question 7 is 3 marks)

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

$$10^{-6} \rightarrow 0.00000797$$

(1)

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

$$\frac{2.52}{4} \times \frac{10^5}{10^{-3}} = 0.63 \times 10^8$$

$$= 6.3 \times 10^7$$

(2)

(Total for Question 8 is 3 marks)



- 9 Jules buys a washing machine.

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?

$$100\% + 20\% = 120\% \quad (\text{new price})$$

$$\equiv 1.2$$

$$£600 \div 1.2 = 500 \quad (100\%)$$

£ 500

(Total for Question 9 is 2 marks)

- 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.

$$(x+1)(x+2)(x+3)$$

$$(x^2+x+2x+2)(x+3)$$

$$(x^2+3x+2)(x+3)$$

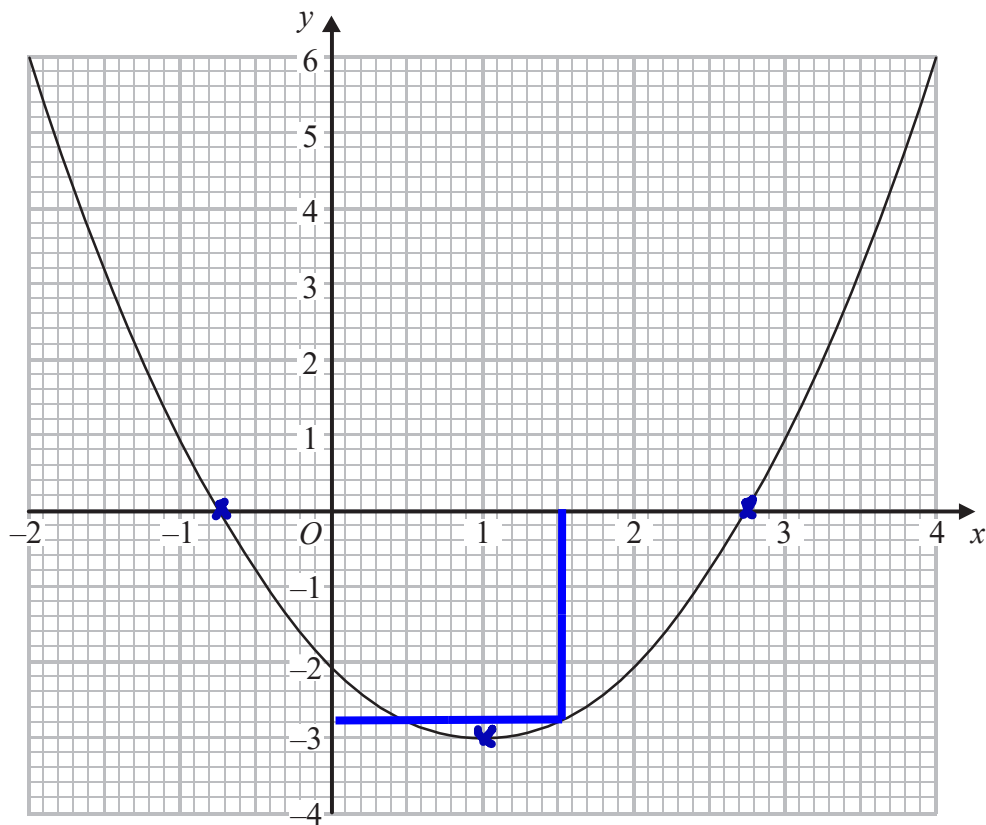
$$x^3 + \underline{3x^2} + \underline{3x^2} + \underline{9x} + \underline{2x} + 6$$

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

(Total for Question 10 is 3 marks)



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)

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

-0.75 , 2.75
(1)

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

-2.8
(1)

(Total for Question 11 is 3 marks)



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

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

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

(2)

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

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

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

(2)

(Total for Question 12 is 4 marks)

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 .

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

$$9 = k$$

$$y = \frac{9}{x^2}$$

(2)

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

$$16 = \frac{9}{x^2} \quad 16x^2 = 9$$

$$x^2 = \frac{9}{16} \quad x = \frac{3}{4}$$

(2)

(Total for Question 13 is 4 marks)



- 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.

	W : B	Total	
	3 : 7	10	
	$\frac{3}{10}$ $\frac{7}{10}$		
White	O : □	Total	
	4 : 5	9	
	$\frac{4}{9}$ $\frac{5}{9}$		
Black	O : □	Total	
	2 : 5	7	
	$\frac{2}{7}$ $\frac{5}{7}$		

$\left(\frac{3}{10} \times \frac{4}{9}\right) + \left(\frac{7}{10} \times \frac{2}{7}\right)$

(Total for Question 14 is 4 marks)



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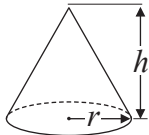
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15 A cone has a volume of 98 cm^3 .
The radius of the cone is 5.13 cm .

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

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



.....cm
(3)

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.

.....
.....
.....
(1)

(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.

(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.

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.

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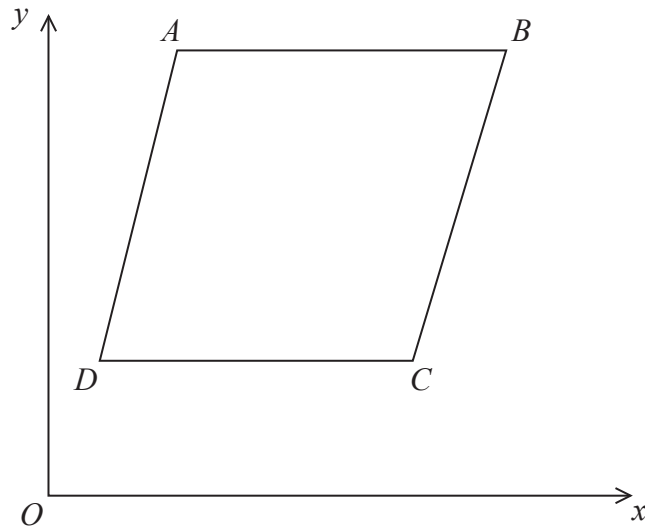
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(Total for Question 17 is 4 marks)



18



$ABCD$ 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)

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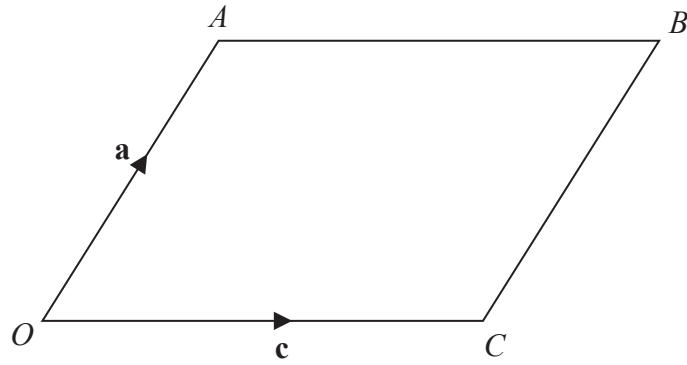
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P 4 8 1 4 7 A 0 1 5 2 0

19



$OABC$ 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 .

$$k = \dots\dots\dots$$

(Total for Question 19 is 4 marks)

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20 Solve algebraically the simultaneous equations

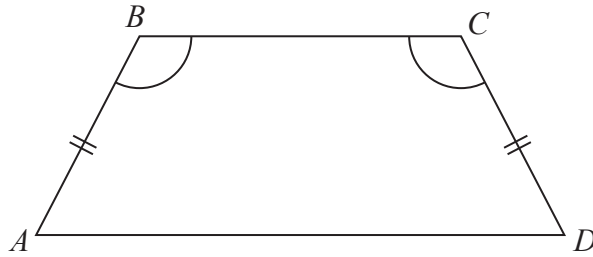
$$x^2 + y^2 = 25$$

$$y - 3x = 13$$

.....
(Total for Question 20 is 5 marks)



21 $ABCD$ is a quadrilateral.



$$AB = CD.$$

$$\text{Angle } ABC = \text{angle } BCD.$$

Prove that $AC = BD$.

(Total for Question 21 is 4 marks)

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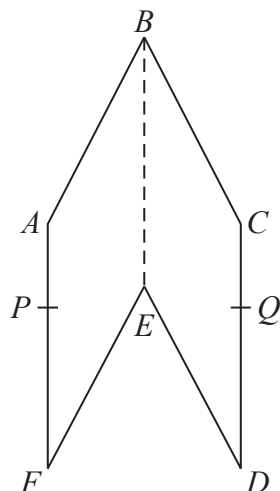
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22 The diagram shows a hexagon $ABCDEF$.



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

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(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS



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