

Write your name here

Surname

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Other names

Zuber

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

Centre Number

90652

Candidate Number

2456

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

43 43

HA022490275



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.*

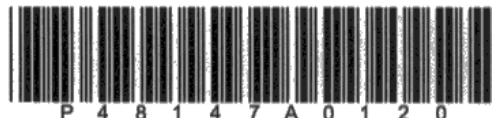
Advice

- 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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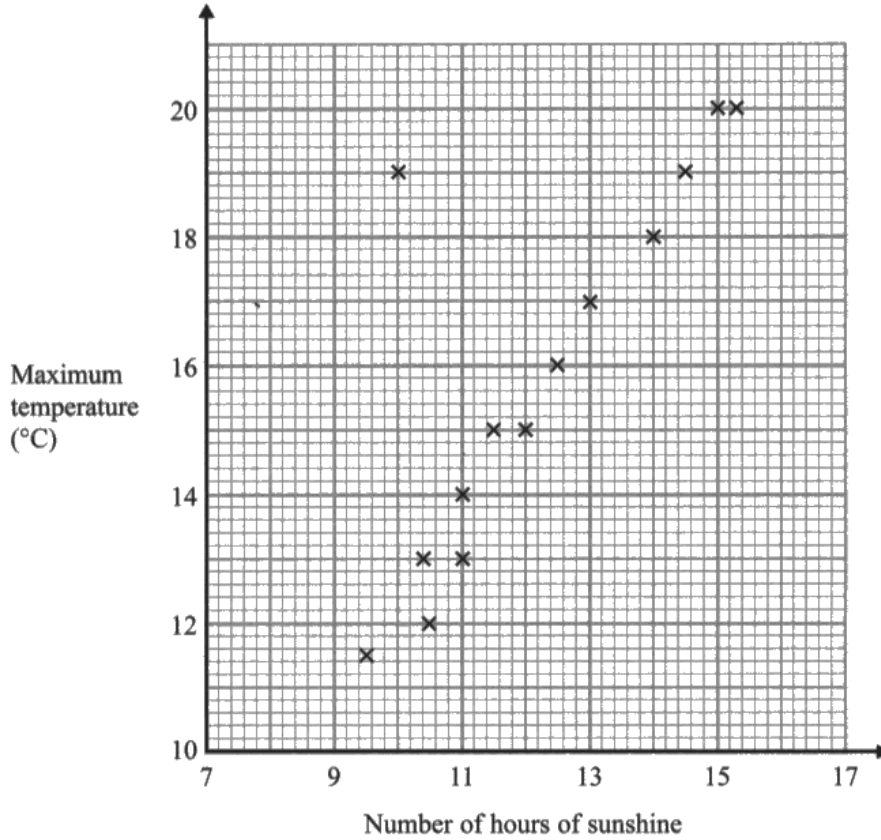

Pearson

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) ✓

Q01a

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

Positive

(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

12 hours

2 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 because the graph has a positive correlation
and both values raise each time.

1

1 Q01d

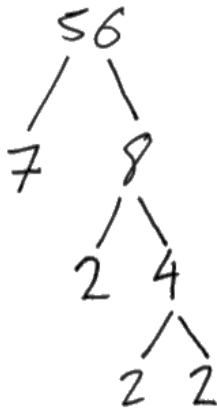
(Total for Question 1 is 5 marks)

5 5

2 Express 56 as the product of its prime factors.

2

2 Q02



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

(Total for Question 2 is 2 marks)

2 2



3 Work out 54.6×4.3

3



3

Q03

	04.	0.3
50.	200	15
04.	16	1.2
0.6	2.4	0.18

MBM

$$3.78 + ~~31~~ + 200 =$$

$$234.78$$

MBM

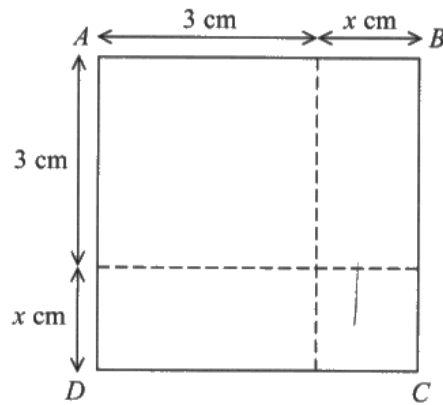
234.78

(Total for Question 3 is 3 marks)

3

3





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

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

$$3 \text{ cm} \times 3 \text{ cm} = 9 \text{ cm}^2$$

$$ABCD = 10 \text{ cm}^2$$

$$x \times 3 + x \times 3 = 3x + x^2 \quad 3x + 3x + x^2 = 6x + x^2$$

$$x \times 3 = 3x$$

$$x^2 + 6x = \text{remainder of area } 10 - 9 = 1$$

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

(Total for Question 4 is 3 marks)



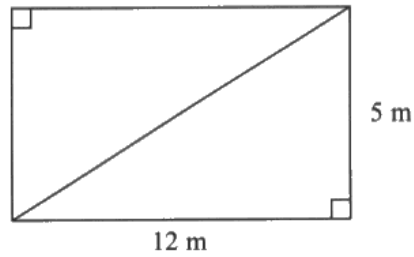
5 This rectangular frame is made from 5 straight pieces of metal.

5



5

Q05



The weight of the metal is 1.5 kg per metre.

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

1.5 kg per 1 metre

$$(12 \times 1.5 = 18) \times 2 = 36$$

$$12^2 + 5^2 = 169$$

$$\sqrt{169} = 13 = \text{hyp}$$

$$36 \text{ kg} + ~~18 \text{ kg}~~ + 19.5 \text{ kg} = 70.5 \text{ kg}$$

70.5

..... 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 $3y - 9x + 5 = 0$

2



2

Q06

Show that these two lines are parallel.

$$3y - 9x + 5 = 0 + 1$$

$$3y - 9x + 6 = 1$$

$$y - 3x + 2 = \frac{1}{3}$$

$$y - 3x + 2 - \frac{1}{3} = 0$$

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

$$L_1 = y = 3x - 2$$

$$y = 3x - \frac{1}{3} = L_2$$

(Total for Question 6 is 2 marks)

They have the same gradient
and are both positive graphs,
and are both $y = 3x + c$
with different c 's.
Therefore they
are parallel.



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.

3



3

Q07

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.

$$30 = \text{total}$$

$$54 \times 20 = 1080 = \text{total of girls marks}$$

$$60 \times 30 = 1800 = \text{total marks in class}$$

$$1800 - 1080 = 720 = \text{total boys marks}$$

$$720 \div 10 = 72$$

72

(Total for Question 7 is 3 marks)

3

3

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

0.00000797

(1) 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.

$$25200 \div 0.004 =$$

$$25200 \div 10 = 2520 \times 4 = 10080 \div 1000 = 10.08$$

10.08

(2) 0



0

Q08b

(Total for Question 8 is 3 marks)

1

1



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?

$$600 = 120\%$$

$$600 \div 120 = 50 = 10\%$$

$$50 \times 10 = 500 = 100\%$$

£ 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.

0



0

Q10

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

$$x \times x \times x \times 2 \times 3$$

$$= 6x^3$$

+

+

$$1 \times x \times x \times 2 \times 3 =$$

$$6x^2$$

+

$$x \times 3 \times 1 = 3x$$

+

$$3 \times 1 = 3$$

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

= A

(Total for Question 10 is 3 marks)

0

0

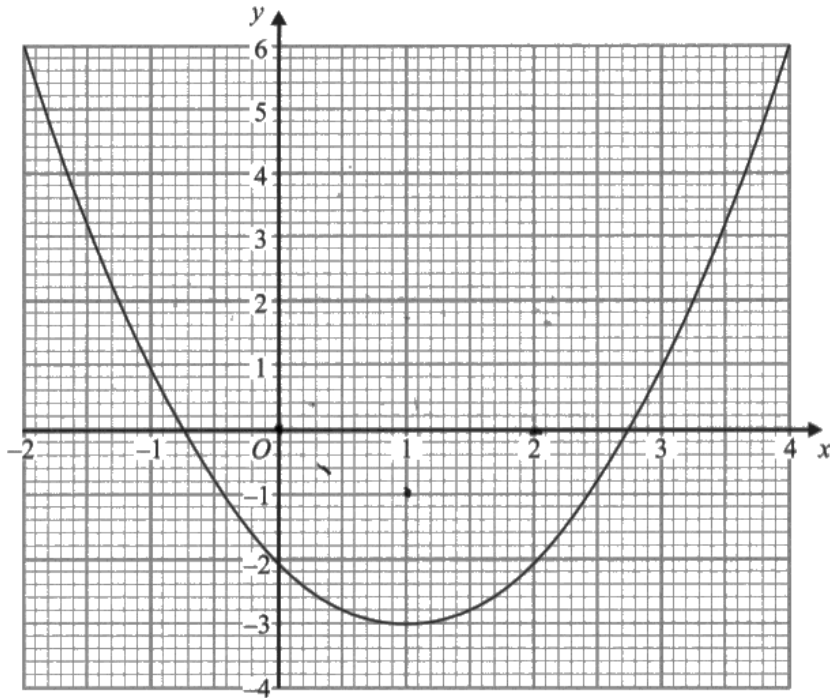


P 4 8 1 4 7 A 0 9 2 0

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) ✓

Q11a

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

$-2 = f(x) = -0.7$ & 2.5

~~(2, 0)~~

(1) ✓

Q11b

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

2

(1) ✓

Q11c

(Total for Question 11 is 3 marks)



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

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

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

(1) 2



2

Q12a

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

$$\frac{64}{125}$$

$$\frac{32}{125}$$

(1) 0



0

Q12b

(Total for Question 12 is 4 marks)

2

2

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 .

$$6\frac{3}{4}$$

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

$$\frac{7}{16}$$

(1) 0



0

Q13a

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

(1) 0



0

Q13b

(Total for Question 13 is 4 marks)

0

0



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

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.

4



4

Q14

White shape : Black shape

3 : 7

total wht shapes
= 9 total black = 21

White circle to: White squares

4 : 5

6 = black circ
15 = black sq

black circle : black square

2 : 5

4 + 6 = total circles
 $\frac{10}{30}$
 $\frac{10}{30}$

(Total for Question 14 is 4 marks)

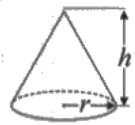
4

4



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.

~~Handwritten work for question 15a:~~
 $98 = \frac{1}{3} \pi r^2 h$
 $98 \div \frac{1}{3} = 294 \div 3 = 98$
 $98 \div 3 = 32.6$
 $\sqrt{100} = 10$
 $10 \div 3 = 1/3 = 10$
 10 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.

less because I have rounded down my integers that weren't whole. However, it could be more as I rounded the volume up.

Q15b

(Total for Question 15 is 4 marks)

16 n is an integer greater than 1

Q16

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

~~Handwritten work for question 16:~~
 $n^2 = n \times n - 2 - ((n-2)(n-2))$
 $n^2 - 2 - (n-2)(n-2)$
 $-2n^2$
 $n^2 - 2 + 2n^2$
 $2n^2 + n^2 = 3n^2$
 $3n^2 - 2$

(Total for Question 16 is 4 marks)



17 There are 9 counters in a bag.

4



4

Q17

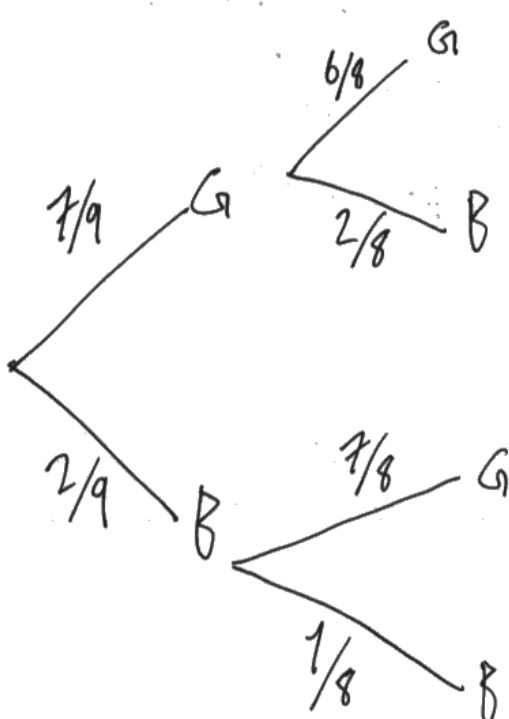
7 of the counters are green.

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.



$$7/9 \times 6/8 = \frac{42}{72}$$

$$42 + 2 = 44 = \text{prob for same colour}$$

$$72 - 44 = 28$$

$$\frac{28}{72} = 2 \text{ diff counters}$$

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

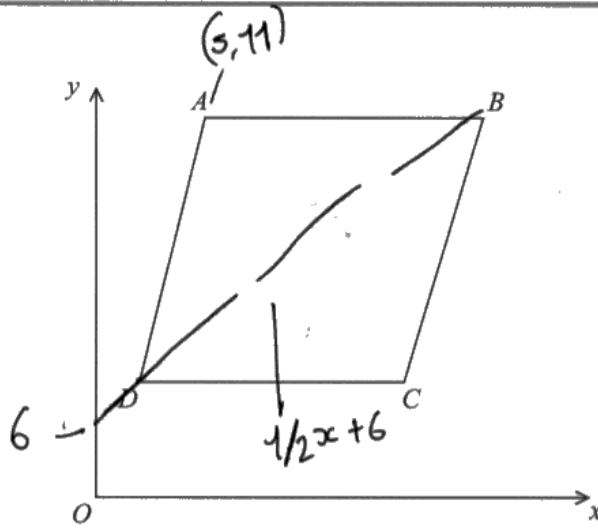
$$\frac{28}{72}$$

(Total for Question 17 is 4 marks)

4

4





$ABCD$ 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 .

$$- \frac{1}{2}x +$$

$$5 - 5 = 0$$

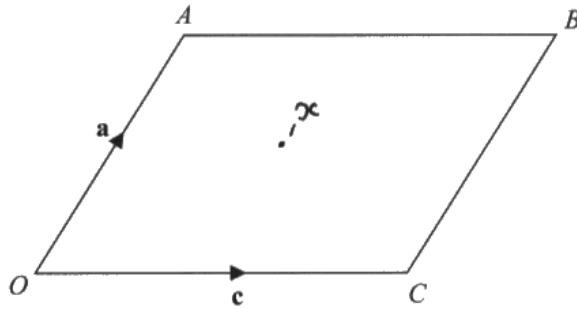
$$11 + 2 \cdot 5 = 13.5$$

$$- \frac{1}{2}x + 13.5$$

$$- \frac{1}{2}x + 13.5$$

(Total for Question 18 is 4 marks)





$OABC$ 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 $OC : CD = k : 1$

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

$$\vec{XB} = 3\mathbf{c} - \frac{1}{2}\mathbf{a}$$

find the value of k .

~~$$\vec{XC} = \frac{1}{2}\mathbf{c} - \frac{1}{2}\mathbf{a}$$~~

~~$$\vec{CD} = \frac{5}{2}\mathbf{c}$$~~

~~$$\vec{OC} = \mathbf{c}$$~~

$$k = 0.4$$

because $\vec{CD} = 2.5 \times \vec{OC}$

$$\vec{OC} : \vec{CD} = 0.4 : 1$$

$$k = 0.4$$

(Total for Question 19 is 4 marks)



20 Solve algebraically the simultaneous equations

0



0

Q20

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

~~Answer~~

$$x^2 + y^2 - (y - 3x) = 12$$

$$x^2 + y^2 - y - 3x = 12$$

$$\frac{x^2 + y^2 - y - 3x}{3} = 4$$

$$y - 3x = 13$$

$$+ 3x$$

$$y = 3x + 13$$

$$- 13$$

$$y = 3x$$

(Total for Question 20 is 5 marks)

0

0



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

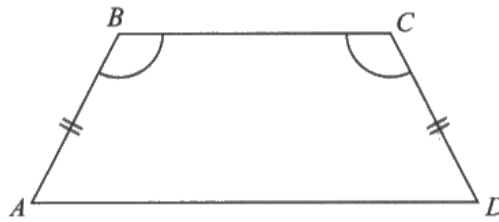
21 $ABCD$ is a quadrilateral.

2



2

Q21



$AB = CD$.

Angle $ABC =$ angle BCD .

Prove that $AC = BD$.

$$\angle ABC = \angle BCD$$

$$\text{and } AB = CD$$

Therefore $\angle BAD$ must $= \angle ADC$

Therefore

BD must be equal to AC

(Total for Question 21 is 4 marks)

2

2



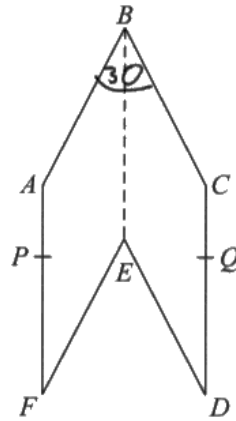
22 The diagram shows a hexagon $ABCDEF$.

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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