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Write your name here

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Other names

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

Centre Number

1 0 6 5 8

Candidate Number

2 4 4 0

Mathematics

Paper 3 (Calculator)

Higher Tier

Tuesday 13 June 2017 – Morning

Time: 1 hour 30 minutes

Paper Reference

1MA1/3H

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

Total Marks

57 57

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 be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.



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 ►

P50549A

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P 5 0 5 4 9 A 0 1 2 0


Pearson

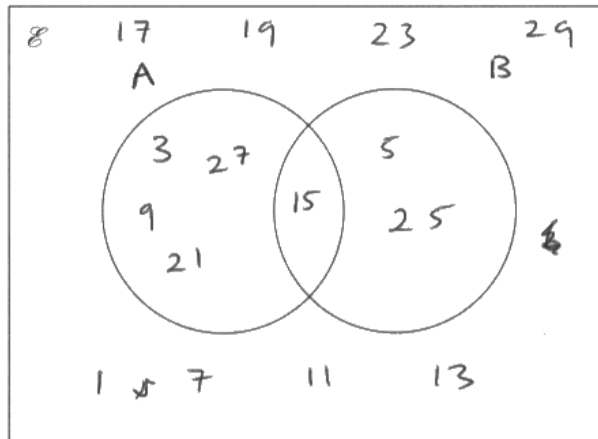
Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 $\mathcal{E} = \{\text{odd numbers less than } 30\}$
 $A = \{3, 9, 15, 21, 27\}$
 $B = \{5, 15, 25\}$

(a) Complete the Venn diagram to represent this information.



(4) Q01a

A number is chosen at random from the universal set, \mathcal{E} .

(b) What is the probability that the number is in the set $A \cup B$?

$$\frac{7}{15}$$

(2) Q01b

(Total for Question 1 is 6 marks)



2 Solve the simultaneous equations

3



3

Q02

$$\begin{aligned} 3x + y &= -4 \\ 3x - 4y &= 6 \end{aligned}$$

$$\begin{aligned} \cancel{3x} + y &= -4 \\ -\cancel{3x} - 4y &= 6 \\ 5y &= -2 \\ y &= \frac{-2}{5} = -0.4 \end{aligned}$$

$$\begin{aligned} 3x - 4y &= 6 \\ -3x + y &= -4 \\ -5y &= 10 \\ y &= \frac{10}{-5} \\ y &= -2 \end{aligned}$$

$$\begin{aligned} \cancel{3x} - 1.6 &= 6 \\ \cancel{3x} &= 6 + 1.6 \\ \cancel{3x} &= 7.6 \\ x &= \frac{7.6}{3} \\ x &= 2.53 \end{aligned}$$

$$\begin{aligned} 3x - 2 &= -4 \\ 3x &= -2 \\ x &= \frac{-2}{3} \\ x &= -\frac{2}{3} \\ y &= -2 \end{aligned}$$

(Total for Question 2 is 3 marks)

3

3

$$3x + 8 = 8$$

$$3x = 6 - 8$$

$$3x = -2$$

$$x = \frac{-2}{3}$$



P 5 0 5 4 9 A 0 3 2 0

3

Turn over ▶

3 The table shows some information about the dress sizes of 25 women.

Dress size	Number of women
8	2
10	9
12	8
14	6

f

(a) Find the median dress size.

44 25

$$\frac{44}{2} = 22 \rightarrow 11.5 \rightarrow 12$$

12

(1) 1 ✓

Q03a

3 of the 25 women have a shoe size of 7

Zoe says that if you choose at random one of the 25 women, the probability that she has either a shoe size of 7 or a dress size of 14 is $\frac{9}{25}$ because

$$\frac{3}{25} + \frac{6}{25} = \frac{9}{25}$$

3

(b) Is Zoe correct?

You must give a reason for your answer.

Zoe is not correct because how does she know if someone doesn't have a shoe size 7 but not dress size of 14.

1 ✓

Q03b

(Total for Question 3 is 2 marks) 2 2



5



5

Q04

4 Daniel bakes 420 cakes.

He bakes only vanilla cakes, banana cakes, lemon cakes and chocolate cakes.

$\frac{2}{7}$ of the cakes are vanilla cakes.

35% of the cakes are banana cakes.

The ratio of the number of lemon cakes to the number of chocolate cakes is 4:5

Work out the number of lemon cakes Daniel bakes.

$$\frac{2}{7} \times 420 = 120 \quad 35\% \text{ of } 420 = 147$$

$$120 + 147 = 267$$

$$420 - 267 = 153 \text{ lemon and chocolate cakes}$$

120 vanilla cakes

147 banana cakes

$$4 + 5 = 9$$

$$\frac{153}{9} = 17$$

$$17 \times 4 = 68 \text{ lemon cakes.}$$

68

(Total for Question 4 is 5 marks)

5

5



P 5 0 5 4 9 A 0 5 2 0

5

Turn over ▶

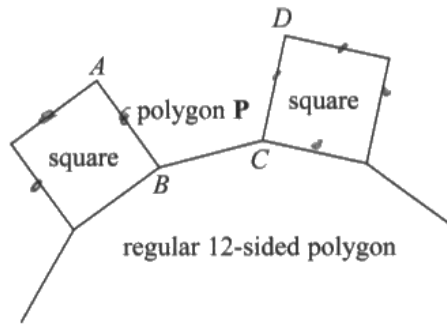
5 In the diagram, AB , BC and CD are three sides of a regular polygon P .

0



0

Q05



Show that polygon P is a hexagon.
You must show your working.

Hexagon has 6 sides

(Total for Question 5 is 4 marks)

0

0



6 The density of apple juice is 1.05 grams per cm^3 .

2



2

Q06

The density of fruit syrup is 1.4 grams per cm^3 .

The density of carbonated water is 0.99 grams per cm^3 .

25 cm^3 of apple juice are mixed with 15 cm^3 of fruit syrup and 280 cm^3 of carbonated water to make a drink with a volume of 320 cm^3 .

Work out the density of the drink.

Give your answer correct to 2 decimal places.

$$D = \frac{m}{V} \quad D = \frac{1.05 + 1.4 + 0.99}{320} = 3.44 \text{ grams per cm}^3$$

$$D = \quad V = 25 + 15 + 280 + 320 = 640 \text{ cm}^3$$

$$\text{Density of apple juice} = 1.05 \times 25 = 26.25$$

$$\text{Density of fruit syrup} = 1.4 \times 15 = 21$$

$$\text{Density of water} = 0.99 \times 280 = 277.2$$

$$26.25 + 21 + 277.2 = 324.45$$

$$V = 320$$

$$D = \frac{108324}{320}$$

$$m = DV$$

$$m = 324.45 \times 320 \quad D =$$

$$m = 103824$$

$$324.45 \text{ g/cm}^3$$

(Total for Question 6 is 4 marks)

2

2

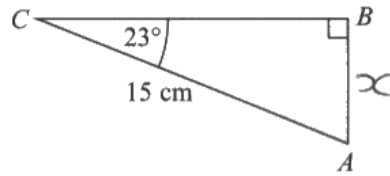


P 5 0 5 4 9 A 0 7 2 0

7

Turn over ▶

7 ABC is a right-angled triangle.



SOH CAH
TOA

2

✓

2

Q07

Calculate the length of AB .
Give your answer correct to 3 significant figures.

$$\sin 23 = \frac{x}{15}$$

$$\sin 23 \times 15 = AB$$

$$AB = 5.86$$

..... 5.86 cm

(Total for Question 7 is 2 marks) 2 2



- 8 A square, with sides of length x cm, is inside a circle.
Each vertex of the square is on the circumference of the circle.

1



1

Q08

The area of the circle is 49 cm^2 .

Work out the value of x .

Give your answer correct to 3 significant figures.

$$A = \pi r^2$$

~~$$A = \pi r^2$$~~

$$49 = \pi \times r^2$$

$$\frac{49}{\pi} = r^2$$

$$r^2 = 15.59718442$$

$$r = 3.949327085$$

$$\text{diameter} = 2r$$

$$\text{diameter} = 7.89865417$$

7.9

(Total for Question 8 is 4 marks)

1

1

$$d = 7.9 \text{ to 3.s.f.}$$



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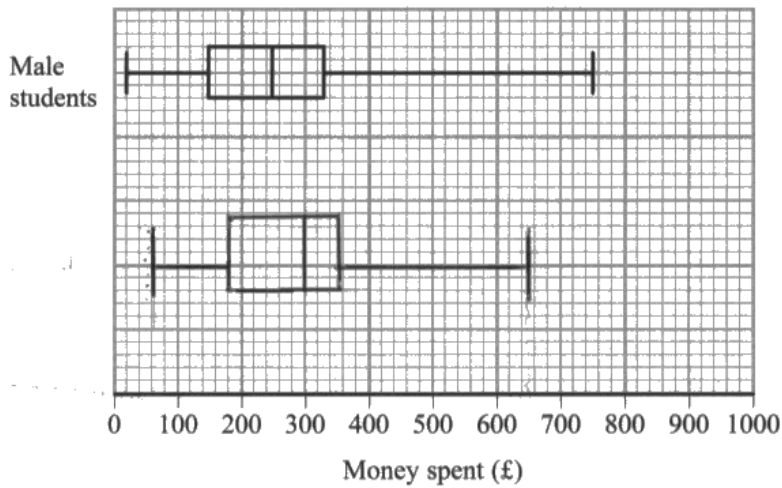
9 The box plot shows information about the distribution of the amounts of money spent by some male students on their holidays.

2
2
0

✓
✓
✓

2
2
0

Q09a
Q09b
Q09c



(a) Work out the interquartile range for the amounts of money spent by these male students.

$$330 - 150 = 180$$

£ 180
(2)

The table below shows information about the distribution of the amounts of money spent by some female students on their holidays.

	Smallest	Lower quartile	Median	Upper quartile	Largest
Money spent (£)	60	180	300	350	650

(b) On the grid above, draw a box plot for the information in the table.

(2)



Chris says,

"The box plots show that the female students spent more money than the male students."

(c) Is Chris correct?

Give a reason for your answer.

Chris is not correct as the
males box plot goes the furthest

(1)

(Total for Question 9 is 5 marks)

4 4

10 Naoby invests £6000 for 5 years.

The investment gets compound interest of $x\%$ per annum.

At the end of 5 years the investment is worth £8029.35

Work out the value of x .

$$6000 \times \left(\frac{x}{100} + 1\right) = 8029.35$$

$$\frac{8029.35}{6000} = \left(\frac{x}{100} + 1\right)$$

$$1.338225 = \left(\frac{x}{100} + 1\right)$$

1

$$1.338225 - 1 = \frac{x}{100}$$

$$0.338225 = \frac{x}{100}$$

$$5.99999$$

0 9 3 3

(Total for Question 10 is 3 marks)

3

✓

3

Q10



11 Jeff is choosing a shrub and a rose tree for his garden.
At the garden centre there are 17 different types of shrubs and some rose trees.

2



2

Q11

Jeff says,

"There are 215 different ways to choose one shrub and one rose tree."

Could Jeff be correct?

You must show how you get your answer.

$$\frac{215}{17} = 12.64$$

Jeff is not correct as 12.64 is not integer which means there is 215 different ways to choose one shrub and one rose tree.

(Total for Question 11 is 2 marks)

2

2

12 The points A, B, C and D lie in order on a straight line.

3



3

Q12

$$AB:BD = 1:5$$

$$AC:CD = 7:11$$

Work out $AB:BC:CD$



$$1 + 5 = 6$$

$$3 + 1 = 4$$

$$7 + 11 = 18$$

$$\frac{6}{2} = 3$$

$$18 + 6 = 24$$

$$\frac{24}{4} = 6$$

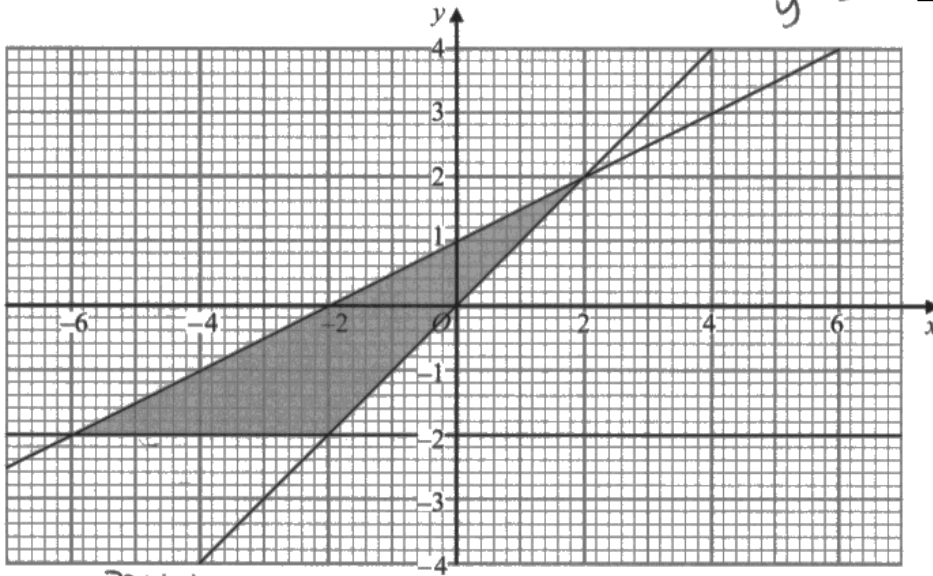
$$3 : 4 : 11$$

(Total for Question 12 is 3 marks)

3

3





$y \geq x + 1$

Write down the three inequalities that define the shaded region.

$y \geq -2$

$y \leq x + 1$

(Total for Question 13 is 4 marks) 1 1



14 (a) Simplify

$$\frac{x^2 - 16}{2x^2 - 5x - 12} = 0$$

$$2x(x+4)$$

$$(x+4)(x-4)$$

$$x^2 - 4x + 4x - 16$$

$$\frac{(x+4)(\cancel{x-4})}{(2x+3)(\cancel{x-4})}$$

$$\frac{(x+4)}{(2x+3)}$$

$$2 \times 12 = 24$$

3

✓

3

Q14a

$$24 - 3(-x+4)$$

$$\begin{array}{r} 124 \\ 212 \\ 64 \\ 83 \end{array}$$

$$2x^2 + 8x + 3x$$

$$-12$$

$$\frac{(x+4)}{(2x+3)}$$

(3)

(b) Make v the subject of the formula $w = \frac{15t - 2v}{v}$

3

✓

3

Q14b

$$w = \frac{15t - 30v}{v}$$

$$v =$$

$$wv = 15t - 30v$$

$$wv + 30v = 15t$$

$$v(w+30)$$

$$v = \frac{15t}{(w+30)}$$

$$v = \frac{15t}{w+30}$$

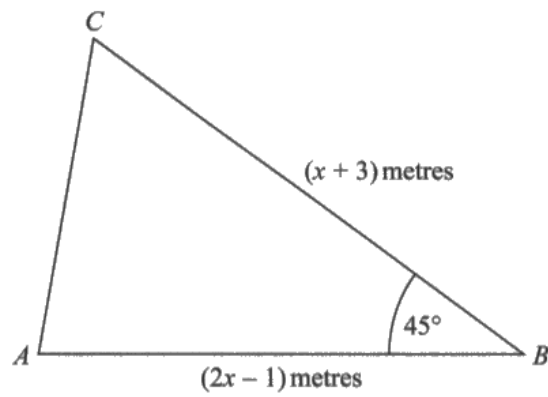
(3)

(Total for Question 14 is 6 marks)

6

6





The area of triangle ABC is $6\sqrt{2} \text{ m}^2$.

Calculate the value of x .

Give your answer correct to 3 significant figures.

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

$$A = \frac{1}{2} ab \sin C$$

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

$$2x^2 + 5x - 3$$

~~A =~~

$$6\sqrt{2} = \frac{2x^2 + 5x - 3}{2} \times \sin 45$$

$$2x = 1$$

$$x = 0.5$$

$$x = -3$$

$$\frac{6\sqrt{2}}{\sin 45} = \frac{2x^2 + 5x - 3}{2}$$

$$12 = \frac{2x^2 + 5x - 3}{2}$$

$$24 = 2x^2 + 5x - 3$$

2.63



16 Using $x_{n+1} = -2 - \frac{4}{x_n^2}$

with $x_0 = -2.5$

(a) find the values of x_1, x_2 and x_3

1 = -2.64
 2 = -2.5739
 3 = -2.603767225
 7c

$x_1 = -2.64$
 $x_2 = -2.5739$
 $x_3 = -2.603767225$
 (3) ✓

Q16a

(b) Explain the relationship between the values of x_1, x_2 and x_3 and the equation $x^3 + 2x^2 + 4 = 0$

.....

(2) ✓

Q16b

(Total for Question 16 is 5 marks)



17 A train travelled along a track in 110 minutes, correct to the nearest 5 minutes.

Jake finds out that the track is 270 km long.

He assumes that the track has been measured correct to the nearest 10 km.

- (a) Could the average speed of the train have been greater than 160 km/h?
You must show how you get your answer.

$$110 \text{ minutes} = 2.5 \text{ hours}$$

~~$$110 \div 2.5 = 112.5 \text{ minutes} = 1.875 \text{ hours}$$~~

~~hours = upper bound~~

~~$$S = \frac{D}{t}$$~~

~~$$S = \frac{270}{2.5}$$~~

~~$$270$$~~

$$u.b = 110 - 2.5 = 107.5 \text{ minutes}$$

$$= 1.716$$

~~$$S = 108 \text{ km/h}$$~~

$$u.b = D = 270 + 5 = 275$$

$$S = \frac{D}{t}$$

$$S = \frac{275}{1.716}$$

the average speed

14 ✓

Can't be greater than 160 km/h

4 Q17a

Jake's assumption was wrong.

The track was measured correct to the nearest 5 km. $S = 153$

- (b) Explain how this could affect your decision in part (a).

it would decrease the average speed of the train as you are lowering the top value of the division

1 ✓

1 Q17b

(Total for Question 17 is 5 marks)

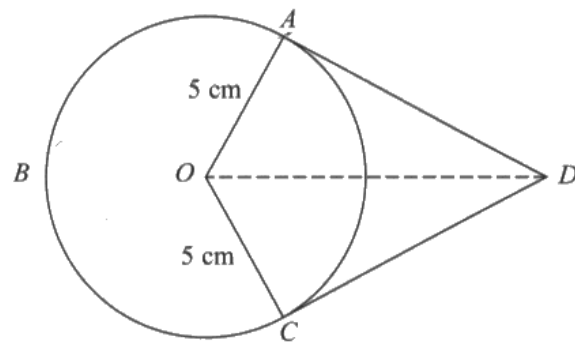
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5

it would decrease the average speed by 3 km/h.



P 5 0 5 4 9 A 0 1 7 2 0



A , B and C are points on a circle of radius 5 cm, centre O .
 DA and DC are tangents to the circle.
 $DO = 9$ cm

Work out the length of arc ABC .
 Give your answer correct to 3 significant figures.

..... cm

(Total for Question 18 is 5 marks)



19 Solve $2x^2 + 3x - 2 > 0$

$$2x - 2 = -4$$

$$-4$$

$$1 - 4$$

3



3

Q19

$$2x^2 - x + 4x - 2 > 0$$

$$x(2x - 1) \quad \cancel{2} \quad 2(2x - 1)$$

$$(x + 2)(2x - 1)$$

$$x + 2 > 0$$

$$x \geq -2$$

$$2x - 1 > 0$$

$$x < -2, \quad x > 0.5$$

(Total for Question 19 is 3 marks)

3

3

$$2x > 1$$

$$x > 0.5$$



P 5 0 5 4 9 A 0 1 9 2 0

20 The equation of a curve is $y = a^x$
 A is the point where the curve intersects the y -axis.

~~0, 1~~
~~0, 1~~ 0, 1

(a) State the coordinates of A .

(..... 0 , 1)
(1) 1 ✓

1 Q20a

The equation of circle C is $x^2 + y^2 = 16$

The circle C is translated by the vector $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$ to give circle B .

(b) Draw a sketch of circle B .

Label with coordinates
the centre of circle B
and any points of intersection with the x -axis.

(3) 0 ✓

0 Q20b

(Total for Question 20 is 4 marks) 1 1

TOTAL FOR PAPER IS 80 MARKS

