Paper Reference 1MA1/1H
Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Total Marks

Mathematics

Paper 1
(Non–Calculator)
Higher Tier

Tuesday 21 May 2019 – Morning

Time: 1 hour 30 minutes plus your additional time allowance.

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

Y53836A

Pearson

YOU MUST HAVE

Ruler, protractor, compasses, writing and drawing equipment. Tracing paper may be used.

YOU WILL BE GIVEN

Diagram Book

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the spaces provided in this Question Paper or on the separate diagrams – there may be more space than you need.

You must SHOW ALL YOUR WORKING.

Diagrams and models are NOT accurate 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.

You may be provided with a model for Question 4

There may be spare copies of some diagrams.

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.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Look at the table for Question 1 in the Diagram Book.

   There are only blue cubes, red cubes and yellow cubes in a box.

   The table shows the probability of taking at random a blue cube from the box.

   The number of red cubes in the box is the same as the number of yellow cubes in the box.

(continued on the next page)

1. continued.

(a) Complete the table.

There are two spaces to fill.

(2 marks)

(continued on the next page)

1. continued.

There are 12 blue cubes in the box.

(b) Work out the total number of cubes in the box.

(2 marks)

Answer space continues on the next page.

1. (b) continued.

(Total for Question 1 is 4 marks)

2. Look at the information for Question 2 in the Diagram Book.

Deon is going to make **60** biscuits.

(a) Work out the amount of flour she needs.

(3 marks)

Answer space continues on the next page.

2. (a) continued.

_____ grams

(continued on the next page)

2. continued.

Deon has to buy all the butter she needs to make 60 biscuits.

She buys the butter in 250 gram packs.

(b) How many packs of butter does Deon need to buy?

(2 marks)

Answer space continues on the next page.

2. (b) continued.

(Total for Question 2 is 5 marks)

3. Find the highest common factor (HCF) of 72 and 90

(Total for Question 3 is 2 marks)

4. Look at the diagrams for Question 4 in the Diagram Book.

You may be provided with a model.

Diagram 1 and the model show a cylinder.

They are not accurate.

Look at Diagram 2 below Diagram 1

Diagram 2 shows three options labelled Option **A**, Option **B** and Option **C** on a grid of squares.

Each square on the grid represents a one centimetre square.

(continued on the next page)

4. continued.

The cylinder is placed with its flat face on a surface.

(a) Which of the options, **A**, **B** or **C**, shows the plan of the cylinder? (1 mark)

(continued on the next page)

4. continued.

(b) Remember:

Each square on the grid represents a one centimetre square.

Using Diagram 2,

(i) write down the diameter of the cylinder.

_____ cm

(continued on the next page)

4. (b) continued.

Remember:

Each square on the grid represents a one centimetre square.

Using Diagram 2,

(ii) write down the height of the cylinder.

_____ cm

(1 mark)

(Total for Question 4 is 2 marks)

5. Look at the diagram for Question 5 in the Diagram Book.

It shows shape **A** and shape **B** on a coordinate grid.

(a) Reflect shape **A** in the **x**–axis.

Label the new shape **X**

(1 mark)

(continued on the next page)

5. continued.

(b) Shape **X** can be transformed to shape **B** by a translation $\begin{pmatrix} c \\ d \end{pmatrix}$

Find the value of **c** and the value of **d**

(2 marks)

c = _____

d = _____

(Total for Question 5 is 3 marks)

6. Look at the information for Question 6 in the Diagram Book.

A shop sells packs of **black** pens, packs of **red** pens and packs of **green** pens.

Work out the number of **green** pens sold.

(4 marks)

Answer space continues on the next two pages.

6. continued.

6. continued.

(Total for Question 6 is 4 marks)

7. Look at the diagram for Question 7 in the Diagram Book.

It shows two rectangles, **ABCD** and **PQRS**

PQ = 10 cm

AD = PS

The perimeter of **ABCD** is **26 cm**

The area of **PQRS** is **45 cm^2**

Find the length of **AB**

(4 marks)

Answer space is on the next page.

7. continued.

_____ cm

(Total for Question 7 is 4 marks)

8. (a) Work out an estimate for the value of

$$\sqrt{63 \cdot 5 \times 101 \cdot 7}$$

(2 marks)

(continued on the next page)

8. continued.

$(2 \cdot 3)^6 = 148$ correct to 3 significant figures.

(b) Find the value of $(0 \cdot 23)^6$ correct to 3 significant figures.

(1 mark)

Answer space continues on the next page.

8. (b) continued.

(continued on the next page)

8. continued.

(c) Find the value of 5^{-2}

(1 mark)

(Total for Question 8 is 4 marks)

9. Work out

$$3\frac{1}{2} \times 1\frac{3}{5}$$

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

(3 marks)

Answer space continues on the next page.

9. continued.

(Total for Question 9 is 3 marks)

10. Look at the diagram for Question 10 in the Diagram Book.

The graphs with equations

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

and

$$2y - 3x = -\frac{113}{12}$$

have been drawn on the grid shown in the diagram.

(continued on the next page)

10. continued.

Using the graphs, find estimates of the solutions of the simultaneous equations

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

$$2y - 3x = -\frac{113}{12}$$

$x =$ _____

$y =$ _____

(Total for Question 10 is 2 marks)

11. Look at the information and table for Question 11 in the Diagram Book.

A bus company recorded the ages, in years, of the people on coach **A** and the people on coach **B**

The information shows the ages of the **23** people on coach **A**

(a) Complete the table to show information about the ages of the people on coach **A**

There are three spaces to fill.

(2 marks)

(continued on the next page)

11. continued.

The table also shows some information about the ages of the people on coach **B**

Richard says that the people on coach **A** are younger than the people on coach **B**

(continued on the next page)

11. continued.

(b) Is Richard correct?

You must give a reason for your answer.

(1 mark)

(continued on the next page)

11. continued.

Richard says that the people on coach **A** vary more in age than the people on coach **B**

(c) Is Richard correct?

You must give a reason for your answer.

(1 mark)

_____

_____

_____

_____

_____

(Total for Question 11 is 4 marks)

12. Look at the diagram for Question 12 in the Diagram Book.

It shows a simplified 2D diagram.

There are three spheres **P**, **Q** and **R**

The volume of sphere **Q** is 50% more than the volume of sphere **P**

The volume of sphere **R** is 50% more than the volume of sphere **Q**

Find the volume of sphere **P** as a fraction of the volume of sphere **R**

(3 marks)

Answer space is on the next page.

12. continued.

(Total for Question 12 is 3 marks)

13. Given that n can be any integer such that $n > 1$, prove that $n^2 - n$ is never an odd number.

(2 marks)

Answer space continues on the next page.

13. continued.

(Total for Question 13 is 2 marks)

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14. Find the exact value of

$$\tan 30° \times \sin 60°$$

Give your answer in its simplest form.

(2 marks)

Answer space continues on the next page.

14. continued.

(Total for Question 14 is 2 marks)

15. Look at the diagrams for Question 15 in the Diagram Book.

Diagram 1 shows a solid shape.

Diagram 2 is a simplified 2D diagram of the solid shape.

The shape is a cone on top of a hemisphere.

A hemisphere is half a sphere.

The height of the cone is **10 cm**

The base of the cone has a diameter of **6 cm**

The hemisphere has a diameter of **6 cm**

(continued on the next page)

15. continued.

The total volume of the shape is $k\pi$ cm^3, where k is an integer.

Work out the value of k

(4 marks)

Answer space continues on the next page.

15. continued.

$k =$ _____

(Total for Question 15 is 4 marks)

16. Look at the diagram for Question 16 in the Diagram Book.

There are three dials on a combination lock.

Each dial can be set to one of the numbers 1, 2, 3, 4, 5

The three digit number 553 is one way the dials can be set, as shown in the diagram.

(a) Work out the number of different three digit numbers that can be set for the combination lock.

(2 marks)

Answer space is on the next page.

16. (a) continued.

(continued on the next page)

16. continued.

(b) How many of the possible three digit numbers have three different digits?

(2 marks)

Answer space continues on the next page.

16. continued.

(Total for Question 16 is 4 marks)

17. Given that

$$y^2 : (3y + 5) = 1 : 2$$

find the possible values of y

(4 marks)

Answer space continues on the next page.

17. continued.

(Total for Question 17 is 4 marks)

18. (a) Express

$\sqrt{3} + \sqrt{12}$

in the form $a\sqrt{3}$ where a is an integer.

(2 marks)

Answer space continues on the next page.

18. (a) continued.

(continued on the next page)

18. continued.

(b) Express

$$\left(\frac{1}{\sqrt{3}}\right)^7$$

in the form $\frac{\sqrt{b}}{c}$ where b and c are integers.

(3 marks)

Answer space continues on the next page.

18. (b) continued.

(Total for Question 18 is 5 marks)

19. Given that

$$x^2 - 6x + 1 = (x - a)^2 - b$$

for all values of x,

(i) find the value of a and the value of b

(2 marks)

Answer space continues on the next page.

19. (i) continued.

$a = \_\_\_\_\_$

$b = \_\_\_\_\_$

(continued on the next page)

19. continued.

(ii) Hence write down the coordinates of the turning point on the graph of

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

(1 mark)

(_____ , _____)

(Total for Question 19 is 3 marks)

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20. h is inversely proportional to p

p is directly proportional to $\sqrt{t}$

Given that $h = 10$ and $t = 144$ when $p = 6$ find a formula for h in terms of t

(4 marks)

Answer space continues on the next page.

20. continued.

(Total for Question 20 is 4 marks)

21. The functions f and g are such that

$$f(x) = 3x - 1 \quad \text{and} \quad g(x) = x^2 + 4$$

(a) Find $f^{-1}(x)$

(2 marks)

Answer space continues on the next page.

21. continued.

$f^{-1}(x) =$ _____

(continued on the next page)

21. continued.

Given that $fg(x) = 2gf(x)$,

(b) show that

$$15x^2 - 12x - 1 = 0$$

(5 marks)

Answer space continues on the next page.

21. (b) continued.

(Total for Question 21 is 7 marks)

22. There are only r red counters and g green counters in a bag.

A counter is taken at random from the bag.

The probability that the counter is green is $\frac{3}{7}$

The counter is put back in the bag.

2 more red counters and 3 more green counters are put in the bag.

A counter is taken at random from the bag.

(continued on the next page)

22. continued.

The probability that the counter is green is $\frac{6}{13}$

Find the number of red counters and the number of green counters that were in the bag originally.

(5 marks)

Answer space continues on the next two pages.

22. continued.

22. continued.

red counters _____

green counters _____

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER
