

**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.**

<b>Surname</b>					
<b>Other names</b>					
<b>Centre Number</b>					
<b>Candidate Number</b>					

**X53836A**

## **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.**

**Turn over**

**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.**

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**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all the 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.**

- (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)

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(Total for Question 1 is 4 marks)

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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)

\_\_\_\_\_ grams

(continued on the next page)

Turn over

**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)**

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**(Total for Question 2 is 5 marks)**

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**Turn over**



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

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(Total for Question 3 is 2 marks)

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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.

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)

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(continued on the next page)

Turn over

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

(ii) write down the height of the cylinder.

\_\_\_\_\_ cm

(1 mark)

(Total for Question 4 is 2 marks)

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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)

- (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)

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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 page.

6. continued.

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**(Total for Question 6 is 4 marks)**

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

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

$$PQ = 10 \text{ cm}$$

$$AD = PS$$

The perimeter of **ABCD** is 26 cm

The area of **PQRS** is  $45 \text{ cm}^2$

Find the length of **AB**

(4 marks)

Answer space continues on the next page.

7. continued.

\_\_\_\_\_ cm

(Total for Question 7 is 4 marks)

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

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

(2 marks)

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(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)

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(continued on the next page)

8. continued.

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

(1 mark)

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(Total for Question 8 is 4 marks)

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9. Work out

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

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

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(Total for Question 9 is 3 marks)

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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.

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)

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- 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**

**(b) Is Richard correct?**

**You must give a reason for your answer.**

**(1 mark)**

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**(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)

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(Total for Question 11 is 4 marks)

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**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 continues on the next page.**

12. continued.

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(Total for Question 12 is 3 marks)

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

(Total for Question 13 is 2 marks)

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14. Find the exact value of  
 $\tan 30^\circ \times \sin 60^\circ$

Give your answer in its simplest form.

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(Total for Question 14 is 2 marks)

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Turn over

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

The total volume of the shape is  $k\pi \text{ cm}^3$ , 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)

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Turn over

**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 continues on the next page.**

16. (a) continued.

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(continued on the next page)



**16. continued.**

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

**(2 marks)**

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**(Total for Question 16 is 4 marks)**

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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.

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(Total for Question 17 is 4 marks)

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18. (a) Express

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

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

(2 marks)

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(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.

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(Total for Question 18 is 5 marks)

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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)

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

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

(continued on the next page)

Turn over

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.

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(Total for Question 20 is 4 marks)

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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)

$$f^{-1}(x) = \underline{\hspace{10cm}}$$

(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)

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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.

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)**

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**TOTAL FOR PAPER IS 80 MARKS**

**END OF PAPER**

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