

**Paper Reference 4MA1/1H**  
**Pearson Edexcel**  
**International GCSE**

Total Marks
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**Mathematics A**  
**PAPER: 1H**  
**Higher Tier**  
**(Calculator)**

**Time: 2 hours**

**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>					

**YOU MUST HAVE**

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

**YOU WILL BE GIVEN**

**Diagram Booklet  
Formulae Pages**

**Turn over**

# **INSTRUCTIONS**

**Answer ALL questions.**

**Without sufficient working, correct answers may be awarded no marks.**

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

**CALCULATORS MAY BE USED.**

**You must NOT write anything on the Formulae Pages. Anything you write on the Formulae Pages will gain NO credit.**

**Turn over**

## **INFORMATION**

**The total mark for this paper is 100**

**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 models for Question 7 and Question 22**

**There may be spare copies of some diagrams in case you need them.**

## **ADVICE**

**Read each question carefully before you start to answer it.**

**Check your answers if you have time at the end.**

**5**

**Answer ALL TWENTY FOUR questions.**

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

**You must write down all the stages in your working.**

**Turn over**

- 1. Below are the first five terms of an arithmetic sequence.**

**1          5          9          13          17**

- (a) Find an expression, in terms of  $n$ , for the  $n$ th term of this sequence.**

**(2 marks)**

**Answer space continues on the next page.**

**1. (a) continued.**

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**(continued on the next page)**

**Turn over**

**1. continued.**

**The  $n$ th term of another arithmetic sequence is**

$$3n + 5$$

**(b) Find an expression, in terms of  $m$ , for the  $(2m)$ th term of this sequence.**

**(1 mark)**

**Answer space continues on the next page.**

**Turn over**



1. (b) continued.

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**(Total for Question 1 is 3 marks)**

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**Turn over**

- 2. Look at the diagram and the table for Question 2 in the Diagram Booklet.**

**The diagram shows a biased 4-sided spinner.**

**The table in the Diagram Booklet gives the probabilities that, when the spinner is spun once, it will land on 1 or it will land on 3**

**The probability that the spinner will land on 2 is equal to the probability that the spinner will land on 4**

**(continued on the next page)**

**Turn over**

**2. continued.**

**Ravina is going to spin the spinner a number of times.**

**Ravina works out that an estimate for the number of times the spinner will land on 3 is 45**

**Work out an estimate for the number of times the spinner will land on 4  
(4 marks)**

**Answer space continues on the next two pages.**

**Turn over**

**2. continued.**

**Turn over**

**2. continued.**

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**(Total for Question 2 is 4 marks)**

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**Turn over**

3. (a) Find the highest common factor (HCF) of 56 and 84

Show your working clearly.

(2 marks)

Answer space continues on the next page.

**3. (a) continued.**

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**(continued on the next page)**

**Turn over**

**3. continued.**

**(b) Find the lowest common multiple (LCM) of 60 and 72**

**Show your working clearly.**

**(2 marks)**

**Answer space continues on the next page.**

**Turn over**



**3. (b) continued.**

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**(Total for Question 3 is 4 marks)**

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**Turn over**

4. Look at the diagram for Question 4 in the Diagram Booklet.

It is NOT accurately drawn.

It shows parts of three regular polygons, **A**, **B** and **C**, meeting at a point.

The internal angle shown for polygon **A** =  $8x^\circ$

The internal angle shown for polygon **B** =  $7x^\circ$

The internal angle shown for polygon **C** =  $3x^\circ$

(continued on the next page)

Turn over

4. continued.

Polygon **B** has  **$n$**  sides.

Work out the value of  **$n$**

(4 marks)

Answer space continues on the next  
two pages.

Turn over

4. continued.

Turn over

**4. continued.**

**n = \_\_\_\_\_**

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

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**Turn over**

5. (a) Expand and simplify

$$(n - 6)(n + 4)$$

(2 marks)

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(continued on the next page)

Turn over

**5. continued.**

**(b) Solve**

$$2x - 3 = \frac{3x - 5}{4}$$

**Show clear algebraic working.**

**(3 marks)**

**Answer space continues on the  
next page.**

**Turn over**

5. (b) continued.

**X =** \_\_\_\_\_

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

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**Turn over**



- 6. Look at the table for Question 6(a) in the Diagram Booklet.**

**Asha bought an apartment.**

**The table in the Diagram Booklet gives information about the value of apartments, in euros, and the annual service charge band.**

**In 2021, the value of Asha's apartment was 634 400 euros.**

**The value of Asha's apartment had increased by 4% from its value in 2020**

**(continued on the next page)**

**Turn over**

**6. continued.**

**(a) Has the annual service charge band changed for Asha's apartment?**

**Show your working clearly.**

**(3 marks)**

**Answer space continues on the next page.**

**Turn over**

**6. (a) continued.**

**(continued on the next page)**

**Turn over**

**6. continued.**

**Pam bought a boat.**

**In each year after Pam bought the boat, the value of the boat depreciated by 15%**

**(b) Work out the total percentage by which the value of the boat had depreciated by the end of the second year after Pam bought the boat.**

**(3 marks)**

**Answer space continues on the next page.**

**Turn over**

6. (b) continued.

\_\_\_\_\_ %

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

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**Turn over**

- 7. Look at the diagram for Question 7 in the Diagram Booklet.**

**You may be provided with a model.**

**They are NOT accurate.**

**They show a cylinder.**

**The cylinder is placed on the ground.**

**(continued on the next page)**

**7. continued.**

**The height of the cylinder is 18 cm**

**The force exerted by the cylinder on the ground is 72 newtons.**

**The pressure on the ground due to the cylinder is  $1.4 \text{ newtons/cm}^2$**

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

**Work out the volume of the cylinder.**

**Give your answer correct to**

**3 significant figures.**

**(4 marks)**

**Answer space is on the next two pages.**

**Turn over**

**7. continued.**

**Turn over**



**7. continued.**

\_\_\_\_\_ **cm<sup>3</sup>**

**(Total for Question 7 is 4 marks)**

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**Turn over**

8. (a) Write

**0·000 089** in standard form.

(1 mark)

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(continued on the next page)

Turn over

**8. continued.**

**(b) Write**

**$8.34 \times 10^4$  as an ordinary  
number.**

**(1 mark)**

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**(Total for Question 8 is 2 marks)**

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**Turn over**

9. (a) Simplify  
 $8 \times (4t)^0$   
(1 mark)
- 

(continued on the next page)

9. continued.

Given that

$$y^6 \div y^{-5} = y^p$$

(b) find the value of  $p$   
(1 mark)

$p =$  \_\_\_\_\_

(continued on the next page)

Turn over

**9. continued.**

**(c) Simplify fully**

$$(2k^2m^4)^3$$

**(2 marks)**

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**(Total for Question 9 is 4 marks)**

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**Turn over**

10. Two circles,  $C_1$  and  $C_2$ , are drawn on a centimetre grid, with a scale of 1 cm for 1 unit on each axis.

The centre of circle  $C_1$  is at the point with coordinates  $(-1, 3)$  and the radius of  $C_1$  is 13 cm

The centre of circle  $C_2$  is at the point with coordinates  $(7, 18)$  and the radius of  $C_2$  is 6 cm

(continued on the next page)

Turn over

**10. continued.**

- (a) Work out the distance between the centre of  $C_1$  and the centre of  $C_2$**

**(3 marks)**

**Answer space continues on the next two pages.**

**Turn over**



10. (a) continued.

Turn over

10. (a) continued.

\_\_\_\_\_ cm

(continued on the next page)

Turn over

**10. continued.**

- (b) Explain why circle  $C_1$  intersects  
circle  $C_2$   
(1 mark)**

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**(Total for Question 10 is 4 marks)**

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**Turn over**

11. (a) Factorise  
 $9x^2 - 4y^2$   
(2 marks)

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(continued on the next page)

Turn over

**11. continued.**

**(b) Express**

**$\frac{7}{8} - \frac{y+3}{4y}$  as a single fraction in**

**its simplest form.**

**(3 marks)**

**Answer space continues on the  
next page.**

**Turn over**

11. (b) continued.

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**(Total for Question 11 is 5 marks)**

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**Turn over**

**12. Look at the diagram for Question 12 in the Diagram Booklet.**

**It shows an incomplete probability tree diagram.**

**Rudolf goes to the gym.**

**The probability that he will use the treadmill is  $0.8$**

**When he uses the treadmill, the probability that he will use the cross trainer is  $0.3$**

**When he does NOT use the treadmill, the probability that he will use the cross trainer is  $0.6$**

**(continued on the next page)**

**Turn over**

**12. continued.**

**(a) Complete the probability tree diagram in the Diagram Booklet for this information.**

**(2 marks)**

**(continued on the next page)**

**Turn over**



**12. continued.**

**(b) Work out the probability that  
Rudolf uses both the treadmill  
and the cross trainer.**

**(2 marks)**

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**(Total for Question 12 is 4 marks)**

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**Turn over**

- 13. Look at the table for Question 13 in the Diagram Booklet.**

**Antoine is going on holiday.**

**He makes 3 separate payments to cover the total cost of his holiday.**

**The table in the Diagram Booklet shows how much money Antoine pays to the holiday company.**

**Work out how much Antoine has to pay for Payment 2**

**(5 marks)**

**Answer space continues on the next two pages.**

**Turn over**

**13. continued.**

**Turn over**

**13. continued.**

**\$ \_\_\_\_\_**

**(Total for Question 13 is 5 marks)**

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**Turn over**

14. The function  $f$  is defined as

$$f: x \mapsto \frac{2x}{x-6} \quad x \neq 6$$

(a) Find  $f(10)$   
(1 mark)

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(continued on the next page)

Turn over

14. continued.

Remember:

The function  $f$  is defined as

$$f: x \mapsto \frac{2x}{x-6} \quad x \neq 6$$

(b) Express the inverse function  $f^{-1}$   
in the form  $f^{-1}: x \mapsto \dots$

(3 marks)

Answer space continues on the  
next page.

Turn over

14. (b) continued.

$$f^{-1}: x \mapsto \underline{\hspace{2cm}}$$

(Total for Question 14 is 4 marks)

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Turn over

**15. Look at the information for Question 15 in the Diagram Booklet. Abraham is going to play a computer game.**

**Abraham can win the game, draw the game or lose the game.**

**Work out the probability that when he has played 3 games his total score is 0 points.**

**(4 marks)**

**Answer space continues on the next two pages.**

**Turn over**



**15. continued.**

**Turn over**

**15. continued.**

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**(Total for Question 15 is 4 marks)**

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**Turn over**

16. Without using a calculator, show that

$$\frac{12}{\sqrt{2}-1} - (\sqrt{2})^5 = 2\sqrt{32} + 12$$

Show your working clearly.

(3 marks)

Answer space continues on the next two pages.

16. continued.

Turn over

**16. continued.**

**(Total for Question 16 is 3 marks)**

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**Turn over**

17. A particle **P** moves along a straight line.

The fixed point **O** lies on this line.

The displacement of **P** from **O** at time  $t$  seconds,  $t \geq 1$ , is  $s$  metres where

$$s = 4t^2 + \frac{125}{t}$$

The velocity of **P** at time  $t$  seconds,  $t \geq 1$ , is  $v$  m/s

Work out the distance of **P** from **O** at the instant when  $v = 0$

(5 marks)

Answer space is on the next two pages.

Turn over

17. continued.

Turn over

**17. continued.**

\_\_\_\_\_ metres

**(Total for Question 17 is 5 marks)**

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**Turn over**



**18. Look at the diagram for Question 18 in the Diagram Booklet.**

**It is NOT accurately drawn.**

**It shows triangle ABC**

$$\mathbf{AB = 9.7 \text{ metres}}$$

$$\mathbf{BC = 12.3 \text{ metres}}$$

$$\mathbf{\text{Angle } ABC = 115^\circ}$$

$$\mathbf{\text{Angle } BCA = x^\circ}$$

**Work out the value of  $x$**

**Give your answer correct to  
3 significant figures.**

**(5 marks)**

**Answer space is on the next two  
pages.**

**Turn over**

**18. continued.**

**Turn over**

**18. continued.**

**X = \_\_\_\_\_**

**(Total for Question 18 is 5 marks)**

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**Turn over**

19. Look at the diagram for Question 19 in the Diagram Booklet.

It is NOT accurately drawn.

**OAB** is a sector **S** of a circle with centre **O** and radius  $(r + 7)$  metres.

Angle **AOB** =  $45^\circ$

A circle **C** has radius  $(r - 2)$  metres.

The area of sector **S** is twice the area of circle **C**

Find the value of  $r$

Show your working clearly.

(5 marks)

Answer space is on the next three pages.

Turn over

**19. continued.**

**Turn over**

**19. continued.**

**Turn over**

**19. continued.**

**r = \_\_\_\_\_**

**(Total for Question 19 is 5 marks)**

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**Turn over**

**20. Look at the diagram for Question 20 in the Diagram Booklet.**

**It shows a sketch of part of the curve with equation  $y = f(x)$**

**There is one maximum point on the curve.**

**The coordinates of this maximum point are  $(s, t)$**

**(continued on the next page)**

**Turn over**



**20. continued.**

**Find, in terms of  $S$  and  $t$ , the  
coordinates of the maximum point on  
the curve with equation**

**(i)  $y = f(x - 2)$**

**(1 mark)**

**( \_\_\_\_\_ , \_\_\_\_\_ )**

**(continued on the next page)**

**Turn over**

**20. continued**

**(ii)  $y = 3f(x)$**

**(1 mark)**

**( \_\_\_\_\_ , \_\_\_\_\_ )**

**(Total for Question 20 is 2 marks)**

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**Turn over**

**21. Look at the diagram for Question 21 in the Diagram Booklet.**

**It is a histogram which shows information about the total time,  $m$  minutes, taken by each child in a school to walk to school every day for one week.**

**There are no children for whom  $m > 100$**

**There are 10 children for whom  $m \leq 20$**

**(continued on the next page)**

**Turn over**

**21. continued**

**Work out an estimate for the number  
of children for whom  $50 < m \leq 80$**

**(3 marks)**

**Answer space continues on the next  
page.**

**Turn over**

**21. continued.**

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**(Total for Question 21 is 3 marks)**

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**Turn over**

**22. Look at Diagram 1 and Diagram 2 for Question 22 in the Diagram Booklet. You may be provided with a model. They are NOT accurate.**

**A solid is made from a cone and a hemisphere as shown by Diagram 1 and the model.**

**A hemisphere is half a sphere.**

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

**(continued on the next page)**

**22. continued**

**The circular plane face of the hemisphere coincides with the circular base of the cone.**

**The radius of the hemisphere and the radius of the circular base of the cone are both 20 cm**

**The curved surface area of the cone is  $580\pi \text{ cm}^2$**

**The volume of the solid is  $k\pi \text{ cm}^3$**

**Work out the exact value of  $k$   
(5 marks)**

**Answer space is on the next three pages.**

**Turn over**

**22. continued.**

**Turn over**



**22. continued.**

**Turn over**

**22. continued.**

**k = \_\_\_\_\_**

**(Total for Question 22 is 5 marks)**

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**Turn over**

**23. A polygon has  $n$  sides, where  $n > 5$**

**When arranged in order of size, starting with the largest number, the sizes of the interior angles of the polygon, in degrees, are the terms of an arithmetic sequence.**

**Below are the first five terms of this sequence.**

**177      175      173      171      169**

**Find the value of  $n$**

**Show clear algebraic working.**

**(6 marks)**

**Answer space is on the next five pages.**

**Turn over**

**23. continued.**

**Turn over**

**23. continued.**

**Turn over**

**23. continued.**

**Turn over**

**23. continued.**

**Turn over**

**23. continued.**

**n = \_\_\_\_\_**

**(Total for Question 23 is 6 marks)**

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**Turn over**



24. Express each of **a**, **b** and **c** in terms of **q** so that

$$q + 12x - qx^2$$

can be written as  $a - b(x - c)^2$

(4 marks)

Answer space continues on the next three pages.

**24. continued.**

**Turn over**

**24. continued.**

**Turn over**

**24. continued.**

**a =** \_\_\_\_\_

**b =** \_\_\_\_\_

**c =** \_\_\_\_\_

**(Total for Question 24 is 4 marks)**

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**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**

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