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

# Mathematics A
## PAPER: 1H
## Higher Tier
## (Calculator)

**Time: 2 hours**

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

| Surname | |
|---|---|
| Other names | |
| Centre Number | |
| Candidate Number | |

**V68796A**

**YOU MUST HAVE**

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

**YOU WILL BE GIVEN**

Diagram Booklet
Formulae Pages

# 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.

# 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.

Answer **ALL TWENTY FOUR** questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

**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.**

_____

**(continued on the next page)**

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.

**1.** **(b)** **continued.**

_____

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

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)**

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.

**2.**   **continued.**

**2.** **continued.**

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

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.**

_____

**(continued on the next page)**

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.

**3.** **(b)** **continued.**

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

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 $\mathbf{A} = 8x°$

The internal angle shown for polygon $\mathbf{B} = 7x°$

The internal angle shown for polygon $\mathbf{C} = 3x°$

(continued on the next page)

4.  continued.

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

Work out the value of **n**

(4 marks)

Answer space continues on the next

two pages.

**4.** **continued.**

**4.**   **continued.**

**n = _____**

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

5. (a) Expand and simplify

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

(2 marks)

_____

**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.

**5.** **(b)** **continued.**

**x =** _____

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

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)

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.

**6.** **(a)** **continued.**

**(continued on the next page)**

**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.

**6.** **(b)** **continued.**

_____**%**

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

**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** 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.**

**7.    continued.**

_____ **cm**$^3$

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

8.   (a)   Write

0·000 089 in standard form.

(1 mark)

_____

(continued on the next page)

8.    continued.

   (b)  Write

   $8 \cdot 34 \times 10^4$ as an ordinary

   number.

   (1 mark)

   _____

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

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)

9. continued.

(c) Simplify fully

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

(2 marks)

_____

(Total for Question 9 is 4 marks)

**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)

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.

**10. (a) continued.**

**10. (a) continued.**

_____ **cm**

**(continued on the next page)**

**10.  continued.**

(b)  **Explain why circle $C_1$ intersects circle $C_2$**

**(1 mark)**

_____

_____

_____

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

**11. (a) Factorise**

$$9x^2 - 4y^2$$

**(2 marks)**

———————————————————————

**(continued on the next page)**

**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.

**11. (b) continued.**

_____

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

**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)

12. continued.

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

(2 marks)

_____

(Total for Question 12 is 4 marks)

**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.**

**13.  continued.**

$_____

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

**Turn over**

14. The function **f** is defined as

$$f : x \longmapsto \frac{2x}{x-6} \qquad x \neq 6$$

(a) Find **f(10)**

(1 mark)

_____

**(continued on the next page)**

14. continued.

Remember:

The function $f$ is defined as

$$f : x \longmapsto \frac{2x}{x-6} \qquad x \neq 6$$

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

(3 marks)

Answer space continues on the next page.

**14. (b) continued.**

$$f^{-1} : x \longmapsto \underline{\hspace{3cm}}$$

**(Total for Question 14 is 4 marks)**

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.

**15.  continued.**

**15.  continued.**

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

**Turn over**

16.  **Without using a calculator, show that**

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

**Show your working clearly.**

**(3 marks)**

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

**16.** **continued.**

**16. continued.**

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

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.

**17.  continued.**

**17.** **continued.**

_____ metres

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

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

 It is NOT accurately drawn.

 It shows triangle **ABC**

 **AB = 9·7** metres

 **BC = 12·3** metres

 Angle **ABC = 115°**

 Angle **BCA = x°**

 **Work out the value of x**

 Give your answer correct to

 **3** significant figures.

 (5 marks)

 Answer space is on the next two pages.

**18.** **continued.**

**18.**  **continued.**

x = _____

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

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** $= 45°$

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.

**19. continued.**

**19. continued.**

**19.  continued.**

**r = _____**

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

**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)

**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)

**20.** **continued**

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

**(1 mark)**

( _____ , _____ )

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

**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)

**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.

**21. continued.**

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

**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 **580π cm$^2$**

The volume of the solid is **kπ cm$^3$**

Work out the exact value of **k**

(5 marks)

Answer space is on the next three pages.

**22. continued.**

**22.** **continued.**

**22.  continued.**

k = _____

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

**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.**

**23.** **continued.**

**23.  continued.**

**23.  continued.**

**23.  continued.**

n = _____

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

**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.**

**24.** **continued.**

**24.** **continued.**

a = _____

b = _____

c = _____

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

**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**