

Paper Reference 4MA1/2H
Pearson Edexcel
International GCSE

Total Marks

Mathematics A
PAPER 2H
Higher Tier
(Calculator)

Friday 10 November 2023 – Morning

Time: 2 hours

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

Surname					
Other names					
Centre Number					
Candidate Number					

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 three models for Question 23
They are NOT accurate.**

**You may be provided with a cutout shape for
Question 3(a)
It is accurate.**

**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. Look at the table for Question 1 in the Diagram Booklet.**

It shows information about the lengths, in minutes, of 50 telephone calls.

- (a) Write down the modal class.**

(1 mark)

(continued on the next page)

1. continued.

(b) Work out an estimate for the total length, in minutes, of these telephone calls.

(3 marks)

_____ minutes

(Total for Question 1 is 4 marks)

2. Look at the diagram for Question 2 in the Diagram Booklet.

It is NOT accurately drawn.

It shows triangle **ABC** and triangle **ECD**

ACD and **EBC** are straight lines.

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

$$AC = 8 \text{ cm}$$

$$EB = 5 \text{ cm}$$

$$CD = 14 \text{ cm}$$

$$ED = w \text{ cm}$$

Angle **ECD** is a right angle.

Work out the value of **w**

Give your answer correct to one decimal place.

(4 marks)

Answer space continues on the next two pages.

2. continued.

2. continued.

w = _____

(Total for Question 2 is 4 marks)

3. (a) Look at the diagram for Question 3(a) in the Diagram Booklet.

It shows shape **T** on a grid.

Reflect shape **T** in the line $y = x$

A cutout shape may be available if you wish to use it.

(2 marks)

- (b) Look at the diagram for Question 3(b) in the Diagram Booklet.

It shows triangle **A** and triangle **B** on a grid.

Describe fully the single transformation that maps triangle **A** onto triangle **B**

(3 marks)

(Total for Question 3 is 5 marks)

4. (a) Solve

$$\frac{2t + 5}{6} = 2t - 5$$

Show clear algebraic working.

(3 marks)

$t =$ _____

(continued on the next page)

4. continued.

(b) Simplify

$$p^{15} \div p^3$$

(1 mark)

(c) Simplify fully

$$(2m^3q^5)^4$$

(2 marks)

(continued on the next page)

4. continued.

(d) Given that

$$\frac{y^5 \times y^n}{y^7} = y^{12}$$

work out the value of n

(2 marks)

$n =$ _____

(Total for Question 4 is 8 marks)

5. Avril bakes a cake.

She uses flour, butter and sugar such that

weight of flour : weight of butter = 6 : 5

weight of butter : weight of sugar = 3 : 2

Avril uses 120 grams of sugar.

Work out the weight of flour Avril uses.

(3 marks)

Answer space continues on the next page.

5. continued.

_____ grams

(Total for Question 5 is 3 marks)

6. Show that

$$3\frac{3}{7} \div 2\frac{2}{3} = 1\frac{2}{7}$$

(3 marks)

Answer space continues on the next page.

6. continued.

(Total for Question 6 is 3 marks)

7. Hermione buys a boat for \$26 800

The value of the boat depreciates by 8% each year.

Work out the value of the boat at the end of 3 years.

Give your answer correct to the nearest dollar.

\$ _____

(Total for Question 7 is 3 marks)

8. The mean number of goals scored by a hockey team in 8 matches is 6

The team plays 2 more matches and scores k goals in each match.

The mean number of goals scored by the hockey team in the 10 matches is 7

Work out the value of k

(3 marks)

Answer space continues on the next page.

8. continued.

$k =$ _____

(Total for Question 8 is 3 marks)

9. A straight line passes through the points with coordinates $(0, -3)$ and $(2, 0)$

Find an equation of the line.

(Total for Question 9 is 2 marks)

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

It is NOT accurately drawn.

It shows a hexagon **ABCDEF**

$$AB = 25 \text{ cm}$$

$$BC = (y + 2) \text{ cm}$$

$$CD = 8 \text{ cm}$$

$$EF = 7 \text{ cm}$$

$$AF = (y + 6) \text{ cm}$$

All the marked angles are right angles.

The area of hexagon **ABCDEF** is 258 cm^2

Work out the value of **y**

(5 marks)

Answer space continues on the next page.

10. continued.

$y =$ _____

(Total for Question 10 is 5 marks)

- 11. Look at the diagram for Question 11 in the Diagram Booklet.**

It shows an incomplete probability tree diagram.

Sid has 2 boxes of crayons, box X and box Y

5 of the 16 crayons in box X are red.

7 of the 20 crayons in box Y are red.

Sid takes at random one crayon from box X and one crayon from box Y

- (a) Complete the probability tree diagram in the Diagram Booklet.**

There are five spaces to fill.

(2 marks)

- (b) Work out the probability that Sid takes two crayons that are red or two crayons that are not red.**

(3 marks)

Answer space continues on the next page.

11. (b) continued.

(Total for Question 11 is 5 marks)

12. (a) Calculate the value of X when

$$2^7 \times 4^5 = 4^x$$

(2 marks)

x = _____

(continued on the next page)

12. continued.

(b) Simplify fully

$$\left(125p^6y^{24}\right)^{\frac{2}{3}}$$

(2 marks)

(Total for Question 12 is 4 marks)

13. Robert asked 11 people how many meetings they attended last week.

Here are the results in numerical order.

1	2	4	6	6	8
11	12	13	14	17	

Find the interquartile range of the number of meetings.

(2 marks)

Answer space continues on the next page.

13. continued.

(Total for Question 13 is 2 marks)

14. Look at the diagram for Question 14 in the Diagram Booklet.

It is the graph of the equation $2y + x = 1$ drawn on a grid.

By drawing another straight line on the grid, solve the simultaneous equations

$$y - x - 2 = 0$$

$$2y + x = 1$$

$$x = \underline{\hspace{4cm}}$$

$$y = \underline{\hspace{4cm}}$$

(Total for Question 14 is 3 marks)

15. (a) Use algebra to show that $0.3\dot{7}\dot{2} = \frac{41}{110}$
(2 marks)

Answer space continues on the next page.

15. (a) continued.

(continued on the next page)

15. continued.

(b) Express

$$\frac{\sqrt{125} + \sqrt{80}}{\sqrt{3}}$$

in the form \sqrt{n} where n is an integer.

Show your working clearly.

(3 marks)

Answer space continues on the next page.

15. (b) continued.

(Total for Question 15 is 5 marks)

16. Expand and simplify

$$(2y + 3)(y - 5)(y + 4)$$

(Total for Question 16 is 3 marks)

17. $P = t(m + y)$

$t = 8.3$ correct to 2 significant figures

$m = 2$ correct to 1 significant figure

$y = 15$ correct to the nearest 5

Work out the upper bound for the value of P

Show your working clearly.

(3 marks)

Answer space continues on the next page.

17. continued.

(Total for Question 17 is 3 marks)

18. A particle is moving along a straight line that passes through the fixed point O

The displacement, s metres, of the particle from O at time t seconds is given by

$$s = 2t^3 - 5t^2 + 6t - 5$$

Find the value of t when the acceleration of the particle is 5 m/s^2

(4 marks)

Answer space continues on the next two pages.

18. continued.

18. continued.

$t =$ _____

(Total for Question 18 is 4 marks)

19. The functions **f** and **g** are such that

$$f:x \mapsto 5x + 7$$

$$g:x \mapsto \frac{5}{2x - 9}$$

- (a) State which value of **x** cannot be included in any domain of **g**
(1 mark)

- (b) Find **fg(4)**
(2 marks)

(continued on the next page)

19. continued.

The function h is such that

$$h : x \mapsto 3x^2 - 12x + 8 \quad \text{where } x > 2$$

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

(4 marks)

Answer space continues on the next page.

19. (c) continued.

$$h^{-1}:x \mapsto \underline{\hspace{10cm}}$$

(Total for Question 19 is 7 marks)

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

It is NOT accurately drawn.

It shows equilateral triangle ABC with sides of length 10 cm

A circle is drawn inside the triangle.

D , E and F are points on the circle.

ADB , BEC and CFA are tangents to the circle.

Calculate the total area of the regions shown shaded in the diagram.

Give your answer correct to 3 significant figures.

(4 marks)

Answer space continues on the next page.

20. continued.

_____ cm^2

(Total for Question 20 is 4 marks)

Turn over

21. The line with equation

$x + 2y = 5$ intersects the curve with equation
 $x^2 + 3y^2 = 13$ at the points **A** and **B**

Find the coordinates of **A** and the coordinates of **B**

Show clear algebraic working.

(5 marks)

Answer space continues on the next two pages.

21. continued.

21. continued.

(_____ , _____)

(_____ , _____)

(Total for Question 21 is 5 marks)

22. Look at the diagram for Question 22 in the Diagram Booklet.

It shows a quadrilateral **OACB**

$$\overrightarrow{OA} = 3\underline{a}$$

$$\overrightarrow{OB} = 4\underline{b}$$

$$\overrightarrow{BC} = 2\underline{a} - 2\underline{b}$$

- (a) (i) Find the vector \overrightarrow{OC} in terms of \underline{a} and \underline{b}
Simplify your answer.

(1 mark)

$$\overrightarrow{OC} = \underline{\hspace{2cm}}$$

(continued on the next page)

22. (a) continued.

- (ii) Find the vector \overrightarrow{AB} in terms of \underline{a} and \underline{b}
(1 mark)

$$\overrightarrow{AB} = \underline{\hspace{2cm}}$$

(continued on the next page)

22. continued.

The point **P** lies on **AB** and on **OC**

(b) Using a vector method, find the ratio $AP : PB$

Show your working clearly.

(3 marks)

Answer space continues on the next two pages.

22. (b) continued.

22. (b) continued.

(Total for Question 22 is 5 marks)

23. Look at Diagram 1 and Diagram 2 for Question 23 in the Diagram Booklet.

You may be provided with three models.

They are NOT accurate.

They show a frustum of a cone.

Diagram 1 shows a 3D view of the frustum.

Diagram 2 shows a 2D view of the frustum.

The frustum is made by removing a small cone from a similar large cone, as shown by the diagrams and the models.

The height of the large cone is 15 cm

The radius of the base of the large cone is 6 cm

The radius of the base of the small cone is x cm

(continued on the next page)

23. continued.

Given that the volume of the frustum is

$$\frac{4212}{25} \pi \text{ cm}^3$$

work out the value of x

Show clear algebraic working.

(5 marks)

Answer space continues on the next two pages.

23. continued.

23. continued.

x = _____

(Total for Question 23 is 5 marks)

24. Solve

$$\frac{45y^3 - 80y}{3y^2 + y - 4} \times \left(\frac{1}{3y - 4} + \frac{1}{y} \right) = \frac{4(y + 2)}{5y - 8}$$

Show clear algebraic working.

(5 marks)

Answer space continues on the next two pages.

24. continued.

24. continued.

x = _____

(Total for Question 24 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

END OF PAPER
