Paper Reference 4MA1/2HR
Pearson Edexcel
International GCSE

Total Marks

Mathematics A

PAPER: 2HR

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					

Y68791A

Pearson

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.

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

You may be provided with models for Question 24

ADVICE

Read each question carefully before you start to answer it.

Check your answers if you have time at the end.

Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Look at the diagram for Question 1 in the Diagram Booklet.

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

   (3 marks)

(continued on the next page)

1. continued.

(b) Describe fully the single transformation that maps triangle **A** onto triangle **C**

(1 mark)

(Total for Question 1 is 4 marks)

2. Write 1200 as a product of powers of its prime factors.

Show your working clearly.

(3 marks)

Answer space continues on the next two pages.

2. continued.

2. continued.

(Total for Question 2 is 3 marks)

3. Alberto, Bill, Candela and Diana are four friends.

Here is some information about the height of each of these friends.

Alberto's height is 158 cm

Bill's height is 175 cm

Candela's height is greater than Diana's height.

The median height of these four friends is 160 cm

The range of the heights of these four friends is 21 cm

(continued on the next page)

3. continued.

Work out Candela's height and Diana's height.

(3 marks)

Answer space continues on the next page.

3. continued.

Candela _____ cm

Diana _____ cm

(Total for Question 3 is 3 marks)

4. $\mathscr{E}$ = {9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20}

A = {multiples of 3}

B = {odd numbers}

(a) List the members of the set

(i) $A \cap B$

(1 mark)

(continued on the next page)

4. (a) continued.

Remember:

$\mathscr{E} = \{9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$

$A = \{\text{multiples of } 3\}$

$B = \{\text{odd numbers}\}$

List the members of the set

(ii) $A \cup B$

(1 mark)

(continued on the next page)

4. continued.

(b) Is it true that $24 \in A$?

Mark one of the boxes below.

Yes ☐

No ☐

Give a reason for your answer.

(1 mark)

_____

_____

_____

(continued on the next page)

4. continued.

Set C has 4 members such that

$$C \cap B' = \{10, 18\}$$

(c) List the members of one possible set C

(2 marks)

Answer space continues on the next page.

4. (c) continued.

(Total for Question 4 is 5 marks)

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

It is NOT accurately drawn.

The diagram shows a shape made from a square **ABCD** and **4** identical semicircles.

As shown in the diagram, the semicircles have **AB**, **BC**, **CD** and **DA** as diameters.

The area of the square is **36 cm^2**

(continued on the next page)

5. continued.

Calculate the total area of the shape.

Give your answer correct to

one decimal place.

(4 marks)

Answer space continues on the next

two pages.

5. continued.

5. continued.

_____ cm^2

(Total for Question 5 is 4 marks)

6. (a) Solve

$$p = \frac{3p - 5}{10}$$

Show clear algebraic working.

(3 marks)

Answer space continues on the next page.

6. (a) continued.

$p =$ _____

(continued on the next page)

6. continued.

(b) Simplify a^0 where $a > 0$

(1 mark)

(continued on the next page)

6. continued.

(c) Simplify fully

$$\frac{3ef^3}{6e^2f}$$

(2 marks)

(continued on the next page)

6. continued.

(d) Factorise fully

$$10c^3d^2 + 15cd^4$$

(2 marks)

(Total for Question 6 is 8 marks)

7. $\frac{2^k}{4^n} = 2^x$

Find an expression for x in terms of k and n

(2 marks)

Answer space continues on the next page.

7. continued.

$x =$ _____

(Total for Question 7 is 2 marks)

8. A cinema increased the cost of an adult ticket by 12%

After the increase, the cost of an adult ticket was £18·20

Work out the cost of an adult ticket before the increase.

(3 marks)

Answer space continues on the next page.

8. continued.

£_____

(Total for Question 8 is 3 marks)

9. Look at the table for Question 9 in the Diagram Booklet.

The table gives information about the population, correct to 2 significant figures, of each of five cities in 2018

(a) Write $8 \cdot 8 \times 10^6$ as an ordinary number.

(1 mark)

(continued on the next page)

9. continued.

(b) Which of these cities had the least population in 2018?

(1 mark)

(continued on the next page)

9. continued.

(c) Work out the difference between the population of Tokyo and the population of Ahmedabad in 2018

Give your answer in standard form correct to 2 significant figures.

(2 marks)

Answer space continues on the next page.

9. (c) continued.

(Total for Question 9 is 4 marks)

10. Look at the diagram for Question 10
in the Diagram Booklet.
It is NOT accurately drawn.
The diagram shows triangle ABP
inside the regular hexagon ABCDEF

AB = 5 cm
BP = 2 cm
Angle ABP = 90°

Work out the size of angle PAF
Give your answer correct to
3 significant figures.
(5 marks)
Answer space is on the next
two pages.

10. continued.

10. continued.

_____ °

(Total for Question 10 is 5 marks)

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

It shows a blank grid.

(continued on the next page)

11. continued.

The cumulative frequency table below shows information about the ages of 60 people who went to a gym on Saturday.

Age (a years)	Cumulative frequency
$10 < a \leq 20$	12
$10 < a \leq 30$	36
$10 < a \leq 40$	44
$10 < a \leq 50$	48
$10 < a \leq 60$	52
$10 < a \leq 70$	56
$10 < a \leq 80$	60

(continued on the next page)

11. continued.

(a) On the grid in the Diagram Booklet, draw a cumulative frequency graph for the information in the table. (2 marks)

(continued on the next page)

11. continued.

(b) Use your graph to find an estimate for the median of the ages of these people.

(1 mark)

_____ years

(continued on the next page)

11. continued.

(c) Use your graph to find an estimate for the interquartile range of the ages of these people.

(2 marks)

Answer space continues on the next page.

11. (c) continued.

_____ years

(continued on the next page)

11. continued.

(d) Use your graph to find an estimate for the number of these people who are older than **55** years.

(2 marks)

Answer space continues on the next page.

11. (d) continued.

(Total for Question 11 is 7 marks)

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

It is NOT accurately drawn.

ACE and **BCD** are straight lines.

AB is parallel to **DE**

Work out the value of **x**

(3 marks)

Answer space continues on the next page.

12. continued.

$x =$ _____

(Total for Question 12 is 3 marks)

13. Look at the diagram for Question 13 in the Diagram Booklet.

It is NOT accurately drawn.

The diagram shows a sector AOB of a circle with centre O

Angle AOB = 67°

OA = OB = 5·2 cm

Calculate the perimeter of the sector.

Give your answer correct to 3 significant figures.

(3 marks)

Answer space continues on the next page.

13. continued.

_____ cm

(Total for Question 13 is 3 marks)

14. Ciara throws FOUR fair six–sided dice.

The faces of each dice are labelled with the numbers 1, 2, 3, 4, 5, 6

Work out the probability that at least one of the dice lands on an even number.

(3 marks)

Answer space continues on the next three pages.

14. continued.

14. continued.

14. continued.

(Total for Question 14 is 3 marks)

15. Look at the diagram for Question 15 in the Diagram Booklet.

It is NOT accurately drawn.

The diagram shows a kite ABCD

AB = 6 cm

BC = 11 cm

Angle ABC = 118°

Calculate the area of the kite.

Give your answer correct to 3 significant figures.

(3 marks)

Answer space continues on the next two pages.

15. continued.

15. continued.

_____ cm^2

(Total for Question 15 is 3 marks)

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

It shows nine graphs.

(continued on the next page)

16. continued.

Complete the table below with the letter of the graph that could represent each given equation.

Write each answer on the answer line.

Equation	Graph
$y = -2x + 3$	_____
$y = -\frac{1}{x}$	_____
$y = \tan x°$	_____
$y = (x + 1)(x - 1)(x - 2)$	_____

(Total for Question 16 is 3 marks)

17. Use algebra to show that

$$0\cdot 3\dot{4}\dot{5} = \frac{19}{55}$$

(2 marks)

Answer space continues on the next page.

17. continued.

(Total for Question 17 is 2 marks)

18. Kaidan and Sonja went on two different car journeys.

For Kaidan's journey

distance = 80 km correct to the nearest 5 km

time = 2·7 hours correct to 1 decimal place

For Sonja's journey

distance = 33 km correct to 2 significant figures

time = 1 hour correct to the nearest 0·1 hour

(continued on the next page)

18. continued.

Kaidan says,

“My average speed could have been greater than Sonja’s average speed.”

By considering bounds, show that Kaidan is correct.

Show your working clearly.

(4 marks)

Answer space continues on the next two pages.

18. continued.

18. continued.

(Total for Question 18 is 4 marks)

19. $f(x) = x^2 - 4$

$g(x) = 2x + 1$

Solve $fg(x) > 0$

Show clear algebraic working.

(4 marks)

Answer space continues on the next two pages.

19. continued.

19. continued.

(Total for Question 19 is 4 marks)

20. The centre O of a circle has coordinates $(4, 7)$

The point A, on the circle, has coordinates $(6, 11)$ and AOP is a diameter of the circle.

Find an equation of the tangent to the circle at the point P

(4 marks)

Answer space continues on the next three pages.

20. continued.

20. continued.

20. continued.

(Total for Question 20 is 4 marks)

21. Solve the simultaneous equations

$$x - 2y = 3$$
$$x^2 - y^2 + 2x = 10$$

Show clear algebraic working.

(5 marks)

Answer space continues on the next three pages.

21. continued.

21. continued.

21. continued.

(Total for Question 21 is 5 marks)

22. The point A with coordinates $(-3, 2)$ lies on the straight line with equation $y = f(x)$

(a) Find the coordinates of the image of the point A on the straight line with equation

(i) $y = f(x) - 3$

(1 mark)

(_____ , _____)

(continued on the next page)

22. (a) continued.

Find the coordinates of the image of the point A on the straight line with equation

(ii) $y = f\left(\frac{x}{2}\right)$

(1 mark)

(_____ , _____)

(continued on the next page)

22. continued.

Look at the diagram for Question 22(b) in the Diagram Booklet.

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

The point B with coordinates (p, q) lies on the curve.

(continued on the next page)

22. continued.

(b) Find the coordinates of the image of the point B on the curve with equation

$$y = -g(x - c)$$

where c is a constant.

(2 marks)

Answer space continues on the next page.

22. (b) continued.

(_____ , _____)

(Total for Question 22 is 4 marks)

23. Express

$$\left(\frac{20}{y^2 - 36} - \frac{2}{y - 6}\right) \times \frac{1}{4 - y}$$

as a single fraction in its simplest form.

(3 marks)

Answer space continues on the next two pages.

23. continued.

23. continued.

(Total for Question 23 is 3 marks)

24. Look at the models provided and Diagram 1 and 2 for Question 24 in the Diagram Booklet.

They are NOT accurate.

The models show a frustum of a cone, a sphere and a small cone.

Diagram 1 shows Solid **A** and Diagram 2 shows solid **B**

The small cone can be added to the frustum to form a large cone.

The small cone and the large cone are similar.

(continued on the next page)

24. continued.

The height of the small cone is h cm and the radius of the base of the small cone is r cm

The height of the large cone is kh cm and the radius of the base of the large cone is kr cm

The radius of the sphere is r cm

The sphere is divided into two hemispheres, each of radius r cm

(continued on the next page)

24. continued.

Solid **A** is formed by joining one of the hemispheres to the frustum. The plane face of the hemisphere coincides with the upper plane face of the frustum, as shown in Diagram 1 in the Diagram Booklet. The frustum has been shaded.

(continued on the next page)

24. continued.

Solid **B** is formed by joining the other hemisphere to the small cone that was removed from the large cone. The plane face of the hemisphere coincides with the plane face of the base of the small cone, as shown in Diagram 2 in the Diagram Booklet.

The volume of solid **A** is **6** times the volume of solid **B**

(continued on the next page)

24. continued.

Given that $k > \sqrt[3]{7}$

find an expression for h in terms of k and r

(6 marks)

Answer space continues on the next four pages.

24. continued.

24. continued.

24. continued.

24. continued.

h = _____

(Total for Question 24 is 6 marks)

25. Look at the diagram for Question 25 in the Diagram Booklet.

It is NOT accurately drawn.

It shows a shape **ABCD**

ABCD is a parallelogram and **ADM** is a straight line.

$\overrightarrow{AB} = \underline{a}$

$\overrightarrow{BC} = \underline{b}$

$\overrightarrow{DM} = \frac{1}{2}\underline{b}$

(continued on the next page)

25. continued.

K is the point on AB such that

$AK : AB = \lambda : 1$

L is the point on CD such that

$CL : CD = \mu : 1$

KLM is a straight line.

Given that $\lambda : \mu = 1 : 2$

use a vector method to find the value of λ and the value of μ

(5 marks)

Answer space continues on the next two pages.

25. continued.

25. continued.

$\lambda =$ _____

$\mu =$ _____

(Total for Question 25 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

END OF PAPER