

Paper Reference 4MA1/2HR
Pearson Edexcel
International GCSE

Total Marks

Mathematics A
Level 1/2
Paper 2HR
(Calculator)
Higher Tier

Thursday 6 June 2019 – Morning

Time: 2 hours plus your additional time allowance.

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 Book
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 a model for Question 23

There may be spare copies of some diagrams.

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. (a) Look at the diagram for Question 1(a) in the Diagram Book.**

Write down the inequality shown on the number line.

(1 mark)

(continued on the next page)

1. continued.

(b) Solve the inequality

$$4y - 13 \leq y + 8$$

(2 marks)

(Total for Question 1 is 3 marks)

Turn over

2. Show that

$$5\frac{2}{3} - 2\frac{3}{4} = 2\frac{11}{12}$$

(3 marks)

Answer space continues on the next page.

2. continued.

(Total for Question 2 is 3 marks)

Turn over

3. (a) Complete the table of values on the next page for

$$y = 1 + 5x - x^2$$

There are four spaces to fill.

(2 marks)

(continued on the next page)

3. (a) continued.

x	y
-1	
0	1
1	
2	7
3	7
4	
5	1
6	

(continued on the next page)

Turn over

3. continued.

**(b) Look at the diagram for
Question 3(b) in the
Diagram Book.**

**On the grid, draw the graph of
 $y = 1 + 5x - x^2$ for values of
 x from -1 to 6
(2 marks)**

(Total for Question 3 is 4 marks)

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

It is NOT accurately drawn.

ABC and **DEF** are similar triangles.

$$AB = 12 \text{ cm}$$

$$BC = 16 \text{ cm}$$

$$EF = 40 \text{ cm}$$

$$\text{Angle } ABC = \text{Angle } DEF$$

$$\text{Angle } BAC = \text{Angle } EDF$$

$$\text{Angle } ACB = \text{Angle } DFE$$

(continued on the next page)

4. continued.

(a) Work out the length of DE
(2 marks)

_____ **cm**

(continued on the next page)

Turn over

4. continued.

The area of triangle DEF is 525 cm^2

**(b) Find the area of triangle DEF
in m^2**

(2 marks)

_____ m^2

(Total for Question 4 is 4 marks)

Turn over

5. Factorise

$$x^2 - 5x - 36$$

(Total for Question 5 is 2 marks)

Turn over

6. Look at the table for Question 6 in the Diagram Book.

There are some ice lollies in a freezer.

The flavour of each ice lolly is banana or strawberry or mint or chocolate.

Julius takes at random an ice lolly from the freezer.

The table shows the probabilities that the flavour of the ice lolly that Julius takes is banana or strawberry or chocolate.

(continued on the next page)

Turn over

6. continued.

Work out the probability that the flavour of the ice lolly that Julius takes is either strawberry or mint.

(3 marks)

Answer space continues on the next page.

6. continued.

(Total for Question 6 is 3 marks)

Turn over

- 7. A football team played 55 games.
Each game was won, drawn or lost.**

**number of games won : number of games
drawn : number of games lost = 6 : 3 : 2**

**Work out how many more games the
team won than the team lost.**

(3 marks)

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

7. continued.

(Total for Question 7 is 3 marks)

Turn over

8.

$$A = 3^2 \times 5^4 \times 7$$

$$B = 3^4 \times 5^3 \times 7 \times 11$$

- (a) Find the highest common factor (HCF) of **A** and **B**
(2 marks)

Answer space continues on the next page.

8. (a) continued.

(continued on the next page)

Turn over

8. continued.

Remember:

$$\mathbf{A = 3^2 \times 5^4 \times 7}$$

$$\mathbf{B = 3^4 \times 5^3 \times 7 \times 11}$$

**(b) Find the lowest common multiple
(LCM) of *A* and *B***

(2 marks)

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

8. (b) continued.

(Total for Question 8 is 4 marks)

9. (a) Write

840 000 in standard form.

(1 mark)

(continued on the next page)

Turn over

9. continued.

(b) Work out

$$(6 \times 10^7) \div (8 \times 10^{-2})$$

Give your answer in standard form.

(2 marks)

(Total for Question 9 is 3 marks)

Turn over

10. Henri buys a yacht for 150 000 euros.

The yacht depreciates in value by 18% each year.

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

Give your answer correct to the nearest euro.

(3 marks)

Answer space continues on the next page.

10. continued.

_____ **euros**

(Total for Question 10 is 3 marks)

Turn over

**11. Look at the diagram for Question 11
in the Diagram Book.**

Line L is drawn on the grid.

Find an equation for L

(Total for Question 11 is 3 marks)

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

It is NOT accurately drawn.

Triangle ABD and triangle CBD are joined to make triangle ABC

$BC = 3.1$ metres

Angle ABD = 42°

Angle BCD = 32°

Angle ADB and BDC are right angles.

(continued on the next page)

12. continued.

Calculate the length of AB

Show your working clearly.

Give your answer correct to

3 significant figures.

(5 marks)

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

Turn over

12. continued.

Turn over

12. continued.

_____ metres

(Total for Question 12 is 5 marks)

Turn over

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

It shows a grid.

Sandeep recorded the length of time, in minutes, that each of 100 adults went for a walk one Saturday afternoon.

The cumulative frequency table on the next page gives information about these times.

(continued on the next page)

13. continued.

Time (t minutes)	Cumulative frequency
$30 < t \leq 40$	10
$30 < t \leq 50$	20
$30 < t \leq 60$	50
$30 < t \leq 70$	80
$30 < t \leq 80$	90
$30 < t \leq 90$	100

(continued on the next page)

Turn over

13. continued.

**(a) On the grid in the Diagram Book,
draw a cumulative frequency
graph for the information in the
table.**

(2 marks)

(continued on the next page)

13. continued.

(b) Use your graph to find an estimate for the median length of time that these adults went for a walk.

(2 marks)

_____ minutes

(continued on the next page)

Turn over

13. continued.

One of the 100 adults is chosen at random.

(c) Use your graph to find an estimate for the probability that this adult went for a walk for more than 70 minutes.

(3 marks)

Answer space continues on the next page.

Turn over

13. (c) continued.

(Total for Question 13 is 7 marks)

Turn over

14. (a) Simplify fully

$$(x^{12}y^8)^{\frac{3}{4}}$$

(2 marks)

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

14. (a) continued.

(continued on the next page)

14. continued.

Given that

$$3^n = \frac{3^x}{9^y}$$

- (b) find an expression for n in terms of x and y**
(2 marks)

Answer space continues on the next page.

14. (b) continued.

n = _____

(Total for Question 14 is 4 marks)

Turn over

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

It is NOT accurately drawn.

A, B, C and D are points on a circle, centre O

AOC is a diameter of the circle.

Angle AOD = 98°

Work out the size of angle DBC

Give a reason for each stage in your working.

(4 marks)

Answer space is on the next two pages.

Turn over

15. continued.

Turn over

15. continued.

○

(Total for Question 15 is 4 marks)

Turn over

16. Look at the table for Question 16 in the Diagram Book.

It gives values of x and y where y is inversely proportional to the square of x

(a) Find a formula for y in terms of x

(3 marks)

Answer space continues on the next page.

16. (a) continued.

(continued on the next page)

Turn over

16. continued.

Given that $x > 0$

(b) find the value of x when

$$y = 144$$

(2 marks)

(Total for Question 16 is 5 marks)

Turn over

17. Look at the table for Question 17 in the Diagram Book.

It gives information about the first six terms of a sequence of numbers.

Prove algebraically that the sum of any two consecutive terms of this sequence is always a square number.

(4 marks)

Answer space continues on the next three pages.

17. continued.

Turn over

17. continued.

Turn over

17. continued.

(Total for Question 17 is 4 marks)

Turn over

18. The functions **f** and **g** are defined as

$$f(x) = \frac{x}{4x-3} \quad \text{and} \quad g(x) = x - 5$$

- (a) State which value of **x** must be excluded from any domain of the function **f**
(1 mark)
-

(continued on the next page)

18. continued.

(b) Find $fg(x)$

Simplify your answer.

(2 marks)

$fg(x) =$ _____

(continued on the next page)

Turn over

18. continued.

**(c) Express the inverse function f^{-1}
in the form $f^{-1}(x) = \dots$**

(3 marks)

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

18. (c) continued.

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

(continued on the next page)

Turn over

18. continued.

Look at the diagram for Question 18(d) in the Diagram Book.

Part of the curve with equation $y = h(x)$ is shown on the grid.

- (d) Find an estimate for the gradient of the curve at the point where $x = -0.5$**

Show your working clearly.

(3 marks)

Answer space continues on the next two pages.

18. (d) continued.

Turn over

18. (d) continued.

(Total for Question 18 is 9 marks)

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

It is NOT accurately drawn.

It shows a sector OAPB of a circle, centre O

AB is a chord of the circle.

Angle AOB = 80°

The area of sector OAPB is
 $\frac{25}{2} \pi \text{ cm}^2$

Work out the perimeter of the shaded segment.

Give your answer correct to
3 significant figures.

(6 marks)

Answer space is on the next two
pages.

Turn over

19. continued.

Turn over

19. continued.

_____ **cm**

(Total for Question 19 is 6 marks)

Turn over

20.

$$x = \frac{6a}{b - a}$$

$a = 3.46$ correct to

3 significant figures.

$b = 6.3$ correct to 1 decimal place.

Work out the upper bound for the value of x

Give your answer as a decimal correct to 3 significant figures.

Show your working clearly.

(3 marks)

Answer space is on the next two pages.

Turn over

20. continued.

Turn over

20. continued.

(Total for Question 20 is 3 marks)

Turn over

21. Look at the diagram for Question 21 in the Diagram Book.

It is NOT accurately drawn.

It shows two similar bottles, A and B

Bottle A has surface area 240 cm^2

**Bottle B has surface area 540 cm^2
and volume 2025 cm^3**

Work out the volume of bottle A

(3 marks)

Answer space continues on the next page.

21. continued.

_____ **cm³**

(Total for Question 21 is 3 marks)

Turn over

22. Write

**$5 + 12y - 2y^2$ in the form
 $a + b(y + c)^2$ where a , b and c
are integers.**

(4 marks)

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

22. continued.

(Total for Question 22 is 4 marks)

Turn over

23. Look at the diagrams for Question 23 in the Diagram Book.

You may be provided with a model.

They are not accurate.

Diagram 1 and the model show a solid pyramid $ABCDE$ with a horizontal base.

The base, $BCDE$, of the pyramid is a square of side 10 cm as shown in Diagram 1a

The pyramid has four triangular faces, ABC , ACD , ADE and AEB . Face ACD is shown in Diagram 1b

(continued on the next page)

Turn over

23. continued.

The vertex A of the pyramid is vertically above the centre O of the base so that $AB = AC = AD = AE$

Diagram 1c shows the triangle AOC

The TOTAL surface area of the pyramid is 360 cm^2

Work out the size of the angle between AC and the base $BCDE$

Give your answer correct to 3 significant figures.

(6 marks)

Answer space is on the next four pages.

Turn over

23. continued.

Turn over

23. continued.

Turn over

23. continued.

Turn over

23. continued.

○

(Total for Question 23 is 6 marks)

Turn over

24. A box contains marbles.

4 of the marbles are red.

The rest of the marbles are yellow.

**Antonia takes at random a marble
from the box and does not replace it.**

**Sergio then takes at random a marble
from the box.**

**The probability that Antonia and
Sergio both take a yellow marble is
 0.7**

(continued on the next page)

Turn over

24. continued.

Work out how many marbles were originally in the box.

Show your working clearly.

(5 marks)

Answer space continues on the next two pages.

24. continued.

Turn over

24. continued.

(Total for Question 24 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

END OF PAPER
