

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

Total Marks

**Mathematics A  
PAPER 1H  
Higher Tier  
(Calculator)**

**Time: 2 hours plus your additional time allowance**

**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**

**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 a model for Question 10.

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 questions.**

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

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

1. (a) Simplify

$$m^8 \div m^2$$

(1 mark)

---

(b) Expand and simplify

$$(y - 3)(y + 1)$$

(2 marks)

---

(Total for Question 1 is 3 marks)

---

Turn over

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

It is NOT accurately drawn.

It shows a right-angled triangle, **ABC**

$$AB = 30 \text{ cm}$$

$$AC = 52 \text{ cm}$$

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

Angle **ABC** is a right-angle.

Calculate the value of **h**

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

(3 marks)

Answer space continues on the next page.

2. continued.

**h =** \_\_\_\_\_

**(Total for Question 2 is 3 marks)**

---

3. There are **54** fish in a tank.

Some of the fish are white and the rest of the fish are red.

Jeevan takes at random a fish from the tank.

The probability that he takes a white fish is  $\frac{4}{9}$

(a) Work out the number of white fish originally in the tank.

(2 marks)

Answer space continues on the next page.

3. (a) continued.



(continued on the next page)

**3. continued.**

**Jeevan puts the fish he took out, back into the tank.  
He puts some more white fish into the tank.**

**Jeevan takes at random a fish from the tank.**

**The probability that he takes a white fish is now  $\frac{1}{2}$**

**(b) Work out the number of white fish Jeevan put  
into the tank.**

**(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 the front of a wooden door with a semicircular glass window.

The height of the door is 2 metres.

The width of the door is 0.75 metres.

The diameter of the semicircular glass window is 0.5 metres.

Julie wants to apply 2 coats of wood varnish to the front of the door, shown shaded in the diagram.

250 millilitres of wood varnish covers  $4 \text{ m}^2$  of the wood.

Work out how many millilitres of wood varnish Julie will need.

Give your answer correct to the nearest millilitre.

(5 marks)

Answer space is on the next page.

4. continued.

\_\_\_\_\_ millilitres

(Total for Question 4 is 5 marks)

---

Turn over

5. Look at Diagram 1 and Diagram 2 for Question 5 in the Diagram Booklet.

They are NOT accurate.

Yasmin has some identical rectangular tiles.

Each tile is  $L$  cm by  $W$  cm as shown in Diagram 1

Using 9 of her tiles, Yasmin makes rectangle **ABCD**, as shown in Diagram 2

The area of **ABCD** is  $1620 \text{ cm}^2$

Work out the value of  $L$  and the value of  $W$   
(5 marks)

Answer space continues on the next page.

5. continued.

L = \_\_\_\_\_ W = \_\_\_\_\_

(Total for Question 5 is 5 marks)

---

Turn over

6. Alison buys 5 apples and 3 pears for a total cost of \$1.96

Greg buys 3 apples and 2 pears for a total cost of \$1.22

Michael buys 10 apples and 10 pears.

Work out how much Michael pays for his 10 apples and 10 pears.

Show your working clearly.

(5 marks)

Answer space continues on the next page.

6. continued.

\$ \_\_\_\_\_

(Total for Question 6 is 5 marks)

---

7. Write  $3 \cdot 6 \times 10^3$  as a product of powers of its prime factors.

Show your working clearly.

---

(Total for Question 7 is 3 marks)

---

8. In 2018, the population of Sydney was 5.48 million.

This was 22% of the total population of Australia.

Work out the total population of Australia in 2018

Give your answer correct to 3 significant figures.

\_\_\_\_\_ million

(Total for Question 8 is 3 marks)

9. (i) Solve the inequalities

$$-7 \leq 2x - 3 < 5$$

(3 marks)

---

(ii) Look at the diagram for Question 9(ii) in the Diagram Booklet.

It shows a number line.

On the number line, represent the solution set to part (i)

(2 marks)

(Total for Question 9 is 5 marks)

---

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

You may be provided with a model.

They are NOT accurate.

A solid aluminium cylinder has radius 10 cm and height  $h$  cm

The mass of the cylinder is 5.4 kg

The density of aluminium is  $0.0027 \text{ kg/cm}^3$

Calculate the value of  $h$

Give your answer correct to one decimal place.

(5 marks)

Answer space continues on the next page.

10. continued.

$h =$  \_\_\_\_\_

(Total for Question 10 is 5 marks)

---

Turn over

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

It gives information about the times taken by 90 runners to complete a 10 km race.

- (a) Complete the cumulative frequency table below.  
There are five spaces to fill.  
(1 mark)

Time (t minutes)	Cumulative Frequency
$25 < t \leq 35$	10
$25 < t \leq 45$	
$25 < t \leq 55$	
$25 < t \leq 65$	
$25 < t \leq 75$	
$25 < t \leq 85$	

(continued on the next page)

Turn over

**11. continued.**

**(b) Look at the diagram for Question 11(b) in the Diagram Booklet.**

**On the grid in the Diagram Booklet, draw a cumulative frequency graph for your table.**

**(2 marks)**

**(continued on the next page)**

11. continued.

Any runner who completed the race in a time  $T$  minutes such that  $40 < T \leq 50$  minutes was awarded a silver medal.

(c) Use your graph to find an estimate for the number of runners who were awarded a silver medal.

(2 marks)

\_\_\_\_\_ runners

(Total for Question 11 is 5 marks)

---

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

**It is NOT accurately drawn.**

**It shows a vertical cliff with a vertical radio mast on top of the cliff and a buoy in the sea.**

**The height of the cliff is 100 metres.**

**The buoy is at the point **B** that is **d** metres from the base of the cliff, point **C****

**The angle of elevation from **B** to the top of the cliff is  $20^\circ$**

**(a) Calculate the value of **d****

**Give your answer correct to**

**3 significant figures.**

**(3 marks)**

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

12. (a) continued.

$d =$  \_\_\_\_\_

(continued on the next page)

12. continued.

The point **A** at the top of the radio mast is vertically above the top of the cliff.

The angle of elevation from **B** to **A** is  $25^\circ$

(b) Calculate the height of the radio mast.

Give your answer correct to

**3** significant figures.

(3 marks)

\_\_\_\_\_ metres

(Total for Question 12 is 6 marks)

---

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

It is NOT accurately drawn.

It shows a triangle  $XYZ$

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

$$\text{Angle } YXZ = 130^\circ$$

$$\text{Angle } XYZ = 25^\circ$$

The length  $XZ$  and the angles  $YXZ$  and  $XYZ$  are each given correct to 2 significant figures.

Calculate the upper bound for the length  $YZ$

Give your answer correct to one decimal place.

Show your working clearly.

(3 marks)

Answer space continues on the next page.

13. continued.

\_\_\_\_\_ cm

(Total for Question 13 is 3 marks)

---

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

It is NOT accurately drawn.

**ABCDEF** and **GHIJKL** are regular hexagons each with centre **O**

**GHIJKL** is an enlargement of **ABCDEF**, with centre **O** and scale factor 2

$$\vec{OA} = \underline{\mathbf{a}} \quad \vec{OB} = \underline{\mathbf{b}}$$

(a) Write the following vectors, in terms of **a** and **b**  
Simplify your answers.

(i)  $\vec{AB}$

(1 mark)

---

(continued on the next page)

Turn over

14. (a) continued.

Remember: **GHIJKL** is an enlargement of **ABCDEF**, with centre **O** and scale factor **2**

$$\overrightarrow{OA} = \underline{a} \quad \overrightarrow{OB} = \underline{b}$$

(ii)  $\overrightarrow{KI}$

(2 marks)

---

(continued on the next page)

14. (a) continued.

Remember: **GHIJKL** is an enlargement of **ABCDEF**, with centre **O** and scale factor **2**

$$\overrightarrow{OA} = \underline{a} \quad \overrightarrow{OB} = \underline{b}$$

(iii)  $\overrightarrow{LD}$

(2 marks)

---

(continued on the next page)

14. continued.

Remember: **GHIJKL** is an enlargement of **ABCDEF**, with centre **O** and scale factor **2**  
The triangle **OAB** has an area of **5 cm<sup>2</sup>**

(b) Calculate the area of the shaded region.  
(3 marks)

\_\_\_\_\_ cm<sup>2</sup>

(Total for Question 14 is 8 marks)

---

Turn over

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

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

**Magnus and Garry play 2 games of chess against each other.**

**The probability that Magnus beats Garry in any game is  $\frac{2}{9}$**

**The probability that any game between Magnus and Garry is drawn is  $\frac{4}{9}$**

**The result of any game is independent of the result of any other game.**

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

**There are ten spaces to fill.**

**(2 marks)**

**(continued on the next page)**

15. continued.

For each game of chess,

the winner gets **2** points and the loser gets  
**0** points,

when the game is drawn, each player gets **1** point.

(b) Work out the probability that, after **2** games,  
Magnus and Garry have the same number of  
points.

(3 marks)

Answer space continues on the next page.

15. (b) continued.



(continued on the next page)

15. continued.

Magnus and Garry now play a third game of chess.

(c) Work out the probability that, after 3 games, Magnus and Garry have the same number of points.

(3 marks)

Answer space continues on the next page.

15. (c) continued.

---

**(Total for Question 15 is 8 marks)**

---

**16. Look at the diagram for Question 16(a) in the Diagram Booklet.**

**It shows an incomplete Venn diagram.**

**There are 32 students in a class.**

**In one term these 32 students each took a test in Maths (set M), in English (set E) and in French (set F)**

**25 students passed the test in Maths.**

**20 students passed the test in English.**

**14 students passed the test in French.**

**18 students passed the tests in Maths and English.**

**11 students passed the tests in Maths and French.**

**4 students failed all three tests.**

**X students passed all three tests.**

**The incomplete Venn diagram in the Diagram Booklet gives some more information about the results of the 32 students.**

**(continued on the next page)**

16. continued.

- (a) Use all the given information about the results of students who passed the test in Maths to find the value of  $X$   
(2 marks)

$X =$  \_\_\_\_\_

(continued on the next page)

Turn over

**16. continued,**

**Look at the diagram for Question 16(b) in the Diagram Booklet.**

**The diagram is the same incomplete Venn diagram as Question 16(a)**

**(b) Use your value of  $X$  to complete the Venn diagram in the Diagram Booklet to show the number of students in each subset.**

**(2 marks)**

**(continued on the next page)**

16. continued,

A student who passed the test in Maths is chosen at random.

(c) Find the probability that this student failed the test in French.

(1 mark)

---

(Total for Question 16 is 5 marks)

---

17. (a) Factorise

$$6y^2 - y - 5$$

(2 marks)

---

(continued on the next page)

17. continued.

(b) Make  $m$  the subject of

$$w = \frac{2m + 3}{8 - m}$$

(3 marks)

---

(continued on the next page)

Turn over

17. continued.

- (c) Express  $4x^2 - 8x + 7$  in the form  $a(x + b)^2 + c$  where  $a$ ,  $b$  and  $c$  are integers.  
(3 marks)

---

(Total for Question 17 is 8 marks)

---

18.  $0.4\dot{x}$  is a recurring decimal.

$x$  is a whole number such that  $1 \leq x \leq 9$

Find, in terms of  $x$ , the recurring decimal  $0.4\dot{x}$  as a fraction.

Give your fraction in its simplest form.

Show clear algebraic working.

(3 marks)

Answer space continues on the next page.

18. continued.

---

**(Total for Question 18 is 3 marks)**

---

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

It is NOT accurately drawn.

**ABCED** is a five-sided shape.

**ABCD** is a rectangle.

**CED** is an equilateral triangle.

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

$$AD = y \text{ cm}$$

The perimeter of **ABCED** is 100 cm

The area of **ABCED** is  $R \text{ cm}^2$

(a) Show that  $R = \frac{x}{4} (200 - [6 - \sqrt{3}] x)$

(3 marks)

Answer space continues on the next page.

19. (a) continued.

(continued on the next page)

Turn over

19. continued.

(b) (i) Find the value of  $x$  for which  $R$  has its maximum value.

Give your answer in the form  $\frac{p}{q - \sqrt{3}}$

where  $p$  and  $q$  are integers.

(2 marks)

Answer space continues on the next page.

19. (b) (i) continued

$x =$  \_\_\_\_\_

- (ii) Explain why the maximum value of  $R$  is given by this value of  $x$   
(1 mark)

---

---

---

(Total for Question 19 is 6 marks)

---

20. The straight line **L** passes through point **A**  $(-6, 2)$  and point **B**  $(5, 3)$

The straight line **M** is perpendicular to **L** and passes through the midpoint of **A** and **B**

The line **M** intersects the line  $x = -1$  at point **C**

Calculate the area of triangle **ABC**

(7 marks)

Answer space continues on the next two pages.

20. continued.

20. continued.

---

(Total for Question 20 is 7 marks)

---

**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**

---