

**Paper Reference 4MA1/2H  
Pearson Edexcel  
International GCSE**

Total Marks
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**Mathematics A  
Paper 2H  
(Calculator)  
Higher Tier**

**Wednesday 15 January 2020 – Morning**

**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 Book  
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.

You may be provided with a shape and a model for Question 26

They are **NOT** accurate.

**ADVICE**

Read each question carefully before you start to answer it.

Check your answers if you have time at the end.

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**Answer ALL TWENTY SIX questions.**

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

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

1. (a) Simplify

$$\frac{x^9}{x^2}$$

(1 mark)

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(continued on the next page)

1. continued.

(b) Write

$$\frac{7^8 \times 7^4}{7^3}$$

as a single power of 7

(2 marks)

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(Total for Question 1 is 3 marks)

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Turn over

2. Change  
 $32.4 \text{ m}^3$  into  $\text{cm}^3$

\_\_\_\_\_  $\text{cm}^3$

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

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3. Show that

$$4\frac{2}{3} + 3\frac{4}{5} = 8\frac{7}{15}$$

(3 marks)

Answer space continues on the next page.

**3. continued.**

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

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**Turn over**

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

It is NOT accurately drawn.

It shows a triangle.

There are three angles marked:

$$30^\circ$$

$$(y + 20)^\circ$$

$$(4y + 10)^\circ$$

Work out the value of  $y$

(4 marks)

Answer space continues on the next page.

4. continued.

$y =$  \_\_\_\_\_

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

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**Turn over**

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

It shows angle **BAC**

Use ruler and compasses to construct the bisector of angle **BAC**

You must show all your construction lines.

(Total for Question 5 is 2 marks)

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

A bag contains only red beads, blue beads, green beads and yellow beads.

The table gives the probabilities that, when a bead is taken at random from the bag, the bead will be blue or the bead will be yellow.

The probability that the bead will be green is twice the probability that the bead will be red.

Sofia takes at random a bead from the bag.

She writes down the colour of the bead and puts the bead back into the bag.

She does this **180** times.

Work out an estimate for the number of times she takes a red bead from the bag.

(4 marks)

Answer space is on the next two pages.

6. continued.

Turn over

6. continued.

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**(Total for Question 6 is 4 marks)**

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7. (a) Solve the inequality

$$2y + 7 > 4$$

(2 marks)

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(continued on the next page)

7. continued.

(b) Solve

$$x^2 - 3x - 40 = 0$$

Show clear algebraic working.

(3 marks)

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(Total for Question 7 is 5 marks)

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Turn over

8. Look at the table for Question 8 in the Diagram Book.

It shows the cost, in euros, of Brigitte's car insurance in each of the years **2016, 2017 and 2018**

Brigitte says,

**“The percentage increase in the cost of my car insurance from 2017 to 2018 is more than the percentage increase in the cost of my car insurance from 2016 to 2017”**

- (a) Is Brigitte correct?

You must show how you get your answer.

(4 marks)

Answer space continues on the next page.

8. (a) continued.

(continued on the next page)

Turn over

8. continued.

Henri wants to insure his car.

He gets a discount of **15%** off the normal price.

Henri pays **952** euros for his car insurance after the discount.

(b) Work out the discount that Henri gets.

(3 marks)

\_\_\_\_\_ euros

**(Total for Question 8 is 7 marks)**

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**Turn over**

9. The density of gold is  $19.3 \text{ g/cm}^3$   
A gold bar has volume  $150 \text{ cm}^3$

Work out the mass of the gold bar.

\_\_\_\_\_ grams

(Total for Question 9 is 2 marks)

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10. Change a speed of **50** metres per second to a speed in kilometres per hour.

(3 marks)

Answer space continues on the next page.

10. continued.

\_\_\_\_\_ kilometres per hour

(Total for Question 10 is 3 marks)

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

It is NOT accurately drawn.

It shows a shape **ABCD** made from a semicircle **ABC** and a right-angled triangle **ACD**

**AD = 17 cm**

**CD = 15 cm**

**AC** is the diameter of the semicircle **ABC**

Work out the perimeter of the shape.

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

(5 marks)

Answer space continues on the next page.

11. continued.

\_\_\_\_\_ cm

(Total for Question 11 is 5 marks)

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Turn over

**12. Astrid wants to buy some oil.**

**She can buy the oil from either Dane Oil or Arctic Oil.**

**Look at the information for Question 12 in the Diagram Book.**

**It shows information about the price that each company will charge Astrid.**

**Astrid wants to get the better value for money for the oil.**

**1 Dollar = 6·57 Krone**

**From which company should she buy her oil, Dane Oil or Arctic Oil?**

**You must show your working.**

**(4 marks)**

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

12. continued.

**(Total for Question 12 is 4 marks)**

**Turn over**

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

It is NOT accurately drawn.

**A, B, C and D** are points on a circle, centre **O**  
**AOD** is a diameter of the circle.

Angle **CBD** =  $28^\circ$

Angle **BDA** =  $32^\circ$

Find the size of angle **BDC**

Give a reason for each stage of your working.

(4 marks)

Answer space continues on the next page.

13. continued.

\_\_\_\_\_ ○

**(Total for Question 13 is 4 marks)**

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**Turn over**

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

It shows an incomplete probability tree diagram.

There are **20** glasses in a cupboard.

**13** of the glasses are large

**7** of the glasses are small

Roberto takes at random two glasses from the cupboard.

(a) Complete the probability tree diagram.

There are six spaces to fill.

(2 marks)

(continued on the next page)

14. continued.

(b) Work out the probability that Roberto takes two small glasses.

(2 marks)

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(Total for Question 14 is 4 marks)

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Turn over

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

It shows six graphs.

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

Write your answers in the boxes.

Equation	Graph
$y = \frac{2}{x^2}$	
$y = -\frac{1}{2}x^3$	
$y = -\frac{5}{x}$	

(Total for Question 15 is 3 marks)

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16. Make  $y$  the subject of

$$x = \sqrt{\frac{y+1}{y-4}}$$

(4 marks)

Answer space continues on the next page.

16. continued.

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**(Total for Question 16 is 4 marks)**

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**Turn over**

**17. Prove that the difference between two consecutive square numbers is always an odd number.**

**Show clear algebraic working.**

**(3 marks)**

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

17. continued.

**(Total for Question 17 is 3 marks)**

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**Turn over**

**18. Look at the diagram for Question 18 in the Diagram Book.**

**The histogram gives information about the times, in minutes, that some customers spent in a supermarket.**

- (a) Work out an estimate for the proportion of these customers who spent between 15 minutes and 35 minutes in the supermarket.**  
**(3 marks)**

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

18. (a) continued.



(continued on the next page)

Turn over

18. continued.

One of the customers is selected at random.

Given that this customer had spent more than **30** minutes in the supermarket,

(b) find the probability that this customer spent more than **35** minutes in the supermarket.

(2 marks)

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

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**Turn over**

19. (a) Write down an equation of a line that is parallel to the line with equation

$$y = 7 - 4x$$

(1 mark)

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(continued on the next page)

19. continued.

The line  $L$  passes through the points with coordinates  $(-3, 1)$  and  $(2, -2)$

(b) Find an equation of the line that is perpendicular to  $L$  and passes through the point with coordinates  $(-6, 4)$

Give your answer in the form  $ax + by + c = 0$  where  $a$ ,  $b$  and  $c$  are integers.

(4 marks)

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(Total for Question 19 is 5 marks)

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Turn over

20. The area of a rectangle is  $18 \text{ cm}^2$

The length of the rectangle is  $(\sqrt{7} + 1) \text{ cm}$

Without using a calculator and showing each stage of your working,

find the width of the rectangle.

Give your answer in the form  $t\sqrt{b} + c$

where  $t$ ,  $b$  and  $c$  are integers.

(3 marks)

Answer space continues on the next page.

20. continued.

\_\_\_\_\_ cm

(Total for Question 20 is 3 marks)

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Turn over

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

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

There is one maximum point on this curve.

The coordinates of this maximum point are  $(4, 6)$

(a) Write down the coordinates of the maximum point on the curve with equation

(i)  $y = f(x + 4)$

( \_\_\_\_\_ , \_\_\_\_\_ )

(ii)  $y = f(2x)$

( \_\_\_\_\_ , \_\_\_\_\_ )

(2 marks)

(continued on the next page)

Turn over

21. continued.

The equation of a curve **C** is  $y = x^2 + 3x + 4$

The curve **C** is transformed to curve **S** under the translation  $\begin{pmatrix} 4 \\ 6 \end{pmatrix}$

(b) Find an equation of curve **S**

**You do not need to simplify the equation.**

**(2 marks)**

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

21. (b) continued.

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**(Total for Question 21 is 4 marks)**

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22. The line with equation  $y = x + 2$  intersects the curve with equation  $x^2 + y^2 - 2y = 24$  at the points **A** and **B**

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

Show clear algebraic working.

(5 marks)

Answer space continues on the next page.

22. continued.

( \_\_\_\_\_ , \_\_\_\_\_ )

( \_\_\_\_\_ , \_\_\_\_\_ )

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

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**Turn over**

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

It is NOT accurately drawn.

The diagram shows a triangle **ABC**

The midpoint of **BC** is **M**

**P** is a point on **AM**

$$\vec{AB} = 4\mathbf{a}$$

$$\vec{AC} = 2\mathbf{b}$$

$$\vec{AP} = \frac{3}{2}\mathbf{a} + \frac{3}{4}\mathbf{b}$$

Find the ratio **AP : PM**

(3 marks)

Answer space continues on the next page.

**23. continued.**

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**(Total for Question 23 is 3 marks)**

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**Turn over**

24. Express

$$\left( \frac{4}{2y-5} - \frac{3}{2y-3} \right) \div \frac{9y-4y^3}{6y^2-17y+5}$$

as a single fraction in its simplest form.

(4 marks)

Answer space continues on the next two pages.

24. continued.

Turn over

24. continued.

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

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**25. Mario is going to save \$50 in the year 2021**

**He is going to continue to save, up to and including the year 2070, by increasing the amount he saves each year by \$k**

**Mario will save a total of \$33 125 from 2021 to 2070**

**Work out the value of k**

**(3 marks)**

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

25. continued.

25. continued.

$k =$  \_\_\_\_\_

**(Total for Question 25 is 3 marks)**

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**Turn over**

26. Look at the model or at the diagrams for Question 26 in the Diagram Book.

They are NOT accurate.

You may be provided with a model.

Diagram 1 shows a sector, **AOB**, of a circle with centre **O** and angle **AOB =  $x^\circ$**

The sector can form the curved surface of a cone by joining **OA** to **OB**

This is shown in Diagram 2 and on the model of the cone.

A cut out shape of the sector may be available if you wish to use it.

The vertical height of the cone is **25 cm**

The volume of the cone is  **$1600 \text{ cm}^3$**

Work out the value of **X**

Give your answer correct to the nearest whole number.

(6 marks)

Answer space is on the next three pages.

Turn over

26. continued.

Turn over

26. continued.

Turn over

26. continued.

**X =** \_\_\_\_\_

**(Total for Question 26 is 6 marks)**

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**Turn over**

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**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**

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