

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

Total Marks

**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>					

**Y59762A**

**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.**

**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.**

**5**

**Answer ALL TWENTY SIX  
questions.**

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

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

**Turn over**

1. (a) Simplify

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

(1 mark)



(continued on the next page)

Turn over

1. continued.

(b) Write

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

as a single power of 7

(2 marks)

Answer space continues on the  
next page.

Turn over

1. (b) continued.

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**(Total for Question 1 is 3 marks)**

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**2. Change**

**$32.4 \text{ m}^3$  into  $\text{cm}^3$**

**(2 marks)**

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

**Turn over**

10

2. continued.

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

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

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**Turn over**

3. Show that

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

(3 marks)

Answer space continues on the next two pages.

Turn over

**3. continued.**

**Turn over**

**3. continued.**

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

---

**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 two pages.

4. continued.

Turn over

4. continued.

$$y = \underline{\hspace{10cm}}$$

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

---

**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.**

**(continued on the next page)**

**Turn over**

**6. continued.**

**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.**

**Turn over**

**6. continued.**

**Turn over**

**6. continued.**

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

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**Turn over**

7. (a) Solve the inequality

$$2y + 7 > 4$$

(2 marks)



(continued on the next page)

Turn over

**7. continued.**

**(b) Solve**

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

**Show clear algebraic working.**

**(3 marks)**

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

**Turn over**

7. (b) continued.



**(Total for Question 7 is 5 marks)**

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**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”**

**(continued on the next page)**

**Turn over**

**8. continued.**

**(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)**

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

**Turn over**

8. (b) continued.

\_\_\_\_\_ euros

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

---

**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.**

**(2 marks)**

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

9. continued.

\_\_\_\_\_ grams

**(Total for Question 9 is 2 marks)**

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**Turn over**

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

**(3 marks)**

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

**10. continued.**

**Turn over**

10. continued.

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

**(Total for Question 10 is 3 marks)**

---

**Turn over**

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 is on the next two pages.

Turn over

**11. continued.**

**Turn over**

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 is on the next two  
pages.

Turn over

12. continued.

Turn over

**12. continued.**

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

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**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 is on the next two pages.**

**Turn over**

13. continued.

Turn over

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)**

**Turn over**

**14. continued.**

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

**(2 marks)**

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

**Turn over**

14. (b) continued.



**(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 on the next page  
with the letter of the graph that could  
represent each given equation.**

15. continued.

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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Turn over

16. Make  $y$  the subject of

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

(4 marks)

Answer space continues on the next two pages.

Turn over

16. continued.

Turn over

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 two pages.**

**17. continued.**

**Turn over**

**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 is on the next two pages.**

**Turn over**

18. (a) continued.

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)**

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

18. (b) continued.

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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)

Turn over

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)

Answer space continues on the next page.

19. (b) continued.



**(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 is on the next two pages.

Turn over

20. continued.

Turn over

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.**

**(continued on the next page)**

21. continued.

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 is on the next  
page.**

**Turn over**

21. (b) continued.

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

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**Turn over**

- 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 two pages.**

**22. continued.**

**Turn over**

**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**

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

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

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

Find the ratio **AP : PM**

(3 marks)

Answer space is on the next two pages.

Turn over

**23. continued.**

**Turn over**

**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 three pages.

Turn over

24. continued.

Turn over

24. continued.

Turn over

**24. continued.**

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

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**Turn over**

**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 three pages.**

**25. continued.**

**Turn over**

25. continued.

Turn over

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.**

**(continued on the next page)**

**Turn over**

26. continued.

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 continues on the next  
four pages.

26. continued.

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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