

**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.**

<b>Surname</b>					
<b>Other names</b>					
<b>Centre Number</b>					
<b>Candidate Number</b>					

**Y60261A**

**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.**

**5**

**Answer ALL TWENTY FOUR questions.**

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

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

**Turn over**

- 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)**

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**(continued on the next page)**

**Turn over**

**1. continued.**

**(b) Solve the inequality**

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

**(2 marks)**

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

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**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.**

**Turn over**



**2. continued.**

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

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**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)

Turn over

3. (a) continued.

<b>x</b>	<b>y</b>
<b>-1</b>	
<b>0</b>	<b>1</b>
<b>1</b>	
<b>2</b>	<b>7</b>
<b>3</b>	<b>7</b>
<b>4</b>	
<b>5</b>	<b>1</b>
<b>6</b>	

(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)**

---

**Turn over**

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)

Turn over

**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  $525 \text{ cm}^2$

(b) Find the area of triangle DEF  
in  $\text{m}^2$

(2 marks)

\_\_\_\_\_  $\text{m}^2$

(Total for Question 4 is 4 marks)

---

Turn over

**5. Factorise**

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

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**(Total for Question 5 is 2 marks)**

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**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.**

**Turn over**

**6. continued.**

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**(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.**

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**(Total for Question 7 is 3 marks)**

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**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.

Turn over

8. (a) continued.

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(continued on the next page)

Turn over

8. continued.

Remember:

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

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

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

Answer space continues on the  
next page.

Turn over



**8. (b) continued.**

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**(Total for Question 8 is 4 marks)**

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**Turn over**

9. (a) Write

**840 000** in standard form.

(1 mark)

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(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)**

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**(Total for Question 9 is 3 marks)**

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**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.**

**Turn over**

**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**

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**(Total for Question 11 is 3 marks)**

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**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 =  $42^\circ$**

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

**Angle ADB and BDC are right angles.**

**(continued on the next page)**

**Turn over**

**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)**

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**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)**

**Turn over**

13. continued.

<b>Time (t minutes)</b>	<b>Cumulative frequency</b>
<b><math>30 &lt; t \leq 40</math></b>	<b>10</b>
<b><math>30 &lt; t \leq 50</math></b>	<b>20</b>
<b><math>30 &lt; t \leq 60</math></b>	<b>50</b>
<b><math>30 &lt; t \leq 70</math></b>	<b>80</b>
<b><math>30 &lt; t \leq 80</math></b>	<b>90</b>
<b><math>30 &lt; t \leq 90</math></b>	<b>100</b>

(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)**

**Turn over**

**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.**

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**(Total for Question 13 is 7 marks)**

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**Turn over**



14. (a) Simplify fully

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

(2 marks)

Answer space continues on the  
next page.

Turn over

14. (a) continued.

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(continued on the next page)

Turn over

**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.**

**Turn over**

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 =  $98^\circ$**

**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)**

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**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.

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(continued on the next page)

Turn over

16. continued.

Given that  $x > 0$

(b) find the value of  $x$  when

$$y = 144$$

(2 marks)

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(Total for Question 16 is 5 marks)

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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)**

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**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)

Turn over

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.**

**Turn over**

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.**

**Turn over**

18. (d) continued.

Turn over

18. (d) continued.

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(Total for Question 18 is 9 marks)

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Turn over

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** =  $80^\circ$

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)**

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**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.**

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**(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 is NOT accurately drawn.**

**It shows two similar bottles, A and B**

**Bottle A has surface area  $240 \text{ cm}^2$**

**Bottle B has surface area  $540 \text{ cm}^2$   
and volume  $2025 \text{ cm}^3$**

**Work out the volume of bottle A**

**(3 marks)**

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

**Turn over**

**21. continued.**

\_\_\_\_\_ **cm<sup>3</sup>**

**(Total for Question 21 is 3 marks)**

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**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.**

**Turn over**

**22. continued.**

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**(Total for Question 22 is 4 marks)**

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**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  $10\text{ cm}$  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  **$360 \text{ cm}^2$**

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.**

○

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**(Total for Question 23 is 6 marks)**

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**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.**

**Turn over**

**24. continued.**

**Turn over**



**24. continued.**

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**(Total for Question 24 is 5 marks)**

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**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**

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