

Paper Reference 1MA1/1H  
Pearson Edexcel  
Level 1/Level 2 GCSE (9–1)

Total Marks
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Mathematics  
PAPER 1 (Non-Calculator)  
Higher Tier

Wednesday 8 November 2023 – Morning  
Time: 1 hour 30 minutes

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, Formulae Sheet (enclosed). Tracing paper may be used.**

**YOU WILL BE GIVEN**

**Diagram Booklet**

# **INSTRUCTIONS**

**Answer ALL questions.**

**Answer the questions in the spaces provided in this Question Paper or on the separate diagrams – there may be more space than you need.**

**You must SHOW ALL YOUR WORKING.**

**Diagrams are NOT accurately drawn, unless otherwise indicated.**

**CALCULATORS MAY NOT BE USED.**

**Turn over**

## **INFORMATION**

**The total mark for this paper is 80**

**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 in case you need them.**

## **ADVICE**

**Read each question carefully before you start to answer it.**

**Try to answer every question.**

**Check your answers if you have time at the end.**

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**Turn over**

**5**

**Answer ALL questions.**

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

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

**Turn over**

**1. Work out**

$$6 \cdot 3 \times 2 \cdot 4$$

**(3 marks)**

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

**1. continued.**

**Turn over**

**1. continued.**

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

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**Turn over**



- 2. (a) (i) Write down the value of**  
 **$5^0$**   
**(1 mark)**
- 

**(continued on the next page)**

**2. (a) continued.**

**(ii) Write down the value of**

$$5^{-2}$$

**(1 mark)**

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**(continued on the next page)**

**Turn over**

**2. continued.**

**(b) Write**

$$\frac{2^5 \times 2^4}{2^3} \text{ in the form } 2^n \text{ where } n$$

**is an integer.**

**(2 marks)**

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**(Total for Question 2 is 4 marks)**

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**Turn over**

- 3. (a) Write 156 as a product of its prime factors.**

**(2 marks)**

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

**3. (a) continued.**

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**(continued on the next page)**

**Turn over**

**3. continued.**

**(b) Find the highest common factor  
(HCF) of 156 and 130  
(2 marks)**

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

**3. (b) continued.**

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**(Total for Question 3 is 4 marks)**

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**Turn over**

- 4. The mean length of 5 sticks is 4.2 cm**

**Nawal measured the length of one of the sticks as 7 cm**

- (a) Work out the mean length of the other 4 sticks.**

**(3 marks)**

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



4. (a) continued.

\_\_\_\_\_ cm

(continued on the next page)

Turn over

**4. continued.**

**Remember:**

**The mean length of 5 sticks is  
4.2 cm**

**Nawal measured the length of one of  
the sticks as 7 cm**

**(continued on the next page)**

**4. continued.**

**(b) Nawal made a mistake.**

**The stick was not 7 cm long.**

**It was 17 cm long.**

**How does this affect your answer  
to part (a)?**

**(1 mark)**

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

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**Turn over**

**5. Look at the diagram for Question 5 in the Diagram Booklet.**

**It shows point  $P$  on the line  $AB$**

**Use ruler and compasses to**

**construct an angle of  $90^\circ$  at  $P$**

**You must show all your construction lines.**

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

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6. Look at the diagram for Question 6 in the Diagram Booklet.

It shows an isosceles triangle **ABD** and the straight line **ABC**

$$\text{Angle DAB} = x^\circ$$

$$\text{Angle DBA} = y^\circ$$

$$\text{Angle DBC} = w^\circ$$

$$BA = BD$$

$$x : y = 2 : 1$$

Work out the value of **w**

(4 marks)

Answer space is on the next two pages.

Turn over

6. continued.

Turn over

**6. continued.**

**W = \_\_\_\_\_**

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

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**Turn over**

**7. Mano has three shelves of books.**

**There are  $y$  books on shelf A**

**There are  $(3y + 1)$  books on shelf B**

**There are  $(2y - 5)$  books on shelf C**

**There is a total of 44 books on the three shelves.**

**All the books have the same mass.**

**The books on shelf B have a total mass of 7500 grams.**

**(continued on the next page)**

**Turn over**



**7. continued.**

**Work out the total mass of the books  
on shelf A**

**(5 marks)**

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

**7. continued.**

**Turn over**

**7. continued.**

\_\_\_\_\_ grams

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

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**Turn over**

8. The normal price of a mattress is reduced by **40%** in a sale.

The price of the mattress in the sale is **£660**

Work out the normal price of the mattress.

(2 marks)

Answer space continues on the next page.

**8. continued.**

£ \_\_\_\_\_

**(Total for Question 8 is 2 marks)**

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**Turn over**

**9. Look at the diagram for Question 9 in the Diagram Booklet.**

**It shows a grid.**

**To cook rice**

**the number of cups of rice ( $x$ ) : the  
number of cups of water ( $y$ ) = 4 : 5**

**(a) Use this information to draw a  
graph on the grid in the Diagram  
Booklet to show the relationship  
between the number of cups of  
rice and the number of cups of  
water needed to cook rice.**

**(2 marks)**

**Space for working is on the next  
page.**

**Turn over**

**9. (a) continued.**

**(continued on the next page)**

**Turn over**

**9. continued.**

**(b) (i) Find the gradient of the line  
drawn in part (a)  
(1 mark)**

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**(continued on the next page)**



9. (b) continued.

(ii) Explain what this gradient represents.

(1 mark)

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**(Total for Question 9 is 4 marks)**

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- 10. The circumference of a circle is 10 metres.**

**Work out the area of the circle.**

**Give your answer in terms of  $\pi$**

**(3 marks)**

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

**10. continued.**

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

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

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**Turn over**

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

**It shows an incomplete box plot diagram.**

**Alice recorded the number of cars going into a village on each of 80 days.**

**The incomplete table on the following page and the incomplete box plot in the Diagram Booklet give information about her results.**

**(continued on the next page)**

**11. continued.**

	<b>Number of cars</b>
<b>Least number</b>	<b>300</b>
<b>Lower quartile</b>	
<b>Median</b>	<b>900</b>
<b>Upper quartile</b>	
<b>Range</b>	<b>1000</b>

**(continued on the next page)**

**Turn over**

**11. continued.**

**(a) (i) Use the information in the table on the previous page to complete the box plot in the Diagram Booklet.**

**(ii) Use the information in the box plot to complete the table on the previous page. There are two spaces to fill. There is a spare copy of this table on page 14 in the Diagram Booklet if you wish to use it.**

**(3 marks)**

**(continued on the next page)**

**Turn over**

**11. continued.**

**On some of these 80 days Alice saw fewer than 1200 cars going into the village.**

**(b) Work out an estimate for the number of days Alice saw fewer than 1200 cars going into the village.**

**(2 marks)**

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

**11. (b) continued.**

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**(Total for Question 11 is 5 marks)**

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- 12. The straight line  $L$  has equation**  
 **$2y = 3x - 7$**

**Find an equation of the straight  
line perpendicular to  $L$  that passes  
through  $(6, -5)$**

**(3 marks)**

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

**12. continued.**

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**(Total for Question 12 is 3 marks)**

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**Turn over**

**13. Solid A and solid B are similar.**

**The ratio of the height of solid A to the height of solid B is 2 : 5**

**The volume of solid A is  $12 \text{ cm}^3$**

**Work out the volume of solid B**  
**(3 marks)**

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

**13. continued.**

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

**(Total for Question 13 is 3 marks)**

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**Turn over**

**14. Work out the value of**

$$27^{\frac{2}{3}} + \left(\frac{1}{2}\right)^{-3}$$

**(3 marks)**

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

**14. continued.**

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**(Total for Question 14 is 3 marks)**

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**Turn over**

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

**An object falls from rest.**

**The diagram shows the distance–time graph for the distance ( $d$  metres) fallen by the object  $t$  seconds after it starts to fall.**

**Work out an estimate for the gradient of the graph at  $t = 3$**

**You must show how you get your answer.**

**(3 marks)**

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

**Turn over**

**15. continued.**

**Turn over**



**15. continued.**

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**(Total for Question 15 is 3 marks)**

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**Turn over**

**16. At the start of year  $n$  the population of a species is  $P_n$**

**At the start of the following year the population of the species is given by**

**$P_{n+1} = kP_n$  where  $k$  is a positive constant.**

**The population of the species at the start of year 1 is 8 million.**

**The population of the species at the start of year 2 is 6 million.**

**(continued on the next page)**

**Turn over**

**16. continued.**

- (a) Work out the population of the species at the start of year 3**  
**(3 marks)**

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

16. (a) continued.

\_\_\_\_\_ million

(continued on the next page)

**16. continued.**

**Remember: At the start of year  $n$  the population of a species is  $P_n$**

**At the start of the following year the population of the species is given by**

**$P_{n+1} = kP_n$  where  $k$  is a positive constant.**

**(b) At the start of year 5 the value of  $k$  is increased by  $0.3$  to a new constant value.**

**(continued on the next page)**

**Turn over**

**16. (b) continued.**

**Louise thinks that from the start of year 5 the population of the species would increase year on year.**

**Is Louise correct?**

**You must give a reason for your answer.**

**(1 mark)**

**Answer lines continue on the next page.**

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**Turn over**

**16. (b) continued.**

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

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17. (a) Factorise

$$6x^2 - 5x - 4$$

(2 marks)

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(continued on the next page)

Turn over



**17. continued.**

**(b) Hence, or otherwise, solve**

$$6x^2 - 5x - 4 < 0$$

**(2 marks)**

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

**17. (b) continued.**

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**(Total for Question 17 is 4 marks)**

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**18. Spinner A and spinner B are each spun once.**

**The probability that spinner A lands on red is  $\frac{1}{4}$**

**The probability that both spinner A and spinner B land on red is  $\frac{1}{24}$**

**Work out the probability that one spinner lands on red and the other spinner does NOT land on red.**

**(4 marks)**

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

**Turn over**

**18. continued.**

**Turn over**

**18. continued.**

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**(Total for Question 18 is 4 marks)**

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**Turn over**

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

**It is the graph of  $y = \sin x^\circ$  for  $-180 \leq x \leq 180$**

**(a) Use the graph to find estimates for the solutions of**

$$\sin x^\circ = 0.75 \text{ for } -180 \leq x \leq 180$$

**(2 marks)**

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

**19. (a) continued.**

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**(continued on the next page)**

**19. continued.**

**(b) Write down a value of  $x$  such  
that**

$$\sin(x + 20)^\circ = 0 \text{ for } -180 \leq x \leq 180$$

**(1 mark)**

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

**(Total for Question 19 is 3 marks)**

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**Turn over**



**20. Look at the diagram for Question 20 in the Diagram Booklet.**

**It shows triangle ABC**

$$\mathbf{BC = 5 \text{ cm}}$$

$$\mathbf{BA = 10 \text{ cm}}$$

$$\mathbf{AC = 5\sqrt{7} \text{ cm}}$$

**Find the size of angle ABC**

**You must show all your working.**

**(4 marks)**

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

**20. continued.**

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**(Total for Question 20 is 4 marks)**

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**Turn over**

**21. (a) Look at the diagram  
for Question 21 in the  
Diagram Booklet.**

**It shows a grid.**

**On the grid, draw the graph of  
 $x^2 + y^2 = 36$**

**(2 marks)**

**(continued on the next page)**

**21. continued.**

**(b) Use your graph to find estimates  
for the solutions of the  
simultaneous equations**

$$x^2 + y^2 = 36$$

$$2y = 3x$$

**(3 marks)**

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**(Total for Question 21 is 5 marks)**

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**Turn over**

**22. The 2nd term of a geometric sequence is**

$$3 + 2\sqrt{2}$$

**The 3rd term of the sequence is**

$$13 + 9\sqrt{2}$$

**Find the value of the common ratio of the sequence.**

**Give your answer in the form  $a + \sqrt{b}$  where  $a$  and  $b$  are integers.**

**You must show all your working.**

**(4 marks)**

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

**22. continued.**

**Turn over**

**22. continued.**

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

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**TOTAL FOR PAPER IS 80 MARKS**

**END OF PAPER**

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