

Paper Reference 4MB1/01  
Pearson Edexcel  
International GCSE

Total Marks
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Mathematics B  
PAPER 1  
(Calculator)

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, calculator. 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.**

**CALCULATORS MAY BE USED.**

## **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 in case you need them.**

**Turn over**

**ADVICE**

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

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

**Without sufficient working, correct answers may be awarded no marks.**

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**Answer all TWENTY SEVEN questions.**

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

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

1. The  $n$ th term of a sequence is given by  $4n - 12$

Write down the first 2 terms of the sequence.

1st term \_\_\_\_\_

2nd term \_\_\_\_\_

(Total for Question 1 is 2 marks)

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2. Bronze is made from copper and tin in the ratio of **22 : 3** by weight.

Calculate the weight of copper, in **kg**, needed to make **12.5 kg** of bronze.

\_\_\_\_\_ kg

(Total for Question 2 is 2 marks)

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3. Look at the diagram for Question 3 in the Diagram Booklet.

It shows a pattern on a white grid that is made from 6 shaded squares.

Shade exactly 2 more squares so that the 8 shaded squares will make a pattern with rotational symmetry of order 4

(Total for Question 3 is 2 marks)

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4. Make **u** the subject of

$$s = ut + \frac{1}{2} at^2$$

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(Total for Question 4 is 2 marks)

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Turn over



5. Without using a calculator and showing all your working, evaluate

$$3\frac{1}{8} \times 2\frac{4}{5}$$

Give your answer as a mixed number in its simplest form.

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(Total for Question 5 is 2 marks)

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Turn over

10

6. Factorise completely

$$2mc^2 + 6p^2c^4$$

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(Total for Question 6 is 2 marks)

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Turn over

7. Inzamam cycles **6.4 km** from his home to school.  
He leaves home at **07 40** and arrives at school at  
**08 20**

Calculate his average speed, in **km/h**, for the  
journey.

\_\_\_\_\_ **km/h**

**(Total for Question 7 is 2 marks)**

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8. Look at the diagram for Question 8 in the Diagram Booklet.

It shows a pie chart.

Rohan asked each of the students in his school what colour paper they would prefer him to use for their worksheets.

There are **150** students in Rohan's school.

Using his results, Rohan drew the accurate pie chart shown in the Diagram Booklet.

Find how many of the **150** students preferred blue paper.

(3 marks)

Answer space continues on the next page.

8. continued.

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(Total for Question 8 is 3 marks)

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9. Solve

$$2(x + 7) = 5x - 6$$

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

(Total for Question 9 is 3 marks)

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Turn over

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

It shows a Venn diagram showing the sets  $\mathbb{N}$ ,  $\mathbb{Z}$ ,  $\mathbb{Q}$  and  $\mathcal{E}$

$\mathbb{N}$  is the set of natural numbers,

$\mathbb{Z}$  is the set of integers,

$\mathbb{Q}$  is the set of rational numbers

$\mathcal{E}$  is the universal set.

Write each of the four numbers below in the correct place in the diagram in the Diagram Booklet.

$$-\frac{4}{11}$$

$$\sqrt{169}$$

$$\sqrt{17}$$

$$\frac{22}{7}$$

(Total for Question 10 is 3 marks)

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

**It is NOT accurately drawn.**

**The diagram shows a biased spinner with four colours blue, red, green and yellow.**

**When the spinner is spun once**

- **the probability it lands on blue is twice the probability it lands on red**
- **the probability it lands on yellow is three times the probability it lands on blue**
- **the probability it lands on green is  $0.25$**

**Find the probability the spinner lands on yellow.**

**(3 marks)**

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



11. continued.

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(Total for Question 11 is 3 marks)

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Turn over

12. Below is a list of four numbers.

$$1.1 \times 10^{15}$$

$$2.1 \times 10^{13}$$

$$3.2 \times 10^{14}$$

$$3.7 \times 10^{16}$$

Find the median of these four numbers.

Give your answer in standard form.

(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. Given that  $y \neq -4$

simplify  $\frac{y^2 + 4y}{2y + 8}$

(3 marks)

Answer space continues on the next page.

**13. continued.**

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

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**Turn over**

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

It is NOT accurately drawn.

Using the diagram in the Diagram Booklet, prove that the sum of the angles of triangle **ABC** is the same as the sum of the angles on the straight line **DCE**

Give a reason for each stage of your proof.

(3 marks)

Answer space continues on the next page.

14. continued.

(Total for Question 14 is 3 marks)

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Turn over

15. The numbers **A**, **B**, and **C** are given as products of their prime factors.

$$A = 3^5 \times 7^4 \times 1039$$

$$B = 3^{16} \times 7^9 \times 11^4$$

$$C = 3^8 \times 7^4 \times 269^2$$

- (a) Find the Highest Common Factor (HCF) of **A**, **B** and **C**

(2 marks)

Answer space continues on the next page.



15. (a) continued.

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(continued on the next page)

**15. continued.**

**Exactly one of the three numbers is the square of an integer  $N$**

**(b) Calculate the value of  $N$**

**(2 marks)**

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

15. (b) continued.

N = \_\_\_\_\_

(Total for Question 15 is 4 marks)

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16.  $A = \begin{pmatrix} 3 & -2 \\ -6 & -1 \end{pmatrix}$

$$B = \begin{pmatrix} -1 & 1 \\ 3 & 1 \end{pmatrix}$$

(a) Calculate  $A + 2B$

(2 marks)

Answer space continues on the next page.

16. (a) continued.

( )

(continued on the next page)

16. continued.

(b) Calculate **AB**

(2 marks)

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

16. (b) continued.

( )

(Total for Question 16 is 4 marks)

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**17. Look at the diagram for Question 17 in the Diagram Booklet.**

**It is NOT accurately drawn.**

**It shows  $OABC$  which is a sector of a circle, centre  $O$ , with angle  $AOC = 100^\circ$**

**The area of the sector is  $27 \text{ cm}^2$**

**Calculate the perimeter, in  $\text{cm}$  to 3 significant figures, of the sector.**

**(4 marks)**

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



17. continued.

\_\_\_\_\_ cm

(Total for Question 17 is 4 marks)

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Turn over

18. Given that  $p = \frac{1 + \sqrt{5}}{2}$

show that  $\frac{1}{p} = p - 1$

Show your working clearly.

(3 marks)

Answer space continues on the next two pages.

18. continued.

Turn over

18. continued.

(Total for Question 18 is 3 marks)

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19. There are  $1000 \text{ cm}^3$  of orange juice in a carton.  
The total surface area of this carton is  $700 \text{ cm}^2$

For a special offer, a new carton is designed.

The volume of orange juice in the new carton is  
 $33.1\%$  more than the volume of orange juice in the  
original carton.

The new carton is mathematically similar to the  
original carton.

Calculate the total surface area of the new carton.  
(4 marks)

Answer space continues on the next two pages.

19. continued.

Turn over

19. continued.

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

(Total for Question 19 is 4 marks)

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Turn over

20. Given that  $\mathbf{a} = \begin{pmatrix} x-2 \\ \sqrt{2x} \end{pmatrix}$  where  $|\mathbf{a}| = \sqrt{5}$

find the exact value of  $x$

(4 marks)

Answer space continues on the next two pages.



20. continued.

20. continued.

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

(Total for Question 20 is 4 marks)

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Turn over

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

**The diagram shows triangle  $ABC$**

**The region  $R$  consists of all the points inside the triangle that are closer to  $C$  than to  $B$  and also closer to  $AB$  than to  $AC$**

**Using ruler and compasses only and showing all your construction lines, construct and show by shading the region  $R$  in the Diagram Booklet. Label the region  $R$**

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

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**22. Look at the diagram for Question 22 in the Diagram Booklet.**

**It shows the line  $L$ , the line with equation  $y = 2$  and the line with equation  $y = x$  drawn on a grid.**

**(a) Find an equation of the line  $L$**   
**(2 marks)**

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**(continued on the next page)**

**22. continued.**

**(b) Write down the three inequalities that define the region shaded in the diagram.**

**(3 marks)**

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

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**Turn over**

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

It is NOT accurately drawn.

It shows **ABCD** which is a kite so that the points **A, B, C** and **D** lie on a circle with radius **7.5 cm**

The diagonals, **AC** and **BD**, of the kite intersect at point **E**, so that **AE = 3 cm**

The line **AEC** is a diameter of the circle.

Find the area of the kite **ABCD**

(5 marks)

Answer space continues on the next page.

**23. continued.**

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

**(Total for Question 23 is 5 marks)**

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**Turn over**

24. In a triangle **ABC**

$$AC = 6.5 \text{ cm}$$

$$BC = 12 \text{ cm}$$

$$\text{angle } ABC = 30^\circ$$

Calculate, in  $\text{cm}^2$  to 3 significant figures, the smaller of the areas of the two possible triangles **ABC**

(6 marks)

Answer space continues on the next two pages.



24. continued.

Turn over

24. continued.

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

(Total for Question 24 is 6 marks)

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Turn over

25. There are **25** sweets in a bag.

**n** of the sweets are orange.

The rest of the sweets are yellow.

Chana takes a sweet at random from the bag.

She eats the sweet.

Chana takes at random another sweet from the bag.

She eats the sweet.

The probability that Chana eats one orange sweet  
and one yellow sweet is  $\frac{1}{3}$

(continued on the next page)

**25. continued.**

**(a) Write down the probability that both sweets taken by Chana are the same colour.**

**(1 mark)**

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**(continued on the next page)**

**25. continued.**

**(b) Find the possible values of  $n$**

**Show clear algebraic working.**

**(6 marks)**

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

25. (b) continued.

Turn over

**25. (b) continued.**

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**(Total for Question 25 is 7 marks)**

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**Turn over**

26.  $f(x) = 2x^3 + 9x^2 - 14x - 9$

- (a) Using the factor theorem, show that  $(2x - 1)$  is  
NOT a factor of  $f(x)$   
(2 marks)

(continued on the next page)



26. continued.

(b) Express  $\frac{f(x)}{2x+1}$  in the form  $(x+a)^2 + b$

where **a** and **b** are integers to be found.

(3 marks)

Answer space continues on the next page.

26. (b) continued.

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(continued on the next page)

Turn over

**26. continued.**

- (c) Hence find the exact solutions of  $f(x) = 0$   
(2 marks)**

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**(Total for Question 26 is 7 marks)**

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**Turn over**

27. A particle **P** is moving along a straight line.

At time **t** seconds, the displacement, **S** metres, of **P** from a fixed point **O** on the line is given by

$$s = t^3 - 18t^2 + 81t \quad 0 \leq t \leq 9$$

At time **T** seconds, where  $T < 9$ , **P** is at the point **A** on the line.

At **A**, particle **P** instantaneously reverses its direction of motion and moves back towards **O**

(a) Find the value of **T**

(5 marks)

Answer space continues on the next page.

**27. (a) continued.**

**T = \_\_\_\_\_**

**(continued on the next page)**

**Turn over**

27. continued.

As **P** moves from **A** back towards **O**, the greatest speed of **P** is **V** m/s

(b) Find the value of **V**  
(4 marks)

**V** = \_\_\_\_\_

(Total for Question 27 is 9 marks)

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**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**

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