Materials
For this paper you must have:
• a calculator
• mathematical instruments.

Instructions
• Use black ink or black ball-point pen. Draw diagrams in pencil.
• Answer all questions.
• You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
• Do all rough work in this book. Cross through any work you do not want to be marked.

Information
• The marks for questions are shown in brackets.
• The maximum mark for this paper is 80.
• You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice
• In all calculations, show clearly how you work out your answer.
Answer all questions in the spaces provided

1. Circle the inequality shown by the diagram.

\[ -4 \leq x < 5 \quad -4 \leq x \leq 5 \quad -4 < x < 5 \quad -4 < x \leq 5 \]

[1 mark]

2. \( y \) is 100% more than \( x \).

Circle the ratio \( x : y \)

\[ 1 : 100 \quad 100 : 1 \quad 1 : 2 \quad 2 : 1 \]

[1 mark]

3. The first four terms of a sequence are \(-10, -8, -6, -4\)

Circle the expression for the \( n \)th term of the sequence.

\[ -12 - 2n \quad -8 - 2n \quad n + 2 \quad 2n - 12 \]

[1 mark]
4. Circle the equation of the line that is parallel to the \( x \)-axis. [1 mark]

\[ y = -5 \quad x - y = 0 \quad x = 3 \quad x + y = 0 \]

5. Multiply out and simplify \((x - 8)^2\) [2 marks]

Answer: ______________________

Turn over for the next question
6. Show that 268 can be written as the sum of a power of 3 and a square number.

[2 marks]

Answer

7. Here is some information about the times taken by 40 people to fill in a form.

<table>
<thead>
<tr>
<th>Time, t minutes</th>
<th>Number of people</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 &lt; t ≤ 5</td>
<td>3</td>
</tr>
<tr>
<td>5 &lt; t ≤ 10</td>
<td>9</td>
</tr>
<tr>
<td>10 &lt; t ≤ 15</td>
<td>11</td>
</tr>
<tr>
<td>15 &lt; t ≤ 20</td>
<td>17</td>
</tr>
</tbody>
</table>

In which class interval is the median?
Circle your answer.

[1 mark]

0 < t ≤ 5       5 < t ≤ 10       10 < t ≤ 15       15 < t ≤ 20
8  \(ABCD\) is a parallelogram.

\[AB = BP\]

Work out the size of angle \(x\).

[4 marks]

Answer \_________________________\ degrees

Turn over for the next question
9 (a)  Rearrange $v = u + at$ to make $t$ the subject of the formula.  

[2 marks]

\[ t = \frac{v - u}{a} \]

Answer

9 (b)  Complete this table with consistent metric units.

[2 marks]

<table>
<thead>
<tr>
<th>Distance</th>
<th>Time</th>
<th>Speed</th>
<th>Acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td>m</td>
<td>s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Construct a locus of points that are the same distance from points $A$ and $B$. [2 marks]
11  42 men and 38 women visit a restaurant.
    44 of these people have a voucher.
    Three times as many men as women do not have a voucher.

11 (a) Complete the frequency tree. [4 marks]
11 (b) A voucher takes 15% off the bill.
After using the voucher, the bill for a meal is £27.20
How much was the bill before using the voucher? [3 marks]

Answer £ ____________________________

Turn over for the next question
The distance by road from Newport to London is 140 miles.

Tom travels by coach from Newport to London.
The coach leaves Newport at 1.30 pm

12 (a) He assumes the coach will travel at an average speed of 50 mph

Use his assumption to work out the arrival time in London.

Answer

12 (b) In fact, the coach has a lower average speed.

How does this affect the arrival time?
Here is some information about the length of time cars stayed in a car park.

- Shortest time: 30 minutes
- Lower quartile: 2 hours
- Longest time: 12 hours
- Interquartile range: 3 hours
- Median time: 4 hours

Draw a box plot to show this information.

[3 marks]

Turn over for the next question.
14 In the Venn diagram
\[ \xi \] represents 31 students in a class
\[ C \] is students who have a cat
\[ D \] is students who have a dog

14 (a) One student from the class is picked at random.
Work out the probability that the student has a dog.

[3 marks]

Answer

14 (b) One of the students who has a cat is picked at random.
Work out the probability that this student has a dog.

[1 mark]

Answer
15 Circle the highest common factor (HCF) of $6x^2y^2$ and $4x^3y^3$.

[1 mark]

$2xy^2$  $2xy$  $12x^3y^2$  $24x^4y^3$

16 $f(x) = x^2 - x^3$

Circle the value of $f(-3)$

[1 mark]

18  $-18$  36  $-36$

Turn over for the next question
17 At a football game
number of men : number of women : number of children = 13 : 5 : 7

There are 4152 more men than women.

Work out the number of children at the game. [3 marks]

Answer

18 Expand and simplify $(3x^2 + 2)(2x + 5) - 6x(x^2 - 3)$ [4 marks]

Answer
A, B and C are points on a circle. 
CD is a tangent to the circle.

Write down the size of angle $x$.
Give a reason for your answer.

[2 marks]

Answer ______________________ degrees

Reason ____________________________

Turn over for the next question
20  \( w \) is a positive number.
\( x \) is 10% more than \( w \).
\( y \) is 10% less than \( x \).

Which statement is true?
Tick one box.

\[ w < x \quad \text{and} \quad w < y \]
\[ w < x \quad \text{and} \quad w = y \]
\[ x > y \quad \text{and} \quad w > y \]
\[ x > y \quad \text{and} \quad w = y \]

[1 mark]

21  \( N \) is a number.

As a product of prime factors in index form \( N = 2 \times 3^4 \times y^3 \)

Work out \( 3N^2 \) as a product of prime factors in index form.
Give your answer in terms of \( y \).

[3 marks]

Answer ________________________________
Here is a triangle.

Work out the length $PR$.

[3 marks]

Answer __________________________ cm

Turn over for the next question
23 Joe draws this graph to identify the region R represented by

\[ y \leq x + 2 \quad \text{and} \quad y > 3 - x \quad \text{and} \quad x < 3 \]

Make two criticisms of his graph.

[2 marks]

Criticism 1

Criticism 2
24 \[ a : b = 9 : 4 \] and \( 10b = 7c \)

Work out \( a : c \) in its simplest form. [3 marks]

Answer \( \underline{\hspace{1cm}} : \underline{\hspace{1cm}} \)

Turn over for the next question
25 Liquid is leaking out of a container.
The graph shows the depth of the liquid for 60 seconds.

Use the graph to work out an estimate of the rate of decrease of depth at 10 seconds. You **must** show your working. [3 marks]

Answer  cm/s
26 \[ a^2 - b^2 = (a + b)(a - b) \]

\[ a \text{ and } b \text{ are positive whole numbers with } a > b \]

\[ a^2 - b^2 \text{ is a prime number.} \]

Why are \( a \) and \( b \) consecutive numbers?

[2 marks]
27. \( VABCD \) is a square-based pyramid. The horizontal base \( ABCD \) has side length 10 cm and centre \( M \). Angle \( VMA \) is 90°. Angle \( VAM \) is 68°.

Volume of pyramid = \( \frac{1}{3} \times \text{area of base} \times \text{perpendicular height} \)
Work out the volume of the pyramid. [6 marks]

Answer __________________________ cm$^3$

Turn over for the next question
28. \( y = p \times q^{x-1} \) where \( p \) and \( q \) are numbers.

\( y = 10 \) when \( x = 1 \)
\( y = 0.3125 \) when \( x = 6 \)

Work out the value of \( y \) when \( x = 3 \)

[5 marks]

Answer ____________________________
29 Here is the graph of \( y = f(x) \) where \( f(x) \) is a quadratic function.

Write down all the integer solutions of \( f(x) \geq 0 \)

Answer

Turn over for the next question
30 \[ f(x) = \frac{x}{3} + 4 \quad \text{for all values of } x. \]
\[ g(x) = 6x^2 + 3 \quad \text{for all values of } x. \]

Work out \( fg(x) \).
Give your answer in the form \( ax^2 + b \) where \( a \) and \( b \) are integers.

[2 marks]

Answer ________________________________________________________________________

END OF QUESTIONS
There are no questions printed on this page

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