Monday 6 November 2017 Morning Time allowed: 1 hour 30 minutes

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

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How many minutes are there in $2\frac{1}{4}$ hours?</td>
<td>Circle your answer.</td>
<td>[1 mark]</td>
</tr>
<tr>
<td></td>
<td>135</td>
<td>145</td>
<td>215</td>
</tr>
<tr>
<td>2</td>
<td>Which of these numbers is half of a square number?</td>
<td>Circle your answer.</td>
<td>[1 mark]</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Circle the value of the digit 3 in the number 17.03</td>
<td>[1 mark]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\frac{3}{10}$</td>
<td>$\frac{1}{30}$</td>
<td>$\frac{3}{100}$</td>
</tr>
</tbody>
</table>
4. The value of $A$ is double the value of $B$. Circle the correct formula. 

\[ A = B + 2 \quad \quad A = 2B \quad \quad A = \frac{B}{2} \quad \quad A = B^2 \]

[1 mark]

5 (a) Simplify $y \times y$ 

Answer ____________________________ 

[1 mark]

5 (b) Simplify $5a + 2 - a + 9$ 

Answer ____________________________ 

[2 marks]

Turn over for the next question
The table shows information about the birds in a garden.

<table>
<thead>
<tr>
<th>Bird</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robin</td>
<td>2</td>
</tr>
<tr>
<td>Sparrow</td>
<td>5</td>
</tr>
<tr>
<td>Wren</td>
<td>3</td>
</tr>
<tr>
<td>Lark</td>
<td>1</td>
</tr>
</tbody>
</table>

Draw a bar chart to show the information. [3 marks]
Eve has these coins.

Ola has these coins.

Eve gives three of her coins to Ola.
Now, Ola has the same amount of money as Eve.
Which coins does Eve give to Ola?

[3 marks]

Answer _______ , _______ , _______
8 A dry cleaning shop has the following offers.

<table>
<thead>
<tr>
<th>Item</th>
<th>Normal Price</th>
<th>Offer Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suit</td>
<td>£12.50</td>
<td>1st suit: normal price, 2nd suit: half price</td>
</tr>
<tr>
<td>Dress</td>
<td>£9.75</td>
<td>Three for the price of two</td>
</tr>
</tbody>
</table>

Work out the total price for 2 suits and 6 dresses.

[4 marks]

Answer £ ________________________________
Karl has twin sisters.

The sum of the ages of Karl and his twin sisters is 39
In 4 years’ time the twins will be 18

How old will Karl be in 4 years’ time?

[3 marks]

Answer

Turn over for the next question
10 One of the angles in a triangle is 60°

Tick a box for each statement.

<table>
<thead>
<tr>
<th>Must be true</th>
<th>Cannot be true</th>
<th>Might be true</th>
</tr>
</thead>
<tbody>
<tr>
<td>The triangle is equilateral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The triangle has at least one other acute angle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The triangle is right-angled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The other two angles are each less than 60°</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[4 marks]
11 Which of these numbers has **exactly** two factors?
Circle your answer. [1 mark]

6 7 8 9

12 Work out \( \sqrt{7.5^2 + 18^2} \)
Circle your answer. [1 mark]

19.5 25.5 331.5 380.25

13 (a) Use your calculator to work out the exact value of \( \frac{18 \, 953 \times 437}{11} \)
[1 mark]

Answer

13 (b) Use approximations to 1 significant figure to check if your answer to part (a) is sensible.
[3 marks]
Chris sells lawnmowers.

The table shows the number he sold each quarter for three years.

<table>
<thead>
<tr>
<th></th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>17</td>
<td>64</td>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td>2015</td>
<td>9</td>
<td>72</td>
<td>61</td>
<td>1</td>
</tr>
<tr>
<td>2014</td>
<td>19</td>
<td>58</td>
<td>53</td>
<td>2</td>
</tr>
</tbody>
</table>

14 (a) In which year did he sell the most lawnmowers?
You must show your working.

Answer

14 (b) He uses the table to decide the number of lawnmowers to stock each quarter.

At the start of which quarter should Chris stock the most lawnmowers?
Circle your answer.
In a test,

Section A has 80 marks
Section B has 120 marks.

Riya scores
55% in Section A
70% in Section B.

To pass, Riya needs to score 65% of the total marks.

Does she pass?

You must show your working.

[4 marks]

Answer _____________________________
A wheel is made of a circular rim and 8 spokes as shown.

The length of each spoke is 37 cm

Work out the total length of the rim and spokes.

Answer __________________________ cm
Here is a formula to convert degrees Celsius (°C) to degrees Fahrenheit (°F).

\[ F = 1.8C + 32 \]

*F* is the number of degrees Fahrenheit

*C* is the number of degrees Celsius

17 (a) Show that \(-40°C = -40°F\)

[2 marks]


17 (b) The temperature is \(-15°C\)

Nick says,

“Because the temperature is negative in Celsius, it *must* be negative in Fahrenheit.”

Is he correct?

You *must* show your working.

[1 mark]


Answer ____________________________________________
Here are five cards.

1 5 7 9 11

One of the cards is removed.
The mean of the numbers on the remaining four cards is 6

Which card was removed?
You must show your working.

[3 marks]

Answer _____________________________
19 (a) Divide 120 in the ratio 1 : 4

[2 marks]

Answer: __________________ : __________________

19 (b) Write the ratio 7 : 4 in the form $n : 1$

[1 mark]

Answer: __________________ : __________________

Turn over for the next question
20 In 2015, Han was paid £1350 per month.

In 2016, he
    had a 2% increase in his monthly pay
    worked 37.5 hours per week
    worked for 47 weeks.

Work out Han’s average pay per hour for 2016 [5 marks]

Answer £ __________________________
An experiment is carried out 200 times. The possible outcomes are K, L and M.

(a) Complete the table.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>K</th>
<th>L</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>84</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Relative</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Altogether, the experiment is carried out 500 times.

How many times would you expect the outcome to be K?

Answer

Turn over for the next question
The table shows information about the UK and Germany.

<table>
<thead>
<tr>
<th></th>
<th>Population</th>
<th>Area (square miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>64 000 000</td>
<td>95 000</td>
</tr>
<tr>
<td>Germany</td>
<td>82 000 000</td>
<td>140 000</td>
</tr>
</tbody>
</table>

Population density = \( \frac{\text{population}}{\text{area}} \)

Compare the population densities of the UK and Germany. [3 marks]

Which one of the following is discrete data?
Circle your answer. [1 mark]

- Mass of a television
- Time taken to deliver a television
- Height of a television mast
- Number of televisions sold
24 Describe fully the **single** transformation that maps triangle $A$ to triangle $B$. 

[3 marks]
25 The graph shows information about prisms with the same volume.

25 (a) Give one example to show the volume is 24 cm$^3$ [1 mark]
25 (b) The diagram shows a prism with volume 24 cm$^3$

The height of the triangular cross section is $h$.

Work out the height, $h$.

[3 marks]

Answer

Turn over for the next question
26 A ball is thrown from a height of 15 metres. It bounces to height \( h_1 \), then to height \( h_2 \) as shown.

\[ h_1 \text{ is three quarters of the original height.} \]

26 (a) Jack expects \( h_2 \) to be three quarters of \( h_1 \)

Work out the value of \( h_2 \) that he expects.

[2 marks]

Answer \( \underline{\phantom{00000}} \) metres
26 (b) In fact, \( h_2 \) is two thirds of \( h_1 \)

How does this affect the answer to part (a)?

Tick a box.

- The ball bounced higher than he expected
- The ball bounced lower than he expected

Show working to support your answer. [2 marks]

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Turn over for the next question
27 Solve \(4(3x - 2) = 2x - 5\) [3 marks]

\[
x = \ldots
\]

28 Work out the next term of this quadratic sequence. [2 marks]

5 8 14 23 …

Answer \ldots
Work out the size of angle $x$. 

Not drawn accurately

Answer ___________________ degrees

END OF QUESTIONS
There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED