INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer all the questions.
- Do not write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is 60.
- This document consists of 16 pages. Any blank pages are indicated.

WARNING

No calculator can be used for this paper
Area of trapezium = \( \frac{1}{2} (a + b)h \)

Volume of prism = (area of cross-section) × length

In any triangle \( ABC \)
Sine rule \( \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \)
Cosine rule \( a^2 = b^2 + c^2 - 2bc \cos A \)
Area of triangle = \( \frac{1}{2} ab \sin C \)

Volume of sphere = \( \frac{4}{3} \pi r^3 \)
Surface area of sphere = \( 4\pi r^2 \)

Volume of cone = \( \frac{1}{3} \pi r^2 h \)
Curved surface area of cone = \( \pi rl \)

The Quadratic Equation
The solutions of \( ax^2 + bx + c = 0 \), where \( a \neq 0 \), are given by
\[
x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}
\]
1 (a) Four students sell ice creams to raise money for charity. They decide to share the money raised between their four charities as follows.

<table>
<thead>
<tr>
<th>Charity</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrea's</td>
<td>1/4</td>
</tr>
<tr>
<td>Bill's</td>
<td>1/3</td>
</tr>
<tr>
<td>Callum's</td>
<td>3/16</td>
</tr>
<tr>
<td>Davinder's</td>
<td>5/24</td>
</tr>
</tbody>
</table>

Put these fractions in order of size to show whose charity gets the most, second most and so on. You must show your working.

(a) _______________ _______________ _______________ _______________ [3]

most

(b) Find the sum of the four fractions and identify an error the students have made. Change one of the fractions to remove the error.

Error _____________________________________________________________________

Change fraction _______________ to _______________ [2]
(a) Rotate triangle T 90° clockwise about the origin. 
Label your image A. [3]

(b) Reflect triangle T in the line y = -1. 
Label your image B. [2]

(c) Describe fully the enlargement that maps triangle T onto triangle U.

________________________________________________________________________
________________________________________________________________________ [2]
3 (a) Solve this inequality.

\[ 5x - 2 < 18 \]

(a) \[ \underline{\quad} \] [2]

(b) This diagram represents the solution of \( p < 2x + 7 \leq q \).

Find the integers \( p \) and \( q \).

(b) \( p = \underline{\quad} \quad q = \underline{\quad} \) [3]
Marcus has the calculation $4.648 \div 0.28$ to do for his homework.

Fill in the boxes to complete his method.

The numbers in boxes A and B are identical.

$$4.648 \div 0.28 = \boxed{\phantom{0}} \div 28$$

$$= \boxed{\phantom{0}} \div \boxed{\phantom{0}} \div 7$$

$$= \boxed{\phantom{0}} \div 7$$

$$= \boxed{\phantom{0}}$$

[4]
A group of students did tests in Music and French. Their results were as follows.

<table>
<thead>
<tr>
<th>Music</th>
<th>34</th>
<th>54</th>
<th>32</th>
<th>46</th>
<th>50</th>
<th>60</th>
<th>26</th>
<th>38</th>
<th>68</th>
<th>77</th>
<th>45</th>
<th>70</th>
<th>62</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>20</td>
<td>61</td>
<td>38</td>
<td>56</td>
<td>51</td>
<td>52</td>
<td>37</td>
<td>44</td>
<td>74</td>
<td>83</td>
<td>89</td>
<td>72</td>
<td>71</td>
</tr>
</tbody>
</table>

(a) Complete the scatter graph to show these results. The first eight points have been plotted for you. [2]

(b) Draw a line of best fit on your scatter graph. [1]

(c) Describe the correlation shown by the graph. [1]

(c) ____________________________

(d) One of the students in the group, Guillaume, is French and always does much better in French than Music.

Draw a ring round the cross that represents Guillaume’s results. [1]
6 The graph shows the cost for a plumber from A1 Plumbing Services to complete a job.

(a) The cost (£) is made up of a fixed call-out charge and an hourly rate.

Complete these sentences.

(i) The fixed call-out charge is £ __________ . [1]
(ii) The hourly rate is £ __________ per hour. [1]

(b) A different plumbing company, Gibbo Plumbers, has an hourly rate of £55 but no call-out charge.

On the axes above, draw the graph to show the cost for a plumber from Gibbo Plumbers to complete a job. [2]

(c) For a job lasting 6 hours, find which company is cheaper and by how much.

(c) ________________________________ is cheaper by £ __________ [2]
(d) Use the graphs to find the job time for which A1 Plumbing Services and Gibbo Plumbers cost the same.

(d) ______________________________ [1]
7 (a) Evaluate, writing each answer as a whole number.
   (i) \(4^{17} \div 4^{14}\)
   (a)(i) __________________________ [2]
   (ii) \(12^0\)
   (ii) __________________________ [1]
   (iii) \(\frac{4}{8^3 \times 8^{-1}}\)
   (iii) __________________________ [3]

(b) Given that \(f(x) = x^2 - 3x\), work out \(f(5)\).
   (b) __________________________ [1]
8* This shape is made from a regular pentagon and a regular octagon each with sides of the same length.

\[ p \]

Not to scale

Prove that angle $p$ is $117^\circ$. [5]
9  Solve these simultaneous equations.

\[ 4x + y = 1 \]
\[ 2x - 3y = 18 \]

\[ x = \underline{\phantom{0}} \]
\[ y = \underline{\phantom{0}} \, [3] \]
10 (a) Simplify \( \sqrt{80} \).

Give your answer in the form \( a \sqrt{b} \), where \( a \) and \( b \) are integers and \( b \) is as small as possible.

(a) ______________________________ [2]

(b) Rationalise the denominator and simplify \( \frac{12}{\sqrt{3}} \).

(b) ______________________________ [3]
Q, R and S are points on a circle. 
PQ and PS are tangents to the circle. 
Angle QPS = 30°.

Calculate the size of angle QRS. 
Give a reason for each stage of your working.

\[ \text{[4]} \]
Four points A, B, C and D are such that \( \overrightarrow{AB} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}, \overrightarrow{BC} = \begin{pmatrix} 4 \\ -2 \end{pmatrix} \) and \( \overrightarrow{CD} = \begin{pmatrix} m \\ m \end{pmatrix} \). \( \overrightarrow{AD} \) is parallel to the x-axis.

Find the vector \( \overrightarrow{AD} \).
You may use the grid to help you.

\[ \overrightarrow{AD} = \begin{pmatrix} \_ \\ \_ \end{pmatrix} \]