ADDITIONAL MATERIALS

A calculator, ruler, protractor and a pair of compasses will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer all the questions in the spaces provided.

Take \( \pi \) as 3.14 or use the \( \pi \) button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.
1. Four friends, Darren, Emma, Jose and Rachel were sponsored to run in a 40 kilometre race. The table shows the amount of money raised and the number of sponsors for each person.

<table>
<thead>
<tr>
<th>Name</th>
<th>Money raised</th>
<th>Number of sponsors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darren</td>
<td>£488.50</td>
<td>25</td>
</tr>
<tr>
<td>Emma</td>
<td>£748</td>
<td>40</td>
</tr>
<tr>
<td>Jose</td>
<td>£862</td>
<td>50</td>
</tr>
<tr>
<td>Rachel</td>
<td>£570</td>
<td>24</td>
</tr>
</tbody>
</table>

Use the grid below to illustrate, as accurately as possible, how much money each of them raised.
Which one of the four friends raised the greatest amount of money per sponsor? You must show all of the calculations you made in order to check that you have found the correct person.

Jose completed the 40 kilometre race. Calculate how much money Jose raised per kilometre that he ran.

Rachel only completed three-eighths ($\frac{3}{8}$) of the race distance. Calculate how much money Rachel raised per kilometre that she ran. (Rachel's sponsors still paid the full amount as it was for a good cause.)
There were 6000 competitors registered for the race.
The ratio of males to females was 2 : 1.

15% of those registered completed the 40 kilometres in less than 3 hours. 
Of those who completed the race in less than 3 hours, the ratio of males to females was 3 : 2.

Calculate the fraction of male competitors who completed the race in less than 3 hours, and the fraction of female competitors who completed the race in less than 3 hours.

Show clearly a method you would use to decide which of the two fractions you have found was the greater.
Before the race, Darren hoped that he could complete the course at an average speed of 10 miles per hour.

Darren also knew that 1 km is approximately five-eighths ($\frac{5}{8}$) of a mile.

Using this information, how much time would Darren hope to take to complete the race?
2. A solid frustum may be thought of as the solid shape left when a cone has its top part removed as shown below.

The volume \( V \) of a frustum is given by the formula.

\[
V = \frac{\pi \times (R^2 + R \times r + r^2) \times h}{3}
\]

where

- \( R \) is the radius of the larger circular face,
- \( r \) is the radius of the smaller circular face, and
- \( h \) is the perpendicular distance between the two circular faces.

A company makes identical solid metal frustum shapes. The dimensions of the shape are given on the diagram.

The metal for producing these shapes is obtained by melting down solid rectangular blocks. These blocks are 1 metre long, 50 cm wide and 50 cm deep.
How many of these frustums can be made using the metal from one rectangular block?

The company has an order for 3000 of the frustum shapes. The rectangular blocks cost £350 each. How much will the company have to pay for enough blocks to provide the metal required to produce 3000 of the frustum shapes?

In order to cover their production costs, and to make a profit, the company sells the 3000 shapes at a price that is three times the total amount they paid for the metal blocks they needed. Calculate the price they should charge for each single frustum shape.
The solid frustum shapes that have been produced are packed into wooden crates. The crates are cubes with internal sides of length 1 metre.

The diagram below shows how the solid frustums are packed. They are packed side by side, the same way up, and in layers on top of each other.

What is the maximum number of these solid frustums that can be packed into one of these crates in this way?
3. A restaurant owner is making a number of surveys to gather information about her business. She recorded the number of people at each table on one particular evening. The results are summarised in the table below.

<table>
<thead>
<tr>
<th>Number of people at the table</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of tables</td>
<td>9</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

She decided to find
(i) the mean number of people per table,
(ii) the mode of the number of people per table,
(iii) the median number of people per table,
and (iv) the range of the number of people per table.

Show her calculations and answers.

(i) Mean

(ii) Mode

(iii) Median

(iv) Range

Whichever answer she looks at could give her an incorrect impression about the size of the groups that usually come to her restaurant. Why do you think this might be?
The tables, set out for five people, were circular with a radius of 60 cm. Using a scale of 1 centimetre to represent 20 centimetres, make a scale drawing of the circumference of the table top.

Use your protractor to show accurately how five people can be seated around this table. Each person needs to be at an equal distance from the person sitting next to them. Use a cross (X) to indicate their positions.

For angle calculation (if required)

[4]

A group of six people have booked a table at the restaurant. They will also be seated at a circular table. The names of the six people have been placed at random around the table. Carlos and Sian are two of these six people. What is the probability that the names of Carlos and Sian have been placed so that they will be sitting next to each other?
4. Stuart has gone to a travel agent to book a 7-day holiday at a Spanish resort for July 2013.

He has the following two **definite** requirements.

- He can only be away on holiday between 6 July 2013 and 27 July 2013
- His flight must land in Malaga

He would like to have as many as possible of the following five **preferred** conditions met.

- To fly from Birmingham
- Depart on a Monday
- Departure time to be before 10:00 am
- The hotel to have a 3-star (*** rating
- The hotel to offer ‘half-board’ (‘half-board’ means evening meals provided)

Using the following information, choose the best two options from the eight holiday packages listed (Reference A to Reference H)

His definite requirements must be met and **as many as possible** of his preferred conditions.

<table>
<thead>
<tr>
<th>JULY 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>14</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Star Rating</th>
<th>Half-Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castilla</td>
<td>***</td>
<td>Yes</td>
</tr>
<tr>
<td>Nou Sol</td>
<td>***</td>
<td>No</td>
</tr>
<tr>
<td>Costa Park</td>
<td>**</td>
<td>Yes</td>
</tr>
<tr>
<td>Villa Fernando</td>
<td>**</td>
<td>No</td>
</tr>
</tbody>
</table>
### Flights

<table>
<thead>
<tr>
<th>Holiday Reference</th>
<th>Flights</th>
<th>Depart</th>
<th>Return</th>
<th>Hotel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From</td>
<td>To</td>
<td>Date</td>
<td>Time</td>
</tr>
<tr>
<td>A</td>
<td>Manchester</td>
<td>Malaga</td>
<td>15/7/13</td>
<td>14:00</td>
</tr>
<tr>
<td>B</td>
<td>Manchester</td>
<td>Malaga</td>
<td>8/7/13</td>
<td>09:30</td>
</tr>
<tr>
<td>C</td>
<td>Manchester</td>
<td>Malaga</td>
<td>9/7/13</td>
<td>06:30</td>
</tr>
<tr>
<td>D</td>
<td>Manchester</td>
<td>Seville</td>
<td>8/7/13</td>
<td>08:00</td>
</tr>
<tr>
<td>E</td>
<td>Birmingham</td>
<td>Malaga</td>
<td>22/7/13</td>
<td>07:30</td>
</tr>
<tr>
<td>F</td>
<td>Birmingham</td>
<td>Malaga</td>
<td>10/7/13</td>
<td>07:30</td>
</tr>
<tr>
<td>G</td>
<td>Birmingham</td>
<td>Malaga</td>
<td>15/7/13</td>
<td>17:00</td>
</tr>
<tr>
<td>H</td>
<td>Birmingham</td>
<td>Malaga</td>
<td>13/7/13</td>
<td>20:30</td>
</tr>
</tbody>
</table>

**You may use this space for making notes if needed**

The two best options for Stuart are
(Allowing for as many of his preferred conditions as possible)

**Holiday Reference**

..........................

and

**Holiday Reference**

..........................