Please read this information before the examination starts.

- This examination is 60 minutes long.
- All questions should be attempted.
- A row of dots ............ denotes a space for your answer.
- Where answers are not exact they should be given to three significant figures, unless specified otherwise.
- The $\pi$ button on your calculator should be used for calculations involving $\pi$. 
1. 1 kilogram (kg) = 2.2 pounds (lb)

(i) Writing down all the figures shown on your calculator, find

(a) the number of pounds in 18 kilograms

Answer: .................................. pounds (1)

(b) the number of kilograms in 18 pounds.

Answer: ............................... kilograms (1)

(ii) (a) Write your answer to part (i) (a) correct to the nearest pound.

Answer: .................................. pounds (1)

(b) Write your answer to part (i) (b) correct to 1 decimal place.

Answer: ............................... kilograms (1)

(iii) Find the cost of 5 kilograms of potatoes if 10 pounds of potatoes cost £2.50

Answer: £ ............................................. (2)
2. The mean rainfall during the first 6 days of a week was 4.3 millimetres per day.

(i) What was the total rainfall during these 6 days?

Answer: ........................................ mm (2)

After a wet day on the 7th day of the week, the total rainfall increased to 32.2 millimetres.

(ii) (a) What was the rainfall on the 7th day?

Answer: ........................................ mm (1)

(b) What was the mean daily rainfall for all 7 days?

Answer: ........................................ mm (1)
3. (a) The prices of a packet of mints and a lollipop are in the ratio of 4:1
   The total cost of 1 packet of mints and 1 lollipop is £1

   (i) What is the cost of a lollipop?

   Answer: .................................... pence (2)

   A box of chocolates is 5 times as expensive as a packet of mints.

   (ii) What is the cost of a box of chocolates?

   Answer: £ ............................................. (1)

(b) Find the total amount if £3.50 is increased by 28%.

   Answer: £ ............................................. (2)

(c) Express 480 metres as a percentage of 2 kilometres.

   Answer: ............................................% (2)
4. The diagram below shows how each £1 is spent on different services by Shire District Council during a one-year period.

(i) Which service spends the most?

Answer: .......................... (1)

(ii) The total amount spent is £18 000 000

(a) How much is spent on roads?

Answer: £ ................................. (2)

A quarter of the education budget is spent on nursery education.

(b) Calculate the size of the remainder of the education budget.

Answer: £ ................................. (2)
5. Richard has a bag of 27 coloured sweets – red ones, yellow ones and orange ones.

The probability that, at random, he picks out a red sweet is $\frac{1}{3}$

(i) How many red sweets are there in the bag?

Answer: ............................................... (1)

Richard eats all the red sweets.

He then finds there are 4 more yellow sweets than there are orange ones.

(ii) (a) How many yellow sweets are there?

Answer: ............................................... (1)

(b) If he picks out one sweet at random, what is the probability that it is yellow?

Answer: ............................................... (1)

He picks a yellow sweet and eats it.

(iii) If he picks another sweet at random, what is the probability it is not yellow?

Answer: ............................................... (1)
6.

(i) On the co-ordinate grid, plot the points (1, 2), (4, 1), (3, 4) and (1, 4). Join the points to form a quadrilateral and label it A. (2)

(ii) With centre (0, 1), enlarge the quadrilateral by scale factor 2
Label the enlarged quadrilateral B. (3)

The area of quadrilateral A is 6 cm$^2$.

(iii) What is the area of quadrilateral B?

Answer: ........................................ cm$^2$ (1)
7. (a) Simplify

(i) \(2a - a + 3a\)

Answer: \( \ldots \ldots \ldots \ldots \ldots \ldots \) \(2\)

(ii) \(3(b + 2) - (2b - 3)\)

Answer: \( \ldots \ldots \ldots \ldots \ldots \ldots \) \(3\)

(iii) \(c \times c^4\)

Answer: \( \ldots \ldots \ldots \ldots \ldots \ldots \) \(1\)

(b) Factorise

\(4p + 6r\)

Answer: \( \ldots \ldots \ldots \ldots \ldots \ldots \) \(2\)
8. Captain Kirk sails from port, $P$, on a bearing of $060^\circ$ towards a fishing boat, $F$, which is 5 kilometres away.

(i) Using a scale of 1:100 000, draw the course that Captain Kirk takes from $P$ to the fishing boat and label the position of the fishing boat, $F$. 

(ii) Draw a north line through $F$. 

Captain Kirk then tows the fishing boat back to harbour, $O$, a distance of 8 kilometres on a bearing of $200^\circ$ from $F$.

(iii) Draw the course of the boats to the harbour, $O$. 

(iv) Measure and write down the distance and bearing of $O$ from $P$.

Answer: distance ..................... km (1) 
bearing .............................. ° (2)
9. ABCDEF shows part of a regular polygon with interior angle $x$ equal to 156°.

(i) Calculate the size of the exterior angle $y$.

Answer: $y = .....................^\circ$  (2)

(ii) How many sides has the regular polygon?

Answer: .........................  (2)

(iii) What is the sum of all the interior angles of the regular polygon?

Answer: ......................... $^\circ$  (1)

(iv) Which type of 4-sided figure is BCDE?

Answer: .........................  (1)

(v) Calculate the size of the angle marked $z$.

Answer: $z = .....................^\circ$  (2)
10. A toy brick is in the shape of a cuboid measuring 3 cm by 2 cm by 1.5 cm.

(i) What is the volume of the brick?

Answer: ....................... $\text{cm}^3$  (2)

Each cubic centimetre of the brick has a mass of 2.3 grams.

(ii) What is the mass of one brick?

Answer: ......................... $\text{g}$  (1)

The bricks are to be painted.

(iii) What is the total surface area of one brick?

Answer: ......................... $\text{cm}^2$  (3)

A set of 24 bricks completely fills a box with a square base of side 6 cm.

(iv) What is the height of the box?

Answer: ......................... $\text{cm}$  (3)
11. The international airport clocks show the following information simultaneously:

Mr M E Grant flies from London to New York. The flight time is $6\frac{1}{2}$ hours.

(i) If the aircraft leaves London at 10 00, at what time (local time) does he arrive in New York?

Answer: .........................  (2)

After a 3 hour wait in New York, Mr Grant travels on to Vancouver where the time is 4 hours behind the time in New York.

(ii) Mr Grant lands in Vancouver at 15 30 local time.

(a) How long is the flight from New York to Vancouver?

Answer: ......................... hours  (2)

(b) What is the time in London when Mr Grant lands in Vancouver?

Answer: .........................  (2)

(iii) How long after leaving London does Mr Grant arrive in Vancouver?

Answer: ............. h.......... min  (1)
12. (i) (a) Calculate the area of a circle of radius 8 centimetres.

Answer: ....................... cm² (2)

(b) Calculate the circumference of a circle of radius 8 centimetres.

Answer: ....................... cm (2)

(ii) Sector \( OAB \) is a quarter of a circle with centre \( O \) and radius 8 cm. Calculate

(a) the area of the sector \( OAB \)

Answer: ....................... cm² (2)

(b) (i) the length of the arc \( AB \)

Answer: ....................... cm (1)

(ii) the perimeter of the sector \( OAB \)

Answer: ....................... cm (1)

(c) the area of the triangle \( OAB \).

Answer: ....................... cm² (2)
13. The number $y$ is 3 bigger than the number $x$.

(i) Form an equation, in terms of $x$ and $y$, to show this information.

Answer: .............................. (1)

(ii) Complete the table of values for your equation in part (i).

<table>
<thead>
<tr>
<th>$x$</th>
<th>-3</th>
<th>0</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y$</td>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

(iii) Using the table in part (ii), plot points onto the grid below and draw a line through them. (2)
The sum of the numbers $x$ and $y$ is 2

(iv) Form an equation, in terms of $x$ and $y$, to show this information.

Answer: .................................. (1)

(v) Complete the table of values for your equation in part (iv).

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>2</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(2)

(vi) Using the table in part (v), plot points onto the grid opposite and draw a straight line through them.

(vii) Write down the co-ordinates of the point of intersection of the two lines.

Answer: (.........., ..........) (1)
14. pattern 1  pattern 2  pattern 3  pattern 4

![Patterns](image)

(i) Sketch pattern 4 in the space provided.  

(ii) Complete the table below to find the total number of squares in each of the patterns.

<table>
<thead>
<tr>
<th></th>
<th>pattern 1</th>
<th>pattern 2</th>
<th>pattern 3</th>
<th>pattern 4</th>
<th>pattern 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>number of 1 × 1 squares</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>...........</td>
<td>...........</td>
</tr>
<tr>
<td>number of 2 × 2 squares</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>...........</td>
<td>...........</td>
</tr>
<tr>
<td>number of 3 × 3 squares</td>
<td>0</td>
<td>0</td>
<td>...........</td>
<td>...........</td>
<td>...........</td>
</tr>
<tr>
<td>number of 4 × 4 squares</td>
<td>0</td>
<td>0</td>
<td>...........</td>
<td>...........</td>
<td>...........</td>
</tr>
<tr>
<td>number of 5 × 5 squares</td>
<td>0</td>
<td>0</td>
<td>...........</td>
<td>...........</td>
<td>...........</td>
</tr>
<tr>
<td>total number of squares</td>
<td>1</td>
<td>5</td>
<td>...........</td>
<td>...........</td>
<td>...........</td>
</tr>
</tbody>
</table>

(iii) By considering the sequence of numbers in the table above, calculate the total number of squares in an 8 × 8 square (pattern 8).

Answer: ..............................  (2)

(Total marks: 100)