1) Simplify
   a) $36 : 21$
   b) $42 : 49 : 77$

2) Write as a fraction in its lowest terms
   $35 : 55$

3) Share 18 beads between Angela and Kristen in the ratio 4 : 2

4) A jug of orange squash is made by mixing 5 parts water to 6 parts orange concentrate.
   How much orange concentrate is needed to make 385 ml of orange squash?

5) A recipe requires 8 cups of flour to make 11 cookies.
   How many cups of flour will be needed to make 77 cookies?

6) If 1 person takes 9 days to pick the peaches from a tree, how many days will it take 9 people to do the same job?
7) If \( c \) is proportional to \( b \) and \( c = 36 \) when \( b = 6 \). Find

a) the formula for \( c \) in terms of \( b \)

b) the value of \( c \) given \( b = 13 \)

c) the value of \( b \) given \( c = 48 \)

8) If \( t \) is proportional to the root of \( s \) and \( t = 6 \) when \( s = 4 \). Find

a) the formula for \( t \) in terms of \( s \)

b) the value of \( t \) given \( s = 25 \)

c) the value of \( s \) given \( t = 27 \)

9) If \( z \) varies inversely as \( y^2 \) and \( z = 9 \) when \( y = 3 \). Find

a) the formula for \( z \) in terms of \( y \)

b) the value of \( z \) given \( y = 7 \)

c) the value of \( y \) given \( z = \frac{81}{100} \)

10) Estimate the answer by rounding each number to 1 significant figure first

a) \[ 385.28 + 263.14 \]

b) \[ 82.1 \times 98.36 \div 81.38 \]
11) The number 84 has been rounded to the nearest integer. Find its lower and upper bounds. [1]

12) The number 300 has been rounded to the nearest 100. Find its lower and upper bounds. [1]

13) The number 69.7 has been rounded to the nearest 1 decimal place. Find its lower and upper bounds. [1]

14) The number 900 has been rounded to 1 significant figure. Find its lower and upper bounds. [1]

15) Find the upper and lower bounds of $a + b$, where $a = 11$ and $b = 8$ (both have been rounded to the nearest unit). [1]

16) Find the upper and lower bounds of $a - b$, where $a = 15$ and $b = 12$ (both have been rounded to the nearest whole number). [1]

17) Make the letter in brackets the subject of the formula [4]

a) $8y + 9v = 11T$ \hspace{1cm} (y)

b) $9 = \frac{10t + 3}{7}$ \hspace{1cm} (t)

c) $d = -r + y^2$ \hspace{1cm} (y)
18) The distance-time graph below shows the journey a business man made from London to Sheffield via Northampton. (Leave answers to nearest whole number where necessary).

Find

a) the distance to Northampton.

b) the time he spent in Northampton.

c) at what speed he travelled from Northampton to Sheffield.

d) his average speed over the whole journey.
19) The speed-time graph below shows the acceleration of a Aston Martin DB9. Find an estimate for the acceleration leaving your answer to 1 decimal place.

![Speed-time graph]

20) Factorise completely

   a) $18x^2 - 15x$

   b) $x^2 - 5x - 36$

   c) $c^2 - 49$

   d) $b^2 - 14b + 49$

   e) $x^2 + 12x + 27$

21) Solve the following

   a) $20a^2 - 15a = 0$

   b) $z^2 + 2z - 24 = 0$

   c) $a^2 - 14a + 48 = 0$

   d) $3z^2 - 5z - 2 = 0$

   e) $2z^2 + 5z + 3 = 0$

   f) $c^2 - 64 = 0$

   g) $16x^2 - 81 = 0$
22) The rectangle below has an area 18 cm$^2$ and the length is twice the width. Find the dimensions of the rectangle.

![Rectangle Diagram]

23) Solve the following, leaving your answers to 3 significant figures.

$$10y^2 + 9y - 5 = 0$$

24) a) Complete the table for the equation $y = x^2 + x - 4$

<table>
<thead>
<tr>
<th>$x$</th>
<th>-4</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x^2$</td>
<td>16</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$+x$</td>
<td>-4</td>
<td>-3</td>
<td>-1</td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>$-4$</td>
<td>-4</td>
<td>-4</td>
<td>-4</td>
<td>-4</td>
<td>-4</td>
<td>-4</td>
<td></td>
</tr>
<tr>
<td>$y$</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-4</td>
</tr>
</tbody>
</table>

b) Draw $y = x^2 + x - 4$ on the grid below

![Graph Grid]
25) Solve the quadratic equation $-3x^2 - x + 1 = 0$ using the graph of $y = -3x^2 - x + 1$ shown below. Leave your answer to 1 decimal place where necessary.
Solutions for the assessment Ratio, Proportion, Estimation, Upper, Lower, Rearranging, Travel, Factorising and Quadratics

1) a) 12 : 7  b) 6 : 7 : 11

2) \(\frac{7}{11}\)

3) Angela gets 12 beads and Kristen gets 6 beads

4) 210 ml

5) 56 cups of flour

6) 1 day

7) a) \(c = 6b\)  b) 78  c) 8

8) a) \(t = 3 \sqrt{s}\)  b) 15  c) 81

9) a) \(z = \frac{81}{y^2}\)  b) \(1 \frac{32}{49}\)  c) 10

10) a) \(400 \div 300 = 700\)  b) \(80 \times 100 \div 80 = 100\)

Exact answer = 648.42

Exact answer = 99.2302285574

11) 83.5 \(\leq\) 84 \(<\) 84.5

12) 250 \(\leq\) 300 \(<\) 350

13) 69.65 \(\leq\) 69.7 \(<\) 69.75

14) 850 \(\leq\) 900 \(<\) 950

15) 18 \(\leq\) \(a + b\) \(<\) 20

16) 2 \(\leq\) \(a - b\) \(<\) 4

17) a) \(y = \frac{11T - 9v}{8}\)  b) \(t = 6\)

c) \(y = \sqrt{d + r}\)  d) \(h = \frac{y^2}{2g}\)

18) a) 80 km  b) 0.5 hours  c) 53 km/h  d) 40 km/h

19) \(3.5 \text{ m/s}^2\) (3.4 - 3.6)

20) a) \(3x(6x - 5)\)  b) \((x + 4)(x - 9)\)

c) \((c + 7)(c - 7)\)  d) \((b - 7)^2\)

e) \((x + 3)(x + 9)\)
21) a) $a = 0$ or $a = \frac{3}{4}$  
   b) $z = -6$ or $z = 4$
   
   c) $a = 8$ or $a = 6$  
   d) $z = -\frac{1}{3}$ or $z = 2$
   
   e) $z = -\frac{3}{2}$ or $z = -1$  
   f) $c = -8$ or $c = 8$
   
   g) $x = -\frac{9}{4}$ or $x = \frac{9}{4}$  
   22) Length is 6 cm and width is 3 cm

23) $y = 0.388$ or $y = -1.29$

24) 1st line: $9, 1, 4$;  
   2nd line: $-2, 0$;  
   3rd line: $-4, -4$;  
   4th line: $8, -2, -4, -2, 2$

25) $x = 0.4$ or $x = -0.8$

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