P6 Solutions

Note: In all solutions, u represents units.

Chapter 1 More Than/Less Than

Unit 1.1 – More Than/Less Than (Model Drawing)

Qn 1
L – Left R – Remained
75% = \(\frac{3}{4}\) 60% = \(\frac{3}{5}\) = \(\frac{12}{20}\) \(\frac{3}{4} \times 40 = 30\)

Total number of children [30 (L) 10 (R)]

Boys 15u (L) 5u (R) 40
Girls 12u (L) 8u (R)

Total number of children remained
Boys 10u (L) 8u (R)
Girls 8u (R)

From the model, 3 units = 18
1 unit = 18 \(\div\) 3 = 6
Total number of girls at first = 20 \(\times\) 6 = 120

Qn 2
G – Gave L – Left
\(\frac{4}{9}\) 1 unit = 9 \(\div\) 9 \(\times\) 36 = 16
G = 16 L = 36 \(\div\) 16 = 20

Chocolate 8u (G) 10u (L) 36
Banana 9u (G) 9u (L)

Left
Chocolate 10u
Banana 9u

1 unit = 5
Total chocolate muffins at first = 18 units + 36
= (18 \(\times\) 5) + 36 = 126

Qn 3
60% = \(\frac{3}{5}\) 25% of $72
\(\frac{3}{5}\) \(\times\) $120 = $72 \(\frac{1}{4}\) \(\times\) $72 = $18
$120 – $72 = $48 $72 – $18 = $54

Charles x x x $120
Benedict $72 + $48

Qn 4
\(\frac{1}{4}\) \(\times\) 80 = 20 60% = \(\frac{3}{5}\) \(\frac{3}{5}\) \(\times\) 20 = 12

Dennis 80
Karen

Dennis +60
Karen +20

In the end
Dennis 92
Karen

Dennis at first = 4 units + 80
= (4 \(\times\) 7) + 80 = 108

Qn 5
At first
Boys
Girls 4

In the end
Boys
Girls 4 Left

2 units = 4 + 8 + 4 = 16
1 unit = 16 \(\div\) 2 = 8
Total boys at first = 3u + 12
= (3 \(\times\) 8) + 12 = 36

Visit the forum page at www.onSponge.com for more challenging problem sums.
Qn 6

At first

<table>
<thead>
<tr>
<th>Boys</th>
<th>2</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

In the end

<table>
<thead>
<tr>
<th>Amount</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>20</td>
<td>+4+4+4</td>
</tr>
</tbody>
</table>

2 units = 20 + 8 = 28

Number of boys at first = 2 units + 8 = 2 x 8 + 8 = 24

Qn 7

John

<table>
<thead>
<tr>
<th>Amount</th>
<th>1 unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal</td>
<td>20 + 4</td>
</tr>
</tbody>
</table>

1 unit = 20 + 4 = 24

Total number of stickers John had at first = 4 units = 4 x 24 = 96

Qn 8

At first

<table>
<thead>
<tr>
<th>Amount</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change</td>
<td>-2</td>
<td>-2</td>
</tr>
</tbody>
</table>

2 units = 42 + 10 = 52

1 unit = 52 + 2 = 26

No. of boys at first = 1 unit + 2 = 26 + 2 = 28

Qn 9 (Cont.)

3 units = 210 + 30
= 240

1 unit = 240 + 3
= 80

Number of children in the end = 15u = 15 x 80 = 1200

Qn 10

<table>
<thead>
<tr>
<th>Amount</th>
<th>Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>4</td>
</tr>
</tbody>
</table>

4 = 16% total
4 = 4% total

Total 11 = 44% total

100% – 44% = 56%
56% = 112
1% = 2
Total in bag = 100% = 200

Qn 11

<table>
<thead>
<tr>
<th>Amount</th>
<th>Triangles</th>
<th>Squares</th>
<th>Rectangles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

3 = 15% of total
5 = 5% of total
8 = 40% of total
100% – 40% = 60%
60% of total → 300
15% of total → 75
Total number of triangles = 75 + 180 = 255

Qn 12

<table>
<thead>
<tr>
<th>Amount</th>
<th>Adults</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change</td>
<td>+12</td>
<td>-4</td>
<td></td>
</tr>
</tbody>
</table>

8u (L) = 30

12u (R) = 120

3 units = 12% of total
1 unit = 4% of total
10 unit = 40% of total
Remaining 60% of total → 120
1% of total → 2
Total number of adults = 12% of total + 120
= (12 x 2) + 120
= 144

Qn 13

<table>
<thead>
<tr>
<th>Amount</th>
<th>(S) – Spent</th>
<th>(R) - Remained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

$288 = 1 x $288 = $288

12u (R) = 210

15u (R) = 30

At first

Daniel | 2u(S) | 10u (R) | $240
Edwin  | 9u (S) | 3u(R)  | $288
Qn 13 (Cont.)
In the end
Daniel  
Edward  
7 units = $303 - $240  
= $63  
1 unit = $63 / 7  
= $9  
Daniel had at first = 12 units + $288  
= (12 x $9) + $288  
= $396

Qn 14
At first
Alan  
Kenneth  
2u = $140 + $120  
= $260  
1u = $130  
Total at first = 1u + $340 + 1u + $140  
= 2u + $480  
= (2 x $130) + $480  
= $740

Qn 15
End
Girls  
Boys  
Therefore,  
Total = 13  
= 520  
= 40

Boys at first = 8  
= (8 x 40)  
= 320

Qn 16 (Cont.)
3 = $1700 - $500  
May = $1700 + $400  
= $2100  
Jenny = $800

Qn 17
Benedict
Jeremy
Each at first  
Benedict = $120 + $1080  
= $1200  
Jeremy = $120 x 3  
= $360

Chapter 2 Patterns
Unit 2.1 – Equal Intervals
Qn 1
(a)  
Diagram  No. of dots  
1  6  
2  10  
3  14  
4  18  
5  22  
+4  +4  +4  +4
(b)  
9th diagram = 6 + (8 x 4)  
= 6 + 32  
= 38  
450th diagram = 6 + (449 x 4)  
= 6 + 1796  
= 1802

Qn 2
(a)  
Diagram  No. of dots  
1  3  
2  5  
3  7  
4  9  
5  11  
+2  +2  +2  +2
(b)  
20th diagram = 3 + (19 x 2)  
= 3 + 38  
= 41 dots  
200th diagram = 3 + (199 x 2)  
= 3 + 398  
= 401

Qn 3
(a)  
T  1  2  3  4  5  15  22  
P  4  6  8  10  32  46  
+2  +2  +2  
(b)  
No. of people around 100 tables = (100 x 2) + 2  
= 202
Qn 4

(a) | Fig. | No. of squares | No. of triangles | Perimeter | No. of sticks |
---|---|---|---|---|
1 | 1 | 2 | 6 | 8 |
2 | 2 | 4 | 10 | 15 |
3 | 3 | 6 | 14 | 22 |
4 | 4 | 8 | 18 | 29 |

(b) Perimeter for Figure 50 = 6 + (49 × 4) = 202
(c) No. of sticks for figure 100 = 8 + (99 × 7) = 701
(d) 254 – 6 = 248
248 + 4 = 62
Figure No = 62 + 1 = 63
No. of squares = 63

Qn 5

(a) T-shaped array

<table>
<thead>
<tr>
<th>Structure</th>
<th>Number of coins</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>5 + (1 × 3) = 8</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>5 + (2 × 3) = 11</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>5 + (3 × 3) = 14</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>5 + (4 × 3) = 17</td>
</tr>
<tr>
<td>5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>5 + (5 × 3) = 20</td>
</tr>
<tr>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
<td>5 + (6 × 3) = 23</td>
</tr>
</tbody>
</table>

(b) No. of coins for 100<sup>th</sup> array = 5 + (99 × 3) = 302
(c) No. of coins for 200<sup>th</sup> array = 5 + (199 × 3) = 602

Qn 6

(a) 2<sup>nd</sup> structure = 12 + (1 × 8) = 20
3<sup>rd</sup> structure = 12 + (2 × 8) = 28
(b) 10<sup>th</sup> structure = 12 + (9 × 8) = 84
(c) 100<sup>th</sup> structure = 12 + (99 × 8) = 12 + 792 = 804
(d) 252 – 12 = 240
240 + 8 = 30
Structure = 30 + 1 = 31 (31<sup>st</sup> structure)

Qn 7

(a) Figure 20 = 7 + (19 × 3) = 64
(b) Figure 90 = 7 + (89 × 3) = 274
(c) 1<sup>st</sup> row = 21 dots
Figure = 21 – 2 = 19 (Figure 19<sup>th</sup>)
Total dots = 7 + (18 × 3) = 61

Qn 8

(a) Total seats = (4 × 4) + 2 = 18
(b) Total seats = (20 × 4) + 2 = 82
(c) Total seats = (100 × 4) + 2 = 402
(d) 370 – 2 = 368
368 + 4 = 372
Diagram 92 could seat 370 students.

Qn 9

(a) Block.

<table>
<thead>
<tr>
<th>1-T</th>
<th>2-T</th>
<th>3-T</th>
<th>4-T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter (cm)</td>
<td>10</td>
<td>14</td>
<td>18</td>
</tr>
</tbody>
</table>

(b) Perimeter of a 20-T block = 10 + (19 × 4) = 86
(c) Perimeter of a 100-T block = 10 + (99 × 4) = 406
(d) 106 – 10 = 96
96 + 4 = 100
24 + 1 = 25-T block
No. of squares = 25 × 4 = 100

Unit 2.2 – Square Numbers

Qn 1

(a)

<table>
<thead>
<tr>
<th>No. of shaded squares, S</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of unshaded squares</td>
<td>0</td>
<td>4</td>
<td>16</td>
<td>36</td>
<td>64</td>
</tr>
<tr>
<td>Total no. of squares, T</td>
<td>1</td>
<td>9</td>
<td>25</td>
<td>49</td>
<td>81</td>
</tr>
</tbody>
</table>

(b) Total squares in diagram 30 = (30 + 29)² = 3481
(c) Total unshaded squares = (49 × 2)² = 9604
(d) 29 – 1 = 28
28 + 4 = 32
7 + 1 = 8
Diagram 8 has 29 shaded squares

Qn 2

(a)

<table>
<thead>
<tr>
<th>No. of squares</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fig. 1</td>
<td>1</td>
</tr>
<tr>
<td>Fig. 2</td>
<td>1 + 4 = 5</td>
</tr>
<tr>
<td>Fig. 3</td>
<td>1 + 4 + 9 = 14</td>
</tr>
<tr>
<td>Fig. 4</td>
<td>1 + 4 + 9 + 16 = 30</td>
</tr>
</tbody>
</table>

(b) 1 + 4 + 9 + 16 + 25 + 36 + 49 + 64 + 81 = 285

Figure 9 since 9 × 9 = 81.

Qn 3

(a)

<table>
<thead>
<tr>
<th>Diagram</th>
<th>No. of shaded triangles</th>
<th>No. of unshaded triangles</th>
<th>Total no. of triangles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>27</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>33</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>15 + (5 × 6) = 45</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 × 9 = 81</td>
<td></td>
</tr>
</tbody>
</table>

(b) 135 – 15 = 120
120 + 6 = 20
Diagram = 20 + 1 = 21

(c) No. of shaded triangles in diagram 50 = 50 × 50 = 2500

(d) Total triangles in Diagram 80 = (83 × 83) = 6889
Qn 4  
(a)  
<table>
<thead>
<tr>
<th>Figure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of white squares</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>No. of coloured squares</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Total no. of squares</td>
<td>9</td>
<td>16</td>
<td>25</td>
<td>36</td>
<td>49</td>
</tr>
</tbody>
</table>

(b)  
100 + 4 = 25  
Figure no. = 25 – 1  
= 24  
(c)  
No. of white squares in Figure 90 = 90 × 90  
= 8100  
(d)  
Total = 102 × 102  
= 10 404

Qn 5  
(a)  
<table>
<thead>
<tr>
<th>Length of side of given big square (cm)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of small black squares</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>No. of small white squares</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Total no. of small squares</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
</tbody>
</table>

(b)  
Side 11 cm = side has 11 squares  
Total squares = 11 × 11  
= 121  
Total white squares = (121 – 1) ÷ 2  
= 60  
(c)  
Length of side = 14 cm  
Since 14 × 14 = 196  
(d)  
Side 18 cm = side has 18 squares  
Total squares = 18 × 18  
= 324  
Total black squares = 324 ÷ 2  
= 162

Unit 2.3 – Sum of Odd Numbers  
Qn 1  
(a)  
10th line = 1 + 3 + 5 + … + 19 = 10² = 100  
(b)  
50th line = 1 + 3 + 5 + … + 99 = 50² = 2 500  
(c)  
100th line = 1 + 3 + 5 … + 199 = 100² = 10 000

Qn 2  
(a)  
<table>
<thead>
<tr>
<th>Figure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of shaded squares</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>No. of unshaded squares</td>
<td>3</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>Total no. of squares</td>
<td>4</td>
<td>9</td>
<td>16</td>
<td>25</td>
<td>36</td>
</tr>
</tbody>
</table>

(b)  
Figure 4 = 1 + 3 + 5 + 7 + 9 + 25 = 5 × 5  
Figure 5 = 1 + 3 + 5 + 7 + 9 + 11 = 36 = 6 × 6  
(c)  
Figure no. × 2 + 1 = last digit  
Figure no. = 39 + 1  
= 40  
The sum = (19 + 1)²  
= 400  
(d)  
Figure no. = 79 + 1  
= 80  
The sum = (39 + 1)²  
= 1600

Qn 3  
(a)  
13 and 49  
(b)  
Total tiles in bottom layer = (29 × 2) – 1  
= 57  
(c)  
Total tiles = 50 × 50  
= 2500  
(d)  
Total tiles = 100 × 100  
= 10 000

Visit www.onspnge.com for solutions and more!
Unit 2.5 – Sum of Even Numbers

Qn 1
(a) Figure 1
   No. of bricks
   1  2  3  4  5
   +2  +4  +6  +8
(b) Figure 20 = (20 × 19) + 1
   381
(c) Figure 100 = (100 × 99) + 1
   9901

Qn 2
(a) Figure 30 = (30 × 31) + 1
   931
(b) Figure 90 = (90 × 91) + 1
   8191

Qn 3
(a) 5th line = 2 × 6 + 10 + 14 + 18 + 22
   = 72
   = 2 × 6²
(b) 38 – 2 = 36
   36 ÷ 4 = 9
   Line 9 = 2 × 10²
   = 2 = 100
   = 200
(c) p² = 512 + 2
   = 256
   p = 16
   = Line 15
   Last digit q = (line no.) × 4 + 2
   = (15 × 4) + 2
   = 62
(d) 50th line sum = 2 × 51²
   = 2 × 2601
   = 5202

Unit 2.6 – Multiples of Sum of Consecutive Numbers

Qn 1
Day 1 = 3 × 1 = 3
Day 2 = 5 × 3 = 3 + 12 = 15
Day 3 = 7 × 5 = 3 + 12 + 20 = 35
Day 4 = 9 × 7 = 3 + 12 + 20 + (9 + 9 + 10) = 63
(a) No. of cubes added on Day 5 = (11 × 2) × (7 × 2)
   = 22 + 14 (36 cubes)
(b) Total blocks on Day 10 = (10 × 2 + 1) × (10 × 2 + 1 – 2)
   = 21 × 19
   = 399
(c) Total blocks on Day 30 = (30 × 2 + 1) × (30 × 2 + 1 – 2)
   = 61 × 59
   = 3599

Qn 2
(a) No. of small triangles = 16
   No. of sticks = 30
   = 3 × 10
(b) Figure 5 = 50 × 50 = 2500 triangles
   Sticks = 3 × (1 + 2 + 3 + … + 50)
   = 3 × 50
   = 3825

Qn 2 (Cont.)
(c) Figure 100 = 100 × 100 (10 000 triangles)
   Sticks = 3 × (1 + 2 + 3 + … + 100)
   = 3 × 100(101)²
   = (1515) sticks
(d) 84 ÷ 3 = 28
   28 × 2 = 56
   Since 7 × 8 = 56
   Figure 7, no. of triangles = 7 × 7
   = 49

Qn 3
(a) Line 4 = 16 + 17 + 18 + 19 + 20
   = 21 + 22 + 23 + 24
(b) Line 50 = 50 × 2 + 1 (101 numbers)
(c) 135 – 1 = 134
   134 × 2 = 67th line

Qn 4
(a) No. of shaded triangles = 12, 15 and 60
   Total no. of triangles = 36, 441
   No. of unshaded triangles = 13, 21 and 381
(b) No. of shaded triangles in diagram 40 = 40 × 3
   = 120
(c) No. of unshaded triangles in diagram 50
   = 1 + (50 × 49)
   = 2451
(d) Total triangles in diagram 80 = 81 × 81
   = 6561

Qn 5
(a) Total no. of dots; No of small right angled triangles
   T4 = 25; 32;
   T10 = 11 × 11 = 121;
   10 × 20 = 200
(b) Total dots for figure 20 = 21 × 21 = 441
(c) Total no. of small right angled triangles in figure 50
   = 50 × 100
   = 5000
(d) No, because 340 ÷ 2 = 170 is not a square number.
   (E.g. 49 is a square number because 7 × 7 = 49)

Qn 6
(a) s = 16, t = 20
(b) Number of unshaded rhombuses in figure 40
   = (8 × 39 × 4)
   = 164

Chapter 3 Circles

Unit 3.1 – Composite Figure (Square – Quadrant)

Qn 1
Area of shaded part = square – quadrant
   = (14 × 14) – (π/4 × 14²)
   ≈ 42.1 cm²

Shaded part = 42.1 cm² × 2
   = 84 cm²

Qn 2
Area of shaded part = square – quadrant
   = (10 × 10) cm² – (π/4 × 10²) cm²
   = 21.5 cm²

Shaded part = 21.5 cm² × 4
   = 86 cm²

Perimeter = 1 big circle + 40 cm
   = 2π(10 cm) + 40 cm
   = 103 cm

Alternatively, area = square – circle
   = (20 × 20) – (π(10 × 10))
   = 86 cm²
Qn 1

Area of shaded part = square – quadrant

\[ = (15 \times 15) \text{ cm}^2 - \left(\frac{1}{4} \pi \times 15^2\right) \text{ cm}^2 \]

= 48.3 cm²

Shaded part = 48.3 cm² × 4

= 193 cm²

Perimeter = 1 big circle

= 2\pi(15 \text{ cm})

= 94 cm

Alternatively, area = square – circle

= (30 \times 30) \text{ cm}^2 - \pi(15 \times 15) \text{ cm}^2

= 193 cm²

Qn 1 (Cont.)

Shaded part (rugby) = 55.9 cm² × 2

= 112 cm²

Qn 2

Radius = 7 cm

Area = circle – square

= circle – 2 triangles

= \pi r^2 - 2\left(\frac{1}{2} \times 14 \times 7\right)

= \pi(7^2) - (14 \times 7)

= 56 cm²

Qn 3

\( \frac{1}{8} \) shaded part = quadrant – triangle

\[ = \left[ \frac{\pi}{4} \times \left(\frac{7}{2}\right)^2\right] - \left[\frac{1}{2} \times \left(\frac{7}{2}\right)^2\right] \]

= 3.5 cm²

Shaded part = 3.5 cm² × 8

= 28 cm²

Qn 4

Area = circle – square

= \pi(8)^2 \text{ cm}² - (16 \times 8) \text{ cm}²

= 73 cm²

Qn 5

Area = (circle – square) × 2

= (circle – 2 triangles) × 2

= 2\pi(10)^2 - (20 \times 10) \text{ cm}² × 2

= 228 cm²

Qn 6

Area = (circle – square) × 2

= (circle – 2 triangles) × 2

= [\pi(8)^2 - (16 \times 8)] \text{ cm}² × 2

= 146 cm²

Qn 7

Area = \( \frac{1}{4} \) big circle

= \( \frac{1}{4} \) (20)² cm²

= 314 cm²

Qn 8

Perimeter = 1 small circle + 1 big quadrant

= 2\pi(7) + \frac{2\pi(14)}{4}

= 66 cm

Area = quadrant – triangle

= \left[\frac{\pi(14)^2}{4} - \frac{1}{2} \times (14)^2\right]

= 56 cm²

Unit 3.3 – Similar Figures

Qn 1

Perimeter = 2\pi rs + 2\pi rd

= 2\pi(5) + 2\pi(8)

= 82 cm

Area = \pi(8)^2 - \pi(5)^2

= 64\pi - 25\pi

= 39\pi

= 123 cm²

Qn 2

Perimeter = 1 big circle

= 2\pi(30 \text{ cm})

= 189 cm

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Qn 2 (Cont.)
Area of small semicircle = \( \frac{\pi (2)^2}{2} \)
= 6 cm²
Area of shaded part = 4 × 6.3 cm²
= 25 cm²
Perimeter of shaded part = 1 big circle = 2\(\pi r\)
= 2\(\pi (6)\) cm
= 38 cm

Qn 4
Perimeter of shaded part = 2 circles (B)
= 2 × 2\(\pi r\)
= 4\(\pi (8)\)
= 101 cm
Diameter (S) : Diameter (B) = 1 : 2
Area (S) : Area (B) = 1 : 4
Area of small circle = \(\pi (4)^2\) (1 unit)
= 50.3 cm²
Area of shaded part = 4u – 2u
= 2 × 50.3 cm²
= 101 cm²

Qn 5
Radius (S) = 10 cm + 2
= 5 cm
Radius (B) = Diameter (S) + Radius (M)
= 10 cm + 10 cm
= 20 cm
(a) Perimeter of shaded part = 2 circles (big)
= 2 × 2\(\pi (20)\) cm
= 80\(\pi\) cm
(b) Radius (S) : Radius (M) : Radius (B) = 5 : 10 : 20
Area (S) : Area (M) : Area (B) = 1 : 2 : 4
Shaded part = 16u – 1u – 1u – 4u = 10u
Fraction shaded = \(\frac{10}{16} = \frac{5}{8}\)

Qn 6
Diameter (S) : Diameter (M) : Diameter (B) = 1 : 2 : 4
Area (S) : Area (M) : Area (B) = 1 : 4 : 16
Shaded part = 16u – 4u – (1 × 4)u
= 8u
Diameter (S) = 72 ÷ 4
= 18 cm
Radius = 9 cm

Qn 6 (Cont.)
Area of small circle = 1u
= \(\pi (9)^2\)
= 81\(\pi\) cm²
Area of shaded part = 81\(\pi \times 8\)
= 648\(\pi\) cm²

Qn 7
Perimeter = 2 big circles
= 4\(\pi (9)\) cm
= 113 cm
Diameter (S) : Diameter (M) : Diameter (B)
= 6 : 12 : 18
= 1 : 2 : 3
Area (S) : Area (M) : Area (B) = 1 : 4 : 9
Area of (small) = \(\pi (3)^2\)
= 28.3 cm²
Area of (shaded) = 9u – 5u
= 4u
= 4 × 28.3
= 113 cm²

Qn 8
Perimeter = 1 quadrant + 1 semicircle + 16
= 1 semicircle (big) + 16
= \(\pi (16)\) cm + 16 cm
= 66 cm
Area of (quadrant) = \(\frac{\pi (16)^2}{4}\)
= 201.1 cm²
Area of (semicircle) = 100.6 cm²
Shaded = 201.1 cm² – 100.6 cm²
= 101 cm²

Qn 9
Perimeter = 1 big semicircle + 1 small circle
= 1 big circle
= 2\(\pi (22)\) cm
= 138 cm
Area of small semicircle = \(\frac{\pi (11)^2}{2}\)
= 190.1 cm²
Area of shaded part = 4u – 1u – 1u
= 2u
= 2 × 190.1 cm²
= 380 cm²

Qn 10
Perimeter of shaded
= 1 big semicircle + 1 small circle + 32 cm
= 1 big circle + 32 cm
= 2\(\pi (16)\) cm + 32 cm
= 133 cm
Area of small semicircle = \(\frac{\pi (8)^2}{2}\)
= 64\(\pi\) cm²
Area of shaded part = 4u – 1u – 1u
= 2u
= 2 × 64\(\pi\)
= 201 cm²

Qn 11
Perimeter of shaded = 4 × (8 + 1 quadrant + 1 semicircle)
= 4 × (8 + 1 big semicircle)
= 4 × (8 + \(\pi (8))
= 133 cm
Qn 11 (Cont.)
Area of small semicircle = 1u
\[ \frac{\pi (4)^2}{4} \text{ cm}^2 \]
\[ \approx 25.1 \text{ cm}^2 \]
Area of shaded part = 4u
\[ = 25.1 \text{ cm}^2 \times 4 \]
\[ = 101 \text{ cm}^2 \]

Qn 12
Perimeter = 1 big circle
\[ = 2\pi(9 \text{ cm}) \]
\[ = 57 \text{ cm} \]
Area = 1 big semicircle
\[ = \frac{\pi (9)^2}{2} \text{ cm}^2 \]
\[ \approx 127 \text{ cm}^2 \]

Unit 3.4 – Cut And Paste
Qn 1
There are 2 equal semicircles formed by the 2 equal sides of the isosceles triangle. Since the small unshaded part overlaps on both semi circles, we could cut and paste the remaining shaded semicircle onto the remaining unshaded semi circle to form a sector.
Area of shaded part = area of sector
\[ = \frac{60 \times \pi(12)^2}{360} \]
\[ = 75 \text{ cm}^2 \]

Qn 2
Area of shaded part = 1 big semicircle
\[ = \frac{\pi r^2}{2} \]
\[ = \frac{\pi (12)^2}{2} \]
\[ = 226 \text{ cm}^2 \]

Qn 3
Area of shaded part = 1 square
\[ = (8 \times 8) \text{ cm}^2 \]
\[ = 64 \text{ cm}^2 \]
Perimeter of shaded
\[ = \pi(8 \text{ cm}) + 16 \text{ cm} \]
\[ = 41 \text{ cm} \]

Qn 4
Perimeter of shaded part = 1 circle + 10 cm
\[ = 2\pi(5 \text{ cm}) + 10 \text{ cm} \]
\[ = 41 \text{ cm} \]
Area of shaded part = circle – rectangle
\[ = (10 \times 10) \text{ cm}^2 - \pi(5)^2 \text{ cm}^2 \]
\[ = 21 \text{ cm}^2 \]

Qn 5
Area of shaded part = area of sector
\[ = \frac{120 \times \pi(10)^2}{360} \text{ cm}^2 \]
\[ = 105 \text{ cm}^2 \]

Qn 6
Area of shaded part = rectangle
\[ = (18 \times 9) \text{ cm}^2 \]
\[ = 162 \text{ cm}^2 \]

Qn 7
Area of shaded part = area of triangle
\[ = \left( \frac{1}{2} \times 16 \times 8 \right) \text{ cm}^2 \]
\[ = 64 \text{ cm}^2 \]

Qn 8
Perimeter = \( \pi r + 10 + 10 + 20 \)
\[ = \pi(10 \text{ cm}) + 40 \text{ cm} \]
\[ = 71 \text{ cm} \]

Qn 9
Area of shaded part
\[ = \text{(square – circle) + triangle} \]
\[ = (16 \times 16) \text{ cm}^2 - \frac{\pi(8)^2}{4} \text{ cm}^2 + \frac{1}{2}(16)(8) \text{ cm}^2 \]
\[ = 256 \text{ cm}^2 + 64 \text{ cm}^2 - 64\pi \text{ cm}^2 \]
\[ \approx 119 \text{ cm}^2 \]

Qn 10
Square – quadrant
\[ = (12)^2 \text{ cm}^2 - \frac{\pi(12)^2}{4} \text{ cm}^2 \]
\[ \approx 30.9 \text{ cm}^2 \]

Area of region Z
\[ = 30.9 \text{ cm}^2 + 2 \]
\[ = 15.5 \text{ cm}^2 \]
Shaded area = semi-circle – Region Z
\[ = \frac{\pi(12)^2}{2} \text{ cm}^2 - 15.5 \text{ cm}^2 \]
\[ = 211 \text{ cm}^2 \]

Qn 11
Area of shaded part = large semicircle – 3 \( \frac{1}{2} \) small circles
\[ = \frac{\pi(30)^2}{2} \text{ cm}^2 - \frac{7}{2}(\pi)(10)^2 \text{ cm}^2 \]
\[ = 314 \text{ cm}^2 \]

Qn 12
\[ \frac{1}{2} \text{ rugby} = \text{quadrant – triangle} \]
\[ = \frac{\pi(8)^2}{4} \text{ cm}^2 - \frac{1}{2}(8)(8) \text{ cm}^2 \]
\[ = 18.3 \text{ cm}^2 \]
Shaded area = big circle – rugby
\[ = \pi(8)^2 \text{ cm}^2 - 2(18.3) \text{ cm}^2 \]
\[ = 165 \text{ cm}^2 \]

Qn 13
Area of shaded part = big semi – triangle + rectangle(after cut N paste)
\[ = \frac{\pi(14)^2}{2} \text{ cm}^2 - \frac{1}{2}(28)(10) \text{ cm}^2 + (14 \times 7) \text{ cm}^2 \]
\[ = 266 \text{ cm}^2 \]
Shaded area is 266 cm²

Unit 3.5 Overlapping Method
Qn 1
Area of small semicircle + medium semicircle + Area of triangle
\[ = \pi(2.5)^2 \text{ cm}^2 + \frac{\pi(6)^2}{2} \text{ cm}^2 + \left( \frac{1}{2} \times 5 \times 12 \right) \text{ cm}^2 \]
\[ \approx 96.4 \text{ cm}^2 \]
Shaded area = total area – big semicircle
\[ = 96.4 - \left( \frac{13}{2} \right)^2 \]
\[ \approx 30 \text{ cm}^2 \]
Qn 2
Region A = square – quadrant
\[
= (8 \times 8) \text{ cm}^2 - \frac{\pi(8)^2}{4} \text{ cm}^2
\]
= 13.7 cm²
Shaded area = \( \frac{1}{2} \times 20 \times 8 \) cm² - 13.7 cm²
= 66 cm²

Qn 3
Region A = rectangle – small quadrant
\[
= (12 \times 5) \text{ cm}^2 - \frac{\pi(5)^2}{4} \text{ cm}^2
\]
= 60 cm² - 19.63 cm²
= 40.4 cm²
Shaded area = big quadrant – Region A
\[
= \frac{\pi(12)^2}{4} \text{ cm}^2 - 40.4 \text{ cm}^2
\]
= 73 cm²

Qn 4
Triangle = 48 cm²
\[\text{1 triangle} = 16 \text{ cm}^2\]
Area of 1 circle = \(\pi \times 6 \times 6\) = 113.1 cm²
113.1 - 48 = 65.1 cm²
65.1 \div 3 = 21.7 cm²
Area of 1 shaded = 21.7 cm² - 16 cm²
Area of shaded parts = 5.7 cm² \times 3
= 17.1 cm²

Qn 5
Area of Region A = rectangle – quadrant
\[
= (8 \times 4) \text{ cm}^2 - \frac{\pi(4)^2}{4} \text{ cm}^2
\]
= 19.4 cm²
Shaded region = Big semicircle – (2 \times region A)
\[
= \frac{\pi(8)^2}{2} \text{ cm}^2 - (2 \times 19.4) \text{ cm}^2
\]
= 62 cm²

Qn 6
Area of unshaded part = 4 squares
\[= (7.5 \times 7.5) \times 4 \]
= 225 cm²
Perimeter of unshaded part = 2 circles + 4 radius
\[= 2(2\pi)(7.5) \text{ cm} + 4(15) \text{ cm} \]
= 154 cm

Qn 7
Areas X + A = quadrant – small semicircle
\[
= \frac{\pi(14)^2}{4} \text{ cm}^2 - \frac{\pi(7)^2}{2} \text{ cm}^2
\]
\[\approx 77.0 \text{ cm}^2\]
Areas Y + A = square – quadrant
\[
= (14 \times 14) \text{ cm}^2 - \frac{\pi(14)^2}{4} \text{ cm}^2
\]
= 42.1 cm²
Difference between X and Y = 77 cm² - 42.1 cm²
= 34.9 cm²

Qn 8
Areas X + A = quadrant
\[
= \frac{\pi(20)^2}{4} \text{ cm}^2
\]
= 314.2 cm²
Areas Y + A = square – quadrant
\[
= (20 \times 20) \text{ cm}^2 - \frac{\pi(20)^2}{4} \text{ cm}^2
\]
= 85.8 cm²
Difference between X and Y = 314.2 cm² - 85.8 cm²
= 228 cm²

Chapter 4 Speed

Unit 4.1 - Journey By Parts

Qn 1
D1 \( \frac{2}{5} \) (140 km)
\[\frac{2}{3} \text{ km/h} \]
S1 = 80 km/h
S2 = 60 km/h
T1 = \( \frac{140}{80} \) = 1 \( \frac{3}{4} \) h
T2 = 3 \( \frac{1}{2} \) h
(a) Distance travelled = 140 km + 210 km = 350 km
(b) Time travelled = \( \frac{1}{2} + \frac{3}{4} \) h
\[= \frac{5}{4} \text{ h}\]

8.15 a.m. 5h 15 min 1.30 p.m.
He started his journey at 8.15 a.m.

Qn 2
(a) Total distance travelled
\[= (60 \text{ km/h} \times 2 \text{ h}) + (40 \text{ km/h} \times \frac{1}{2} \text{ h})\]
= 120 km + 20 km
= 140 km
(b) Average speed for the journey = \( 140 \text{ km} + \frac{1}{2} \text{ km/h} \)
= 56 km/h

Qn 3
Since \( \frac{4}{5} \) journey = 160 km
\[\frac{1}{5} \text{ journey} = 40 \text{ km}\]
Total journey = 160 km + 40 km
= 200 km
Time taken to complete 1st part of journey = \( \frac{40 \text{ km}}{20 \text{ km}} \)
= 2 h
Time taken to complete 2nd part of journey = \( \frac{160 \text{ km}}{80 \text{ km}} \)
= 2 h
Total time taken = 4 h
Average speed for whole journey = \( \frac{200 \text{ km} + 4 \text{ h}}{50 \text{ km/h}} \)

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Qn 4
Total distance = 70 km/h × 5 h
= 350 km
Distance (1st part) = \( \frac{2}{5} \times 350 \) km
= 140 km
Speed (1st part) = \( \frac{140 \text{ km}}{\frac{1}{2} \text{ h}} \)
= 56 km/h

Qn 5
\( \frac{3}{4} \) journey = 50 km/h × 3 h = 150 km
\( \frac{1}{4} \) journey = 50 km
Journey = 200 km
Total time taken = \( \frac{200 \text{ km}}{50 \text{ km/h}} \)
= 4 h

Qn 6
To find the average speed for the whole journey, we must first find the total distance from Town A to B.

Distance (1st hr) = 24 km/h × 2 h
= 48 km
Distance (2nd hr) = 20 km/h × 2 h
= 40 km
Whole distance = 24 km + 20 km = 44 km
Average speed for whole journey = \( \frac{44 \text{ km}}{4 \text{ h}} \)
= 11 km/h

Unit 4.2 – Journey In Opposite Direction
Qn 1
In 1 min, A + B jogged 250 km.

Time taken to meet = \( \frac{3000 \text{ m}}{250 \text{ m}} \)
= 12 min
Distance Andy travelled = 100 m/min × 12 min
= 1200 m

Qn 2
In 1 hour, Mr Tan and Mr Krishnan travelled = 150 km

Time taken to meet = \( \frac{225 \text{ km}}{150 \text{ km}} \)
= 1.5 h.
1.5 h later
9 a.m. → 10.30 a.m.
They will meet at 10.30 a.m.

Qn 3
In 1 hour, Tommy and Jerry travelled 105 km

Time taken to meet = \( \frac{210 \text{ km}}{105 \text{ km}} \)
= 2 h
2 h later
8.30 a.m. → 10.30 a.m.
They will meet at 10.30 a.m.

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Chapter 5 Simultaneous

Unit 5.1 – Simultaneous (Fraction of Different Quantities)

Qn 1 (Cont.)
(Multiply by 7)
\[
\begin{align*}
\frac{7}{8} \text{ of boys} + \frac{7}{3} \text{ of girls} &= 112 (16 \times 7) \\
\frac{8}{5} \text{ boys} + \frac{7}{2} \text{ girls} &= 124 \\
1 \text{ of boys} &= 124 - 112 = 12 \\
\text{Boys} = 12 \times 8 &= 96
\end{align*}
\]

Qn 2
\[
\begin{align*}
\frac{4}{7} \text{ of English} + \frac{1}{7} \text{ of Chinese} &= 55 \quad \times 2 \\
\frac{8}{7} \text{ of English} + \frac{2}{7} \text{ of Chinese} &= 110 \\
\text{English} + \text{Chinese} &= 100
\end{align*}
\]

Qn 3
\[
\begin{align*}
\frac{4}{7} \text{ of men} + \frac{4}{3} \text{ of women} &= 240 \\
\frac{1}{7} \text{ of men} + \frac{9}{4} \text{ of women} &= 60 \quad \times 9 \\
\frac{1}{7} \text{ of men} + \frac{9}{5} \text{ of women} &= 540 \\
\text{But men} + \text{women} &= 490 \\
\text{Extra} \frac{2}{7} \text{ men} &= 50 \\
\frac{1}{7} \text{ men} &= 25 \\
\text{Number of men at first} &= 25 \times 7 = 175
\end{align*}
\]

Qn 4
\[
\begin{align*}
\frac{1}{4} \text{ circle} + \frac{1}{3} \text{ rectangle} &= \frac{2}{5} \text{ square} \\
\frac{3}{4} \text{ circle} + \frac{3}{5} \text{ rectangle} &= \frac{6}{10} \text{ square} \\
\text{Circle} + \text{rectangle} &= \frac{7}{5} \text{ square} \\
\frac{1}{4} \text{ circle} &= \frac{1}{5} \text{ square} \\
\text{Circle} : \text{Square} &= \frac{4}{5} \\
4u + \text{rectangle} &= \frac{7}{5} \times 5 = 7u \\
\text{Rectangle} &= 3u
\end{align*}
\]

Qn 5
\[
\begin{align*}
\frac{1}{5} \text{ of circle} + \frac{1}{3} \text{ of rectangle} &= \frac{3}{5} \text{ of square} \quad \times 3 \\
\frac{3}{5} \text{ of circle} + \text{rectangle} &= \frac{9}{5} \text{ of square} \\
\text{Circle} + \text{rectangle} &= 2 \text{ squares} \\
\frac{2}{5} \text{ of circle} &= \frac{2}{10} \text{ of square} \\
\frac{2}{5} \text{ of circle} &= \frac{2}{10} \text{ of square}
\end{align*}
\]
Qn 5 (Cont.)
Circle : Square
5 : 10
5u + rectangle = 20u
Rectangle = 15u

Qn 6
X

Y

Z

Z : X
5 : 12
Y + 5u = \frac{3}{4} (12u)
Y = 4u
\begin{align*}
\frac{1}{3} Y + \frac{1}{5} Z &= \frac{4}{5} X \\
Y + \frac{4}{5} Z &= \frac{3}{5} X \\
\frac{1}{3} Z &= \frac{1}{12} X
\end{align*}

Total area of figure = Area (X + Y + Z) – Shaded Area
= 5u + 12u + 4u – 2u
= 19u
= 19 × 24
= 456 cm²

Qn 7
\begin{align*}
\frac{1}{2} A + \frac{1}{2} B &= 840 – 620 \\
A + B &= 220 \\
C &= 440 \\
&= 400
\end{align*}
Since 4u = 400
1u = 100
Bernard = 100

Qn 8
\begin{align*}
\frac{1}{3} \text{ girls} - \frac{1}{4} \text{ boys} &= 120 \\
\text{Girls} - \frac{2}{3} \text{ boys} &= 240 \\
\text{Girls} + \text{Boys} &= 720 \\
\text{Difference} \frac{4}{3} \text{ boys} + \frac{2}{3} \text{ boys} &= 720 – 240 \\
&= 480
\end{align*}
\begin{align*}
\frac{6}{3} \text{ boys} &= 480 \\
\frac{3}{2} \text{ boys} &= 480 \\
\frac{1}{3} \text{ boys} &= 160 \\
\text{Boys} &= 160 \times 2 \\
&= 320
\end{align*}

Chapter 6 Percentage

Unit 6.1 – Percentage Of Different Bases

Qn 1
Boys = 45%
Girls = 100%
Adults = \frac{120}{100} \times 45%
= 54%

Difference between adults and boys = 54% – 45%
= 9%

9% = 63
1% = 7
Total = 45% + 100% + 54%
= 199%
= 199 \times 7
= 1393

There were 1393 people at the fun fair altogether.

Qn 2
At first, pears = 40%
oranges = 60%
Left, oranges = 70% of 60%
= \frac{7}{10} \times 60% = 42%
End, pears increase = 60% of 40%
= \frac{6}{10} \times 40% = 24%
Total pears = 24% + 60%
= 64%
Total in the end = 42% + 64%
= 106%
6% of fruits = 24
1% of fruits = 4
Total at first = 100%
= 100 \times 4
= 400

There were 400 fruits in the box at first.

Qn 3
(a) Adults = 80%
Children = 20%
Female = 30% of 80%
= \frac{3}{10} \times 80% = 24%
Male = 80% – 24%
= 56%
Girls = 60% of 20%
= \frac{6}{10} \times 20% = 12%
Boys = 20% – 12%
= 8%
Boys – Girls = 12% – 8%
= 4%

4% of audience → 40
1% of audience → 10
100% of audience → 1000
(b) The number of children and men remained the same,
Children + male = 76%
76% of audience → 760
If 80% of remaining people → 760
1% of remaining people → 9.5
20% of remaining people → 9.5 \times 20
= 190

Woman at first = 240
Women who left = 240 – 190
= 50
Qn 4
At first, pears → 60% (3u) apples → 40% (2u) 
\[ \begin{align*} 
3u & \times 7 = 21u \\
2u & \times 7 = 14u 
\end{align*} \]
End, pears → 30% (3u) apples → 70% (7u) 
\[ \begin{align*} 
3u & = 6u \\
7u & = 14u 
\end{align*} \]
Since the number of apples remained unchanged, the units for apples were made the same in both scenarios.

\[ \begin{align*} 
\text{Decrease in pears} &= 21u - 6u = 15u \\
\text{1u} & = 3 \\
\text{Apples} &= 14u = 14 \times 3 = 42 
\end{align*} \]
There are 42 apples in the basket.

Qn 5
Fixed = 40% (2u) \[ \times 5 = 10u \]
Unfixed = 100% (5u) \[ \times 5 = 25u \]
Fixed = 80% (4u) \[ \times 7 = 28u \]
Unfixed = 20% (1u) \[ \times 7 = 7u \]
Transfer = 18u = 180 pieces
1u = 10 pieces
Total = 35u = 35 \times 10 = 350 pieces

Qn 6
Daryl + Chelsia = 75% (3u)
John = 25% (1u)
\[ \begin{align*} 
3u & \times 5 = 15u \\
1u & = 5u 
\end{align*} \]
Chelsia + John = 60% (3u)
Daryl = 40% (2u)
\[ \begin{align*} 
3u & \times 4 = 12u \\
2u & = 8u 
\end{align*} \]
Chelsia : Daryl : John
7 : 8 : 5

Qn 7
Roy spent \( \frac{3}{7} \) of his money → left with \( \frac{4}{7} \) of his money
Dennis spent \( \frac{2}{5} \) of his money → left with \( \frac{3}{5} \) of his money
At the end
Dennis = 2 \times \text{Roy’s money}
\[ \begin{align*} 
\frac{3}{5} & \times D = 2 \times \frac{1}{7} R \\
\frac{3}{5} & \times D = \frac{2}{7} R \\
\frac{3}{5} & \times D = \frac{3}{10} R 
\end{align*} \]
Total
11u = $660
1u = $60

Dennis at end = 3u
\[ \begin{align*} 
3 \times 3 & = 9 \\
3 \times 60 & = 180 
\end{align*} \]

Qn 8
50% of A → 30% of B
\[ \begin{align*} 
\frac{1}{2} A &= \frac{3}{10} B \\
\frac{3}{5} A &= \frac{3}{10} B 
\end{align*} \]

Qn 8 (Cont.)
A : B = 6 : 10
C is 50% of A + B
\[ \begin{align*} 
C &= 1 \times \frac{1}{2} u = 16u \\
&= 8u 
\end{align*} \]
Removed \( \frac{1}{2} \times 8u = 2u \) (in C)
A : B : C
6 : 10 : 6
\[ \begin{align*} 
4u & = 12 \\
1u & = 3 
\end{align*} \]
No. of oranges in A = 6 \times 3 = 18

Qn 9
\$105
\[ \begin{align*} 
\text{Money} & \rightarrow 40\% \text{ books} \\
\text{remained} & \rightarrow 60\% \text{ left (} \frac{3}{5} \text{) total (} \frac{1}{5} \text{) total} \\
\text{3} \frac{1}{5} & \text{ of remainder = } \frac{1}{3} \text{ of total} \\
\text{Remainder} & = \frac{1}{3} + \frac{3}{5} \text{ of total} \\
& = \frac{1}{3} \times \frac{5}{3} = \frac{5}{9} \text{ of total} \\
\frac{7}{9} & \text{ of total = } \$105 \text{ + } \frac{1}{9} \text{ of total = } \$105 + 7 = \$112 = \$15 \\
\text{Total} & = 15 \times 12 = \$180 
\end{align*} \]
She had \$180 at first.

Qn 10
\[ \begin{align*} 
\text{Money} & \rightarrow 25\% \ + \$30 \ (\text{book}) \\
75\% - \$30 \ (\text{book}) \rightarrow \text{remainder} \rightarrow 40\% - \$20 \ (\text{CD}) \\
\text{64} & \rightarrow 40\% \text{ remainder} \rightarrow \$20 + \$64 = \$84 \\
\text{20\% remainder} & \rightarrow \$42 \\
\text{Remainder} & \rightarrow \$42 \times 5 = \$210 \\
75\% \text{ total} & \rightarrow \$30 \rightarrow \$210 \\
75\% \text{ total} & \rightarrow \$240 \\
25\% \text{ total} & \rightarrow \$80 \\
\text{Total} & = 80 \times 4 = \$320 
\end{align*} \]

Qn 11
First 2 bags, selling price = 125% of \$80
\[ \begin{align*} 
&= \frac{125}{100} \times 80 \\
&= \$100 
\end{align*} \]
3rd bag, selling price = 60% of \$80
\[ \begin{align*} 
&= \frac{6}{10} \times 80 \\
&= \$48 
\end{align*} \]
Amount of money = \$100 \times 2 + \$48 = \$248
She received \$248 from selling the three bags.

Qn 12
Jenny = 80%
Daryl = 100%
Jenny left = 80\% \times 80\% = 64\%
Qn 1
Chapter 7 Pie Chart

Qn 1
(b) 70° of total = 35
2° of total = 1
360° of total = 180

Qn 2
(a) 4u = 360° – 160° = 200°
1u = 50°
Percentage of cricket = \( \frac{50}{360} \times 100\% = 13.89\% \)

(b) 70° of total = 35
2° of total = 1
360° of total = 180

Qn 3
(a) \( \frac{360}{3} \times 2 \times 180 = 280 \)
(b) \( 5 \times 360° = 100° = 220° \)
1u = 44°
Spiders, 2u = 88°

% of housewives who dislike spider = \( \frac{88}{360} \times 100\% = 24.44\% \)

Qn 4
(a) 6u = 360° – 240° = 120°
1u = 20°
% teachers = \( \frac{20}{360} \times 100\% = 5.56\% \)

(b) 20° of total = 45
240° of total = 45 × 12 = 540

Qn 5
(a) \( \frac{14}{4} \times 105° = 210° \)
1u = 15°
TV sets = 7u = 105°
Diff = 5° = 10
1° = 2
Radios = 4 × 15° = 60°
60° = 60 × 2 = 120°

(b) Total = 360°
360° = 360 × 2 = 720

(c) Irons sold = 3u
= 3 × 15° = 45°
% of iron sold = \( \frac{45}{360} \times 100\% = 12.5\% \)

Qn 6
(a) Total angle sector = 160° + 90° = 250°
Amount spend = \( \frac{250}{360} \times 1800 = \$1250 \)

(b) Fare → 120° (6u)
Miscellaneous → 100% (5u)
11u = 360° – 90° – 160° = 110°
1u = 10°
Miscellaneous = 5u
5u = 50°
\( \frac{50}{360} \times 1800 = \$250 \)

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Qn 7
(a) % of girls who chose diet coke → \( \frac{126}{360} \times 100\% = 35\% \)
(b) 90% of total → 112
   Total number of girls, 360° = 4 × 112
   = 448

Qn 8
(a) \( \frac{90}{360} \times 100\% = 25\% \)
(b) \( \frac{4u = 360° - 90° - 126°}{1u = 36°} \)
   Chinese, 3u = \( 3 \times 36° = 108° \)
(c) \( 126° - 90° = 36° \)
   \( 36° = 24 \)
   \( 3° = 2 \)
   Total, 360° = \( 2 \times 120 \)
   = 240

Qn 9
(a) Total, 6u = 360° - 240°
   = 120°
   \( 1u = 20 \)
   \( 5u + 100 = 100\% \)
   % of girls → \( \frac{100\%}{360°} = 27.78\% \)
(b) \( 1u = 20° \)
   \( 20° = 30 \)
   \( 2° = 3 \)
   Difference between boys and girls = \( 240° - 100° \)
   = \( 140° \)

Qn 10
(a) \( 6u = 360° - 240° \)
   = 120°
   \( 1u = 20° \)
   % of students who walk to school → \( \frac{20}{360°} \times 100\% = 5.56\% \)
(b) 20% of total → 125
   i) Cars, 100% of total → 125 × 5 = 625 students
   ii) Bus, 240% of total → 125 × 12 = 1500 students

Qn 11
(a) \( 20\% \) of \( 360° = \frac{20}{100} \times 360° \)
   = 72°
   Others = \( 360° - 180° - 72° - 80° \)
   = 28°
   % on other expenditure → \( \frac{28}{360°} \times 100\% = 7.78\% \)
(b) Amount spent on souvenir = \( \frac{1}{x} \times 8000 \)
   = $4000

Qn 12
60 yrs old and above: 40 - 59 yrs old
   \( 1 \times 2 = 2 \)
   \( 2 : 4 \)
40 - 59 yrs old: 0 - 19 yrs old
   \( 4 \)
Total = \( 5u + 4u + 2u \)
   = 11u
   1u = \( 360° - 140° \)
   = 220°
1u = \( 20° \)
(a) 60 yrs old and above, 2 units = 40°
   Fraction of people 60 years old and above = \( \frac{40}{360°} \times \frac{1}{9} \)
(b) \( \frac{140}{360°} \times 10 \times 800 = 4200 \)

Chapter 8 Algebra

Unit 8.1 Introduction to Algebra

Qn 1
Breadth = \( w \) cm
Length = \( 3w \) cm
(a) Perimeter = \( (w + 3w) \times 2 \)
   = \( 8w \) cm
(b) Area = \( 3w \times w \)
   = \( 3 \times 5 \times 5 \)
   = \( 75 \) cm²

Qn 2
Annie = \( b \) years old
Mother = \( b \times 3 \)
   = \( 3b \) years old
Father = \( (3b + 5) \) years old
3 years’ time, father = \( (3b + 5 + 3) \) years old
   = \( (3b + 8) \) years old

Qn 3
Gary = 15 years old
Nathaniel = 15 – \( w \) years old
Daniel = \( \frac{15 - w}{2} \) years old

Qn 4
5 years ago,
Age difference = \( k \) years
Since age difference remains the same throughout,
John = \( (k + 12) + 3 \)
   = \( (k + 15) \) years old

Qn 5
3 apples + 2 oranges = \( 240 \) cents
1 apple + 1 orange = \( w \) cents
2 apples + 2 oranges = \( 2w \) cents
1 apple = \( (240 - 2w) \) cents
   = \( \frac{240 - 2w}{100} \) or \( \frac{120 - w}{50} \)

Qn 6
Notebook = \( u \)
Pen = \( 4 + u \)
\( \begin{array}{l}
\text{CO} = \frac{2u + 4u + 1u}{10 + 3u} \\
\text{T} = \frac{7 - 10}{5}
\end{array} \)
Notebook = \( \frac{u}{5} \)

Qn 7
(a) \( x \) cm
Total perimeter = \( 12u = X \) cm
\( 1u = \frac{x}{12} \) cm
Shortest length, \( 3u = 3 \times \frac{x}{12} = \frac{x}{4} \) cm
(b) Since \( X = 24 \) cm; Shortest = 6 cm
2\text{nd} shortest, \( 4u = \frac{24}{12} \)
   = 8 cm
Area of triangle = \( \frac{1}{2} \times 8 \times 6 \)
   = 24 cm²

Qn 8
Total score = \( 78(x) \)
   = 78x points
Total new score = \( 80(x + 1) \)
   = \( (80x + 80) \) points
Next test = \( 80x + 80 - 78x \)
   = \( (80 + 2x) \) points
Qn 9

Siti \[ \begin{array}{c}
\text{Lilian} \\
\text{Janet}
\end{array} \right\} \begin{array}{c}
\text{\$K} \\
\text{\$} \frac{k}{2}
\end{array} \} \$165

5 \square + \frac{3k}{2} = 165

5 \square = 165 - \frac{3k}{2}

\square = \frac{330 - 3k}{5}

\text{Siti} \rightarrow 2 \square = 2\left( \frac{330 - 3k}{10} \right) = \frac{330 - 3k}{5}

K = 8, \text{Siti} = \frac{330 - 3(8)}{5} = \$61.20

Qn 10

\text{Total units} = 6 \text{ units} + k \text{ units}

\text{(6 + k) units} = \$120

\text{1U} = \frac{120}{6+k}

\text{Amount by Mrs Lee} = k \text{ units}

\text{= \$ \frac{120k}{6+k}}

Qn 11

(a) 1 box of chocolates = \$(w + 4)

(b) Amount of money Mrs Lim have

= 6(w + 4) - w or 5(w + 4) + 4

= 6w + 24 - w or 5w + 20 + 4

= \$(5w + 24)

Qn 12

80% of cost \rightarrow \$n

10% of cost \rightarrow \$ \frac{n}{10}

100% of cost \rightarrow 10 \times \frac{n}{10} = \$( \frac{5n}{2} )

Qn 13

(a) Total chairs = 12(3p) + 8 = 36p + 8

(b) Total chairs = 36(8) + 8 = 296

Qn 14

\text{Total work to be done} = w \times 30

= 30w

\text{Total days taken with additional workers} = \frac{30w}{xw+4}

= \frac{30w}{3w}(10 \text{ days})

Qn 15

\text{Cost of pen} = \frac{3}{2} \text{ m}

5 calculators = \$5m

8 pens = \$ \left( \frac{5}{3} \right) m

\text{Total cost} = \$5m + \$6m

= \$11m

Unit 8.2 Solving Simple Linear Equations Involving Whole Number Coefficient

Qn 1

\text{J} \quad \text{E} \quad \text{p}

\text{3p} = 30

\text{p} = 10

Janice has 10 sweets.

Qn 2

\text{J} = w

\text{E} = w + 24

\text{E (end)} = \frac{1}{4} w + w + 24

= \frac{5}{4} w + 24

\text{2} \left( \frac{5}{4} w + 24 \right) = 40

\text{2} \left( \frac{5}{4} w \right) = 40 - 24

= 16

\text{Jason at first} = \frac{16}{2} \times 3

= 24

Qn 3

\text{D} = \$m

\text{T} = \$(m + 48)

\text{C} = \$(\frac{m}{10} + 12)

\text{Total} = \$( \frac{9m}{4} + 60)

\frac{9m}{4} = \$78 - \$60

= \$18

\text{m} = \$2

\text{D} = \$8

Qn 4

\text{J (now)} = (3x + 1) \text{ years old}

\text{B (now)} = (3x + 4) \text{ years old}

\text{J (in 3 years' time)} = (3x + 4) \text{ years old}

\text{B (in 3 years' time)} = (3x + 7) \text{ years old}

3x + 4 + 3x + 7 = 29

6x = 29 - 4 - 7

= 18

x = 3

\text{Joy (now)} = (3 \times 3 + 1) \text{ years old}

= 10 \text{ years old}

\text{Chapter 9 Revision of Key Constructs}

Qn 1

<table>
<thead>
<tr>
<th>Square</th>
<th>Round</th>
<th>Square</th>
<th>Oval</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x 4</td>
<td>2 x 2</td>
<td>4 x 3</td>
<td>3 x 3</td>
</tr>
</tbody>
</table>

Square : Round : Oval

(a) 12 : 8 : 9

(b) Round : Square + Oval

30% : 70%

= 3 : 7

\times 3 : \times 3

9 : 21

Increase in round cookies = 120

\text{Square cookies} = 12 \times 120 = 1440

Qn 2

\text{Cost of a child's ticket} = \frac{50}{100} \times \$14

= \$7

\text{Number} \times \text{Value (\$)} = \text{Total cost (\$)}

\text{Adults} 60\% \times 14 = 42u

\text{Children} 40\% \times 7 = 14u

\text{56u} = 6720

1u = 6720 - 56

= 120

Tickets for adults, 3u = 3 \times 120

= 360

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Qn 3
$10 tickets : $5 tickets
3 : 2
\times 2 \times 2
6 : 4
Number \times Value ($) = Total amount ($)
5U \times 10 = 50u
4U \times 5 = 20u
70u = $5600
1u = $5600 \div 70
= 80
1u = of adult tickets
= 80 \times $10
= $800
Qn 4
Area of square = 10 \times 10
= 100 \text{ cm}^2
Area of triangle CDE = \frac{1}{2} \times 10 \times 10
= 50 \text{ cm}^2
Difference in square and triangle CDE = difference in shaded area = 100 \text{ cm}^2 - 50 \text{ cm}^2 = 50 \text{ cm}^2
Qn 5
(a) 120% of total → $3000
20% of total → $500
Mr Soon’s salary, 100% of total → $2500
(b) Difference currently = $500
New difference = $500 + $3000
\% increase in salary = \% increase in difference
\frac{90}{500} \times 100\% = 18\%
Qn 6
Difference in income = $250
Difference in savings = $1350 - $600 = $750
(a) Number of months Clayton take to save $600
\frac{750}{250} = 3 \text{ months}
(b) Alvin’s monthly income = \frac{1350}{15} + $500
= $950
Qn 7
\begin{align*}
\text{Roses} &= 80 \\
\text{remainder} &\rightarrow \frac{1}{7} \text{ threw} \\
\text{6 left} &\rightarrow \frac{2}{9} \text{ total left} \\
\text{6 of remainder} &\rightarrow \frac{2}{9} \text{ total} \\
\text{Remainder} &\rightarrow 2 \times \frac{7}{9} = \frac{14}{36} \\
1 \times \frac{14}{36} = \frac{16}{36} \text{ of total} &= 80 \text{ sold} \\
\frac{1}{3} \text{ of total} &= 80 \div 16 = 5 \\
\text{Total number of roses} &= 5 \times 30 \\
&= 150 \\
\text{Total number of roses left} &\times \frac{2}{9} \times 150 \\
&= 60
\end{align*}
Qn 8
Total cost
\begin{align*}
\text{Keychain} &= \frac{\$112}{\$8} \rightarrow 232 \\
\text{Mug} &= \frac{\$112}{\$2} \rightarrow 56 \\
232 - 56 &= 176 \\
3u \text{ of key chains cost } \$120. \\
1u \text{ of key chains cost } \$40. \\
1u \text{ of mugs cost } \$112. \\
\text{Difference in } 1u = \$112 - \$40 = \$72 \\
\text{No. of items in } 1u = \frac{\$72}{\$4.50} = 16 \\
16 \text{ mugs cost } \$112. \\
1 \text{ mug cost } = \frac{\$112}{16} = \$7
\end{align*}
Qn 9
\begin{align*}
A &= 60\% (3u) \rightarrow 15u \\
B + C &= 100\% (5u) \rightarrow 5 \times 5 = 25u \\
B &= 25\% (1u) \rightarrow 8u \\
A + C &= 100\% (4u) \rightarrow 8 \times 8 \rightarrow 32u \\
A : B : C \\
15 : 8 : 17
\end{align*}
Qn 10
In 1 day, Imran can paint \frac{1}{12} \text{ house.}
Hence in 3 days, he can paint \frac{1}{12} \times 3 = \frac{1}{4} \text{ of the house}
(Imran painted alone as John rested on these 3 days).
In 1 day, John can paint \frac{1}{15} \text{ house.}
Hence, in 5 days, he can paint \frac{1}{15} \times 5 = \frac{1}{3} \text{ of the house}
(John painted alone as Imran rested on these 5 days.)
Remaining part of the house for both to paint together
\begin{align*}
\rightarrow 1 - \frac{1}{4} - \frac{1}{3} = \frac{5}{12} \text{ house} \\
\text{Number of days for both} &= \frac{5}{12} \div \left( \frac{1}{12} + \frac{1}{15} \right) \\
&= \frac{5}{12} \times \frac{60}{9} = \frac{25}{9} = \frac{27}{9} \\
\text{Total number of days} &= 3 + 5 + \frac{2}{9} = \frac{53}{9}
\end{align*}
Qn 11
\begin{align*}
A : B &= 40\% \rightarrow 40\% \text{ of } 5u \\
3u : 5u &= 2u \\
1u : 3u &= 2u \\
\frac{1}{1u + 3u} &= \frac{1}{4} \times 100\% \rightarrow \text{ or } 66\frac{2}{3}\% \text{ or } 66.67\%
\end{align*}
Qn 12
Case 1: +10 red beads
Ratio Red : Blue = 2 : 3
Case 2: +10 red beads + 30 blue beads
1 : 3 (+2) = 2 : 6
Red changed by 3 units,
3u = 30 beads
1u = 10 beads
Number of beads = 20 – 10 = 10

Qn 13
80% male → 90% female
8 male
9
10
72 male
80 female
72
90
Total = 90u + 80u = 170u
170u = 170 members
1u = 1 member
Total this year, 144u = 144 members

Qn 14
Performers 30% → 70% of 70% = 49%
Spectators 70% → 70% - 49% = 21% female
Difference 28% of total → 4200
Performers + female spectators (remains constant)
→ 51% = 51 × 150 = 7650
100% - 40% = 60%
60% of total → 7650
20% of total → 2550
40% of total → 5100 male spectators left
Number of male that must leave = (49 × 150) - 5100
= 7350 - 5100
= 2250

Qn 15
(a) Total number of rectangles in Figure 90
= 4 + 89 (3) = 271
(b) 451 - 4 = 447
447 + 3 = 449 → Figure 150 (151 shaded rectangle)
Unshaded rectangles = 451 - 51 = 300
(c) 697 - 4 = 693
693 + 3 = 231 → Figure 232 (233 shaded rectangle)
Unshaded rectangles = 697 - 233 = 464

Qn 16
$834 - $66 = $768
$768 ÷ 2 = $384
Pants = $384 + $66 = $450
Shirts = $384
3u of pants cost $450
4u of shirts cost $384
1u of pants cost $150
1u of shirts cost $96
Difference in 1u = $54

Qn 17
<table>
<thead>
<tr>
<th>Item</th>
<th>No. of Boxes</th>
<th>×</th>
<th>Item</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Red + 12</td>
<td>×</td>
<td>120</td>
<td>120Red + 1440</td>
</tr>
<tr>
<td>Red</td>
<td>Red</td>
<td>×</td>
<td>150</td>
<td>150Red</td>
</tr>
</tbody>
</table>
Comparing the total of items (plates vs cups)
Cups = Plates + 120
150 Red = 120 Red + 1440 + 120
30 Red = 1560
Number of Red boxes = 1560 ÷ 30 = 52
Number of Blue boxes = 52 + 12 = 64
Total Plates = 64 × 120 = 7680

Qn 18
1 3
Lim = 3 2
Zhang
3 4
Lim : Zhang
5x
5
9u : 4u
6p : 5p
6
Lim
45u
Zhang
24u
300
750
(45 - 24)u = 21u
= 1050
1u = 50
Total ducks = 13u
= 13 × 50
= 650

Qn 19
Total shaded area = 1 3 × 20 × 17 × 4
= 680 cm²
Since AB = BE but AB = BC
Therefore EB = BC = CF = 60 cm ÷ 3 = 20 cm

Qn 20
Initial extra = 6 × 50-cent
= $3
After using eight 50-cent coins, 8 × 50-cent = $4
$4 - $3 = $1
Difference in value of 50-cent coins and 20-cents coin
= $7.40 + $1
= $8.40

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Qn 20 (Cont.)
Difference in value of one 50-cent coin and one 20-cent coin
= $0.50 – $0.20
= $0.30
8.40 ÷ $0.30 = 28
At first, he had 28 20-cent coins and 28 ÷ 6 = 45 50-cent coins.

Qn 21
Green : Blue
5u : 3u
x4 x4
20u : 12u

Green markers sold, 25% of 20u = \( \frac{1}{4} \times 20u = 5u \)

<table>
<thead>
<tr>
<th>Number</th>
<th>Value ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>15u × 4</td>
<td>60u</td>
</tr>
<tr>
<td>Blue</td>
<td>12u × 5</td>
<td>60u</td>
</tr>
</tbody>
</table>

120u = 480
1u = 480 ÷ 120
= 4

Green markets at first, 20u = 20 × 4
= 80

Qn 22
Yeo 120% (6u) × 5
Lim 100% (5u) × 5
Tang 60% (3u) × 6
Yeo 100% (5u) × 6

50% of 18u → 9u
3p = 9u
1p = 3u

Difference between Lim and Tang = 8u
8u = 96
1u = 96 ÷ 8
= 12

Mrs Yeo gave Miss Tang 3u of books = 3 × 12
= 36

Qn 23
Terry loses \( \frac{4}{5} \), Alex left \( \frac{5}{4} \)

<table>
<thead>
<tr>
<th>Class</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terry</td>
<td>2 : 5</td>
</tr>
<tr>
<td>Alex</td>
<td>3 : 5</td>
</tr>
<tr>
<td>Total</td>
<td>10u : 15u</td>
</tr>
<tr>
<td>+8u</td>
<td>28u</td>
</tr>
</tbody>
</table>

(a) 18 : 7
(b) At first = T : A = 18 : 7
2nd stage = T : A = 10 : 15

Since \( \frac{5}{4} \) of Terry = 10u
1 \( \frac{1}{4} \) of Terry = 2u
4 \( \frac{2}{4} \) of Terry = 8u

Finally T : A = 1 : 4 = 5 : 20
Transfer = 5u = 35
1u = 7
Terry in the end = 5u = 35

Qn 24
(a) No. of shaded tiles = 20
No. of plain tiles = 16

(b) Shaded 8 + 8 (4) = 40
Plain 9 × 9 = 81
Total = 40 + 81

= 121

Qn 25
Assume all delivered successfully,
Total earned = $25 × 500
= $12500

Amount refunded = $12,500 – $9500
= $3000

No. of parcels damaged = $3000 ÷ ($25 + $15)
= 75
No. of parcels delivered successfully = 500 – 75
= 425

Qn 26
Area of unshaded part = \( \frac{1}{2} \times 12 + 7 \)
= 66 \( \frac{1}{2} \) cm²

Shaded = quadrant + square – unshaded
= \( \frac{n(12)^2}{4} + (7 \times 7) - 66.5 \)
= 96 cm²

Qn 27
Spent
Anna 40% $30
Isabel 20% $30
Kenneth 80% Anna

Total amount spent = $640 – $370
= $270

120% of Anna + $30 → $270
120% of Anna → $240
1% of Anna → $2
100% of Anna → $200

Isabel + Kenneth at first = $640 – $200
= $440

Qn 28
Total (Alan + Charles) = 120 × 2
= 240
Total (Charles + Gavin) = 95 × 2
= 190

Difference between Alan + Gavin = 50
Gavin = 5u
Alan = 7u

Qn 29
Square X = 1u × 3
= 3u
Rectangle Y = 3u × 3
= 9u
Unshaded X = 1u × 2
= 2u
Unshaded Y = 4u × 2
= 8u

Decrease each, 1u = 27 cm²
Area (Square X), 3u × 3 = 27 cm²
= 81 cm²
Length of square = 9 cm

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Qn 30
\[ \angle AFG = 115^\circ \]
\[ \angle DFE = 180^\circ - 50^\circ - 50^\circ = 80^\circ \]
\[ \angle AFD = 360^\circ - 115^\circ - 75^\circ - 80^\circ = 90^\circ \]
\[ \angle BFG = \frac{90}{3} = 30^\circ \]
\[ \angle FBC = \frac{180 - 30}{2} = 75^\circ \]

Qn 31
Find the ratio of speed for the remaining journey from home to school.
Original speed, \( S_1 \):
- Increased speed, \( S_2 \):
  - 40: 50
  - 4: 5
Since the distance for the remaining journey is the same, the ratio of the time taken to complete the rest of the journey is opposite to the speed.
Original time, \( T_1 \):
- New time, \( T_2 \):
  - 5 : 4
Difference in time, \( t_1 = 3 \text{ min} + 1 \text{ min} \)
  - 4 min
  - 5 u = 4 min \times 5 = 20 \text{ min}
Total distance = \((2 \times 40) \text{ m} + (40 \text{ m/min} \times 20 \text{ min}) = 680 \text{ m}

Qn 32

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfred</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benedict</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Alfred
- $840

Benedict
- $210

Qn 33

<table>
<thead>
<tr>
<th></th>
<th>-16</th>
<th>-16</th>
<th>-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaron</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lucy</td>
<td>16</td>
<td>+12</td>
<td></td>
</tr>
</tbody>
</table>

\[ 2u = 16 + 12 + 2 = 30 \]
\[ 1u = 15 \]
Lucy at first = 15 + 16 = 31

Qn 34

\[ \begin{align*}
A &= 1u \times 4 \\
B + C + J &= 4u \times 4 \\
B &= 1u \times 5 \\
A + C + J &= 3u \times 5 \\
\end{align*} \]

Qn 34 (Cont.)

\[ \begin{align*}
C &= 3u \times 2 \\
\text{Difference 1u} &= 14 \\
A + B + J &= 7u \times 2 \\
\text{Cost of present} &= 20u \\
&= 20 \times 14 \\
&= 280 \\
\end{align*} \]

Qn 35

\[ \begin{align*}
A &= 4u \\
B + C + D &= 11u \\
B &= 5u \\
C + D &= 6u \\
C &= 1u \times 2 \\
D &= 2u \times 2 \\
\text{Difference 2u} &= 400 \\
1u &= 200 \\
\text{Total sum} &= 15u \\
&= 15 \times 200 \\
&= 3000 \\
\end{align*} \]

Qn 36

\[ \begin{align*}
\text{Number} \times \text{Value ($)} &= \text{Total ($)} \\
\text{On time} &= 18u \times 6 = 108u \\
\text{Late} &= 2u \times 4 = 8u \\
116u &= 2320 \\
1u &= 20 \\
(a) \text{Number of parcels delivered on time} &= 18u = 20 \times 18 = 360 \\
(b) \text{Amount did not collect} &= 2u \times (6 - 4) \\
&= 80 \\
\end{align*} \]

Qn 37

\[ \begin{align*}
\text{W} &= 1u \times 2 \\
\text{W} &= 2 \times 3 \\
\text{X} &= 1u \times 2 \\
\text{Y} &= 4u \times 2 \\
\text{Y} &= 3u \\
\text{Z} &= 5u \\
\text{Difference 3u} &= 24 \\
\text{Total cost of present, } 12u &= 12 \times 8 \\
&= 96 \\
\end{align*} \]

Qn 38

\[ \begin{align*}
\frac{3}{15} \text{ of Joel's} &= \frac{2}{3} \text{ of Matthew's} \\
\frac{6}{15} \text{ of Joel's} &= \frac{6}{15} \text{ of Matthew's} \\
\text{Joel} &= 10u \\
\text{Matt} &= 9u \\
\text{Ben} &= 5u \\
1u &= 7 \\
(a) J : M : B &= 10 : 9 : 5 \\
(b) \text{Total savings, } 24u &= 24 \times 7 \\
&= 168 \\
\end{align*} \]

Qn 39

\[ \begin{align*}
A &= 2u \times 10 \\
A + B &= 2u \times 20 \\
B &= 3u \times 7 \\
A + C &= 7u \times 7 \\
1u &= 12 \\
\text{Total cost of present, } 70u &= 70 \times 12 \\
&= 840 \\
\end{align*} \]

Qn 40

\[ \begin{align*}
\text{A, 50% of total} \rightarrow 1u &= 9 \\
\text{B + C, 100% of total} \rightarrow 2u &= 9 + 7 = 11 \\
\text{B, 35% of total} \rightarrow 7u \\
\text{A + C, 100% of total} \rightarrow 20u \\
\text{2u} &= 18 \\
1u &= 9 \\
\text{Total} &= 27u \\
&= 27 \times 9 \\
&= 243 \\
\end{align*} \]

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Qn 41

W

10

50

C

Total no. of students who like either or both types of food
= 50 + 30 + 10
= 90
Number of students who do not like Western or Chinese
= 120 – 90
= 30
Percentage = \( \frac{30}{120} \times 100\% \)
= 25%

Qn 42

A : B = 3 : 2
B : C = 3 : 3
4 : 6 : 9
Summary
A : B : C
4 : 6 : 9

Since all triangles have the same height,
area ratio = base ratio
area of triangle D = \( 9u + 4u - 6u \)
= \( 7u \)
Area of rectangle = \( (9u + 4u) \times 2 \)
= \( 26u \)
= \( 26 \times 10 \)
= \( 260 \text{ cm}^2 \)

Qn 43

Perimeter = \( (16 \times 2) + (x + 10) + (x + 10) \)
= \( (52 + 2x) \text{ m} \)
Cost = \( 30(52 + 2x) \)
= \$1560 + \( 60x \)

Qn 44

Perimeter of circle = \( 2\pi(10 \text{ cm}) \)
= \( 20\pi \text{ cm} \)
Perimeter of figure = \( 20\pi + (40 - 20) \text{ cm} \times 2 + 40 \text{ cm} \)
= \( (80 + 20\pi) \text{ cm} \)

Qn 45

D_o : D_e : D_o
100 : 80 : 60
5 : 4 : 3
Since time is the same,
S_o : S_e : S_o
= 5 : 4 : 3
D_o : D_e
= 4 : 3
= 4 + 4
= \( \frac{1}{3} \)

For every unit that Faith travelled, George would travel
\( \frac{3}{\pi} \) u. Faith would complete the race in 20 m,
so if 1u = 20 m,
\( \frac{3}{\pi} \times 20 \text{ m} \)
= 15 m
When Faith completed the remaining 20 m, George would have travelled another 15 m.
Distance George was from finishing line
= 40 m – 15 m
= 25 m

Qn 46

Total cost
Watch
\[
\begin{array}{|c|c|}
\hline
\text{Watch} & \text{Price} \\
\hline
\$1980 & \$2820 \\
\hline
\end{array}
\]
\( \sum \text{Price} = \$6780 \)

\( \frac{1}{2} \times \$6780 - \$2820 = \$1980 \)
3u of clocks cost $1980
5u of watches cost $4800
Difference in 1u = $300
1u = \$120 \text{ (12 items)}

Total number of watches and clocks, 8u = 8 \times 12 \text{ items}
= 96 \text{ items}

Qn 47

Area of shaded part
= \( (12 \times 12 \times 3) \text{ cm}^2 - \left( \frac{1}{5} \times 12^2 \right) \text{ cm}^2 \)
= \( 432 \text{ cm}^2 - 72 \text{ cm}^2 \)
= \( 360 \text{ cm}^2 \)

Qn 48

When both have the same height,
Ratio of volume = ratio of base area
Base Area (A) : Base Area (B)
\( (12 \times 5) : (10 \times 4) \)
= \( 3 : 2 \)
Volume of water in Tank A = \( 12 \times 5 \times 12 \)
= \( 720 \text{ cm}^3 \)
720 \text{ cm}^3 is to be shared between Tank A and Tank B in the ratio 3:2 respectively.
5u = \( 720 \text{ cm}^3 \)
1u = \( 720 \text{ cm}^3 \times \frac{1}{5} \)
= \( 144 \text{ cm}^3 \)
Volume of water transferred to tank B, 2u = \( 288 \text{ cm}^3 \)

Qn 49

Calvin
\[
\begin{array}{|c|c|}
\hline
\text{u} & \text{Left} \\
\hline
2 & 432 \text{ (left)} \\
10U & \text{10U} \text{ (left)} \\
\hline
\end{array}
\]

Elizabeth
\[
\begin{array}{|c|c|}
\hline
\text{u} & \text{540} \text{ (left)} \\
9U & \text{9U} \text{ (left)} \\
3 & \text{324} \\
\hline
\end{array}
\]

\( \text{Left behind} \)

Calvin

\( \frac{324}{2u} = \frac{10U}{12U} \text{ (left)} \)

Elizabeth

\( \frac{2u}{3} = \frac{9U}{12U} \text{ (left)} \)

Left behind

Calvin

\( \frac{324}{2u} = \frac{10U}{12U} \text{ (left)} \)

Elizabeth

\( \frac{2u}{3} = \frac{9U}{12U} \text{ (left)} \)

1u

\( \frac{324}{2u} = \frac{10U}{12U} \text{ (left)} \)

1u = 12
Total sweets Calvin had at first = \( 12u + 288 \)
= \( 12 \times 12 + 288 \)
= 432

Qn 50

Total 5 numbers
= 60 \times 5
= 300
Total 6 numbers
= 65 \times 6
= 390
Total 7 numbers
= 63 \times 7
= 441
7th number
= 441 - 390
= 51
Qn 51
\[
\frac{1}{2} \text{ of } A + \frac{1}{2} \text{ of } B = 640 - 420 = 220
\]
\[
A + B = 440
\]
\[
C = 640 - 440 = 200
\]
Since 4u = 200
\[
u = \frac{200}{4} = 50
\]
B + C, 9u = 9 \times 50 = 450
Number of sweets Annie had at first = 640 - 450 = 190

Qn 52
Since triangle A, B and C have the same height, ratio of their areas is equal to ratio of their bases.

Area A : Area B : Area C
= Base A : Base B : Base C,
so, Base A (YQ) : Base C (QZ)
1 : 3

Area A : Area C
1 : 3

Difference = (3 - 1)u
2u = 24 cm²
Area B, 4u = 24 \times 2 = 48 cm²

Sample Examination Paper 1 – Booklet A
1. (4) 2. (4) 3. (3) 4. (2) 5. (3)
6. (1) 7. (3) 8. (1) 9. (4) 10. (2)
11. (4) 12. (2) 13. (3) 14. (1) 15. (3)
16. 62° 17. 5 \frac{7}{14} \text{ cm} 18. 48 19. 1000
20. 1 h 45 min 21. 50 22. 210 days
23. 7 km 24. $72
25. 39, 40, 41, 42, 43, 44, 45, 45
26. \frac{8}{12} = \frac{2}{3} = \frac{6}{9} \text{ Ans: 9}
27. \frac{3}{5} N = 48, \frac{1}{5} N = 16
Number = 16 \times 5 = 80
\frac{1}{2} \text{ of number} = 40 \text{ Ans: 40}
28. \frac{2}{5} \text{ of red } = \frac{3}{2} \text{ of blue }
\frac{6}{10} \text{ of red } = \frac{6}{15} \text{ of blue}
red = 15u
blue = 8u \text{ Ans: } \frac{15}{18}
29. Average = \frac{9 + (38 - 2) + (23 - 3) + (24 - 4)}{100} = 2.5
30. D (75%) 3u \times 4
C (100%) 4u \times 4
D (80%) 4u \times 3
J (100%) 5u \times 3
43u = 172
1u = 172 + 43 = 4
D = 12 \times 4 = 48

Sample Examination Paper 1 – Booklet B
1. Area of shaded part = \frac{1}{2} \times 14 \text{ cm} \times 18 \text{ cm} = 126 \text{ cm}²
2. \angle Z + 35° = 82° - 28° (Alt \angle)
\angle Z = 54° - 35° = 19°
3. 85% of original \rightarrow $d
5% of original \rightarrow \frac{d}{17}
100% of original \rightarrow \frac{d}{17} \times 20 = 5 \frac{20d}{17}
4. 
5. Difference = $120
End, Imran = (50%) 1u
Jason = (100%) 2u
Difference, 1u = $120
Amount each spent = $200 - $120 = $80
6. 
Janet
Tony

\begin{array}{ccc}
\text{Janet} & & \\
1U & & -$90 \\
\text{Tony} & & +$90 \\
\end{array}

2u = $90 + $60 + $90 = $240
1u = $120
Janet at first, 3u - $90 = (3 \times 120) - 90 = $270
7. \angle c + \angle d = 180° - 25°
= 155° (sum of angles in a triangles)
\angle a + \angle b = 180° - 25°
= 155° (2 interior \angle = 1 exterior \angle)
\angle a + \angle b + \angle c + \angle d = 155° \times 2 = 310°
8. Area of shaded part = \frac{1}{2} \times 20 \text{ cm} \times 20 \text{ cm} \times 2 = 400 \text{ cm}²
9. Total (A + B) = $5200 \times 2 = $10 400
Total (B + C) = $3800 \times 2 = $7600
Difference, 2u = $10 400 - $7600 = $2800
1u = $1400
Bensen = $7600 - (3 \times 1400) = $3400
10. \angle BFE = 90°
(a) \angle DFC = 90° + 28°
= 118° (2 interior \angle = 1 exterior \angle)
\angle DFC = 180° - 118° = 62°
(b) \angle BDF = 45° - 28° = 17°

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11. Before

Pears = 1u
Oranges = 2u
\[
\begin{align*}
\text{Before} & : \\
\text{Pears} & = 1u \\
\text{Oranges} & = 2u \\
\text{Difference in oranges} & = 1u \\
1u & = 8 \\
\text{Total} & = 9u \\
\end{align*}
\]

After

Pears = 3u
Oranges = 5u
\[
\begin{align*}
\text{After} & : \\
\text{Pears} & = 3u \\
\text{Oranges} & = 5u \\
\text{Total} & = 12u \\
\end{align*}
\]

12. \[
\begin{align*}
\frac{1}{4} & \text{ of total + } 10 \\
\frac{3}{4} & \text{ of total – } 10 \\
\frac{2}{3} & \text{ of remainder + } 15 \\
\frac{3}{5} & \text{ of remainder } = 33 + 15 \\
\frac{1}{5} & \text{ of remainder } = 48 \\
\text{Remainder} & = 16 \times 5 = 80 \\
\frac{3}{4} & \text{ of total } = 90 \\
\frac{1}{4} & \text{ of total } = 90 \div 3 = 30 \\
\text{Total amount of money at first } & = 30 \times 4 = 120
\end{align*}
\]

13. In 1 h, Mr Tan would paint \( \frac{1}{12} \) of the house.

In 1 h, Mr Tan + Krishnan would paint \( \frac{1}{12} \) of the house.

Krishnan would paint \( \frac{1}{12} - \frac{1}{12} = \frac{1}{12} \) of the house in 1 h.

To paint the whole house, Krishnan would take 12 h.

14. \[
\begin{align*}
S_1 : S_2 & : T_1 : T_2 \\
5 : 4 & : 4 : 5 \\
9u & = 54 \text{ min} \\
1u & = 6 \text{ min} \\
\text{T_1 (home to nearby park)} & = 4u \\
& = 4 \times 6 = 24 \text{ min}
\end{align*}
\]

15. Area = big semicircle – \( \frac{3}{2} \) small circles
\[
\begin{align*}
& = \frac{3\pi(10)^2}{2} - \frac{3}{2} \\
& = 314 \text{ cm}^2
\end{align*}
\]

16. At first

<table>
<thead>
<tr>
<th></th>
<th>8u (gave)</th>
<th>12u (left)</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banana</td>
<td>15u (gave)</td>
<td>5u (left)</td>
<td></td>
</tr>
</tbody>
</table>

\[
16. (\text{Cont.})
\]

**Left**

<table>
<thead>
<tr>
<th></th>
<th>12u (left)</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banana</td>
<td>64</td>
<td></td>
</tr>
</tbody>
</table>

\[
7u = 64 - 36 = 28 \\
1u = 4
\]

Chocolate pies at first = 20u + 60
\[
= 20 \times 4 + 60 = 140
\]

17. (a) Number of shaded triangles in Figure 10
\[
= 1 + 2 + 3 + \ldots + 11 = \frac{11(12)}{2} = 66
\]

(b) Number of unshaded triangles in Figure 50
\[
= 1 + 2 + 3 + \ldots + 50 = \frac{50(51)}{2} = 1275
\]

(c) Total number of triangles in Figure 100
\[
= 101 \times 101 = 10201
\]

**Sample Examination Paper 2 – Booklet A**

1. (1) 2. (2) 3. (3) 4. (1) 5. (4)

6. (3) 7. (2) 8. (3) 9. (2) 10. (2)

11. (1) 12. (4) 13. (2) 14. (2) 15. (3)

16. \( \frac{1}{4} \) 17. 1440 18. 144 19. 1264 20. \( \frac{1}{2} \)

21. 2 m 22. 20 \( \frac{1}{4} \) h 23. 400 24. 126

25. \( \frac{1}{2} \) of total + 12 = 60

\( \frac{1}{2} \) of total = 48

Total at first = 48 \times 2 = 96

26. \( \triangle y = 180^\circ - 90^\circ - 20^\circ \)

27. 2 apples + 3 oranges = \$2.10

1 apple + 1 orange = \$0.85

\( \times 2 \quad \times 2 \quad \times 2 \)

Compare 2 apples + 2 oranges = \$1.70

1 orange = 40 cent

Ans: 40 cents or \$0.40

28. \$26 - 3(\$7) = \$5

3 + 3 + 3 + 2 = 11

29. Total = 20 + 2(30) + 3(60) + 4(20) + 5(40) = 540

30. \[
\begin{align*}
\text{Gerald} & : -40 : -20 \\
\text{Tommy} & : \quad +60
\end{align*}
\]

\[
2u = \$60 + \$40 = \$100 \\
1u = \$50 \\
\text{Gerald} = 1u + \$60 = \$50 + \$60 = \$110
\]

**Sample Examination Paper 2 – Booklet B**

1. Total sweets = 40 \times 4 + w = 160 + w

Total needed for each student to receive 6 sweets = 40 \times 6 = 240

Extra sweets needed = 240 – 160 – w = 80 – w
2. 1\textsuperscript{st} watch = \frac{70}{100} \times $150 = $105
Loss = $45
2\textsuperscript{nd} watch = \frac{120}{100} \times $150 = $180
Profit = $30
Overall loss = $15

3. \angle BCD = 180^\circ - 130^\circ = 50^\circ \text{ (interior angles in a parallelogram)}
(a) \angle BCE = 50^\circ - 30^\circ = 20^\circ 
(b) \angle ACE = 360^\circ - 130^\circ - 20^\circ - 50^\circ = 160^\circ \text{ (angles in a quadrilateral)}

4. Volume of solid = 12 \times 1 \text{ cm}^3 = 12 \text{ cm}^3

5. Number \times Value (legs) = Total Legs

| Chickens | 2u \times 2 = 4u |
| Horses   | 1u \times 4 = 8u |
8u = 152
1u = 152 \div 8 = 19
Chickens, 2u = 19 \times 2 = 38

6. Square

<table>
<thead>
<tr>
<th>Unshaded</th>
<th>Shaded</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 : 1</td>
<td>4 : 3</td>
</tr>
<tr>
<td>8 : 4</td>
<td></td>
</tr>
</tbody>
</table>
Fraction of figure unshaded = \frac{8 \times 3}{8 \times 4} = \frac{11}{16}

7. Since all 3 triangles share the same height, area ratio will be equal to base ratio

14 : 6 : 14 = 7 : 3 : 7
7u = 56 \text{ cm}^2
1u = 8 \text{ cm}^2
Total unshaded, 10u = 80 \text{ cm}^2

8. \[
\begin{array}{c|c|c}
\hline
\text{\$84} & \frac{4}{5} \text{ of total} & \frac{1}{5} \text{ of total} \\
\hline
\end{array}
\]

2u = \frac{1}{5} \text{ of total}
1u = \frac{1}{10} \text{ of total}
\frac{4}{5} \text{ of total} = \$84 + 1U \rightarrow \$84 + \frac{1}{10} \text{ of total}
(\frac{8}{10} - \frac{1}{10}) \text{ of total} = \$84
\frac{7}{10} \text{ of total} = \$84
\frac{1}{10} \text{ of total} = \$84 \div 7 = $12
Total = $12 \times 10 = $120

9. Volume = 5u \times 3u \times 3u = 1215 \text{ cm}^3
1u \times 1u \times 1u = 1215 \div 45 = 27 \text{ cm}^3
1u = 3 \text{ cm}

Area of base = 3 \text{ unit} \times 3 \text{ unit} = (3 \times 3) \times (3 \times 3) = 9 \times 9 = 81 \text{ cm}^2

10. John = 1u \times 2 = 2u
Sister = 4u \times 2 = 8u
Difference = 3u
In 14 yrs time,
John = 3u \times 3 = 9u
Sister = 5u \times 3 = 15u
Difference = 2u

Increase each = 7u = 14 years
John is now = 2 \times 2 years = 4 years old

11. \begin{align*}
S_1 : S_2 & = \text{T}_1 : \text{T}_2 \\
10 : 12 & = 6 : 5 \\
n & = 11 \\
5 & = 6
\end{align*}

T_1 (home to nearby park), 6u = 6 \times 5 = 30 \text{ min}

12. 40% wife
100% = 60% himself (remainder)
Increase
\begin{align*}
\text{wife} & = \frac{40}{100} \times 130\% = 52\% \\
\text{himself} & = 130\% - 52\% = 78\%
\end{align*}

Increase (wife), 12% of total \rightarrow $360
1% of total \rightarrow $30
Income before, 100% of total \rightarrow 100 \times $30 = $3000

13. 30% of total + 40% jewellery box
70% of total = $40
50% remainder + $10 CD
50% remainder = $54
Remainder = $64 \times 2 = $128
70% of total = $40 \rightarrow $128
70% of total = $168
10% of total = $24
100% of total = $24 \times 10 = $240

14. (a) \( P = 1 \text{ small circle} + 1 \text{ big semicircle} + 24 \text{ cm}
= 2\pi(6) + \pi(12) + 24
= 99 \text{ cm}

(b) Area = square \rightarrow \text{small circle} \rightarrow \text{big semicircle}
= (24 \times 24) - \pi(6^2) - \frac{\pi(12)^2}{2}
= 237 \text{ cm}^2

15. \begin{align*}
\text{Elias} & : \text{Roy} \\
\begin{cases}
(30\%) 3u & : 10u (100\%) \\
50 & +25 \\
(80\%) 4p & : 5p (100\%)
\end{cases}
\end{align*}
\times 4
\times 4
Elias = 15u
Roy = 250
25u = 150
1u = 150 \div 25
= 6
Elias at first, 3u = 3 \times 6 = 18

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16. At first

<table>
<thead>
<tr>
<th></th>
<th>-4</th>
<th>-4</th>
<th>-4</th>
<th>+8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Girls</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

In the end

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(1u = 30 - 16 - 8\)
\(= 6\)

Number of boys at first
\(= 6 \times 3 + 12\)
\(= 18 + 12\)
\(= 30\)

17. (a) Total unshaded in Figure 10 = \(10 \times 11\)
\(= 110\)
(b) Total unshaded in Figure 50 = \(50 \times 51\)
\(= 2550\)
(c) (Figure No.) \(\times\) (Figure No. + 1) = 600
\(24 \times 25 = 600\)
Therefore Figure 24.