5 →Primary

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Essential
Problem Solving Skills

✓ Lateral and vertical thinking enhanced by questions of varied types, level of difficulty and topic-to-strategy approach
✓ Pre-exercises designed to develop conceptual understanding
✓ Review section by mixed topics, combined problem solving concepts

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Based on Latest
MOE Syllabus

P5 Solutions

Note: In all solution, u represents units and p represents parts.

Let's Get Started 1.1

2.

3.

4.

Ask yourself

1.   There are 80 more men than women at first.

Let's Practise 1.1

Question 1

At first

End

2u = 32

1u = 32 ÷ 2

    = 16

1u + 52 = 16 + 52

        = 68

Bernard had **$68** at first.

Question 2

At first

End

Question 2 (Cont.)

3u = 150 – 60

    = 90

1u = 90 ÷ 3

    = 30

1u + 150 = 30 + 150

        = 180

There were **180** blue ribbons at first.

Question 3

At first

End

3u = 240 + 390

    = 630

1u = 630 ÷ 3

    = 210

F (at first) = 210 + 240 + 135

          = 585

B (at first) = 210 + 240

          = 450

585 + 450 = 1035

1035 items were on sale at first.

Question 4

At first

2u = 636 – 116

    = 520

1u = 520 ÷ 2

    = 260

S (at first) = 260 + 116

          = 376

C(at first) = 260

End

S = 376 – 226

  = 150

C = 150 × 4

  = 600

600 – 260 = 340

Andrew bought **340 toy cars**.

Question 5

At first

| B | | 50 |
| C | | |

End

4u

| B | 1u | 1u | 50 | 12 |
| C | 1u | 1u | | |

2u

2u = 50 + 12

= 62

1u = 62 ÷ 2

= 31

2u + 50 = 2 × 31 + 50

= 112

There were **112 button pins** at first.

Question 6

At first

| C | 1u | 1u | 1u | 1u | 43 |
| M | 1u | | | | |

End

| C | 1u | 1u | 1u | 1u | 10 | 33 |
| M | 1u | 18 | | | | |

73

3u = 73 + 18 − 10

= 81

1u = 81 ÷ 3

= 27

C (at first) = 4u + 43

= 4 × 27 + 43

= 151

(a) She baked **151 cupcakes** at first.

(b) She baked **27 muffins** at first.

Let's Get Started 1.2

1. Draw your 'At first' and 'End' models here.

At first

| A | | 55 |
| B | | |

End

80

| A | 1u | 25 | 55 | |
| B | 1u | 25 | 55 | 25 |

Answer :

25 + 80 = 105

Bryan has **105 more** game cards than Alvin in the end.

2. Draw your 'At first' and 'End' models here.

At first

| C | | |
| D | | 230 |

End

| C | | 45 | | |
| D | | 45 | 230 | 45 |

?

Answer :

45 + 230 + 45 = 320

Diana had **320 more** beads than Catherine in the end.

Ask Yourself

1. Mandy has more money than Kurt. Hence, the bar model representing Mandy is longer than that of Kurt.

2. Mandy gave money to Kurt.

3. The total amount of money they had did not change.

Think Further

At first

| M | 1p | 80 |
| K | 1p | |

440

End

| M | 1u | | |
| K | 1u | 1u | 1u |

440

4u = 440

1u = 440 ÷ 4

= 110

2p = 440 − 80

= 360

1p = 360 ÷ 2

= 180

M (at first) = 1p + 80 = 180 + 80

= 260

M (gave) = 260 − 110 = 150

Mandy must give **$150** to Kurt.

Let's Practise 1.2

Question 1

At first

| A | | 23 |
| B | | |

Question 1 (Cont.)

<u>End</u>

	4u			
A	1u	146	23	146
B	1u	146		

3u
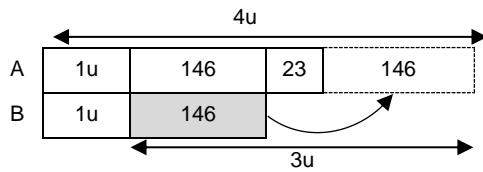
3u = 146 + 23 + 146

   = 315

1u = 315 ÷ 3

   = 105

4u − 146 = 4 × 105 − 146

        = 274

Amos had **274 marbles** at first.

Question 2

<u>At first</u>

X		204
Y		

<u>End</u>

6u

X	1u	123	204	123
Y	1u	123		

5u
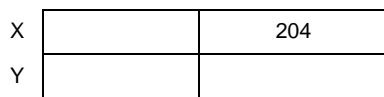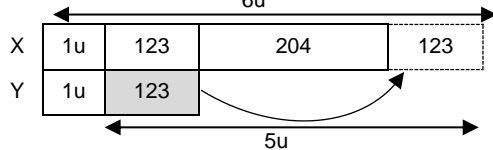
5u = 123 + 204 + 123

   = 450

1u = 450 ÷ 5

   = 90

7u = 7 × 90

   = 630

They had **$630** in total at first.

Question 3

<u>At first</u>

D	
S	300

<u>End</u>

1u

D		46
S	46	208	46

2u

3u
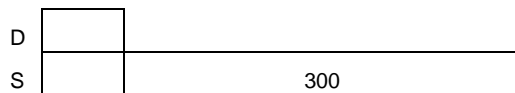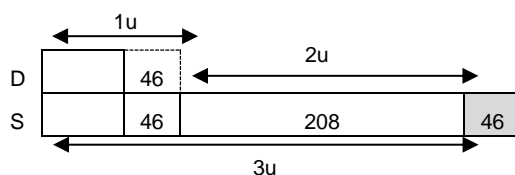
2u = 208

1u = 208 ÷ 2

   = 104

4u = 4 × 104

   = 416

There were **416 participants** altogether.

Question 4

<u>At first</u>

$2		80
$1		

<u>End</u>

2u

$2	30	35	15
$1	30		

1u   1u
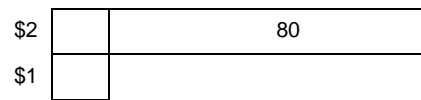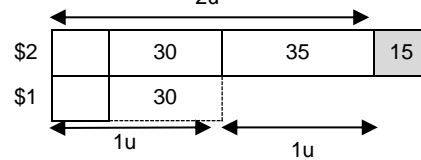
1u = 35

No. of $2-notes = 35 × 2

          = 70

No. of $1-coins = 50 – 15

          = 35

Amount of money = 70 × $2 + 35 × $1

           = $175

There was **$175** in the piggy bank at first.

Question 5

<u>At first</u>

A			
B			

<u>End</u>

5u

A	1u	50	1u	50	1u	50	50
B	1u	50					

4u
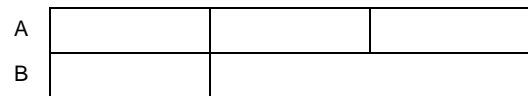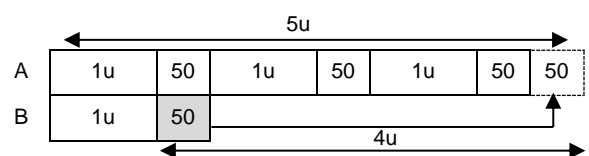
2u = 4 × 50

   = 200

1u = 200 ÷ 2

   =100

3u + 150 = 3 × 100 + 150

        = 450

There was **450 ml** of water in Tank A.

Question 6

<u>At first</u>

A			
B			

<u>End</u>

7u

A	1u	30	1u	30	1u	30	1u	30	30
B	1u	30							

6u
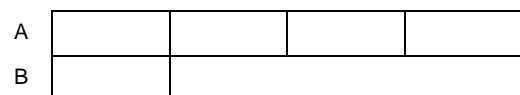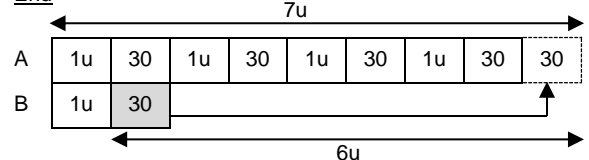
Question 6 (Cont.)

3u = 5 × 30

= 150

1u = 150 ÷ 3

= 50

1u + 30 = 50 + 30

= 80

There were **80 oranges** in Box B at first.

Let's Get Started 1.3

3.

End

| E | 1u |
| F | 1u |

At first

3u = 235 − 124

= 111

1u = 111 ÷ 3

= 37

4.

At first

| G | |
| H | |

End

1u = 10

Ask Yourself

1. The keywords in this problem sum are 'an equal number of stapler bullets left'.

Think Further

1. We can solve from the beginning because a comparison between Billy and Anna was provided. It was challenging to solve form the beginning as we do not know where to cut the model for the no. of chicken nuggets eaten by Billy.

Let's Practise 1.3

Question 1

At first

| W | |
| M | |

End

1u = 30 + 12

= 42

1u + 30 = 42 + 30

= 72

Total = 72 × 2

= 144

144 people were at the opening ceremony at first.

Question 2

Monday

| A | |
| B | |

Tuesday

3u = 16 + 29

= 45

1u = 45 ÷ 3

= 15

1u + 16 = 15 + 16

= 31

Total coins at first = 31 × 2

= 62

There were **62 coins** in the boxes altogether at first.

Question 3

At first

| A | |
| B | |

End

Question 3 (Cont.)

$3u = 30$

$1u = 30 \div 3$

$\quad = 10$

$4u + 6 = 4 \times 10 + 6$

$\qquad = 46$

There were **46 mattresses** in each room.

Question 4

End

C	1u
T	1u

At first

$2u = 240 - 4 \times 50$

$\quad = 40$

$1u = 40 \div 2$

$\quad = 20$

$1u + 50 = 20 + 50$

$\qquad = 70$

Mrs Chin had **70 cabbages** at first.

Question 5

End

K	
D	

At first

$3u = 24 + 60$

$\quad = 84$

$1u = 84 \div 3$

$\quad = 28$

Dave (end) $= 1u + 24$

$\qquad\qquad = 28 + 24$

$\qquad\qquad = 52$

Dave had **52 badges** in the end.

Question 6

End

J	
K	

Question 6 (Cont.)

At first

$4u = 64 + 24 + 64$

$\quad = 152$

$1u = 152 \div 4$

$\quad = 38$

Kennard had **38 keychains** at first.

Let's Get Started 1.4

S/N	What remains the same
1.	K had **14** marbles left. M had **90** marbles left.
2.	K had **20** marbles left. M had **112** marbles.
3.	K had **2u – 6** of marbles left. M had **3u** of marbles left.
4.	K had **2u** of marbles left. M had **3u + 22** of marbles left.

Ask Yourself

1. Two. The relationships in the "At first" and "In the end".

2. The number of units for the blouses must be the same "At first" and "In the end".

Let's Practise 1.4

Question 1

At first

End

$11u = 33$

$1u = 33 \div 11$

$\quad = 3$

$9u = 9 \times 3$

$\quad = 27$

Henry had **27 more** paper clips than fridge magnets.

Question 2

<u>At first</u>

R
C

<u>End</u>

20

R
C

$2u = 20$

$1u = 20 \div 2$

$\quad = 10$

Rulers (sold) $= 14u = 14 \times 10$

$\quad = 140$

Money received $= 140 \times \$2$

$\quad = \$280$

The store received **$280** from the sale of the rulers

Question 3

<u>At first</u>

A		26
B		

<u>End</u>

5u

A	1u	14	26
B	1u	14	

4u

$4u = 14 + 26$

$\quad = 40$

$1u = 40 \div 4$

$\quad = 10$

$6u = 6 \times 10$

$\quad = 60$

There were **60 students** altogether in both buses in the end.

Question 4

<u>At first</u>

B		36
D		

<u>End</u>

6u

B	1u	34	36
D	1u	34	

5u

$5u = 34 + 36$

$\quad = 70$

$1u = 70 \div 5$

$\quad = 14$

Question 4 (Cont.)

$1u + 34 = 14 + 34$

$\quad = 48$

Dylan had **48 cards**.

Question 5

<u>At first</u>

P		142
C		

<u>End</u>

180

P	1u	38	142
C	1u	38	

3u

$2u = 38$

$1u = 38 \div 2$

$\quad = 19$

$3u = 3 \times 19$

$\quad = 57$

Celine had **57 buttons**.

Question 6

<u>At first</u>

P		240
T		

<u>End</u>

P	1u	30	240
T	1u	1u	

$1u = 30$

$1u + 270 = 30 + 270$

$\quad = 300$

Percy brought **$300** shopping.

Let's Get Started 1.5

The table can be completed using any acceptable answers given. Ensure that same student and teacher are being used across all the years indicated in the table. You will realize the age difference between the student and the teacher remains the same throughout.

Ask Yourself

1. The difference in age between any two people will always remain the same.

Think Further

1. When equal parts are added to the model, in this instance 8 years, we draw the equal parts to the left of the model to show clearly the difference did not change (as can be seen on the right side of the model).

Let's Practise 1.5

Question 1

Now

J
F   28

In 6 years' time

J   6   1u
F   6   1u   28   } 64

2u = 64 − 28 − 6 − 6

   = 24

1u = 24 ÷ 2

   = 12

Josh's age in 9 years' time = 12 + 9

                             = 21

Josh will be **21 years old** in 9 years' time.

Question 2

Present (Now)	Future (? years time)
M = 24	M = 3u
S = 2	S = 1u
Difference = 24 − 2	Difference = 3u − 1u
= 22	= 2u

2u = 22

1u = 22 ÷ 2

   = 11

No. of years later = 11 − 2

                = 9

In **9 years' time**, Mary would be thrice her younger sister's age.

Question 3

6 years' ago

K = 3u

S = 1u

Difference = 2u

2u = 24

1u = 24 ÷ 2

   = 12

In 10 years' time = 3 × 12 + 10 + 6

                  = 52

Mrs Kumar will be **52 years** old in 10 years' time.

Question 4

At first	End (left)
Shirts = 1210	Shirts = 1u
Shorts =1910	Shorts = 15u
Difference=700	Difference = 14u

Question 4 (Cont.)

14u = 700

1u = 700 ÷ 14

   = 50

Shirts sold = 1210 − 50

           = 1160

Total sold = 1160 × 2

         = 2320

2320 shirts and **pairs of shorts** were sold altogether.

Question 5

At first	End (left)
P = 1u	P = 72 ÷ 6
	= 12
R = 5u	R = 72
Difference = 4u	Difference = 60

4u = 60

1u = 60 ÷ 4

   = 15

Pens sold =15 − 12

       = 3

Amount of money received = (3 × $2) + (3 × $1)

                        = $9

Mr Kim received **$9** from the sale of the two items.

Question 6

At first	End (left)
J = 200	J = 1u
H = 840	H = 3u
Difference = 640	Difference = 2u

2u = 640

1u = 640 ÷ 2

   = 320

(a)   Each boy received = 320 − 200

                       = 120

    Ian gave **120 marbles** to each boy.

    Both boys (received) = 2 × 120

                      = 240

    300 − 240 = 60

(b)   Ian was left with **60 marbles**.

Let's Get Started 1.6

1.

A
B
C

(Ben is repeated)

2.

B	1u	33	57
K	1u	33	
I	1u		

(Kenny is repeated)

3.

M	1u	1u	1u	21
F	1u	1u	1u	

G	1u	1u	}
W	1u		

F (3u)

(Female is repeated)

4.

A $= 2u^{x8}$ (16u)
B + C + D = $1u^{x8}$ (8u)

B $= 3u^{x2}$ (6u)
C + D $= 1u^{x2}$ (2u)
B + C + D = $4u^{x2}$ (8u)

C $= 1u$
D $= 1u$
C + D $= 2u$

Summary
A = 16u
B = 6u
C = 1u
D = 1u

(Ben, Cecil and Dan are repeated)

Ask Yourself

1. The number of children is being repeated as boys and girls.

2. It is repeated as a group (boys and girls).

Think Further

B	1u	1u	
G	1u		
A		200	

220

3u

6u = 220 + 200

    = 420

1u = 420 ÷ 6

   = 70

3u – 200 = 3 × 70 – 200

            = 210 – 200

            = 10

There were **10 adults** at the event.

Let's Practise 1.6

Question 1

	G	W	
F			
M			50

300

Question 1 (Cont.)

10u = 300 – 50

    = 250

1u = 250 ÷ 10

   = 25

4u + 50 = 4 × 25 + 50

        = 150

There were **150 more** male guests than girls.

Question 2

C			
A+B			

A			
B			

Unitary approach

C = $1u^{x3}$ (3u)
A + B = $4u^{x3}$ (12u)

A = $1u^{x4}$ (4u)
B = $2u^{x4}$ (8u)
A + B = $3u^{x4}$ (12u)

Summary
A = 4u
B = 8u
C = 3u
Total = 4u + 8u + 3u
       = 15u

4u = 80

1u = 80 ÷ 4

   = 20

15u = 15 × 20

    = 300

The three girls had **$300 altogether.**

Question 3

103

M	1u	11	1u	11	1u	11
T	1u	11				
W	1u					
Th	1u	1u	1u	1u	1u	

2u = 103 – 11 × 3

   = 70

1u = 70 ÷ 2

   = 35

5u = 5 × 35

   = 175

175 cups were sold on Thursday

Question 4

274

A	B	C

354

482

Question 4 (Cont.)

C = 482 − 274

  = 208

B = 354 − 208

  = 146

Bonita sold **146 funfair tickets**.

Question 5

At first

K	1u	1u	12	12	32
P	1u	1u	12	12	
R	1u	1u			
Z	1u	12			

In the end

K	1u	1u	12	12	32
P	1u	1u	12	12	
R	1u	1u			
Z		14	12		

124

12 + 12 + 32 + 14 = 70

1u = 124 − 70

  = 54

Total of P, K, R = 6u + 80

6u + 80 = 6 × 54 + 80

      = 404

Kenny, Penny and Ryan had **$404** altogether.

Question 6

C	1u	1u	1u	2400	3400
B	1u	1u	1u	2400	
A	1u	1u	1u		
D	1u				

25 800 + 2000 = 27 800

2400 + 2400 + 3400 = 8200

10u = 27 800 − 8200

    = 19 600

1u = 19 600 ÷ 10

  = 1960

3u + 2400 = 3 × 1960 + 2400

       = 8280

Brandon had **8280 reward points**.

Let's Get Started 1.7

Denomination of notes	Quantity of notes	×	Value ($)	=	Total Value ($)
$1	1	×	1	=	1
$2	6	×	2	=	12
$5	2	×	5	=	10
$10	11	×	10	=	110
Total	22				135

Ask Yourself

1. The 'quantity' is represented by the number of birds and hamsters at the pet store. The 'value' is represented by the number of legs of each animal at the pet store.

Let's Practise 1.7

Question 1

Items	Quantity of items	×	Value of items (Cents)	Total value (Cents)
20-cent	3u	×	20	60u
50-cent	1u	×	50	50u
Total	4u			110u

110u = 6600

1u = 6600 ÷ 110

  = 60

3u = 3 × 60

  = 180

Joseph has **180 20-cent coins**.

Question 2

Items	Quantity of items	×	Value of items ($)	Total Value ($)
G	3u	×	150	450u
C	1u	×	50	50u
Total	4u			500u

Difference = 450u − 50u

         = 400u

400u = 1200

1u = 1200 ÷ 400

  = 3

4u = 4 × 3

  = 12

12 people will be receiving the red packets.

Question 3

1 pair of sport shoes = 2 × 23

= 46

Items	Quantity of items	×	Value of items ($)	Total Value ($)
Sa	1u	×	23	23u
Sl	3u	×	16	48u
Sp	1u	×	46	46u
Total	5u			117u

117u = 468

1u = 468 ÷ 117 = 4

48u – 23u = 25u

25u = 25 × 4 = 100

Wayne spent **$100 more** on the pairs of slippers than on pairs of the sandals.

Question 4

NP = 4u

P = 1u

OM = 1u^{×2} (2u)

NP = 2u^{×2} (4u)

Summary

NP = 4u

P = 1u

OM = 2u

Items	Quantity of items	×	Value of items (Coupons)	Unit Value (Coupons)
Non-participants	4u	×	3	12u
Participants	1u	×	8	8u
Organising members	2u	×	12	24u
Total	7u			44u

24u – 8u = 16u

16u = 144

1u = 144 ÷ 16

= 9

7u = 7 × 9

= 63

There were **63 people** at the swimming meet.

Question 5

7 – 12 years old = 3u

13 – 16 years old = 1u

1 – 6 years old = 2u^{×3} (6u)

7 – 12 years old = 1u^{×3} (3u)

Summary

1 – 6 yr old = 6u

7 – 12 yr old = 3u

13 – 16 yr old = 1u

Question 5 (Cont.)

Items	Quantity of items	×	Value of items ($)	Unit Value ($)
1-6 years old	6u	×	3	18u
7-12 years old	3u	×	6	18u
13-16 years old	1u	×	12	12u
Total	10u			48u

48u = 1440

1u = 1440 ÷ 48

= 30

18u = 18 × 30

= 540

$540 was collected from the age category of 1 to 6 years old.

Question 6

C = 5u

A = 1u

B = 3u

G = 2u

C = 3u + 2u

= 5u

Summary

B = 3u

G = 2u

A = 1u

Items	Quantity of items	×	Value of items ($)	Unit Value ($)
Adults	1u	×	2	2u
Boys	3u	×	1	3u
Girls	2u	×	1	2u
Total	6u			7u

7u = 1470

1u = 1470 ÷ 7

= 210

5u = 5 × 210

= 1050

1050 children were at the event.

Let's Get Started 2.1

S/N	Branch Diagram
2.	Total pages $3u^{x2}$ (6u) $1u^{x2}$ (2u)　　$2u^{x2}$ (4u) 1st day　　　Remainder 　　　　　　　　4u 　　　　2nd day　　Left 　　　　1u　　　3u = 90
3.	$5u^{x3}$ (15u) Total fishes $3u^{x3}$ (9u)　　$2u^{x3}$ (6u) Guppies　　Remainder 　　　　　　$3u^{x2}$ (6u) 　　Goldfish　　Tetras 　　$1u^{x2}$ (2u)　$2u^{x2}$ (4u)

Think Further

1　$5u - 2u = 3u$
　　$3u = 72$
　　$1u = 72 \div 3$
　　　 $= 24$
　　$15u = 15 \times 24$
　　　　 $= 360$
　　Anthony had **$360** at first.

2　Money on food and shoes $= \dfrac{1}{3} + \dfrac{1}{5}$
　　　　　　　　　　　　　$= \dfrac{5}{15} + \dfrac{3}{15}$
　　　　　　　　　　　　　$= \dfrac{8}{15}$

　　Money left 　$= 1 - \dfrac{8}{15}$
　　　　　　　　$= \dfrac{7}{15}$
　　$\dfrac{7}{15}$ of total = 70
　　$\dfrac{1}{15}$ of total = 10
　　$\dfrac{15}{15}$ of total = 10 × 15
　　　　　　　　 = 150

　　Anthony had **$150** at first.

Let's Practise 2.1

Question 1
　　　Total money
　　　　10u

　　W　　Remainder
　　3u　　　7u

　　　　D　　Left
　　　　3u　　4u
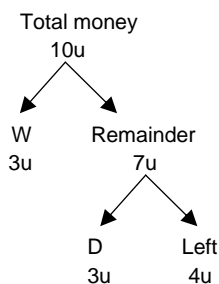
Question 1 (Cont.)

(a)　Fraction spent on dress $= \dfrac{3}{10}$

　　Felicity spent $\dfrac{3}{10}$ of her money on the dress.

(b)　$4u = 400$
　　$1u = 400 \div 4$
　　　 $= 100$
　　$10u = 10 \times 100$
　　　　 $= 1000$
　　Felicity had **$1000** at first

Question 2

　　　　5u
　　Total money

　　1u　　　4u
　　W　　Remainder
　　　　　　$2u^{x2}$ (4u)

　　　　TV　　　Left
　　　$1u^{x2}$ (2u)　$1u^{x2}$ (2u)
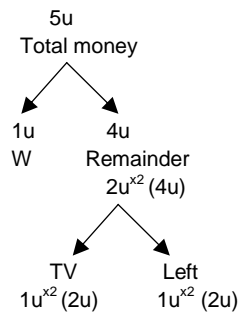
(a) Fraction spent on TV set $= \dfrac{2}{5}$

　　Caleb spent $\dfrac{2}{5}$ his money on the television set.

(b) $2u = 1440$
　　$1u = 1440 \div 2$
　　　 $= 720$
　　The watch cost **$720**.

Question 3

　　　Total money
　　　　40u

　　D　　P　　Remainder
　　8u　　25u　　7u

　　　　　　C　　Left
　　　　　　4u　　3u
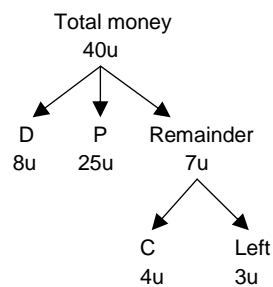
Purse : $\dfrac{5}{8} = \dfrac{25}{40}$

Dress : $\dfrac{1}{5} = \dfrac{8}{40}$

$3u = 183$
$1u = 183 \div 3$
　 $= 61$
$25u = 25 \times 61$
　　 $= 1525$
Rebecca spent **$1525** on the purse.

Question 4

Total stamps
35u

Brother : $\frac{2}{7} = \frac{10}{35}$

Best friend : $\frac{1}{5} = \frac{7}{35}$

10u   7u   18u
B   F   Remainder
$3u^{x6}$ (18u)

D   Left
$1u^{x6}$ (6u) $2u^{x6}$ (12u)
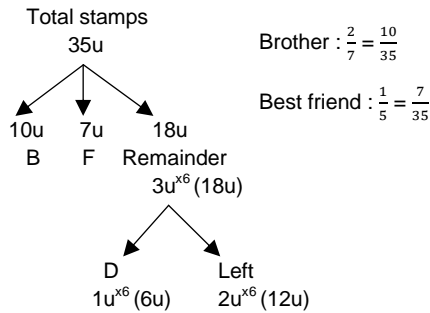
12u = 36

1u = 36 ÷ 12

   = 3

35u = 35 × 3

    = 105

Mabel had **105 stamps** at first.

Question 5

$9u^{x4}$ (36u)
Total donations

$4u^{x4}$ (16u) $5u^{x4}$ (20u)
P   Remainder
$4u^{x5}$ (20u)

S   C
$1u^{x5}$ (5u) $3u^{x5}$ (15u)
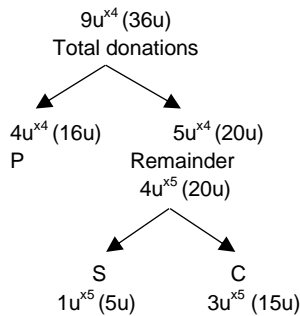
15u = 240 000

1u = 240 000 ÷ 15

   = 16 000

36u = 36 × 16 000

    = 576 000

$576 000 was raised during the event.

Question 6

Total cupcakes
$3u^{x2}$ (6u)

S   Remainder
$1u^{x2}$ (2u) $2u^{x2}$ (4u)

A   Left
1u   3u
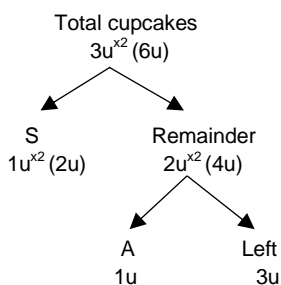
(a) Fraction to orphanage = $\frac{3}{6}$

                  = $\frac{1}{2}$

(b) 3u = 285

   1u = 285 ÷ 3

     = 95

   2u = 2 × 95

     = 190

   190 cupcakes were for Sally's birthday party.

Let's Get Started 2.2

S/N	Branch Diagram
2.	Total monthly savings Bag Remainder $60 3u Basketball Left 2u 1u Working backwards: $\frac{1}{4}$ of total = 1u $\frac{4}{4}$ of total = 4u Bag = 4u − 3u = 1u
3.	Total participants A C 330 4u G B 1u 3u Working backwards : $\frac{1}{5}$ of total = 3u $\frac{5}{5}$ of total = 15u Adults = 15u − 4u = 11u

Ask Yourself

1. A value is given at the beginning for one of the branch. This makes it different from that in the previous units where all the fractions representing each branch are given as part of the information in the question.

Think Further

$\frac{1}{3}$ of money = 3u

$\frac{3}{3}$ of money = 9u

Money spent on plates = 9u − 5u

                      = 4u

3S = 1P

12S = 4P

2u of money = 4P

4u of money = 8P

8P = 156

1P = 156 ÷ 8

   = 19.50

Each plate cost **$19.50.**

Let's Practise 2.2

Question 1

Total stickers

B
111

Remainder
8u

C
3u

Left
5u
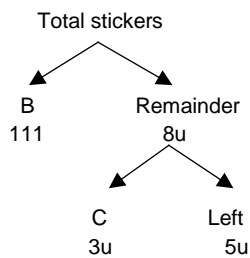
$\frac{1}{9}$ of stickers = 5u

$\frac{9}{9}$ of stickers = 9 × 5u

= 45u

B = 45u − 8u

= 37u

37u = 111

1u = 111 ÷ 37

= 3

45u = 45 × 3

= 135

Ken had **135 stickers** at first.

Question 2

Total money

E
$18

Remainder
12u

C
7u

Left
5u
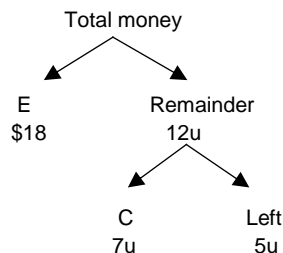
$\frac{1}{3}$ of total = 5u

$\frac{3}{3}$ of total = 3 × 5

= 15u

E = 15u − 12u

= 3u

3u = 18

1u = 18 ÷ 3

= 6

7u = 7 × 6

= 42

Jack's mother spent **$42** on the Chinese story books.

Question 3

Total fruits

M
280

Remainder
5u

A
3u

Left
2u
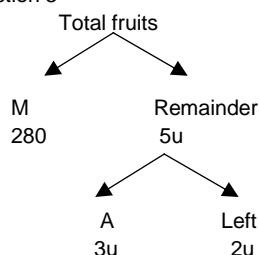
Question 3 (Cont.)

$\frac{1}{6}$ of total = 2u

$\frac{6}{6}$ of total = 6 × 2u

= 12u

M = 12u − 5u

= 7u

7u = 280

1u = 280 ÷ 7

= 40

Apples sold in afternoon = 3u = 3 × 40

= 120

Number of packs of apples sold = 120 ÷ 6

= 20

Amount received = 20 × 2.50

= 50

$50 was collected from sales of apples in the afternoon.

Question 4

Total money

B

Remainder
$7u^{×2}$ (14u)

C
$4u^{×2}$ (8u)
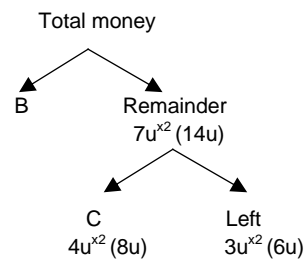
Left
$3u^{×2}$ (6u)

$\frac{2}{5}$ of total = $3u^{×2}$ (6u)

$\frac{1}{5}$ of total = 6u ÷ 2

= 3u

$\frac{5}{5}$ of total = 5 × 3u

= 15u

B = 15u − 14u

= 1u

Difference between crayons and books = 8u − 1u

= 7u

7u = 28

1u = 28 ÷ 7

= 4

6u = 6 × 4

= 24

Jazreel was left with **$24** in the end.

Question 5

Total beads

B

Remainder
$5u^{×4}$ (20u)

A
$2u^{×4}$ (8u)
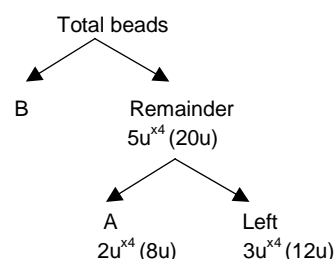
Left
$3u^{×4}$ (12u)

Question 5 (Cont.)

$\frac{4}{9}$ of total = 3u$^{\text{x4}}$ (12u)

$\frac{1}{9}$ of total = 12u ÷ 4

       = 3u

$\frac{9}{9}$ of total = 9 × 3u

       = 27u

B = 27u – 20u

  = 7u

B + left = 7u + 12u

      = 19u

19u = 209

1u = 209 ÷ 19

  = 11

27u = 27 × 11

   = 297

Caitlin had **297 beads** at first.

Question 6

Total point

S — 220 ml   Remainder — 5u

H — 1u   Left — 4u+80
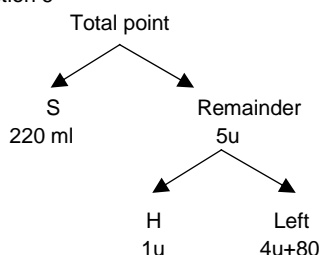
$\frac{2}{3}$ of total = 4u + 80

$\frac{1}{3}$ of total = 2u + 40

$\frac{3}{3}$ of total = 6u + 120

S = 1u + 120

1u = 220 – 120

  = 100

6u + 120 = 6 × 100 + 120

        = 720

Darren had **720 ml** of paint at first.

Let's Get Started 2.3

S/N	Branch Diagram
2.	 Total jelly beans S ($\frac{1}{4}$ T + 7) Remainder Coc ($\frac{1}{3}$ R – 2) Cot 25

3.	 Total students Fo ($\frac{1}{2}$ T + 3) Remainder Fl ($\frac{3}{4}$ R – 4) H 22
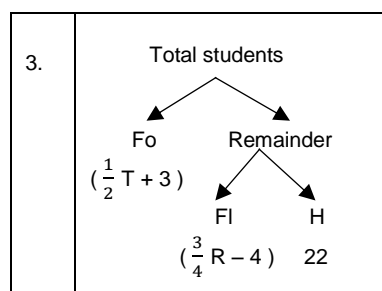
Ask Yourself

1. The key words are 'of the remaining/remainder' which hint on the use of the Branching approach.
2. A fraction and a whole number more/fewer than is given in the question compared to previous units.
3. The sum of any whole numbers and the fractions found at a particular branch level must add up to 1 whole and shall equate with the value of the branch directly above it.
4. We shall start solving the sum from the last level of the branches and work upwards/backwards.

Let's Practise 2.3

Question 1

Total amount of money (T)

AM ($\frac{1}{6}$ T + 6) $\frac{5}{6}$ T   Remainder(R) 24

S ($\frac{1}{8}$ R + 8) $\frac{7}{8}$ R   Left 13
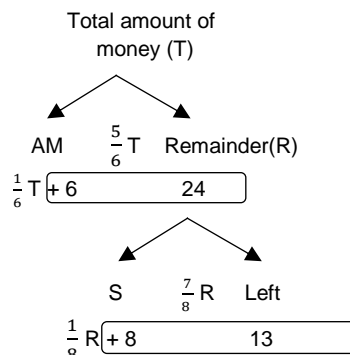
$\frac{7}{8}$ of remainder = 8 + 13

       = 21

$\frac{1}{8}$ of remainder = 21 ÷ 7

       = 3

$\frac{8}{8}$ of remainder = 8 × 3

       = 24

$\frac{5}{6}$ of total = 6 + 24

       = 30

$\frac{1}{6}$ of total = 30 ÷ 5

       = 6

Art materials = $\frac{1}{6}$ T + 6 = 6 + 6

       = 12

The art materials cost **$12**.

Question 2

Total no. of beads(T)

B $\frac{5}{9}$ T   Remainder (R)

$\frac{4}{9}$ T | + 15   45 |

N $\frac{3}{5}$ R   Left

$\frac{2}{5}$ R | + 13   14 |
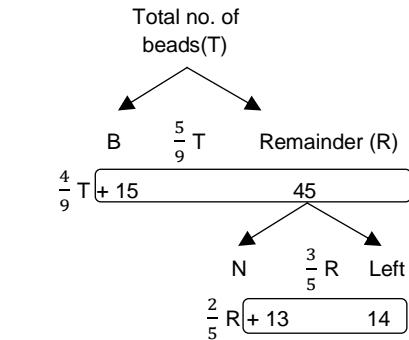
$\frac{3}{5}$ of remainder $= 13 + 14$

$= 27$

$\frac{1}{5}$ of remainder $= 27 \div 3$

$= 9$

$\frac{5}{5}$ of remainder $= 9 \times 5$

$= 45$

$\frac{5}{9}$ of total $= 45 + 15$

$= 60$

$\frac{1}{9}$ of total $= 60 \div 5$

$= 12$

$B = \frac{4}{9}$ of total $+ 15$

$= 12 \times 4 + 15$

$= 63$

$N = 45 - 14 = 31$

Total beads used $= 63 + 31$

$= 94$

Jane used **94 beads** for the bracelet and necklace.

Question 3

Total no. of points (T)

D $\frac{5}{9}$ T   Remainder (R)

$\frac{4}{9}$ T | − 200   1100 |

M $\frac{10}{11}$ R   Left

$\frac{1}{11}$ R | − 13)   1013 |
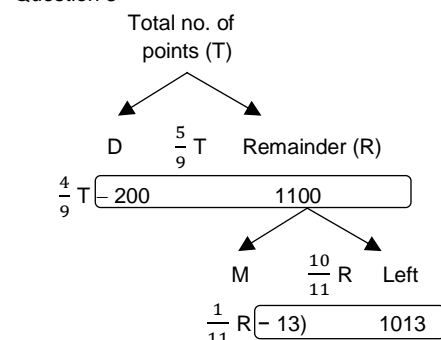
$\frac{10}{11}$ of remainder $= 1013 - 13$

$= 1000$

$\frac{1}{11}$ of remainder $= 1000 \div 10$

$= 100$

$\frac{11}{11}$ of remainder $= 11 \times 100$

$= 1100$

$\frac{5}{9}$ of total $= 1100 - 200$

$= 900$

Question 3 (Cont.)

$\frac{1}{9}$ of total $= 900 \div 5$

$= 180$

$\frac{9}{9}$ of total $= 9 \times 180$

$= 1620$

Mr Davley had **1620 membership** points before the redemption.

_____

Question 4

Total amount of money (T)

C $\frac{2}{5}$ T   Remainder (R)

$\frac{3}{5}$ T | + 16   48 |

L $\frac{3}{4}$ R   Left

$\frac{1}{4}$ R | − 2   38 |
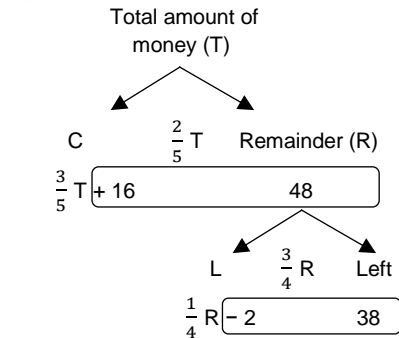
$\frac{3}{4}$ of remainder $= 38 - 2$

$= 36$

$\frac{1}{4}$ of remainder $= 36 \div 3$

$= 12$

$\frac{4}{4}$ of remainder $= 4 \times 12$

$= 48$

$\frac{2}{5}$ of total $= 48 + 16 = 64$

$\frac{1}{5}$ of total $= 64 \div 2$

$= 32$

$C = \frac{3}{5}$ of total $+ 16$

$= 3 \times 32 + 16$

$= 112$

$L = 48 - 38$

$= 10$

Difference $= 112 - 10$

$= 102$

Doreen spent **$102 more** on cosmetic products than on her lunch.

_____

Question 5

Total no. of problem sums (T)

Mon   Tues   Remainder (R)

$\frac{5}{9}$ T | 2   22 |

Wed $\frac{7}{11}$ R   Thurs

$\frac{4}{11}$ R | − 15   29 |
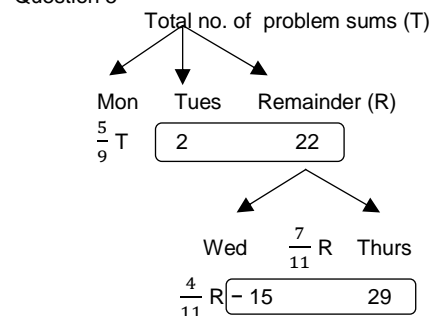
Question 5 (Cont.)

$\frac{7}{11}$ of remainder = 29 − 15

$\qquad\qquad$ = 14

$\frac{1}{11}$ of remainder = 14 ÷ 7

$\qquad\qquad$ = 2

$\frac{11}{11}$ of remainder = 11 × 2

$\qquad\qquad$ = 22

$\frac{4}{9}$ of total = 22 + 2

$\qquad$ = 24

$\frac{1}{9}$ of total = 24 ÷ 4

$\qquad$ = 6

$\frac{9}{9}$ of total = 9 × 6

$\qquad$ = 54

Mike was given **54 questions** at first.

Question 6

Total no. of
pages (T)

1st	2nd	Remainder (R)
$\frac{1}{3}$ T	121	273

3rd $\qquad \frac{3}{7}$ R $\qquad$ Last week

$\frac{4}{7}$ R + 9 $\qquad\qquad$ 108
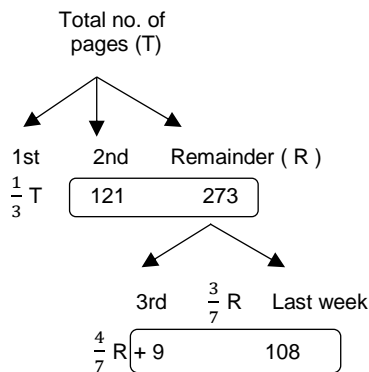
$\frac{3}{7}$ of remainder = 108 + 9

$\qquad\qquad$ = 117

$\frac{1}{7}$ of remainder = 117 ÷ 73

$\qquad\qquad$ = 39

$\frac{7}{7}$ of remainder = 7 × 39

$\qquad\qquad$ = 273

$\frac{2}{3}$ of total = 121 + 273

$\qquad$ = 394

$\frac{1}{3}$ of total = 394 ÷ 2

$\qquad$ = 197
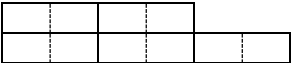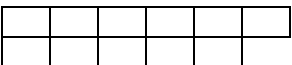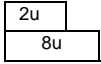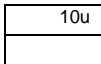
$\frac{3}{3}$ of total = 3 × 197

$\qquad$ = 591

There were **591 pages** in the novel.

Let's Get Started 2.4

S/N	Model-drawing approach	Unitary approach
2.	G D D O	$G = 3u^{\times 2}$ (6u) $D = 2u^{\times 2}$ (4u) D = 4u O = 3u Summary G = 6u D = 4u O = 3u
3.	A C C B	$A = 2u^{\times 2}$ (4u) $C = 3u^{\times 2}$ (6u) C = 6u B = 5u Summary A = 4u B = 5u C = 6u
4.	B $\quad$ 2u G $\quad$ 8u B+G $\quad$ 10u A $\quad$ 25u	$B = 1u^{\times 2}$ (2u) $G = 4u^{\times 2}$ (8u) $B+G = 5u^{\times 2}$ (10u) $B+G = 2u^{\times 5}$ (10u) $A = 5^{\times 5}$ (25u) Summary A = 25u B = 2u G = 8u

Ask Yourself

The shaded part is the overlapping part between the two

figures. Hence, it is the repeated item.

Think Further

1.

X + Y = $1u^{\times 7}$ (7u) $\qquad$ Summary

Y + Z = $2u^{\times 7}$ (14u) $\qquad$ X : 7u − 4u = 3u

$\qquad\qquad\qquad\qquad\qquad$ Y : 4u

Y = $2u^{\times 2}$ (4u) $\qquad$ Z : 14u − 4u = 10u

Y + Z = $7u^{\times 2}$ (14u) $\qquad$ Total = 3u + 4u + 10u

$\qquad\qquad\qquad\qquad\qquad$ = 17u

Fraction of the figure that is shaded = $\frac{4}{17}$

Let's Practise 2.4

Question 1
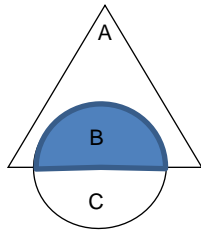
$A + B = 3u^{x5}$ (15u)
$C + B = 4u^{x5}$ (20u)

Summary
A = 3u

$B = 3u^{x4}$ (12u)
$C = 2u^{x4}$ (8u)
$B + C = 5u^{x4}$ (20u)

B = 12u
C = 8u

Fraction of figure shaded $= \dfrac{12}{23}$

Question 2
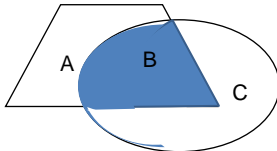
$A + B = 3u^{x3}$ = (9u)
$C + B = 7u^{x3}$ = (21u)

Summary
A = 2u

$B = 1u^{x7}$ (7u)
$C = 2u^{x7}$ (14u)
$B + C = 3u^{x7}$ (21u)

B = 7u
C = 14u

Shaded part, B = 7u = 42
1u = 42 ÷ 7
   = 6

Difference in area between the four-sided figure (A+B) and
the oval (B+C) = 21u – 9u
              = 12u

12u = 12 × 6
    = 72

The difference in the area is **72 cm²**.

Question 3

J = 2u
K = 1u

Summary
J = 2u
D = 6u
K = 1u

$J = 1u^{x2}$ (2u)
$D = 3u^{x2}$ (6u)

7u = 21
1u = 21 ÷ 7
    = 3
2u = 2 × 3
    = 6

Jason had **6 cousins**.

Question 4

$T = 2u^{x4}$ (8u)
$Sh = 9u^{x4}$ (36u)

Summary
T   = 8u
Sh = 36u

$So = 3u^{x9}$ (27u)
$Sh = 4u^{x9}$ (36u)

So = 27u

Difference between socks and trousers = 27u – 8u
                                      = 19u

19u = 38
1u = 38 ÷ 19
    = 2
71u = 71 × 2
    = 142

Mr Osman bought **142 trousers, shirts and pairs of socks**.

Question 5

$50 = 3u^{x3}$ (9u)
$10 = 4u^{x3}$ (12u)
$10 + $50 = 7u^{x3}$ (21u)

Summary
$50 = 9u
$10 = 12u
$2 = 7u

$10 + $50 = 3u^{x7}$ (21u)
$2 = 1u^{x7}$ (7u)

12u – 7u = 5u
5u = 15
1u = 15 ÷ 5
    = 3

Number of $50-notes = 9u = 9 × 3
                        = 27
Total value of $50-notes   = 27 × 50
                         = 1350

Number of $10-notes = 12u
                    = 12 × 3
                    = 36
Total value of $10-notes   = 36 × 10
                         = 360

Number of $2-notes   = 7u
                    = 7 × 3
                    = 21
Total value of $2-notes = 21 × 2
                      = 42
Money in the end = 1350 + 360 + 42
                 = 1752

There was **$1752** in the safe deposit box.

Question 6

$A = 1u^{\times 3}$ (3u)

$B + C + D = 8u^{\times 3}$ (24u)

$B = 1u^{\times 6}$ = (6u)

$C + D = 3u^{\times 6}$ (18u)

$B + C + D = 4u^{\times 6}$ (24u)

$C = 5u^{\times 2}$ (10u)

$D = 4u^{\times 2}$ (8u)

$C + D = 9u^{\times 2}$ (18u)

Summary

A = 3u

B = 6u

C = 10u

D = 8u

Total = 3u + 6u + 10u + 8u

= 27u

C + D = 10u + 8u

= 18u

A + B = 3u + 6u

= 9u

Difference = 18u − 9u

= 9u

9u = 288

1u = 288 ÷ 9

= 32

27u = 27 × 32

= 864

The girls have **$864**.

Let's Get Started 2.5

	At first	What has happened?	End (As a result)	What remained unchanged?	Find the value of 1 unit.
2.	A has $\frac{2}{3}$ as many marbles as B	A loses 40 marbles	B has 4 times as many marbles as A.	The number of marbles that B has.	
	A = $2u^{\times 4}$ (8u) B = $3u^{\times 4}$ (12u)		A = $1u^{\times 3}$ (3u) B = $4u^{\times 3}$ (12u)		Diff = 8u − 3u = 5u 5u = 40 1u = 8
3.	$\frac{2}{5}$ of the fruits at a stall are apples (A) and oranges (O). The rest were pears.	25 pears are added to the stall	$\frac{7}{10}$ of the fruits are pears. The rest are apples and oranges.	The number of apples and oranges.	
	A+O = $2u^{\times 3}$ (6u) P = $3u^{\times 3}$ (9u)		A+O = $3u^{\times 2}$ (6u) P = $7u^{\times 2}$ (14u)		Diff =14u–9u = 5u 5u = 25 1u = 5

Ask Yourself

1. 'If' implies that the event did not occur hence the question need not mention 'at first' or 'at the end'.

Think Further

<u>At first</u>
P   = $2u^{\times 4}$ (8u)
S + A   = $7u^{\times 4}$ (28)

<u>End</u>
P   = $1u^{\times 7}$ (7u)
S + A   = $4u^{\times 7}$ (28u)

1u = 12
Total = 8u + 28u
= 36u
36u = 36 × 12
= 432
Mrs Han had **432 fruits**.

Let's Practise 2.5

Question 1

<u>At first</u>
P = $1u^{\times 4}$ (4u)
M = $3u^{\times 4}$ (12u)

<u>End</u>
P = $3u^{\times 3}$ (9u)
M = $4u^{\times 3}$ (12u)

Difference = 9u − 4u
= 5u

5u = 10
1u = 10 ÷ 5
= 2
12u = 12 × 2
= 24
The puppy's mother was **24 kg**.

Question 2

<u>At first</u>
B = $1u^{\times 4}$ (4u)
G = $2u^{\times 4}$ (8u)

<u>End</u>
B = 4u
G = 5u

Difference = 8u − 5u
= 3u

4u = 40
1u = 40 ÷ 4
= 10
3u = 3 × 10
= 30
30 girls who had left the hall.

Question 3

<u>At first</u>
R = $3u^{\times 4}$ (12u)
S = $7u^{\times 4}$ (28u)

<u>End</u>
R = $4u^{\times 3}$ (12u)
S = $5u^{\times 3}$ (15u)

Difference = 28u − 15u
= 13u

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Question 3 (cont.)

13u = 39

1u = 39 ÷ 13

= 3

Difference at first = 28u − 12u

= 16u

16u = 16 × 3

= 48

Jen had **48 more sunflowers** than roses at first.

Question 4

<u>At first</u>
A = 5u^{x3} (15u)
B = 3u^{x3} (9u)

Difference = 20u − 9u
= 11u

<u>End</u>
A = 3u^{x5} (15u)
B = 4u^{x5} (20u)

11u = 33

1u = 33 ÷ 11

= 3

15u = 15 × 3

= 45

45 customers were in Restaurant A.

Question 5

<u>At first</u>
E = 2u^{x3} (6u)
A+S = 3u^{x3} (9u)

<u>End</u>
E = 3u^{x2} (6u)
A+S = 1u^{x2} (2u)

Difference = 9u − 2u
= 7u

7u = 42

1u = 42 ÷ 7

= 6

Total at first = 6u + 9u

= 15u

15u = 15 × 6

= 90

There were **90 toys** in the shop.

Question 6

<u>At first</u>
S+M = 4u^{x3} (12u)
W = 5u^{x3} (15u)

<u>End</u>
S+M = 3u^{x4} (12u)
W = 5u^{x4} (20u)

Difference = 20u − 15u
= 5u

5u = 300

1u = 300 ÷ 5

= 60

Question 6 (cont.)

20u = 20 × 60

= 1200

There were **1200 ml** of water in the mixture in the end.

Let's Get Started 2.6

Items	Quantity in units			Value of 1u
	Peter	John	Total	
At first	5u^{x5} (25u)	3u^{x5} (15u)	8u^{x5} (40u)	25u − 16u = 9u
What happened?	−36	+ 36		9u = 36
In the end	2u^{x8} (16u)	3u^{x8} (24u)	5u^{x8} (40u)	1u = 4

Think Further

1.
<u>At first</u>
A = 1u^{x3} (3u)
C = 3u^{x3} (9u)
Difference = 2u^{x3} (6u)

Difference = 10u − 9u
= 1u

<u>End</u>
A = 2u^{x2} (4u)
C = 5u^{x2} (10u)
Difference = 3u^{x2} (6u)

1u = 28

10u = 10 × 28

= 280

There were **280 children** in the train at the end.

Let's Practise 2.6

Question 1

<u>At first</u>
O = 1u^{x7} (7u)
R = 5u^{x7} (35u)
Total = 6u^{x7} (42u)

<u>End</u>
O = 3u^{x6} (18u)
R = 4u^{x6} (24u)
Total = 7u^{x6} (42u)

Difference = 18u − 7u
= 11u

11u = 44

1u = 44 ÷ 11

= 4

35u = 35 × 4

= 140

There were **140 pots** of roses at first.

Question 2
<u>At first</u>
B = 2u^{x9} (18u)
G = 3u^{x9} (27u)
Total = 5u^{x9} (45u)

Difference = 20u − 18u
= 2u

<u>End</u>
B = 4u^{x5} (20u)
G = 5u^{x5} (25u)
Total = 9u^{x5} (45u)

2u = 12
1u = 12 ÷ 2
= 6
18u = 18 × 6
= 108
There were **108 boys** in the gym.

Question 3

<u>At first</u>
P = 3u^{x8} (24u)
M = 4u^{x8} (32u)
Total = 7u^{x8} (56u)

Difference = 35u − 24
= 11u

<u>End</u>
P = 5u^{x7} (35u)
M = 3u^{x7} (21u)
Total = 8u^{x7} (56u)

11u = 77
1u = 77 ÷ 11
= 7
24u = 24 × 7
= 168
Paul had **168 ants**.

Question 4

<u>At first</u>
A = 4u^{x7} (28u)
N = 5u^{x7} (35u)
Total = 9u^{x7} (63u)

Difference = 28u − 18u
= 10u

<u>At first</u>
A = 2u^{x9} (18u)
N = 5u^{x9} (45u)
Total = 7u^{x9} (63u)

10u = 40
1u = 40 ÷ 10
= 4
28u = 28 × 4
= 112
Alisha had **112 stickers** at first.

Question 5

<u>30 min</u>
C = 1u
I = 9u
Total = 10u

Difference = 4u − 1u
= 3u

<u>45 min</u>
C = 2u^{x2} (4u)
I = 3u^{x2} (6u)
Total = 5u^{x2} (10u)

3u = 12
1u = 12 ÷ 3
= 4
10u = 10 × 4
= 40
There were **40 questions**.

Question 6

<u>At first</u>
U = 9u
P = 5u
Total = 14u

Difference = 9u − 8u
= 1u

<u>45 min</u>
U = 4u^{x2} (8u)
P = 3u^{x2} (6u)
Total = 7u^{x2} (14u)

1u = 4
14u = 14 × 4
= 56
There were **56 cars** in the workshop.

Let's Get Started 2.7

Items	Quantity in units			Conclusion
	Annie	Mother	Diff	
Now	1u^{x2} (2u)	6u^{x2} (12u)	5u^{x2} (10u)	What has not changed?
What happened? (9 years later)	+9	+9		The age difference between Annie and her mother.
Future	1u^{x5} (5u)	3u^{x5} (15u)	2u^{x5} (10u)	Their age increased by 3u each after 9 years. Hence, 3u = 9 1u = 3

Ask Yourself

1. Overlapping figures where an equal area is being removed or cut from the each of the figures.

Let's Practise 2.7

Question 1

<u>At first</u>
A = $2u^{x4}$ (8u)
C = $5u^{x4}$ (20u)
Difference = $3u^{x4}$ (12u)

Difference = 8u − 3u
= 5u

<u>End</u>
A = $1u^{x3}$ (3u)
C = $5u^{x3}$ (15u)
Difference = $4u^{x3}$ (12u)

5u = 145
1u = 145 ÷ 5
= 29
28u = 28 × 29
= 812
There were **812 people** in the conference hall at first.

Question 2

<u>At first</u>
Difference = 8 metres
<u>End</u>
L = 13u
S = 8u
Difference = 5u
5u = 8
1u = 8 ÷ 5
= 1.6
21u = 1.6 × 21
= 33.6
Total length removed = 34 − 33.6
= 0.4
Length removed from each = 0.4 ÷ 2
= 0.2
0.2 m was cut off from each piece of rope.

Question 3

<u>Now</u>
J = $1u^{x3}$ (3u)
F = $3u^{x3}$ (9u)
Difference = $2u^{x3}$ (6u)

Difference = 4u − 3u
= 1u

<u>5 years later</u>
J = $2u^{x2}$ (4u)
F = $5u^{x2}$ (10u)
Difference = $3u^{x2}$ (6u)
1u = 5

Question 3 (cont.)

<u>Now</u>
Jasper, 3u = 3 × 5
= 15
Father, 9u = 9 × 5
= 45
Jasper's and his father's present ages are **15 years old** and **45 years old** respectively.

Question 4

? years ago	Now
G = 3u	G = $4u^{x4}$ (16u)
N = 7u	N = $5u^{x4}$ (20u)
Difference = 4u	Difference = $1u^{x4}$ (4u)

Sum of their ages now = 136 − 14 − 14
= 108
16u + 20u = 108
36u = 108
1u = 108 ÷ 36
= 3
Change = 16u − 3u
= 13u
13u = 13 × 3
= 39

George was $\frac{3}{7}$ of Nathan age **39 years ago**.

Question 5
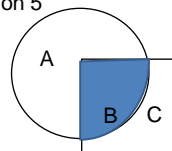
<u>At first</u>
A + B = $3u^{x2}$ (6u)
C + B = $5u^{x2}$ (10u)
Difference = $2u^{x2}$ (4u)

<u>End</u>
A = 3u
C = 7u
Difference = 4u

Shaded part (B) = 6u − 3u
= 3u
3u = 36
1u = 36 ÷ 3
= 12
A + B + C = 3u + 3u + 7u
= 13u
13u = 13 × 12
= 156
The area of the figure is **156 cm^2**.

Question 6

At first

A + B + C + D = $5u^{x2}$ (10u)
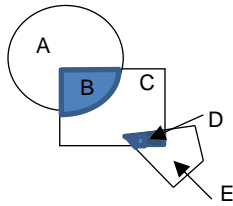
B + C + D + E = $7u^{x2}$ (14u)

Difference = $2u^{x2}$ (4u)

End

A + C = 5u

C + E = 9u

Difference = 4u

Shaded part (B+D) = 14u – 9u

= 5u

5u = 45

1u = 45 ÷ 5

= 9

Unshaded area of square and the quadrilateral

= C + E

= 9u

= 9 × 9

= 81

The area of the unshaded part of the square and quadrilateral is **81 cm^2**.

Let's Get Started 2.8

Change 1 (Both Add)

R	7u	3u	13
W	7u	39	13

4p

3u = 39

1u = 39 ÷ 3

= 13

Change 2 (Both Subtract)

11u

R	5p	65	48
W	5p	65	

7u   4u

4u = 48

1u = 48 ÷ 4

= 12

Change 3 (1 Add, 1 Subtract)

1p

R	3u	28	
W	3u	28	42

5u

8u

5u = 28 + 42

= 70

1u = 70 ÷ 5

= 14

Ask Yourself

1. We make the end parts the same to help us draw the model to arrive at the value of the 1 unit in order to solve the problem sum.

Let's Practise 2.8

Question 1

(Actual)	**R**	**B**
At first	$3u^{x3}$	$2u^{x4}$
Change	$+20^{x3}$	$+30^{x4}$
In the end	$4p^{x3}$	$3p^{x4}$

(Working)	**R**	**B**
At first	9u	8u
Change	+60	+120
In the end	12p	12p

12p

R	8u	1u	60
B	8u	60	60

(a)
1u = 120 – 60

= 60

3u = 3 × 60

= 180

Rodney had **180 sweets**.

(b)
2u = 2 × 60

= 120

Bryan had **120 sweets**.

Question 2

(Actual)	**A**	**B**
At first	$3u^{x5}$	$5u^{x4}$
Change	$+30^{x5}$	$+20^{x4}$
In the end	$4p^{x5}$	$5p^{x4}$

(Working)	**A**	**B**
At first	15u	20u
Change	+150	+80
End	20p	20p

20p

A	15u	70	80
B	15u	5u	80

Question 2 (cont.)

5u = 150 − 80

    = 70

1u = 70 ÷ 5

    = 14

(a)

3u = 3 × 14

    = 42

There were **42 boxes** of Soap A at first.

(b)

5u + 20 = 5 × 14 + 20

        = 90

There were **90 boxes** of Soap B in the end.

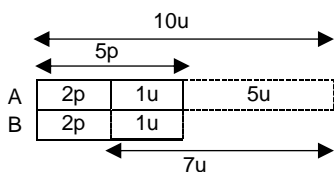---

Question 3

(Actual)	A	B
At first	$2u^{x5}$	3u
Change	-30^{x5}	+25
In the end	$1p^{x5}$	5p

(Working)	A	B
At first	10u	3u
Change	−150	+25
In the end	5p	5p

(a)

7u = 150 + 25

    = 175

1u = 175 ÷ 7

    = 25

2u − 30 = 2 × 25 − 30

        = 20

There were **20 oranges** in Box A in the end.

(b)

Box B (end), 3u + 25 = 3 × 25 + 25

                  = 100

Difference = 100 − 20

          = 80

There were **80 more oranges** in Box B than Box A in the end.
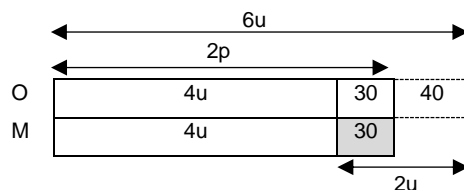

Question 4

(Actual)	O	M
At first	$3u^{x2}$	4u
Change	-20^{x2}	+30
In the end	$1p^{x2}$	2p

(Working)	O	M
At first	6u	4u
Change	−40	+30
In the end	2p	2p

Question 4 (Cont.)

2u = 30 + 40

    = 70

1u = 70 ÷ 2

    = 35

4u = 4 × 35

    = 140

(140 + 30) ÷ 5 = 34

There were **34 customers** in the last group.

Question 5

No. of red balloons at first $= \frac{3}{8} \times 200$

                      = 75
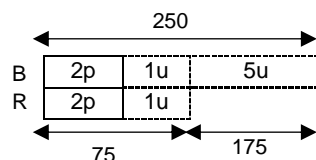
No. of blue balloons at first = 200 − 75

                      = 125

(Actual)	B	R
At first	125^{x2}	75
Change	$-3u^{x2}$	−1u
In the end	$1p^{x2}$	2p

(Working)	B	R
At first	250	75
Change	−6u	−1u
In the end	2p	2p

5u = 250 − 75

    = 175

1u = 175 ÷ 5

    = 35

4u = 4 × 35 = 140

Balloons left in the end = 200 − 140

                    = 60

Paul had **60 balloons** in the end.

Question 6

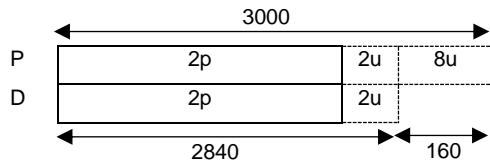| (Actual)	P	D
At first	1500^{x2}	2840
Change	$-5u^{x2}$	−2u
In the end	$1p^{x2}$	2p

(Working)	P	D
At first	3000	2840
Change	−10u	−2u
In the end	2p	2p

Question 6 (cont.)

8u = 3000 − 2840

   = 160

1u = 160 ÷ 2

   = 20

Peter, end = 1500 − 5 × 20

         = 1400

Dave, end = 2840 − 2 × 20

         = 2800

Peter and Dave had **1400** and **2800 stickers** respectively in the end.

Let's Get Started 2.9

S/N	Model drawing	Numerators the Same
3.	J $4u^{x3}$(12u) $3u^{x3}$(9u) K $3u^{x4}$(12u) $4u^{x4}$ (16u) Total units J = 21u K = 28u	$\frac{4}{7}$ J = $\frac{3}{7}$ K $\frac{12}{21}$ J = $\frac{12}{28}$ K Total units J = 21u K = 28u
4.	J $2u^{x5}$ (10u) $9u^{x5}$ (45u) K $5u^{x2}$ (10u) $3u^{x2}$ (6u) Total units J = 55u K = 16u	$\frac{2}{11}$ J = $\frac{5}{8}$ K $\frac{10}{55}$ J = $\frac{10}{16}$ K Total units J = 55u K = 16u
5.	J 3u 4u K 3u 1u Total units J = 7u B = 4u	$\frac{3}{7}$J = $\frac{3}{4}$ K Total units J = 7u B = 4u

Ask Yourself
1. When phrase "is equal to" is between two given fractions.

Think Further
1.
32u + 35u = 201

67u = 201

1u = 201 ÷ 67

   = 3

Muffins sold = (32u + 35u) − (20u × 2)

         = 27u

27u = 27 × 3

   = 81

Mrs Heng sold a total of **81 muffins.**

2. I will make the denominators the same when the items being compared are from the same whole unit/group.

Let's Practise 2.9

Question 1

Left

$\frac{5×2}{7×2}$ A = $\frac{2×5}{5×5}$ B

$\frac{10}{14}$ A = $\frac{10}{25}$ B

At first

Shop A = 14u

Shop B = 25u

Difference = 25u − 14u

         = 11u

11u = 396

1u = 396 ÷ 11

   = 36

25u = 25 × 36

   = 900

Shop B had **900 apples** in at first.

Question 2

$\frac{3×5}{8×5}$ D = $\frac{5×3}{6×3}$ L

$\frac{15}{40}$ D = $\frac{15}{18}$ L

At first

D = 40u

L = 18u

Difference = 40u − 18u

         = 22u

22u = 44

1u = 44 ÷ 22

   = 2

Total = 40u + 18u

     = 58u

58u = 58 × 2

   = 116

Their total allowance is **$116**.

Question 3

Left

$\frac{4}{11}$J $= \frac{2x2}{7x2}$ D

$\frac{4}{11}$J $= \frac{4}{14}$ D

At first

J = 11u

D = 14u

Difference = 14u − 11u

= 3u

3u = 36

1u = 36 ÷ 3

= 12

8u = 8 × 12

= 96

They had a total of **96 marbles** in the end.

Question 4

Left

$\frac{1\times4}{7\times4}$ R is twice of $\frac{2}{5}$ W

$\frac{4}{28}$ R is twice of $\frac{2}{5}$ W

At first

R = 28u

W = 5u

Difference = 28u − 5u

= 23u

23u = 46

1u = 46 ÷ 23

= 2

28u = 2 × 28

= 56

Roy had **56 toy cars**.

Question 5

Left

K = 1u^{x3} (3u)   C = 2u^{x3} (6u)

$\frac{3}{5}$ K is half of $\frac{2\times3}{3\times3}$ C

$\frac{3}{5}$ K is half of $\frac{6}{9}$ C

At first

K = 5u

C = 9u

Total = 5u + 9u

= 14u

14u = 350

1u = 350 ÷ 14

= 25

Question 5 (cont.)

Difference = 9u − 5u

= 4u

4u = 4 × 25

= 100

Claudia had **100 more stickers** than Kim.

Question 6

End

X = 3u^{x6} (18u)   Z = 1u^{x6} (6u)

$\frac{3x6}{5x6}$ X is thrice of $\frac{6}{11}$ Z

$\frac{18}{30}$ X is thrice of $\frac{6}{11}$ Z

At first

X = 30u

Z = 11u

Total = 30u + 11u

= 41u

41u = 656

1u = 656 ÷ 41

= 16

(a) 30u = 30 × 16

= 480

Xavier received **$480** from his father.

(b) Z's deposit amount = 5u

= 5 × 16

= 80

Increase by $\frac{1}{4}$ of savings = $80

Savings (in the end) = $80 × 5

= $400

Zane's savings in the bank was **$400** in the end.

Let's Get Started 2.10

Items	Quantity of items	×	Value of items (wheels)	Total value (wheels)
C	5u	×	4	20u
M	3u	×	2	6u
Total	8u = 40			26u = 130

Items	Quantity of items	×	Value of items ($)	Total value ($)
50¢ coin	1u	×	0.5	0.5u
$1 coin	2u	×	1	2u
Total	3u = 15			2.5u = 12.5

Items	Quantity of items	×	Value of items (legs)	Total value (legs)
C	4u	×	4	16u
D	6u	×	2	12u
Total	10u = 120			28u → 336

Ask Yourself

1. In Quantity × Value, the quantity/number of units of each item is given but in Guess and Check, only the total number of items are given.

Let's Practise 2.10

Question 1

Items	Quantity of items	×	Value of items (wheels)	Total value (wheels)
S	3u	×	2	6u
D	1u	×	3	3u
Total	4u			9u

9u = 225

1u = 225 ÷ 9

= 25

4u = 4 × 25

= 100

There were **100 bicycles** altogether.

Question 2

Items	Quantity of items	×	Value of items ($)	Total value ($)
A	5u	×	10	50u
C	12u	×	4	48u
Total	17u			98u

(a)

98u = 9800

1u = 9800 ÷ 98

= 100

12u = 12 × 100

= 1200

There were a total of **1200 children**.

(b)

Difference = 50u – 48u

= 2u

2u = 2 × 100

= 200

The difference in the total amount of money collected between the adults and children was **$200**.

Question 3

R = 1u ⎫ Summary
C = 2u ⎪ R = 1u
⎬ C = 2u
R = 1u ⎪ V = 1u
V = 1u ⎭

Items	Quantity of items	×	Value of items ($)	Total value ($)
R	1u	×	1.1	1.1u
V	1u	×	1.2	1.2u
C	2u	×	1.4	2.8u
Total	4u			5.1u

5.1u = 153

1u = 153 ÷ 5.1

= 30

Question 3 (Cont.)

2u = 2 × 30

= 60

Sarah bakes **30 red velvet muffins, 30 vanilla muffins** and **60 chocolate muffins**.

Question 4

A = 1u ⎫ Summary
O = 1u ⎪ A = 1u
⎬ O = 1u
P = 4u ⎪ P = 4u
A = 1u ⎭

Items	Quantity of items	×	Value of items ($)	Total value ($)
A	1u	×	0.4	0.4u
O	1u	×	0.5	0.5u
P	4u	×	0.6	2.4u
Total	6u			3.3u

3.3u = 39.6

1u = 39.6 ÷ 3.3

= 12

Total spent on apples and oranges = 0.4u + 0.5u

= 0.9u

Difference = 2.4u – 0.9u

= 1.5u

1.5u = 1.5u × 12

= 18

He spent **$18 more** on the pears than apples and oranges.

Question 5

B = 4u ⎫
R = 3u ⎪ Summary
⎬ R = 3u
S = 3u$^{×3}$ (9u) ⎪ B = 4u
R = 1u$^{×3}$ (3u) ⎭ S = 9u

Items	Quantity of items	×	Value of items (g)	Total value (g)
R	3u	×	30	90u
B	4u	×	40	160u
S	9u	×	50	450u
Total	16u			700u

700u = 14 000

1u = 14 000 ÷ 700

= 20

160u = 160 × 20

= 3200

(a) The mass of flour needed is **3200 g**.

Difference = 9u – 3u

= 6u

6u = 6 × 20

= 120

(b) The difference in the number of strawberry muffins and the number of raspberry muffins is **120**.

Question 6

$\frac{2x5}{3x5}$ B = $\frac{5x2}{6x2}$ G

$\frac{10}{15}$ B = $\frac{10}{12}$ G

B = 15u

G = 12u

Total = 15u + 12u

      = 27u

A = $\frac{1}{3}$ × 27u

  = 9u

Items	Quantity of items	×	Value of items ($)	Total value ($)
B	15u	×	4	60u
G	12u	×	5	60u
A	9u	×	10	90u
Total	36u			210u

Difference = 90u – 60u

        = 30u

30u = 3000

1u = 3000 ÷ 30

   = 100

210u = 210 × 100

     = 21 000

(a) The total amount collected from the donations is **$21 000**.

    Total adults and girls = 9u + 12u

                = 21u

    21u = 21 × 100

       = 2100

(b) There is a total of **2100 adults and girls**.

Question 1

A + B = 3u^{x6} (18u)

C   = 2u^{x6} (12u)

Total = 5u^{x6} (30u)

Summary

A + C = 5u^{x5} (25u)

B   = 1u^{x5} (5u)

Total = 6u^{x5} (30u)

Summary
A = 13u
B = 5u
C = 12u
Total = 30u

12u = 144

1u = 144 ÷ 12

    = 12

30u = 30 × 12

    = 360

The pair of earrings cost **$360**.

Question 2

J + E = 3u^{x6} (18u)

G + R = 4u^{x6} (24u)

Total = 7u^{x6} (42u)

J + E + G = 5u^{x7} (35u)

R = 1u^{x7} (7u)

Total = 6u^{x7} (42u)

J = 1u^{x3} (3u)

E = 5u^{x3} (15u)

J+E = 6u^{x3} (18u)

Summary
J = 3u
E = 15u
G = 17u
R = 7u
Total = 42u

Difference between G and E = 17u – 15u

                 = 2u

2u = 16

1u = 16 ÷ 2

   = 8

42u = 42 × 8

    = 336

The four children managed to pool **336 marbles** together.

Question 3

At first
R = 2u^{x2} (4u)
M = 1u^{x2} (2u)
Change 1
R = 4u + 1u
  = 5u
M = 2u – 1u
  = 1u
End
R = 5u – 3u
  = 2u
M = 1u + 3u
  = 4u
Difference = 4u – 2u

         = 2u

2u = 4

1u = 4 ÷ 2

   = 2

4u = 4 × 2

   = 8

Robert and Melvin had 8 magnets and 4 magnets respectively at first.

Question 4

People
7u^{x2} (14u)

Adults (Participants)
3u^{x2} (6u)

Remaining
4u^{x2} (8u)

1u^{x2} (2u)
Girls (Participants)

3u^{x2} (6u)
Left
2u^{x3} (6u)

Boys (Participants)
1u^{x3} (3u)

Organisers
1u^{x3} (3u)
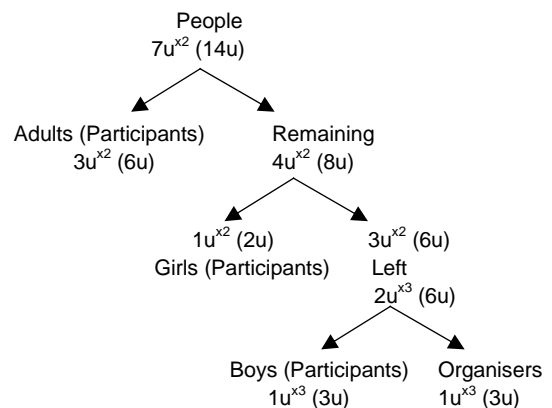
Question 4 (cont.)

Items	Quantity of items	×	Value of items ($)	Total value ($)
A	6u	×	2	12u
G	2u	×	5	10u
B	3u	×	6	18u
Total	11u			40u

(a)

$$40u = 400$$

$$1u = 400 \div 40$$

$$= 10$$

$$18u = 18 \times 10$$

$$= 180$$

The boys spent **$180** on drinks.

(b)

$$3u = 3 \times 10$$

$$= 30$$

30 people were event organisers.

(c)

$$14u = 14 \times 10$$

$$= 140$$

There were **140 people** at the event.

Question 5

$$\frac{2^{\times 3}}{5^{\times 3}} A = \frac{3^{\times 2}}{4^{\times 2}} B$$

$$\frac{6}{15} A = \frac{6}{8} B$$

$$A = 15u^{\times 2} (30u)$$

$$B = 8u^{\times 2} (16u)$$

$$\frac{3^{\times 4}}{4^{\times 4}} B = \frac{4^{\times 3}}{7^{\times 3}} C$$

$$\frac{12}{16} B = \frac{12}{21} C$$

$$B = 16u$$

$$C = 21u$$

Summary
A = 30u
B = 16u
C = 21u

$$\text{Difference} = 30u - 21u$$

$$= 9u$$

$$9u = 45$$

$$1u = 45 \div 9$$

$$= 5$$

$$16u = 16 \times 5$$

$$= 80$$

There are **80 pineapples** in Basket B.

Question 6

P = 3u
E+R = 7u
Total = 10u

$$E = 1u^{\times 5} (5u)$$

$$P+R = 1u^{\times 5} (5u)$$

Total = 2u (10u)

Summary
P = 3u
E = 5u
R = 2u

Items	Quantity of items	×	Value of items ($)	Total value ($)
P	3u	×	1.95	5.85u
E	5u	×	0.75	3.75u
R	2u	×	2.2	4.4u
Total	10u			14u

Question 6 (cont.)

$$14u = 28$$

$$1u = 28 \div 14$$

$$= 2$$

$$10u = 10 \times 2$$

$$= 20$$

There are **20 items** in the bag.

Question 7

Fraction of ducks left $= 1 - \frac{5}{7}$

$$= \frac{2}{7}$$

Fraction of chickens left $= 1 - \frac{2}{5}$

$$= \frac{3}{5}$$

$$\frac{3^{\times 2}}{5^{\times 2}} C = \frac{2^{\times 3}}{7^{\times 3}} D$$

$$\frac{6}{10} C = \frac{6}{21} D$$

$$C = 10u$$

$$D = 21u$$

$$\text{Total (at first)} = 10u + 21u$$

$$= 31u$$
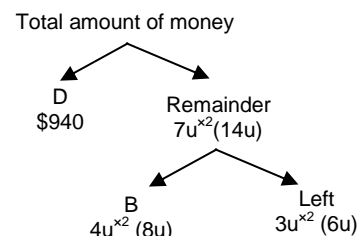
$$\text{Sold} = 15u + 4u$$

$$= 19u$$

$$19u = 855$$

$$1u = 855 \div 19$$

$$= 45$$

$$31u = 31 \times 45$$

$$= 1395$$

There were a total of **1395 animals** at Farmer Oei's farm at first.

Question 8

Total amount of money

D
$940

Remainder
$7u^{\times 2}$ (14u)

B
$4u^{\times 2}$ (8u)

Left
$3u^{\times 2}$ (6u)

$\frac{2}{9}$ of total = 6u + 180

$\frac{1}{9}$ of total = 3u + 90

$\frac{9}{9}$ of total = 27u + 810

$$\text{Dress} = 27u + 810 - 14u$$

$$= 13u + 810$$

$$13u = 940 - 810$$

$$= 130$$

$$1u = 130 \div 13$$

$$= 10$$

$$27u + 810 = 27 \times 10 + 810$$

$$= 1080$$

Niki had **$1080** at first.

Question 9

$$\frac{3}{11} N = \frac{2}{9} E$$

$$\frac{6}{22} N = \frac{6}{27} E$$

$$N = 22u$$

$$E = 27u$$

Question 9 (Cont.)

Total = 22u + 27u
    = 49u
Spent = 6u + 6u
    = 12u
Left = 49u – 12u
    = 37u

37u = 3700
1u = 3700 ÷ 37
  = 100
22u = 22 × 100
   = 2200

Norman's savings was **$2200**.

Question 10

Items	Quantity of items	×	Value of items ($)	Total value ($)
C	3u + 15	×	3.5	10.5u + 52.5
R	3u	×	3	9u
P	1u + 5	×	2.9	2.9u + 14.5
Total	7u + 20			22.4u + 67

22.4u = 179 – 67
    = 112
1u = 112 ÷ 22.4
  = 5
7u + 20 = 7 × 5 + 20
     = 55
They sell **55 pieces** of tokiwado daily.

Question 11

$\frac{2^{\times 3}}{3^{\times 3}} A = \frac{3^{\times 2}}{4^{\times 2}} N$
$\frac{6}{9} A = \frac{6}{8} N$
A = 9u
N = 8u

In the end
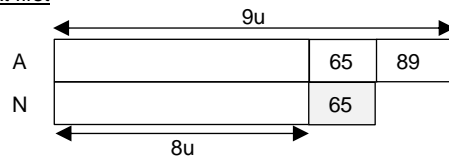
At first

1u = 89 + 65
  = 154
9u = 9 × 154
  = 1386
8u = 8 × 154
  = 1232
Alyssa and Nerissa had **$1386** and **$1232** respectively.

Question 12

L = 5u
K = 6u
I = 5u
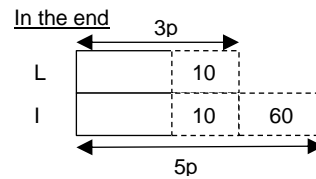
In the end

2p = 60
1p = 60 ÷ 2
  = 30
3p = 3 × 30
  = 90
L (at first) = 90 – 10
       = 80
5u = 80
1u = 80 ÷ 5
  = 16
6u = 6 × 16
  = 96
K (end) = 96 – 10 – 70
     = 16
Kevin had **16 cards** in the end.

Answers to Unit 3.1

Let's Get Started 3.1

Ratio Comparison	Which item(s) is/are repeated?	Step 1 Make the units for the 'repeated item' the same	Step 2 Create a Summary ratio of the items
S : H 1 : 6 **P : S+H** 9 : 14	S+H	**S : H : S+H** $1^{\times 2}$: $6^{\times 2}$: $7^{\times 2}$ 2 : 12 : 14 **P : S+H** 9 : 14	**S : H : P** 2 : 12 : 9
X : Y : Z 9 : 2 : 4 **W : X+Y** 5 : 2	X+Y	**X : Y : Z : X+Y** $9^{\times 2}$: $2^{\times 2}$: $4^{\times 2}$: $11^{\times 2}$ 18 : 4 : 8 : 22 **W : X+Y** $5^{\times 11}$: $2^{\times 11}$ 55 : 22	**X : Y : Z : W** 18 : 4 : 8 : 55
Ratio Comparison	Which item(s) is/are repeated?	Step 1 Make the units for the 'repeated item' the same	Step 2 Create a Summary ratio of the items
C : D 5 : 9 **A : C+D** 2 : 7 **J : A+C+D** 1 : 2	C+D A+C+D	**C : D : C+D** 5 : 9 : 14 **A : C+D : A+C+D** $2^{\times 2}$: $7^{\times 2}$: $9^{\times 2}$ 4 : 14 : 18 **J : A+C+D** $1^{\times 9}$: $2^{\times 9}$ 9 : 18	**A : C : D : J** 4 : 5 : 9 : 9

Ask Yourself

1. The girls shared a number of biscuits together and the quantity by each girl is given in sets of ratio amongst them.

2. Since Hannah is the Repeated Item, the number of units representing Hannah in both sets of ratio must be made the same using the principle of the First Common Multiple (FCM) of 5 and 4 which is 20.

Let's Practise 3.1

Question 1

$$
\begin{array}{llll}
J & : & D & \qquad J : K \\
1^{\times 3} & : & 8^{\times 3} & \qquad 3 : 1 \\
3 & : & 24 &
\end{array}
$$

Summary
J : D : K
3 : 24 : 1

Total = 3u + 24u + 1u
= 28u
28u = 280
1u = 280 ÷ 28
= 10
Difference = 24u – 1u
= 23u
23u = 23 × 10
= 230

Duncan had **230 more** coins than Keith.

Question 2

$$
\begin{array}{lllllll}
A + C & : & B & \quad A & : & C & : & A+C \\
2^{\times 5} & : & 3^{\times 5} & \quad 4^{\times 2} & : & 1^{\times 2} & : & 5^{\times 2} \\
10 & : & 15 & \quad 8 & : & 2 & : & 10
\end{array}
$$

Summary
A : B : C
8 : 15 : 2

7u = 147
1u = 147 ÷ 7
= 21
Total = 8u + 15u + 2u
= 25u
25u = 25 × 21
= 525

The three boys received **$525** altogether.

Question 3

$$
\begin{array}{lllllll}
J & : & E+G & : & J+G+E & \quad E & : & J+G & : & J+G+E \\
1^{\times 2} & : & 4^{\times 2} & : & 5^{\times 2} & \quad 3 & : & 7 & : & 10 \\
2 & : & 8 & : & 10 &
\end{array}
$$

Summary
J : E : G
2 : 3 : 5

10u = 80

Question 3 (Cont.)

1u = 80 ÷ 10
= 8
Difference between G and J = 3u
3u = 3 × 8
= 24

Grace has **24 more** playing cards than Jason.

Question 4

$$
\begin{array}{llllllll}
G & : & C+D+J & \quad J & : & C+D & : & J+C+D & \quad C & : & D & : & C+D \\
2^{\times 10} & : & 3^{\times 10} & \quad 4^{\times 6} & : & 1^{\times 6} & : & 5^{\times 6} & \quad 1 & : & 5 & : & 6 \\
20 & : & 30 & \quad 24 & : & 6 & : & 30 &
\end{array}
$$

Summary
G : J : C : D
20 : 24 : 1 : 5

44u = 132
1u = 132 ÷ 44
= 3
Total = 20u + 24u + 1u + 5u
= 50u
50u = 50 × 3
= 150

The four girls contributed a total of **$150**.

Question 5
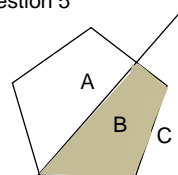
$$
\begin{array}{lllll}
B & : & C & \quad B & : & A \\
6^{\times 2} & : & 5^{\times 2} & \quad 4^{\times 3} & : & 3^{\times 3} \\
12 & : & 10 & \quad 12 & : & 9
\end{array}
$$

Summary
A : B : C
9 : 12 : 10

Unshaded = 9u + 10u
= 19u
19u = 38
1u = 38 ÷ 19
= 2
Shaded part B = 12u
12u = 12 × 2
= 24

The area of the shaded part is **24 cm²**.

Question 6
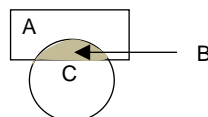
$$
\begin{array}{lllllll}
A & : & B & : & A+B & \quad A+B & : & B+C \\
2^{\times 2} & : & 1^{\times 2} & : & 3^{\times 2} & \quad 2^{\times 3} & : & 1^{\times 3} \\
4 & : & 2 & : & 6 & \quad 6 & : & 3
\end{array}
$$

Summary
A : B : C
4 : 2 : 3

Question 6 (cont.)

7u = 49

1u = 49 ÷ 7

= 7

Shaded B = 2u

2u = 2 × 7

= 14

The area of the shaded part of the figure is **14 cm^2**.

Answers to Unit 3.2

Let's Get Started 3.2

At first	What has happened	End (As a result)	What has not changed?	Find the value of 1 unit.
C : D 2$^{×3}$: 5$^{×3}$ 6 : 15	D received 4 more marbles.	C : D 6 : 17	C	17u – 15u = 2u 2u = 4 1u = 2
E : F 4$^{×3}$: 7$^{×3}$ 12 : 21	E won 22 cards.	E : F 2$^{×7}$: 3$^{×7}$ 14 : 21	F	14u – 12u = 2u 2u = 22 1u = 11
G : H : K 2$^{×2}$: 3$^{×2}$: 5$^{×2}$ 4 : 6 : 10	H purchased 30 pencils and K gave away 45 Pencils.	G : H : K 4 : 8 : 7	G	8u – 6u = 2u 2u = 30 1u = 15
A : O+P 5$^{×2}$: 3$^{×2}$ 10 : 6	21 apples are rotten and were thrown away.	A : O+P 1$^{×3}$: 2$^{×3}$ 3 : 6	O + P	10u – 3u = 7u 7u = 21 1u = 3

Ask yourself

1. The change is the fifty-four $1 coins that were removed. To form the relationship based on the change, we write out the "At first" and "End" sets of ratio.

2. There is a change in the ratio as the total number of coins had changed given that some $1 coins were removed.

3. Since the number of 10-cent coins remained the same, the units representing the 10-cent coins must be made the same in the 'Before/At first' and 'After/End' ratios using the principle of First Common Multiple (FCM).
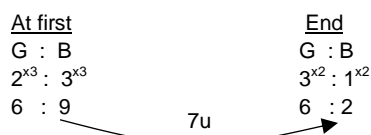
Think Further

1. Amount of money Patrick had in the end
= (10 × 2 × 0.1) + (8 × 2 × 1) = $18

Let's Practise 3.2

Question 1

At first   End
G : B   G : B
2$^{×3}$: 3$^{×3}$ 3$^{×2}$: 1$^{×2}$
6 : 9   6 : 2
                7u

Answers to Unit 3.2

Question 1 (cont.)

7u = 14

1u = 14 ÷ 7

= 2

8u = 8 × 2

= 16

There were **16 dancers** in the dance studio.

Question 2

At first   End
F : B   F : B
4$^{×3}$: 1$^{×3}$ 3$^{×4}$: 2$^{×4}$
12 : 3   12 : 8
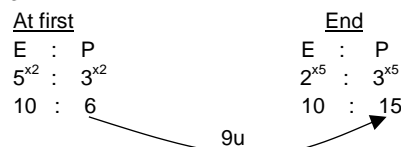   5u
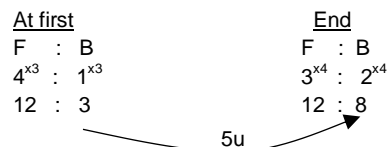
Total, end = 12u + 8u

= 20u

20u = 1000

1u = 100 ÷ 20

= 50

5u = 5 × 50

= 250

Cost for the bean curds ordered = 250 × $0.80

= $200

The cost of the beancurd added was **$200**.

Question 3

At first   End
E : P   E : P
5$^{×2}$: 3$^{×2}$ 2$^{×5}$: 3$^{×5}$
10 : 6   10 : 15
                9u

9u = 45

1u = 45 ÷ 9

= 5

Erasers = 10u

10u = 10 × 5

= 50

Fraction of erasers lost = $\frac{25}{50}$

= $\frac{1}{2}$

Keith lost $\frac{1}{2}$ of his erasers.

Question 4

At first   End
C : B   C : B
3$^{×3}$: 2$^{×3}$ 1$^{×2}$: 3$^{×2}$
9 : 6   2 : 6
        7u
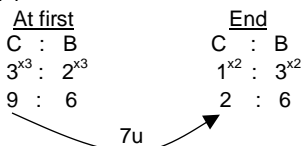
No. of chocolates sold = 9u − 7u

= 7u

7u = 28

1u = 28 ÷ 7

= 4

15u = 15 × 4

= 60

There were **60 cupcakes** altogether at Cupalicious at first.

Question 5

At first	End
H : G	H : G
$3^{\times 4}$: $1^{\times 4}$	3 : 4
12 : 4	

Hamster left $= \frac{1}{4}$

$\qquad\qquad = \frac{3}{12}$

$7u = 21$

$1u = 21 \div 7$

$\quad = 3$

Total $= 12u + 4u$

$\qquad = 16u$

$16u = 16 \times 3$

$\qquad = 48$

Mr Rashid had **48 hamsters and guinea pigs** in his pet shop.

Question 6

At first	End
F : N	F : N
$7^{\times 3}$: $5^{\times 3}$	14 : 15
21 : 15	

Fiction books left $= \frac{2}{3}$

$\qquad\qquad\quad = \frac{14}{21}$

$29u = 87$

$1u = 87 \div 29$

$\quad = 3$

Fiction books donated $= 21u - 14u$

$\qquad\qquad\qquad\qquad = 7u$

$7u = 7 \times 3$

$\quad = 21$

He donated **21 books**.

Let's Get Started 3.3

Change	At first	End	Put a tick if 'Total Unchanged' is applicable	Find the value of 1 unit.
A gave 4 pens to B	A : B 3 : 5 Total = 8u	A : B $1^{\times 2}$: $3^{\times 2}$ 2 : 6 Total = 8u	✓	3u – 2u = 1u 1u = 4
A and B gave away 16 pens each.			Difference Unchanged	X
A bought 14 pens and B lost 14 pens.	A : B $1^{\times 3}$: $4^{\times 3}$ 3 : 12 Total = $5u^{\times 3}$ (15u)	A : B $2^{\times 5}$: $1^{\times 5}$ 10 : 5 Total = $3u^{\times 5}$ (15u)	✓	10u – 3u = 7u 7u =14 1u = 2

Ask Yourself

1. The total number of questions that needed to be solved remained the same throughout the 3-week period.

2. The total number of units in both ratios must be made the same since the total questions to be done and completed must remain the same within the 3-week period.

Let's Practise 3.3

Question 1

At first			End		
P :	C	: Total	P :	C	: Total
$3^{\times 3}$:	$7^{\times 3}$	: $10^{\times 3}$	$1^{\times 10}$:	$2^{\times 10}$	: $3^{\times 10}$
9 :	21	: 30	10 :	20	: 30

1u   1u

Difference, at first $= 21u - 9u$

$\qquad\qquad\qquad\quad = 12u$

$12u = 24$

$1u = 24 \div 12$

$\quad = 2$

Planes (end) $= 10u$

$\qquad\qquad\quad = 10 \times 2$

$\qquad\qquad\quad = 20$

$20u = 20 \times 2$

$\qquad = 40$

There were a total of **20 toy planes and 40 toy cars** on the display shelves in the end.

Question 2

At first			End		
A :	M	: Total	A :	M	: Total
$2^{\times 4}$:	$3^{\times 4}$	: $5^{\times 4}$	$3^{\times 5}$:	$1^{\times 5}$	: $4^{\times 5}$
8 :	12	: 20	15 :	5	: 20

7u   7u

$7u = 84$

$1u = 84 \div 7$

$\quad = 12$

$10u = 10 \times 12$

$\quad\; = 120$

Alan had **120 more stamps** than May in the end.

Question 3

First week			Second week		
S :	U	: Total	S :	U	: Total
$3^{\times 2}$:	$7^{\times 2}$	: $10^{\times 2}$	$3^{\times 5}$:	$1^{\times 5}$	: $4^{\times 5}$
6 :	14	: 20	15 :	5	: 20

9u   9u

$9u = 36$

$1u = 36 \div 9$

$\quad = 4$

$5u = 5 \times 4$

$\quad = 20$

Dennis need to solve **20 questions** in the third week to complete his assignment.

Question 4

Monday				Friday		
R :	U	: Total		R :	U :	Total
3^{x11} :	4^{x11}	: 7^{x11}		9^{x7} :	2^{x7} :	11^{x7}
33 :	44	: 77		63 :	14 :	77

77u = 231

1u = 231 ÷ 77

  = 3

14u = 14 × 3

   = 42

John would need to read **42 pages over the weekend**.

Question 5

At first			End	
C :	Total		C :	Total
1^{x5} :	3^{x5}		4^{x3} :	5^{x3}
5 :	15		12 :	15

7u

7u = 14

1u = 14 ÷ 7

  = 2

No. of steps needed to climb = 15u – 12u

                     = 3u

3u = 3 × 2

  = 6

Peter need to climb another **6 more steps.**

Question 6

R :	S		S :	T
4^{x3} :	5^{x3}		3^{x5} :	5^{x5}
12 :	15		15 :	25

Summary
R : S : T
12 : 15 : 25

At first			End		
T :	S :	Total	T :	S :	Total
25 :	15 :	40	1^{x20} :	1^{x20} :	2^{x20}
			20 :	20 :	40

Change = 25u – 20u

        = 5u

5u = 15

1u = 15 ÷ 5

  = 3

Difference Tom and Reese in the end = 20u – 12u

                            = 8u

8u = 8 × 3

  = 24

Tom had **$24 more** than Reese in the end.

Ask Yourself

1. The amount of flour, the amount of sugar and the total amount of flour 'At First' and 'End' had changed. However, the difference between the amount of flour and sugar has remained unchanged.

2. Since the quantity given 'at first' is the actual value, the difference of 5 units is equivalent to the 40 kg (the difference).

Let's Practise 3.4

Question 1

At first				End		
A :	C :	Diff		A :	C :	Diff
3^{x3} :	10^{x3} :	7^{x3}		1^{x7} :	4^{x7} :	3^{x7}
9 :	30 :	21		7 :	28 :	21

2u   2u

2u = 20

1u = 20 ÷ 2

  = 10

21u = 21 × 10

    = 210

There were **210 more** adults than in the end.

Question 2

At first				End		
50¢ :	$1 :	Diff		50¢ :	$1 :	Diff
2^{x4} :	5^{x4} :	3^{x4}		5^{x3} :	9^{x3} :	4^{x3}
8 :	20 :	12		15 :	27 :	12

7u   7u

7u = 14

1u = 14 ÷ 7

  = 2

Total value of 50¢ coins, in the end = 15u

                            = 15 × 2

                            = 30

Total value of $1 coins, in the end = 27u

                           = 27 × 2

                           = 54

No. of 50¢ coins (end) = 30 ÷ 0.5

                   = 60

No. of $1 coins (end) = 54 ÷ 1

                = 54

Danny had **60 fifty-cent** coins and **54 one-dollar** coins in the end.

Question 3

14 years' ago				Now		
J :	L :	Diff		J :	L :	Diff
1^{x2} :	4^{x2} :	3^{x2}		3^{x3} :	5^{x3} :	2^{x3}
2 :	8 :	6		9 :	15 :	6

7u   7u

7u = 14

1u = 14 ÷ 7

  = 2

Difference = 6u

        = 6 × 2

        = 12

Lin Xia is **12 years older** than Joelle.

Question 4

<u>Two years' ago</u>

J	:	G	:	P	:	Diff (J&G)
4^{x2}	:	7^{x2}	:	1^{x2}	:	3^{x2}
8	:	14	:	2	:	6

<u>In 6 years after</u>

J	:	G	:	Diff J&G
3^{x3}	:	5^{x3}	:	2^{x3}
9	:	15	:	6

1u = 2 + 6

   = 8

Penny's age, 2 years' ago = 2u

= 2 × 8
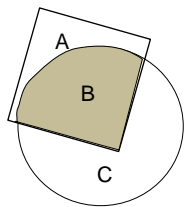
= 16

Penny's age now = 16 + 2

= 18

Penny is **18 years old** now.

Question 5

A+B : B+C : Diff   A : C : Diff
5^{x3} : 9^{x3} : 4^{x3} 1^{x2} : 7^{x2} : 6^{x2}
15 : 27 : 12   2 : 14 : 12

13u   13u

Summary
A : B : C
2 : 13 : 14

Area of square = 12 × 12

= 144

15u = 144

1u = 144 ÷ 15 = 9.6

Area of shaded part B = 13u

= 13 × 9.6

= 124.8

Area of shaded part B is **124.8 cm²**.

Question 6

A+B : B+C : Diff   A : C : Diff
2^{x2} : 3^{x2} : 1^{x2} 3 : 5 : 2
4 : 6 : 2

Summary
A : B : C
3 : 1 : 5

Difference = 6u – 4u

= 2u

2u = 32

1u = 32 ÷ 2

= 16
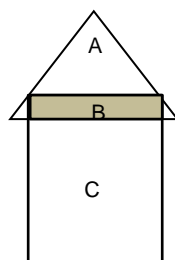
Question 6 (cont.)

Width = 16 ÷ 8

= 2

The width of the shaded rectangle is **2 cm**.

Let's Get Started 3.5

Type of Change	Models (End)

Change 1
(Both added)

| D | 6u | 1u | 32 |
| P | 6u | 18 | 32 |

28p

1u = 18

Change 2
(Both subtracted)

14u   1u

| D | | 180 | 20 |
| P | | 180 | |

10p

1u = 20

Type of Change	Models (End)

Change 3
(1 added,
1 subtracted)

2p

| D | 2u | 14 | |
| P | 2u | 14 | 66 |

8u

8u = 14 + 66

= 80

1u = 80 ÷ 8

= 10

 Ask Yourself

1. The number of almond cupcakes decreased and the number of walnut cupcakes increased. Their total and difference 'At First' and 'End' changed. In summary, everything changes (All Items Changed).
2. To solve such question, I need to make one of the unknowns   to be the same (in this case, to make the 'parts' at the end the same).

Think Further

1. When an equal number of almond and walnut cupcakes were sold/removed, the difference between the 2 types of cupcakes would remain unchanged. The Difference Unchanged strategy will be used to solve the question.

Let's Practise 3.5

Question 1

(Actual)	**C**	**P**
At first	4u	$1u^{x3}$
Change	+15	$+10^{x3}$
In the end	3p	$1p^{x3}$

(Working)	**C**	**P**
At first	4u	3u
Change	+15	+30
In the end	3p	3p

Question 1 (Cont.)

C	3u	1u	15
P	3u	15	15

30

1u = 15

5u = 5 × 15

= 75

Cherie had **75 hair accessories** at first.

Question 2

(Actual)	**G**	**J**
At first	$3u^{x2}$	$4u^{x3}$
Change	-3^{x2}	-14^{x3}
In the end	$3p^{x2}$	$2p^{x3}$

(Working)	**G**	**J**
At first	6u	12u
Change	−6	−42
In the end	6p	6p

6u

G	6p	6	
J	6p	6	36

12u

6u = 36

1u = 36 ÷ 6

= 6

J (end) = 4u − 14

= 4 × 6 − 14

= 10

Jiaying had **10 cakes** in the end.

Question 3

(Actual)	**R**	**B**
At first	$4u^{x2}$	$5u^{x3}$
Change	$+7^{x2}$	-14^{x3}
In the end	$3p^{x2}$	$2p^{x3}$

(Working)	**R**	**B**
At first	8u	15u
Change	+14	−42
In the end	6p	6p

6p

R	8u	14	
B	8u	14	42

15u

7u = 14 + 42

= 56

1u = 56 ÷ 7

= 8

Difference between R and B at first = 1u

= 1 × 8

= 8

There were **8 more** blue than red ornaments at first.

Question 4

(Actual)	**M**	**F**
At first	360	400^{x4}
Change	−1u	$-2u^{x4}$
In the end	4p	$1p^{x4}$

(Working)	**M**	**F**
At first	360	1600
Change	−1u	−8u
In the end	4p	4p

360   1240

M		1u	
F		1u	7u

1600

7u = 840

1u = 840 ÷ 7

= 120

3u = 3 × 120

= 360

360 people left the queue.

Question 5

(Actual)	**Y**	**L**
At first	1u	3u
Change	−3p	−1p
In the end	6	42

(Reverse)	**Y**	**L**
In the end	6^{x3}	42
Reverse change	$+3p^{x3}$	+1p
At first	$1u^{x3}$	3u

(Working)	**Y**	**L**
In the end	18	42
Reverse change	+9p	+1p
At first	3u	3u

Y	18	8p	1p
L	18	24	1p

42

8p = 42 − 18

= 24

1p = 24 ÷ 8

= 3

Y (at first) = 6 + 3p

= 6 + 3 × 3

= 15

Z (at first) = 42 + 1p

= 42 + 3

= 45

Yvonne and Lynica had **$15** and **$45** respectively at first.

Question 6

(Actual)	K	H
At first	1u	4u
Change	−2p	−3p
In the end	12	108
(Reverse)	K	H
In the end	12^{x4}	108
Reverse change	+2p^{x4}	+3p
At first	1u^{x4}	4u
(Working)	K	H
End	48	108
Reverse change	+8p	+3p
At first	4u	4u
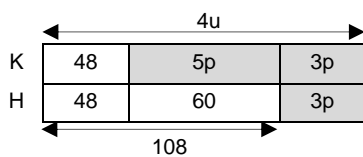
$5p = 108 - 48$

$\quad = 60$

$1p = 60 \div 5$

$\quad = 12$

K (spent) $= 2p$

$\quad\quad\quad = 2 \times 12$

$\quad\quad\quad = 24$

Kevin spent **$24.**

Let's Get Started 3.6

2. Branch Diagram

Students
10u^{x3} (30u)

T
3u^{x3} (9u)

Remainder
7u^{x3} (21u)

A
1u^{x7} (7u)

H
2u^{x7} (14u)
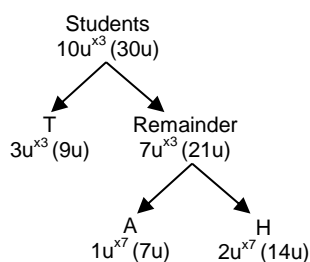
$14u = 42$

$1u = 42 \div 14$

$\quad = 3$

Total voted $= 30u$

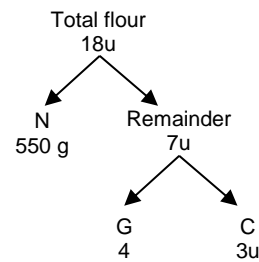$\quad\quad\quad\quad = 30 \times 3$

$\quad\quad\quad\quad = 90$

Ask Yourself

1. The keywords are 'the remaining amount'. I can use
    Branching approach to solve the question.

Let's Practise 3.6

Question 1

Total flour
18u

N
550 g

Remainder
7u

G
4

C
3u

$\frac{2}{9}$ Total $= 4u$

$\frac{1}{9}$ Total $= 2u$

$\frac{9}{9}$ Total $= 18u$

Noodles $= 18u - 7u$

$\quad\quad\quad = 11u$

$11u = 550$

$1u = 550 \div 11$

$\quad = 50$

$3u = 3 \times 50$

$\quad = 150$

She used **150 g** of flour to bake the cupcakes.

Question 2

Laundry
5u^{x7} (35u)

Linen
2u^{x7} (14u)

Remainder
3u^{x7} (21u)

Cotton
3u^{x3} (9u)

Synthetic
4u^{x3} (12u)
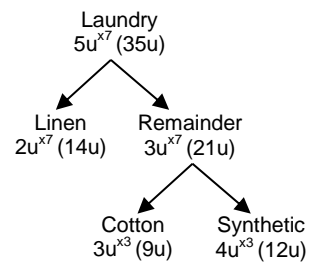
(a) Fraction $= \frac{9}{35}$

$\frac{9}{35}$ of his laundry was made of cotton.

(b) $12u = 24$

$1u = 24 \div 12$

$\quad = 2$

$35u = 35 \times 2$

$\quad\quad = 70$

Derrick had **70 pieces** of clothing in his laundry.

Question 3

Total bikes
7u^{x13} (91u)

M
2u^{x13} (26u)

Remainder
5u^{x13} (65u)

R
2u^{x13} (26u)

Rest
3u^{x13} (39u)

K
10u^{x3} (30u)

T
3u^{x3} (9u)
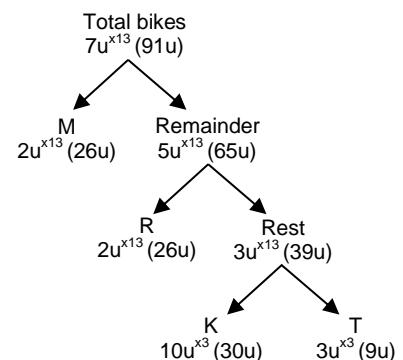
Question 3 (Cont.)

30u – 26u = 4u

4u = 16

1u = 16 ÷ 4

  = 4

9u = 9 × 4

  = 36

There were **36 trick bikes**.

Question 4

Polishing Liquid
$7u^{x5}$ (35u)

E
$3u^{x5}$ (15u)

Remainder
$4u^{x5}$ (20u)

D
$3u^{x2}$ (6u)

S
$7u^{x2}$ (14u)
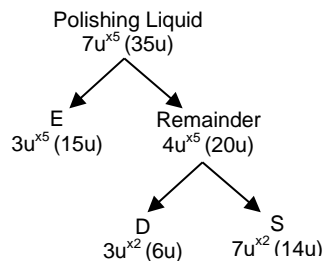
Difference between exterior and dashboard = 15u − 6u

                        = 9u

9u = 0.18

1u = 0.18 ÷ 9

  = 0.02

Amount of polish = 35u

            = 35 × 0.02

            = 0.7

0.7 ℓ = 700 mℓ

The bottle contained **700 mℓ of polishing liquid** at first.

Question 5

Students
$3u^{x25}$ (75u)

$1u^{x25}$ (25u)
P5 & P6

$2u^{x25}$ (50u)
Remainder 1
$5u^{x10}$ (10u)

$2u^{x10}$ (20u)
P3 & P4

$3u^{x10}$ (30u)
Remainder 2
$10u^{x3}$ (30u)

P1
$3u^{x3}$ (9u)

P2
$7u^{x3}$ (21u)
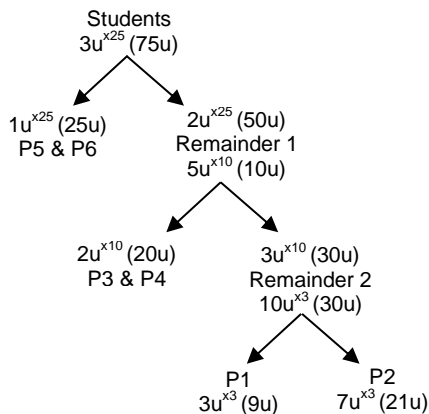
Difference = 25u – 9u

         = 16u

16u = 208

1u = 208 ÷ 16 = 13

75u = 75 × 13 = 975

There were **975 students** at the school fun fair.

Question 6

Money
$2u^{x8}$ (16u)

C
$1u^{x8}$ (8u)

Remainder
$1u^{x8}$ (8u)

25
T

H
3u
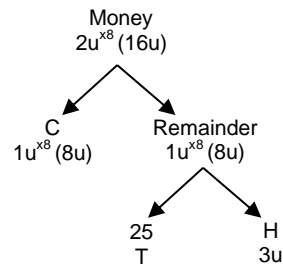
3 cheese buns = 1 tuna bun

75 cheese buns = 25 tuna buns

3u of money = 25 tuna buns

5u of money = 75 cheese buns

1u of money = 15 cheese buns

8u of money = 8 × 15 = 120

Donald bought **120 cheese buns**.

<u>Alternative solution</u>

Sum of money = 25 tuna buns

1u of money = 25 ÷ 5

          = 5 tuna buns

8u of money = 8 × 5

          = 40 tuna buns

Total cheese buns = 40 × 3

              = 120 cheese buns

Ask Yourself
1. The comparison is the number of 20-cent coins and the number of 50-cent coins; and
2. Yes. The number of coins in each group multiplies by the value of the coins.

Think Further
1. My approach will still be the same but the answer will be different.

Difference = 2.5u – 1.8u

         = 0.7u

0.7u = 301

1u = 301 ÷ 0.7 = 430

1.8u = 1.8 × 430

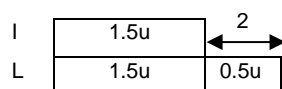   = 774

The total value of her 50-cent coins is **$774**.

Let's Practise 3.7

Question 1

Items	Quantity of items	×	Value of items ($)	Total value ($)
I	3u	×	0.5	1.5u
L	2u	×	1	2u
Total	5u			3.5u

Question 1 (Cont.)

$0.5u = 2$

$1u = 2 ÷ 0.5$

$= 4$

$3.5u = 3.5 × 4$

$= 14$

They have **$14** altogether.

Question 2

Items	Quantity of items	×	Value of items ($)	Total value ($)
X	4u	×	1.2	4.8u
Y	2u	×	0.85	1.7u
Z	5u	×	0.6	3u
Total	11u			9.5u

$11u = 451$

$1u = 451 ÷ 11$

$= 41$

$9.5u = 9.5 × 41$

$= 389.5$

Sally collected **$389.50** from the sales of all her seashells.

Question 3

Late : On time
4 : 16
1 : 4

Items	Quantity of items	×	Value of items ($)	Total value ($)
L	1u	×	3.25	3.25u
O	4u	×	5.25	21u
Total	5u			24.25u

$24.25u = 9700$

$1u = 9700 ÷ 24.25$

$= 400$

(a) $4u = 4 × 400 = 1600$

1600 pizzas were delivered on time last month.

(b) No. of pizzas delivered late, $1u = 400$

Difference in cost = $2

Difference in total cost = $400 × 2

$= 800

Le Pizza Restaurant would have to pay **$800 more** if all the pizzas were delivered on time.

Question 4

Items	Quantity of items	×	Value of items ($)	Total value ($)
$158 tickets (sold)	1u	×	158	158u
$88 tickets (sold)	2u	×	88	176u
Total	3u			334u

Question 4 (Cont.)

$334u = 78\ 156$

$1u = 78\ 156 ÷ 334$

$= 234$

$3u = 3 × 234 = 702$

(a) **702 tickets** were sold in all.

Difference = $87\ 636 − 78\ 156$

$= 9480$

No. of another $158 tickets needed to be sold

$= 9480 ÷ 158$

$= 60$

(b) **60 more** $158-ticket need to be sold to meet the targeted amount.

Question 5

Items	Quantity of items	×	Value of items (stickers)	Total value (stickers)
C	1u	×	6	6u
T	1u + 35	×	9	9u + 315
Total	2u + 35			15u + 315

$15u = 7590 – 315$

$= 7275$

$1u = 7275 ÷ 15 = 485$

(a) Sarah and her friends stamped **485 caps**.

$1u + 35 = 485 + 35 = 520$

(b) Sarah and her friends stamped **520 T-shirts.**

Question 6

Items	Quantity of items	×	Value of items (mooncakes)	Total value (mooncakes)
A	1u + 25	×	4	4u + 100
C	1u	×	2	2u
Total	2u + 25			6u + 100

$6u = 676 – 100$

$= 576$

$1u = 576 ÷ 6 = 96$

$2u + 25 = 2 × 96 + 25$

$= 217$

217 people were at the celebration.

Question 1

L	:	E+S		E	:	S	:	E+S
$3^{×9}$	:	$7^{×9}$		$4^{×7}$	:	$5^{×7}$	:	$9^{×7}$
27	:	63		28	:	35	:	63

Summary

L	:	E	:	S
27	:	28	:	35

Question 1 (cont.)

At first				In the end		
L	:	E		L	:	E
27	:	28		5^{x7}	:	4^{x7}
				35	:	28

8u

Total (end) = 35u + 28u + 35u

= 98u

98u = 588

1u = 588 ÷ 98

= 6

35u = 35 × 6

= 210

Lynette had **210 coins**.

Question 2

At first					In the end				
M	:	S	:	Total		M	:	S	:	Total
8^{x4}	:	5^{x4}	:	13^{x4}		1^{x13}	:	3^{x13}	:	4^{x13}
32	:	20	:	52		13	:	39	:	52

19u   19u

19u = 114

1u = 114 ÷ 19

= 6

32u = 32 × 6

= 192

Mia had **$192** at first.

Question 3

T	:	C		T	:	O
2^{x3}	:	3^{x3}		6	:	5
6	:	9				

Summary

T	:	C	:	O
6	:	9	:	5

At first				In the end		
T+C	:	O		T+C	:	O
15	:	5		3	:	5

12u

Total mass = 6u + 9u + 5u

= 20u

20u = 11.2

1u = 11.2 ÷ 20

= 0.56

12u = 12 × 0.56

= 6.72

6.72 kg of vegetables were used to make the beef stew.

Question 4

G	:	F+W		F	:	W	:	F+W
2^{x5}	:	3^{x5}		1^{x3}	:	4^{x3}	:	5^{x3}
10	:	15		3	:	12	:	15

Summary

G	:	F	:	W
10	:	3	:	12

Geetha spent = 10u – 3u

= 7u

Total (end) = 3u + 3u + 12u

= 18u

18u = 234

1u = 234 ÷ 18

= 13

7u = 7 × 13

= 91

Geetha spent **$91**.

Question 5

Total length of lace

D   Remainder
$\frac{3}{5}$T + 1.2

S $\frac{2}{3}$R   B
$\frac{1}{3}$R + 0.8   2.4

$\frac{2}{3}$ of Remainder = 2.4 + 0.8

= 3.2
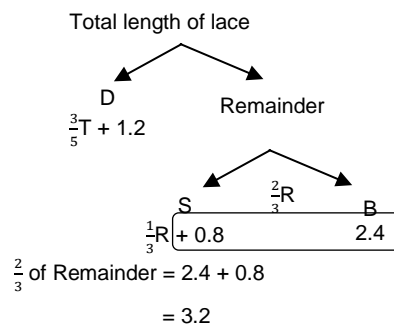
$\frac{1}{3}$ of Remainder = 3.2 ÷ 2

= 1.6

$\frac{3}{3}$ of Remainder = 3 × 1.6

= 4.8

$\frac{2}{5}$ of Total = 4.8 + 1.2

= 6

$\frac{1}{5}$ of Total = 6 ÷ 2

= 3

$\frac{5}{5}$ of Total = 5 × 3

= 15

The seamstress had **15 m** of lace at first.

Question 6

Case 1

	61			
Ne	1u	1u	16	1u
G	1u	1u		
Ni	1u			

Question 6 (Cont.)

Case 2

Ne	16	1u	16	1u
G	16	1u		
Ni	16			

$3u = 61 - 16$

$\quad = 45$

$1u = 45 \div 3$

$\quad = 15$

$1u + 16 = 15 + 16$

$\qquad = 31$

Gayle's neighbour will always be 31 years older.

Gayle's neighbour = 31 + 33

$\qquad\qquad = 64$

Gayle's neighbour will be **64 years old** when she is 33 years old.

Question 7

C	:	Sa+Sq	:	Total	Sa	:	C+Sq	:	Total
3^{x5}	:	4^{x5}	:	7^{x5}	1^{x7}	:	4^{x7}	:	5^{x7}
15	:	20	:	35	7	:	28	:	35

Summary

C	:	Sa	:	Sq
15	:	7	:	13

	At first				In the end		
C	:	Sa	:	Sq	C	:	Sa	:	Sq
15	:	7	:	13	1^{x13}	:	1^{x13}	:	1^{x13}
					13	:	13	:	13

6u

$6u = 42$

$1u = 42 \div 6$

$\quad = 7$

$2u = 2 \times 7$

$\quad = 14$

14 crabstick takoyaki were sold.
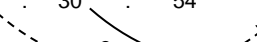
Question 8

L	:	K		K	:	A
4^{x3}	:	5^{x3}		3^{x5}	:	5^{x5}
12	:	15		15	:	25

Summary

L	:	K	:	A
12	:	15	:	25

	At first					In the end		
L	:	K	:	Total	L	:	K	:	Total
12^{x2}	:	15^{x2}	:	27^{x2}	1^{x27}	:	1^{x27}	:	2
24	:	30	:	54	27	:	27	:	54

3u

3u

Question 8 (Cont.)

$3u = 12$

$1u = 12 \div 3$

$\quad = 4$

Difference = 50u – 27u

$\qquad = 23u$

$23u = 23 \times 4$

$\quad = 92$

Alexis had **$92 more** than Kyra in the end.

Let's Get Started

1.

Average $= \dfrac{115+36+280+41+9+1001}{6}$

$= \dfrac{1482}{6}$

$= 247$

The average of the numbers is **247**.

2.

Average $= \dfrac{(60\times3)+(75\times12)+(85\times8)+(90\times4)}{(3+12+8+4)}$

$= \dfrac{2120}{27}$

$= \textbf{78.5}$ (1 d.p.)

The average mark scored by each student is **78.5**.

3.

Average $=$

$\dfrac{(480\times5)+(495\times10)+(510\times11)+(570\times6)+(595\times2)}{(5+10+11+6+2)}$

$= \dfrac{17570}{34}$

$= 516.76$ (2 d.p.)

The average amount of water used by each household is **516.76 litres**.

Ask Yourself

1. Given the average mass, the total mass of the 3rd and 4th sculpture can be calculated after subtracting the mass of the 1st and 2nd sculptures from the total mass of the 4 sculptures.

Let's Practise 4.1

Question 1

Total marks (4 subjects) $= 65 \times 4$

$\qquad\qquad\qquad = 260$

Total marks (English + Science) $= 65 + 64$

$\qquad\qquad\qquad\qquad\qquad = 129$

Total marks (Math + Chinese) $= 260 - 120$

$\qquad\qquad\qquad\qquad\qquad = 131$

Question 1 (Cont.)

M ▭ 1u | 5 ⎤
C ▭ 1u   ⎦ — 131

2u = 131 – 5

   = 126

1u = 126 ÷ 2

   = 63

1u + 5 = 63 + 5

       = 68

John scored **68 marks** for his Science.

Question 2

Total number of hotdogs sold from 1st June to 4th June

= 50 × 4

= 200

Total number of hotdogs sold from 5th June to 9th June

= 5 × 24

= 120

Total number of hotdogs sold from 10th June to 20th June

= $240 ÷ $2

= 120

Total number of hotdogs from 1st June to 20th June

= 200 + 120 + 120

= 440

Average number of hotdogs in 20 days = 440 ÷ 20

                                    = 22

An average of **22 hotdogs** was sold from 1st of June to 20th of June.

Question 3

Total number of pens bought

= (3 × 5) + (5 × 20) + (7 × 5) + (9 × 10)

= 240

Total number of children = 5 + 20 + 5 + 10

                        = 40

Average number of pens = 240 ÷ 40

                       = 6

Each child bought an average of **6 pens**.

Question 4

At first (Mon)   End(Fri)

R : N : Total   R : N : Total
$3^{×11}$: $4^{×11}$: $7^{×11}$ $9^{×7}$: $2^{×7}$: $11^{×7}$
33 : 44 : 77   63 : 14 : 77
                    30u

No. of pages read on Friday = 63u – 33u

                           = 30u

30u = 60

1u = 60 ÷ 30

   = 2

Question 4 (Cont.)

77u = 77 × 2

    = 154

Average = 154 ÷ 7 = 22

John would need to read an average of **22 pages** each day.

Question 5

At first   End

S : N : Total   S : N : Total
$3^{×9}$: $5^{×9}$: $8u^{×9}$ $8^{×8}$: $1^{×8}$: $9u^{×8}$
27 : 45 : 72u   64 : 8 : 72u
                    30u

Apples sold in the next 3 days = 64u – 27u

                              = 37u

37u = 111

1u = 111 ÷ 37

   = 3

72u = 72 × 3

    = 216

Average = 216 ÷ 9

        = 24

Belle sold an average of **24 apples** each day.

Question 6

Total score of 23 students = 23 × 76.5

                          = 1759.5

Total score of next 2 highest score = 2 × 82.25

                                    = 164.5

Total score of the top 3 highest scores = 95 + 164.5

                                        = 259.5

Total score of 20 students = 1759.5 – 259.5

                          = 1500

Average score of the remaining students = 1500 ÷ 20

                                        = 75

(a) The average score of the remaining students is **75**.

    New average score = 76.5 + 0.5 = 77

    New total score = 77 × 24 = 1848

    New score = 1848 – 1759.5 = 88.5

(b) The new student's score is **88.5**.

Let's Get Started

(a)

	Number of girls	Average	Total
Before	6	8	6 × 8 = 48
After	7	9	7 × 9 = 63

(b) The increase in the number of girls by 1.

Ask Yourself

In this question, the number of girls in the group is unknown

---

Let's Practise 4.2

Question 1

	Number of students	Average amount collected ($)	Total amount collected ($)
Before	1u	125	125u
After	1u + 15	113	113u + 1695

B	113u	12u	1275
A	113u	1695	

12u = 1695 – 1275

     = 420

1u = 420 ÷ 12

   = 35

1u + 15 = 35 + 15

        = 50

There were **50 students** in a group.

Question 2

	Number of days	Average number of pages read	Total number of pages read
Before	1u	15	15u
After	1u + 4	17	17u + 68

B	15u	88	
A	15u	2u	68

2u = 88 – 68

   = 20

1u = 20 ÷ 2

   = 10

Days read in all = 1u + 4

               = 10 + 4

               = 14

John read for **14 days** in all altogether.

Question 3

Method 1

	Number of babies	Average mass (kg)	Total mass (kg)
Before	1u	3.2	3.2u
After	1u + 1	3.4	3.4u + 3.4

B	3.2u	5.8	
A	3.2u	0.2u	3.4u

3.4u – 3.2u = 0.2u

0.2u = 5.8 – 3.4

     = 2.4

1u = 2.4 ÷ 0.2

   = 12

There were **12 babies** in the nursery.

Question 3 (Cont.)

Method 2

Difference in mass of the new baby = 5.8 – 3.4

                                  = 2.4

Average change with the new baby = 3.4 – 3.2

                                 = 0.2

Number of babies = 2.4 ÷ 0.2

                 = 12

There were **12 babies** in the nursery.

Question 4

Method I

	Number of pairs of chopsticks	Average price ($)	Total price ($)
Before	1u	12.5	12.5u
After	1u + 2	15.75	15.75u + 31.5

B	12.5u	16 + 35 = 51	
A	12.5u	3.25u	31.5

3.25u = 51 – 31.5

      = 19.5

1u = 19.5 ÷ 3.25

   = 6

Nisa bought **6 pairs of stainless steel chopsticks** for her friends.

Method 2

Difference in the cost of 1 pair of silver and 1 pair of gold-plated chopsticks = ($16 + $35) – ($15.75 × 2)

                = $19.50

Average change = $15.75 – $12.50

               = $3.25

Number of stainless steel chopsticks bought

= $19.50 ÷ $3.25

= 6

Nisa bought **6 pairs of stainless steel chopsticks** for her friends.

Question 5

	Number of friends	Average points	Total points
Before	1u + 1	38	38u + 38
After	1u	36	36u

B	36u	2u	38
A	36u	48	

2u = 48 – 38

   = 10

1u = 10 ÷ 2

= 5

5 of Jennifer's friends took part in the quiz.

Question 6

	Number of people	Average marks	Total marks
C1	1u	90	90u
C2	1u	87	87u
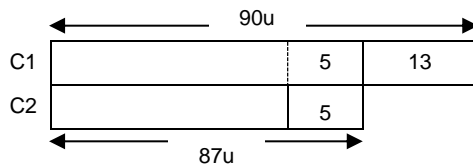
Difference = 90u – 87u

= 3u

Gap = 5 + 13

= 18

3u = 18

1u = 18 ÷ 3

= 6

6 – 1 = 5

Harith has **5 friends**.

Let's Get Started

1. Total seashells of M and K = 8 × 2

= 16
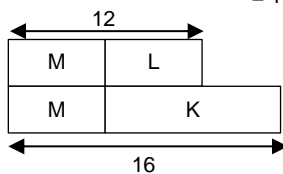
Difference = 16 – 12

= 4

(a) Kim had **4 more** seashells than Lisa.

Number of seashells Kim had = 7 + 4

= 11

(b) Kim had **11 seashells**.

2. Total number of cars of D and M = 20 × 2

= 40

Total number of cars of D, M and K = 19 × 3

= 57

Number of cars Keith had = 57 – 40

= 17

(a) Keith had **17 toy cars**.
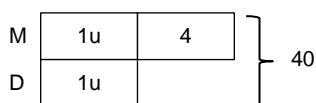
2u = 40 – 4

= 36

1u = 36 ÷ 2

= 18

(b) Danny had **18 toy cars**.

Ask Yourself

1. The repeated items are Louisa and Fanny.

Let's Practise 4.3

Question 1

	Average score (points)	Total score (points)
S + M	77	77 × 2 = 154
R + M	71.5	71.5 × 2 = 143
S + M + A	73	73 × 3 = 219
A + R	69	69 × 2 = 138

Ada's score = 219 – 154

= 65

Risa's score = 138 – 65

= 73

Mayo' score = 143 – 73

= 70

Sally's score = 154 – 70

= 84

Sally, Mayo, Ada and Risa scored **84 points, 70 points, 65 points and 73 points** respectively.

Question 2

Total tags (D + C) = 203 × 2

= 406

Total tags (E + C) = 194 × 2

= 388

Total tags (E + D) = 181 × 2

= 362

Total tags (2D + 2C + 2E) = 406 + 388 + 362

= 1156

Total tags (D + C + E) = 1156 ÷ 2

= 578

E = 578 – 406

= 172

C = 388 – 172

= 216

D = 362 – 172

= 190

Dave, Cherrie and Elaine had **190 tags, 216 tags and 172 tags** respectively.

Question 3

Total number of perfume bottles collected = 4 × 25

= 100

(3 × 3) + (2 × 8) + 15 = 40

Question 3 (Cont.)

4u = 100 – 40

   = 60

1u = 60 ÷ 4

   = 15

Total number of perfume bottles collect by R+E+H

= 3u + 14

= 3 × 15 + 14

= 59

Average number of perfume bottles collect by R+E+H

= 59 ÷ 3

= $19\frac{2}{3}$

≈ 20 (nearest whole number)

The average number of perfume bottles collect by Rachel, Eileen and Henna is **20**.

Question 4

Total number of door knobs produced by A and B weekly

= 3486 × 2

= 6972

Total number of door knobs produced by A and C weekly

= 6586 × 2

= 13 172

Difference in the number of door knobs produced between B and C weekly = 13 172 – 6972

             = 6200

Difference in units between B and C = 7u – 2u

                    = 5u

5u = 6200

1u = 6200 ÷ 5

   = 1240

2u = 2 × 1240

   = 2480 (Factory B)

Factory A = 6972 – 2480

        = 4492

Factory A produces **4492 door knobs** weekly.

Question 5

Total number of stones J and R had = 105 × 2

                       = 210

Total number of stones J and D had = 67.5 × 2

                       = 135

Difference between R and D = 210 – 135

                    = 75

Difference in units between R and D = 5u – 2u

                     = 3u

3u = 75

1u = 75 ÷ 3

   = 25

2u = 2 × 25

   = 50 (Darren)

Number of stones Jason had = 135 – 50

                = 85

Jason had **85 stones**.

Question 6

End				Summary		
5A :	5B	5C	5B	5A :	5B :	5C
$1^{×2}$:	$2^{×2}$	3 :	4	2 :	4 :	3
2 :	4					

Total number of candies at first = 225 × 3

                      = 675

Total number of candies in the end = 45 × 3

                       = 135

Total number of candies sold = 675 – 135

                    = 540

Total candies sold (units) = 2u + 4u + 3u

                    = 9u

9u = 540

1u = 540 ÷ 9

   = 60

Total number of candies sold by Class 5A and 5C

= 2u + 3u

= 5u

5u = 5 × 60

   = 300

Class 5A and Class 5C sold **300 candies** altogether.

Let's Get Started

1. Using the property that the sum of angles on a straight line is 180°,

   52° + 60° = 112°

   ∠y = 180° − 112°

      = **68°**.

2. Using the property that vertically opposite angles between straight lines are equal (or the same),

   ∠p = **46°**, and

   ∠q = **39°**.

Ask Yourself

1. The sum of angles on a straight line is 180°.

Think Further

1. From the given ratios, ∠c is the repeated item/subject. Hence, form a relationship between the two sets of ratios where the ratio representing ∠c is made the same in both ratios.

∠a	:	∠c		∠b	:	∠c
$2^{×2}$	:	$1^{×2}$		3	:	2
4	:	2				

Summary

∠a	:	∠c	:	∠b
4	:	2	:	3

Let's Practise 5.1

Question 1

Using the property that the sum of angles on a straight line is 180°,

$\angle a + \angle b + 120° = 180°$

$\angle a + \angle b = 180 - 120°$

$\qquad = 60°$

$6u = 60°$

$1u = 60° \div 6$

$\quad = 10°$

$\angle a = 4u = 4 \times 10°$

$\quad$ **= 40°**

$\angle b = 2u = 2 \times 10°$

$\quad$ **= 20°**

Question 2

Using the property that the sum of angles on a straight line is 180°,

$\angle m + \angle n + 90° = 180°$

$\angle m + \angle n = 180° - 90°$

$\qquad = 90°$

$5u = 90°$

$1u = 90° \div 5$

$\quad = 18°$

$\angle m = 2u$

$\qquad = 18° \times 2$

$\qquad$ **= 36°**

$\angle n = 3u$

$\qquad = 18° \times 3$

$\qquad$ **= 54°**

Question 3

Using the property of vertically opposite angles,

$\angle a + \angle b = 126°$

$3u = 126°$

$1u = 126° \div 3$

$\quad = 42°$

$\angle a = 2u$

$\qquad = 42° \times 2$

$\qquad$ **= 84°**

$\angle b =$ **42°**

Question 4

Using the property of vertically opposite angles,

$\angle m + \angle n + 40° = 135°$

$\angle m + \angle n = 135° - 40°$

$\qquad = 95°$

$5u = 95°$

$1u = 95° \div 5$

$\quad = 19°$

Question 4 (Cont.)

$\angle m = 19° \times 3$

$\quad = 57°$

$\angle n = 19° \times 2$

$\quad = 38°$

Question 5

Using the property of vertically opposite angles,

$\angle a =$ **88°**

$\angle b = 88° \div 2$

$\quad =$ **44°** (given: half that of $\angle a$)

$\angle a + \angle b = 88° + 44°$

$\qquad = 132°$

Using the property that the sum of angles on a straight line is 180°,

$\angle a + \angle b + \angle c = 180°$

$\angle c = 180° - 132°$

$\qquad$ **= 48°**

Question 6

$\angle XNY = 115°$ (Vertically opposite angles)

$\angle a = 180° - 115° - 42.5°$

$\quad = 22.5°$ (Sum of angles in a triangle)

$\angle b = 92.5°$ (Exterior angles)

$\angle MKY = 180° - 45° - 92.5°$

$\qquad = 42.5°$ (Angles on a straight line)

$\angle c = 115° + 42.5°$

$\quad =$ **157.5°** (Exterior Angles)

Let's Get Started

Question 1

(a) There are **two pairs** of parallel lines i.e. AB // CD and AC // BD.

(b) $\angle ACD = \angle ABD$ and $\angle BAC = \angle BDC$

(c) $\angle BAC + \angle ACD = 180°$, $\angle ABD + \angle CDB = 180°$, $\angle CAB + \angle ABD = 180°$ and $\angle BDC + \angle DCA = 180°$.

Question 2

(a) There are **two pairs** of parallel lines i.e. AB // DC and AD // BC.

(b) $\angle ABC = \angle ADC$ and $\angle BAD = \angle BCD$

(c) $\angle BAD + \angle ABC = 180°$, $\angle ABC + \angle BCD = 180°$, $\angle BCD + \angle ADC = 180°$ and $\angle CDA + \angle DAB = 180°$.

Question 3

(a) There is **a pair** of parallel lines i.e. CD // BA.

(b) There are no angles that are the same.

(c) $\angle ADC + BAD = 180°$ and $\angle DCB + ABC = 180°$

Question 4

Using the property that the sum of interior angles between a pair of parallel lines add up to 180°,

$\angle SRU + 37° = 180°$

$\angle SRU = 180° − 37°$

$\quad\quad\quad = 143°$

Using the property of the sum of angles at a point is 360°,

$\angle QRS + 143° + 68° = 360°$

$143° + 68° = 211°$

$\angle QRS = 360° − 211°$

$\quad\quad\quad = 149°$

Using the property that the sum of interior angles between a pair of parallel lines add up to 180°,

$\angle k + \angle QRS = 180°$

$\angle k + 149° = 180°$

$\angle k = 180° − 149°$

$\quad\; = 31°$

Question 5

Using the property that the sum of angles on a straight line is 180°,

$\angle a + 52° + 55° = 180°$

$55° + 52° = 107°$

$\angle a = 180° − 107° = 73°$

Method 1

$\angle a + 52° + \angle c = 180°$ (Internal angles)

$73° + 52° + \angle c = 180°$

$73° + 52° = 125°$

$\angle c = 180° − 125°$

$\quad\; = \mathbf{55°}$

Method 2

Using the property of corresponding angles,

$\angle c = 55°$

Using the property that the sum of angles in a triangle is 180°,

$\angle b + 55° + 73° = 180°$

$55° + 73° = 128°$

$\angle b = 180° − 128° = 52°$

Question 6

Using the property that the sum of interior angles between a pair of parallel lines add up to 180°,

$107° + \angle BCD = 180°$

$\angle BCD = 180° − 107°$

$\quad\quad\quad = 73°$

$\angle DCF = 73°$

$\angle n = 180° − 73°$

$\quad\; = \mathbf{107°}$ (Interior Angles)

Using the property that the sum of angles on a straight line is 180°,

$\angle n + \angle m = 180°$

$\angle m = 180° − 107°$

$\quad\; = \mathbf{73°}$

Ask Yourself

1. Sum of angles on a straight line. Yes, we can find the angle directly.
2. Sum of angles in a triangle.
3. The base angles in an isosceles triangle are the same.

Let's Practise 5.2

Question 1

Using the property that the line BD is a diagonal to Square ABCD, it cuts the angles at the corners in half.

(a) $\angle CBD = \mathbf{45°}$

$\quad \angle BDC = 45°$

$\quad \angle CBD = \angle BDC$

$\quad\quad\quad\; = 45°$

$\quad \angle CBD : \angle BDC = 1 : 1$

(b) The ratio is **1 : 1**.

Question 2

Using the property that the sum of angles on a straight line is 180°,

$\angle BED + 65° = 180°$

$\angle BED = 180° − 65°$

$\quad\quad\quad = 115°$

Using the property that Triangle BED is an isosceles triangle and that the sum of angles in a triangle is 180°,

$\angle DBE = \angle EDB$

$\quad\quad\; = \frac{180° − 115°}{2}$

$\quad\quad\; = \mathbf{32.5°}$

Question 3

Using the property that the sum of angles in a triangle is 180°,

$\angle ECH + 70° + 90° = 20°$

$70° + 90° = 160°$

$\angle ECH = 180° − 160°$

$\quad\quad\quad = 20°$

Using the property that the line BD is a diagonal to Square ABCD, it cuts the angles at the corners in half.

$\angle ACB = 45°$

$\angle ACE = 45° − 20°$

$\quad\quad\; = \mathbf{25°}$

Question 4

Using the property that the sum of angles on a straight line is 180°.

$\angle HED = 180° − 60°$

$\quad\quad\quad = 120°$

$\angle HDE = 45°$

$\angle DHE = 180° − 120° − 45°$

$\quad\quad\quad = 15°$

Question 4 (Cont.)

$\angle BHC = 180° - 90° - 45° - 15°$

$\qquad = 30°$

$\angle HBC = \frac{180° - 30°}{2}$

$\qquad = \textbf{75°}$

Question 5

Using the property that Triangle BDF is an isosceles triangle and that the sum of angles in a triangle is 180°,

$\angle BFD + \angle BDF + 30° = 180°$

$\angle BFD = \angle BDF$

$\qquad = \frac{180° - 30°}{2}$

$\qquad = 75°$

Using the property that the sum of angles in a triangle is 180°,

$\angle ADE + 40° + 90° = 180°$

$40° + 90° = 130°$

$\angle ADE = 180° - 130°$

$\qquad = 50°$

Using the property that the sum of angles on a straight line is 180°,

$\angle BDC + 50° + 75° = 180°$

$50° + 75° = 125°$

$\angle BDC = 180° - 125°$

$\qquad = 55°$

Using the property that the sum of angles in a triangle is 180°,

$\angle DBC + 55° + 90° = 180°$

$55° + 90° = 145°$

$\angle DBC = 180° - 145°$

$\qquad = \textbf{35°}$

Question 6

Using the property that the sum of angles in a triangle is 180°,

$\angle CFD + 65° + 90° = 180°$

$65° + 90° = 155°$

$\angle CFD = 180° - 155°$

$\qquad = 25°$

Using the property that the line BF is a diagonal to Square ABEF, it cuts the angles at the corners in half.

$\angle BFC + 25° = 45°$

$\angle BFC = 45° - 25°$

$\qquad = \textbf{20°}$

Question 7

Since ABCD is a rhombus, the line BD cuts the rhombus into half such that Triangle BCD and Triangle ABD becomes isosceles triangles where BC = CD and AB = AD respectively.

Question 7 (Cont.)

$\angle CBD = \angle CDB = \angle ABD = \angle ADB = \frac{180° - 45°}{2}$

$\qquad\qquad\qquad\qquad\qquad = 67.5°$

$\angle EDB = 67.5° - 30°$

$\qquad = \textbf{37.5°}$

Question 8

$\angle EDB = 118°$

$\angle EBD = \frac{180° - 118°}{2}$

$\qquad = 31°$

$\angle BDC = 180° - 118°$

$\qquad = 62°$ (Angles on a straight line)

$\angle DBC = 180° - 62° - 62°$

$\qquad = 56°$

$\angle EBC = 31° + 56°$

$\qquad = 87°$

Question 9

$\angle BEC = 55°$ (Corresponding angles)

$\angle DEA = \angle BEC = 55°$ (Triangle ADE and Triangle BEC are identical)

$\angle AEB = 180° - 55° - 55°$

$\qquad = \textbf{70°}$

Question 10

Using the property that opposite angles in a parallelogram are equal.

$\angle AEC = 75°$

(a) $\angle AED = 180° - 75°$

$\qquad = \textbf{105°}$

$\angle AEF = 35°$ (Alternate angles)

(b) $\angle FEC = 75° - 35°$

$\qquad = \textbf{40°}$

Question 11

Since BCDE is a rhombus, the line BD cuts the rhombus into half such that Triangle BCD and Triangle BED becomes isosceles triangles where BC = CD and BE = DE respectively.

Since Triangle BCD is an equilateral triangle,

(a) $\angle CDB = \textbf{60°}$

Since AF = AE, ABEF and BCDE are identical rhombuses,

$\angle BAE = 60°$

(b) $\angle EAK = 60° - 50° = \textbf{10°}$

Question 12

$\angle EFC = 180° - 50°$

$\qquad = 130°$ (Interior angles)

$\angle GFA = 130°$ (Vertically opposite angles)

Question 12 (Cont.)

$\angle AGF = \frac{180° - 130°}{2}$

$\qquad$ = 25° (Sum of angles in an isosceles triangle)

$\angle GHB = 180° - 25° - 78°$

$\qquad$ = **77°** (Sum of angles in a triangle)

Question 13

Using the property that the sum of angles in isosceles triangle is 180°,

30° + 30° = 60°

$\angle ACB = 180° - 60°$

$\qquad$ = 120°

Using the property of vertically opposite angles,

$\angle DCE = 120°$

$\angle CDE = \angle CED$

$\qquad = \frac{180° - 120°}{2}$

$\qquad$ = 30°

Using the property of vertically opposite angles,

$\angle FEK = 30°$

$\angle GEK = 30° - 18°$

$\qquad$ = 12°

Using the property that the sum of angles on a straight line is 180°,

$\angle EGK = 180° - 105°$

$\qquad$ = 75°

Using the property that the sum of angles in a triangle is 180°,

12° + 75° = 87°

$\angle GKE = 180° - 87°$

$\qquad$ = 93°

$\angle GKJ = 180° - 93°$

$\qquad$ = **87°**

Using the property that the sum of angles in a triangle is 180°,

30° + 93° = 123°

$\angle EFK = 180° - 123°$

$\qquad$ = **57°**

Question 14

Using the property that the sum of interior angles between a pair of parallel lines add up to 180°,

$\angle ACD = 180° - 72°$

$\qquad$ = 108°

Using the property that the sum of angles in a triangle is 180°,

25° + 108° = 133°

$\angle ADC = 180° - 133°$

$\qquad$ = 47°

$\angle CAB = 180° - 78° \times 2$

$\qquad$ = 24°

$\angle GAD = 180° - 24° - 78° - 25°$

$\qquad$ = 53° (Interior angles)

Question 15

Using the property that the sum of angles in a triangle is 180° and Triangle BGF is an isosceles triangle,

$\angle BFG = \angle BGF$

$\qquad = \frac{180 - 24}{2}$

$\qquad$ = 78°

Using the property that the sum of angles on a straight line is 180°,

78° + 39° + 49° = 166°

$\angle CFD = 180° - 166°$

$\qquad$ = 14°

$\angle CDE = 63°$ (Corresponding angles)

$\angle DCF = 180° - 63°$

$\qquad$ = 117° (Interior angles)

Answers to Unit 6.1

1. Height: AB
2. Base: AB; Height: CD
3. Base: AB; Height: GF
4. Area of A = $\frac{1}{2}$ × 4 cm × 3 cm = 6 cm^2

   Area of B = $\frac{1}{2}$ × 6 cm × 1 cm = 3 cm^2

   Area of C = $\frac{1}{2}$ × 2 cm × 4 cm = 4 cm^2
5. (a) Area of the shaded triangle

   $\qquad = \frac{1}{2}$ × 6 cm × 5 cm = 15 cm^2

   (b) Area of the shaded triangle

   $\qquad = \frac{1}{2}$ × 5 cm × 6 cm = 15 cm^2

Let's Get Started 6.1

2. (a) <u>Method 1</u>

   Area of Triangle A = $\frac{1}{2}$ × 22 cm × 20 cm

   $\qquad\qquad\qquad$ = 220 cm^2

   Area of Triangle B = $\frac{1}{2}$ × 22 cm × 30 cm

   $\qquad\qquad\qquad$ = 330 cm^2

   Total area of Triangles A and B

   = 220 cm^2 + 330 cm^2

   = **550 cm^2**

<u>Method 2</u>

Total area = $\frac{1}{2}$ × 22 cm × 50 cm

$\qquad\qquad$ = 550 cm^2

(b) No. The area of the shaded parts in both rectangles is the same since they have the same base and height.

3. Area of the shaded part = $\frac{1}{2}$ × 10 cm × 5 cm = **25 cm²**

   OR

   $\frac{1}{2}$ × common base × combined height

   = $\frac{1}{2}$ × 5 cm × 10 cm

   = **25 cm²**

4. Area of Triangle ABC = $\frac{1}{2}$ × 20 cm × (25 − 12) cm

   = 130 cm²

   Area of Triangle ABD = $\frac{1}{2}$ × 20 cm × 25 cm

   = 250 cm²

   Ratio = 130 : 250 = **13 : 25**

   (Notice that the ratio of the two areas of triangles sharing a common base is actually the same as the ratio of its height.)

5. Area of the shaded triangles

   = $\frac{1}{2}$ × 12 cm × (14 − 5) cm + $\frac{1}{2}$ × 12 cm × (10 − 5) cm

   = **84 cm²**

Ask Yourself

1. The height of both triangles are the same.

Let's Practise 6.1

Question 1

Total area of the unshaded triangles

= $\frac{1}{2}$ × 20 cm × 10 cm

= **100 cm²**

Question 2

Total area of the unshaded triangles

= $\frac{1}{2}$ × 24 cm × 18 cm

= **216 cm²**

Question 3

Total area of the shaded triangles

= $\frac{1}{2}$ × (9 + 7 + 3) cm × 6 cm

= **57 cm²**

Question 4

Total area of the 3 shaded triangles

= $\frac{1}{2}$ × (15 + 2) cm × 18 cm

= **153 cm²**

Question 5

Total area of the shaded triangles

= $\frac{1}{2}$ × 20 cm × (10 + 5) cm

= **150 cm²**

Question 6

Total area of the shaded triangles

= $\frac{1}{2}$ × 32 cm × 28 cm

= **448 cm²**

Question 7

Total area of the shaded triangles

= $\frac{1}{2}$ × (10 + 15) cm × 20 cm

= **250 cm²**

Question 8

Total area of the unshaded triangles

= $\frac{1}{2}$ × 15 cm × (48 + 9) cm

= **427.5 cm²**

Question 9

Total area of the shaded triangles

= $\frac{1}{2}$ × (10 + 8) cm × 20 cm

= **180 cm²**

Question 10

Total area of the unshaded parts of the figure

= (11 + 20) cm × 18 cm − $\frac{1}{2}$ × 20 cm × 18 cm

= **378 cm²**

Question 11

Total area of the shaded parts

= $\frac{1}{2}$ × 30 cm × (30 + 10) cm

= **600 cm²**

Question 12

Length of the rectangle, FD = $\frac{1323 \times 2}{42}$

= 63 cm

BC = $\frac{2}{7}$ × 63 cm

= 18 cm

ED = 18 cm − 10 cm

= 8 cm

Total area of the unshaded triangles

= $\frac{1}{2}$ × 18 cm × 23 cm + $\frac{1}{2}$ × 8 cm × 19 cm

= **283 cm²**

Question 13

Total area of the shaded parts

= $\frac{1}{2}$ × (26 + 26) cm × 26 cm

= **676 cm²**

Question 14

Area of A = Area of B + C

Area of A = $\frac{1}{2}$ × 18 cm + 18 cm

        = 162 cm^2

Area of D + C = $\frac{1}{2}$ × (18 + 18) cm × 18 cm

          = 324 cm^2

Total area of the shaded parts

= 2 × 162 cm^2 + 324 cm^2

= **648 cm^2**

Let's Get Started 6.2

1. Area of the square

    = 2 × $\frac{1}{2}$ × 48 cm × (48 ÷ 2) cm

    = **1152 cm^2**

2. Height of each identical triangle = 20 ÷ 2

                                    = 10

    Area of figure = 8 × $\frac{1}{2}$ × 9 cm × 10 cm

                  = **360 cm^2**

3. Area of figure = 5 × $\frac{1}{2}$ × 18 cm × 10 cm

                  = **450 cm^2**

Ask Yourself

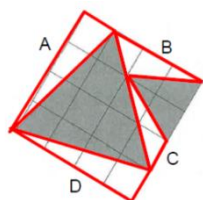1. The sum of the 3 triangles on each side of diagonal line is the same.

Think Further

1. If the figure is made up of 6 identical triangles, then the area of Triangle F would be found using the formula:

$\frac{1}{2}$ × base length × height

Let's Practise 6.2

Question 1

Area of Figure = 24 cm × 24 cm

            = 576 cm^2

Area of the Triangle A = $\frac{1}{2}$ × 24 cm × 6 cm

                    = 72 cm^2

Area of the Triangle B = $\frac{1}{2}$ × 18 cm × 6 cm

                    = 54 cm^2

Question 1 (Cont.)

Area of the Triangle C = $\frac{1}{2}$ × 12 cm × 6 cm

                    = 36 cm^2

Area of Triangle D is the same as Area of Triangle A

= 72 cm^2

Area of shaded area

= 576 cm^2 − 72 cm^2 – 54 cm^2 – 36 cm^2 – 72 cm^2

= 324 cm^2

Question 2

Area of shaded Triangle A

= $\frac{1}{2}$ × 6 cm × (12 – 5) cm

= **21 cm^2**

Area of shaded Triangle B

= $\frac{1}{2}$ × 11 cm × 12 cm + $\frac{1}{2}$ × 11 cm × 8 cm

= **110 cm^2**

Question 3

Total units = 4u + 3u + 2u

         = 9u

9u = 36 cm

1u = 36 cm ÷ 9

   = 4 cm

AH = 4 × 4 cm

   = 16 cm

HG = 3 × 4 cm

   = 12 cm

GF = 2 × 4 cm

   = 8 cm

Total area of Triangle ABH and Triangle BHC

= $\frac{1}{2}$ × 16 cm × 10 cm

= 80 cm^2

Area of Triangle BCH and Triangle DCE

= $\frac{1}{2}$ × 12 cm × 10 cm

= 60 cm^2

Area of Triangle EGF = $\frac{1}{2}$ × 8 cm × 10 cm

                  = 40 cm^2

Area of the figure

= 80 cm^2 + 60 cm^2 + 40 cm^2 + 110 cm^2

= **290 cm^2**

Question 4

AB	:	EF		CD	:	AB
1$^{×3}$	:	2$^{×3}$		2	:	3
3	:	6				

Summary ratio

AB	:	EF	:	CD
3	:	6	:	2

Difference = 6u – 2u = 4u

Question 4 (Cont.)

4u = 12 cm

1u = 12 cm ÷ 4 = 3 cm

AB = 3 × 3 cm = 9 cm

Area of figure = $\frac{1}{2}$ × 10 cm × (9 + 12) cm = **105 cm²**

<u>Alternative solution by Richard</u>

Area of Triangle AEH = $\frac{1}{2}$ × 10 cm × 9 cm

= 45 cm²

Area of Triangle EGC = $\frac{1}{2}$ × 10 cm × (18 cm − 6 cm)

= 60 cm²

Area of figure = 45 cm² + 60 cm²

= **105 cm²**

Question 5

AB = $\frac{3}{8}$ × 200 m

= 75 m

(a) Cost of building the picnic area

= 75 m × 75 m × $20

= **$112 500**

(b) Cost of fencing the fountain

= (250 m + 150 m + 200 m) × $12

= **$7200**

Question 6

Area of square = 20 m × 20 m

= 400 m²

Area of A = 400 m² − $\frac{1}{2}$ × 20 m × (20 − 7) m²

= 270 m²

Area of C = $\frac{1}{2}$ × 20 m × (15 − 13) m

= 20 m²

Difference = 270 m² − 20 m²

= **250 m²**

Question 7

Base length of Triangle B and Triangle C

= 70 m² × 2 ÷ 7 m

= 20 m

Area of A = 28 m × 20 m − 70 m²

= 490 m²

Area of D = $\frac{1}{2}$ × (28m − 21 m) × 8 m

= 28 m²

Sum of areas of A and D = 490 m² + 28 m²

= **518 m²**

Question 8

Area of Rectangle FBCD = 2 × 52 cm²

= 104 cm²

Area of Triangle ABF = $\frac{1}{2}$ × 52 cm²

= 26 cm²

Question 8 (Cont.)

Area of Triangle FDE = 52 cm²

Area of figure = 104 cm² + 52 cm² + 26 cm²

= **182 cm²**

Question 9

Area of the entire figure = 3 × 100 cm²

= **300 cm²**

Question 10

Height of shaded triangles is the same as the length of each side of the square.

Length of small square = $\sqrt{144}$

= 12 cm

Area of big square = 24 cm × 24 cm

= 576 cm²

Area of unshaded parts = $\frac{1}{2}$ × 24 cm × 24 cm

= 288 cm²

Fraction = $\frac{576 - (288 + 144)}{576}$

= $\frac{1}{4}$

$\frac{1}{4}$ of the figure is made up of the shaded triangles.

Question 11

Area of Triangle BCJ and Triangle CDE

= 2 × $\frac{1}{2}$ × 20 cm × 10 cm = 200 cm²

Area of Triangle GJE = $\frac{1}{2}$ × 30 cm × 10 cm

= 150 cm²

Area of Triangle ABG = $\frac{1}{2}$ × 20 cm × 20 cm

= 200 cm²

Area of two big squares = 2 × 20 cm × 20 cm

= 800 cm²

Total area of shaded parts

= 800 cm² − (150 cm² + 200 cm² + 200 cm²)

= **250 cm²**

Question 12

Area of unshaded parts of Triangle ABC

= $\frac{1}{2}$ × 36 cm × (18 − 5) cm − 125 cm²

= **109 cm²**

Question 13

Area of unshaded parts

= $\frac{1}{2}$ × 4.6 cm × 4.6 cm + $\frac{1}{2}$ × 4.6 cm × (4.6 + 2.6) cm + $\frac{1}{2}$ × 4.6 cm × (4.6 + 4.6) cm

= 48.3 cm²

Total area of shaded parts = 9.2 cm × 9.2 cm − 48.3 cm

= **36.34 cm²**

Question 14

Area of each identical square which make up the figure

= 576 cm^2 ÷ 16

= 36 cm^2

Area of small shaded triangle = $\frac{1}{2}$ × 12 cm × 12 cm

= 72 cm^2

Area of unshaded triangles

= $\frac{1}{2}$ × 18 cm × 18 cm + $\frac{1}{2}$ × 24 cm × 6 cm × 2 – 72 cm^2

= 234 cm^2

Total area of the shaded triangles

= 576 cm^2 – 234 cm^2

= **342 cm^2**

Answers to Unit 7.1

Let's Get Started 7.1

S/N	Sentence	What should we do?	Ratio	Model drawing
2	E has 50% more than money than F.	**Step 1**: Convert the percentage into fraction in its simplest form. 50% = $\frac{1}{2}$ **Step 2**: Find the relationship between E and F. E has $\frac{1}{2}$ more money than F **Step 3**: Express the relationship in the form of ratio of draw models if you prefer.	**E : F** **3 : 2** Note: E has 1 unit more than F (2 units).	E [2u][1u] F [2u]

S/N	Sentence	What should we do?	Ratio	Model drawing
3	P has 80% more than R. R has $125 more than J.	**Step 1**: Convert the percentage into fraction in its simplest form. 80% = $\frac{4}{5}$ **Step 2**: Find the relationship between P and R. P has $\frac{4}{5}$ more money than R **Step 3**: Find the relationship between R and J. **Step 4**: When there is a comparsion involving whole number, drawing models is necessary.	**P : R** **9 : 5** R = 5u J = 5u – $125	P [5u][4u] R [5u] J [←→] $125

Ask Yourself

1. Convert the percentage given into a fraction in its simplest form i.e. 20% = $\frac{1}{5}$.

   Using the fraction, Roy has 1 more unit than Joe at first i.e Roy : Joe = 6 : 5

   At the end, Joe has 1 more unit than Roy, i.e.

   Roy : Joe = 5 : 6

2. If the event were to occur, Roy would have fewer stamps than Joe; and the number of stamps Joe has would increase; and the total number of stamps between them would remain the same.

Think Further

It can be rephrased as:

'Joe has 120% as many stamps as Roy' or

'Roy has $83\frac{1}{3}$% ($\frac{5}{6}$ × 100%) as many stamps as Joe.'

Let's Practise 7.1

Question 1

At first   End

G	:	C	:	Total		G	:	C	:	Total
100	:	125	:			125	:	100	:	
4	:	5	:	9		5	:	4	:	9

1u = 125

9u = 9 × 125

   = 1125

They have **1125 cards** altogether.

Question 2

B	:	A
100	:	130
10	:	13

13u = 65

1u = 65 ÷ 13

   = 5

3u = 5 × 3

   = 15

The difference between the two numbers is **15**.

Question 3

Percentage of girls are boys = $\frac{50}{40}$ × 100%

                          = 125%

125% of the girls are the number of boys.

Question 4

Percentage of forks are spoons = $\frac{10}{20}$ × 100%

                            = 50%

50% of the forks are the number of spoons.

Question 5

Difference between pink and green marbles = 50 – 40

                                        = 10

Percent more pink than green marbles = $\frac{10}{40}$ ×100%

                                  = 25%

There are **25% more** pink marbles than green marbles in the bag.

To check that your answer is correct, you can work backwards.

25% more pink than green marbles means that the ratio of the number of pink marbles to the number of green marbles is 5 : 4.

Total = 5u + 4u

    = 9u

9u = 90

1u = 90 ÷ 9

   = 10

5u = 5 × 10

   = 50

Question 5 (Cont.)

4u = 4 × 10

   = 40

Difference = 50 – 40

          = 10

There are **10 more** pink marbles than green marbles in the bag.

Question 6

At first (20% increased)   End (30% increased)

1st	:	2nd		2nd	:	3rd+4th
100	:	120		100	:	130
5×5	:	6×5		10×3	:	13×3
25	:	30		30	:	39

Summary

1st	:	2nd	:	3rd+4th
25	:	30	:	39

39u = 585

1u = 585 ÷ 39

   = 15

25u = 15 × 25

    = 375

There were **375 hamsters** at first.

Let's Get Started 7.2

S/N	Sentence	What should we do?	Ratio comparison	Model drawing
1	C has 25% less money than D.	Step 1: Convert the percentage into a fraction in its simplest form. 25% = $\frac{1}{4}$ Step 2: Find the relationship between C and D. C has $\frac{1}{4}$ less money than D. Step 3: Express the relationship into a ratio or draw a model.	C : D 3 : 4 Note: C has 1 unit less than D (4 units).	C: 3u D: 3u 1u

2	X has 60% less money than Y.	**Step 1:** Convert the percentage into fraction in its simplest form. $60\% = \frac{3}{5}$ **Step 2:** Find the relationship between X and Y. X has $\frac{3}{5}$ less money than Y. **Step 3:** Express the relationship into a ratio or draw a model.	X : Y 2 : 5 Note: X has 3 units less than Y (5 units).	X | 2u | Y | 2u | 3u |
3	X has $350 less than Z.	**Step 1:** Find the relationship between X and Z. X = 1u Z = 1u+350 **Step 2:** As the comparison involves a whole number, drawing a model is necessary.		X | 1u | Z | 1u | 350 |

Ask Yourself

1. Convert the percentage into a fraction in its simplest form i.e. $35\% = \frac{7}{20}$

2. The number of girls is 7 units fewer than the number of adults (20 units). Therefore the relationship between the number of girls and the number of adults in the form of ratio is 13 : 20.

Think Further

A	:	G		B	:	G
$20^{\times 2}$	:	$13^{\times 2}$		$1^{\times 13}$	:	$2^{\times 13}$
40	:	26		13	:	26

Think Further (Cont.)

40u – 13u = 27u

27u = 324

1u = 324 ÷ 27

   = 12

Total people = 40u + 26u + 13u

          = 79u

79u = 79 × 12

   = 948

948 people attended the concert.

Let's Practise 7.2

Question 1

B	:	G	:	C		C	:	A
50	:	100				10	:	90
1	:	2	:	3		$1^{\times 3}$	:	$9^{\times 3}$
						3	:	27

Summary

B	:	G	:	A
1	:	2	:	27

27u = 540

1u = 540 ÷ 27

   = 20

2u = 2 × 20

   = 40

There were **40 girls.**

Question 2

At first

C	:	K	: Total
20	:	100	
$1^{\times 5}$	:	$5^{\times 5}$	: $6^{\times 5}$
5	:	25	: 30

End

C	:	K	: Total
$2^{\times 6}$	:	$3^{\times 6}$	: $5^{\times 6}$
12	:	18	: 30

25u – 18u = 7u

7u = 210

1u = 210 ÷ 7

   = 30

C (end), 12u = 12 x 30

         = 360

K (end), 18u = 18 x 30

         = 540

Cliff and Kevin had **$360** and **$540** in the end respectively.

Question 3

Last Year

Daughter	:	Yvonne
20	:	100
1	:	5

Question 3 (Cont.)

Total age (last yr), 6u = 50 − 2

           = 48

1u = 48 ÷ 6

   = 8

Daughter's age (3 yrs' time) = 8 + 4

                     = 12

Her daughter will be **12 years old** in 3 years' time.

Question 4

```
    End
 J   :   B    : Total
 80  :  100
 4   :   5    :  9
```

9u = 360

1u = 360 ÷ 9

   = 40

4u (remaining 50%) = 4 x 40

                = 160

Julian gave **$160** to Brendon.

Question 5

```
 A    :   B              B   :   C
100   :  80             60   :  100
 5^x3 :  4^x3            3^x4 :  5^x4
 15   :  12             12   :  20
```

Summary

```
 A    :   B    :   C
 15   :  12    :  20
```

5u = 500

1u = 500 ÷ 5

   = 100

12u = 12 × 100

     = 1200

(a) Brenna's salary is **$1200**.

    Brenna (current) :   Brenna (New)
         100   :   80
           5   :   4

    5p = 1200

    1p = 1200 ÷ 5

        = 240

    4p = 4 × 240

        = 960

    Or, Brenna's new salary $= \frac{4}{5} \times 1200$
                            = 960

(b) Brenna's new salary is **$960**.

Question 6

```
 G    :   R              R    :   P
 20   :  100            100   :  70
  2   :   10             10   :   7
```

Summary

```
 G    :   R    :   P
 2    :   10   :   7
```

5u = 330

1u = 330 ÷ 5

   = 66

19u = 19 × 66

     = 1254

(a) There are a total of **1254 balls** in the playpen.

    Percentage of the number of green balls is the number

    of purple $= \frac{2}{7} \times 100\%$

               $= 28\frac{4}{7}\%$

(b) There are **$28\frac{4}{7}$ %** green balls as compared to the

    number of purple balls.

Ask Yourself

1. 'same number of stamps' at first hints that we have to
   solve the problem sum from the beginning.

Think Further

1. At 25% ($\frac{1}{4}$), Vincent's end = 3u.

   At 50% ($\frac{1}{2}$), Vincent's end = 2u

   Difference (end) = 3u − 2u

                = 1u

              1u = 30

Vincent had **30 more** stamp**s** in the end.

Let's Practise 7.3

Question 1

At first

```
TT  | 10u |
TC  | 10u |
```

Working
TT increased 60%
$\frac{3}{5} \times 10u = 6u$

TC increased 30%
$\frac{3}{10} \times 10u = 3u$

In the end

```
TT  | 10u | 3u | 3u |
TC  | 10u | 3u | <- 45 ->
```

3u = 45

1u = 45 ÷ 3

   = 15

16u = 16 × 15

     = 240

There were **240 toy trains** in the end.

Question 2

At first

T	10u
N	10u

Working
Tom increased 50%
$\frac{1}{2} \times 10u = 5u$

Nancy increased 20%
$\frac{1}{5} \times 10u = 2u$

In the end

T	10u	2u	3u	3u
N	10u	2u		

300

Tom increased 20% (if receiving another $300 from father)

$= \frac{1}{5} \times 15u$

$= 3u$

$3u = 300$

$1u = 300 \div 3$

$= 100$

$3u = 3 \times 100$

$= 300$

The difference in the amount of money is **$300**.

Question 3

At first

A	10u
O	10u

Working
Monday
Apples increased 80%
$\frac{4}{5} \times 10u = 8u$

Tuesday
Apples increased 50%
$\frac{1}{2} \times 18u = 9u$

Oranges decreased 20%
$\frac{1}{5} \times 10u = 2u$

Monday

A	10u	8u
O	10u	

Tuesday

A	8u	2u	8u	9u
O	8u	2u		

38

$19u = 38$

$1u = 38 \div 19$

$= 2$

$20u = 20 \times 2$

$= 40$

There were **40 apples and oranges** in the crate at first.

Question 4

Morning

T	10u
C	10u

Working
Noon
Tables increased 20%
$\frac{1}{5} \times 10u = 2u$

Chairs decreased 30%
$\frac{3}{10} \times 10u = 3u$

7 p.m.
Tables increased 50%
$\frac{1}{2} \times 12u = 6u$

Noon

T	7u	3u	2u
C	7u	3u	

Question 4 (Cont.)

7 p.m.

T	7u	3u	2u	6u
C	7u	3u		

32

$8u = 32$

$1u = 32 \div 8 = 4$

More tables than chairs $= 18u - 7u$

$= 11u$

$11u = 11 \times 4$

$= 44$

There were **44 more tables than chairs** in the storeroom in the end.

Question 5

At end

W	7u
B	7u

At first

W	7u	70
B	7u	3u

40

$3u = 70 - 40$

$= 30$

$1u = 30 \div 3 = 10$

$7u + 70 = 7 \times 10 + 70$

$= 140$

There were **140 white sneakers** in the shop at first.

Question 6

End

50¢	2u
20¢	2u

At first

50¢	2u	51
20¢	2u	3u

24

$3u = 51 - 24$

$= 27$

$1u = 27 \div 3$

$= 9$

Value of 20¢ used $= 27 \times 0.2$

$= 5.4$

Value of 50¢ used $= 51 \times 0.5$

$= 25.5$

Cost of present $= 25.5 + 5.4$

$= 30.9$

The present cost **$30.90**.

Ask Yourself

The individual amount of money will change. However, their total amount of money will remain unchanged.

Let's Practise 7.4

Question 1

At first		End	

	B : R : Total		B : R : Total
	$3^{×2}$: $7^{×2}$: $10^{×2}$		$1^{×5}$: $3^{×5}$: $4^{×5}$
	6 : 14 : 20		5 : 15 : 20

Gave = 6u – 5u

= 1u

1u = 5

20u = 20 × 5

= 100

The boys were given a total of **$ 100**.

Question 2

At first		End	

	J : P : Total		J : P : Total
	$5^{×5}$: $6^{×5}$: $11^{×5}$		$4^{×11}$: $1^{×11}$: $5^{×11}$
	25 : 30 : 55		44 : 11 : 55

Passed = 30u – 11u

= 19u

19u = 57

1u = 57 ÷ 19

= 3

55u = 55 × 3

= 165

40% cards sold = 0.4 × 165

= 66

Amount collected = 66 × $2

= $132

$132 was collected from the sale of the cards.

Question 3

At first		End	

	A : B : Total		A : B : Total
	$2^{×3}$: $3^{×3}$: $5^{×3}$		$1^{×5}$: $2^{×5}$: $3^{×5}$
	6 : 9 : 15		5 : 10 : 15

5u = 110

1u = 110 ÷ 5

= 22

Transferred = 6u – 5u

= 1u

22 mint candies were transferred from Tin A to Tin B.

Question 4

	J : K	Working
At first	9 : 20	**Transfer 1**: K = J
Transfer (1)	+4 –4	20% of K = $\frac{1}{5}$ × 20u
End	13 : 16	= 4u

3u = 18

1u = 18 ÷ 3

= 6

29u = 29 × 6

= 174

The girls had **174 bangles** altogether.

Question 5

	W : X : Y	Working
At first	$2^{×4}$: $3^{×4}$: $5^{×4}$	**Transfer 1**: Y = W
	8 : 12 : 20	20% of Y = $\frac{1}{5}$ × 20u
Transfer (1)	+4 –4	= 4u
	12 : 12 : 16	
Transfer (2)	–3 +3	**Transfer 2**: X = Y
End	12 : 9 : 19	25% of X = $\frac{1}{4}$ × 12u
		= 3u

100% of Xavier = 9u

125% of Xavier = $\frac{9}{100}$ × 125

= 11.25u

Ratio

X :	W+Y
$11.25^{×4}$:	$31^{×4}$
45 :	124

The ratio of Xavier's marbles to the sum of Willy's and Yoshua's marbles in the end was **45 : 124**.

Question 6

	A : B : C	Working
At First	$2^{×5}$: $4^{×5}$: $3^{×5}$	**Transfer 1**: A → B
	10 : 20 : 15	30% of A = $\frac{3}{10}$ × 10u
Transfer (1)	–3 +3	= 3u
	7 : 23 : 15	
Transfer (2)	+9 –9	**Transfer 2**: C → B
End	7 : 32 : 6	60% of C = $\frac{3}{5}$ × 15u
		= 9u

32u = 38.4

1u = 38.4 ÷ 32

= 1.2

Total transferred to B = 3u + 9u

= 12u

12u = 12 × 1.2

= 14.4

14.4 kg of cement were transferred into Bag B.

Ask Yourself

1. Yes. The keywords are "of the remaining".
2. Units are used.

Let's Practise 7.5

Question 1

```
              Salary
               4u
            ↙        ↘
       Petrol         Remainder
        1u               3u
                     ↙        ↘
               Groceries      Left
                  1u           2u
```
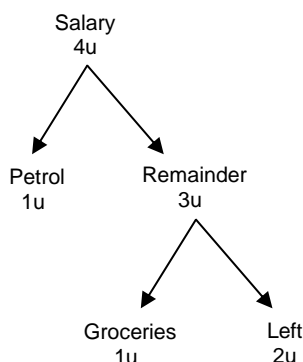
(a) Percentage of salary on grocery = $\frac{1}{4}$ × 100% = 25%

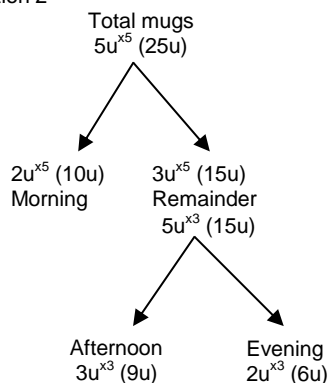   She spent **25%** of her salary on groceries.

(b)   2u = 560

   1u = 560 ÷ 2

   = 280

   4u = 4 × 280

   = 1120

Her monthly salary was **$1120**.

Question 2

```
            Total mugs
           5u^x5 (25u)
          ↙           ↘
   2u^x5 (10u)      3u^x5 (15u)
    Morning          Remainder
                    5u^x3 (15u)
                   ↙           ↘
             Afternoon        Evening
             3u^x3 (9u)      2u^x3 (6u)
```

Difference = 10u – 6u

   = 4u

4u = 40

1u = 40 ÷ 4

   = 10

25u = 25 × 10

   = 250

He sold **250 mugs** altogether at the flea market.

Question 3

```
        Total amount of
            money
         ↙           ↘
     TV set         Remainder
     $1400             5u
                    ↙        ↘
              Blue-ray       Bed
                2u          3u = 1/4 Total
```
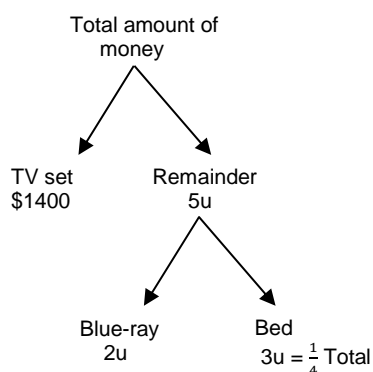
Question 3 (Cont.)

$\frac{1}{4}$ Total = 3u

$\frac{4}{4}$ Total = 3u × 4

   = 12u

TV set = 12u – 5u

   = 7u

7u = 1400

1u = 1400 ÷ 7

   = 200

3u (Bed) = 3 × 200

   = 600

Difference = 1400 − 600

   = 800

The TV set cost **$800 more** than the bed.

Question 4

```
          Total number
           of jerseys
          ↙          ↘
   Blue-striped     Remainder 1
      250           4u^x5 (20u)
                   ↙           ↘
            1u^x5 (5u)       3u^x5 (15u)
            Red-striped      Remainder 2
                             5u^x3 (15u)
                            ↙           ↘
                    Yellow-striped    Black-striped
                     2u^x3 (6u)       3u^x3 (9u) = 1/5 Total
```
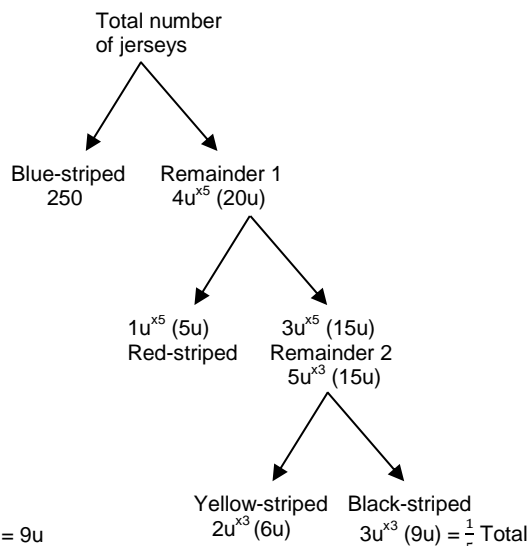
$\frac{1}{5}$ Total = 9u

$\frac{5}{5}$ Total = 9u × 5

   = 45u

Blue-striped = 45u – 20u

   = 25u

25u = 250

1u = 250 ÷ 25

   = 10

30u = 30 × 10

   = 300

300 red and blue-striped jerseys were sold altogether.

Question 5

```
          Total number
          of fruits (T)
          ↙          ↘
      Oranges        Remainder (R)
      2/3 T + $10
                    ↙           ↘
             Mangosteens       Left
              1/5 R + $8       $16
```
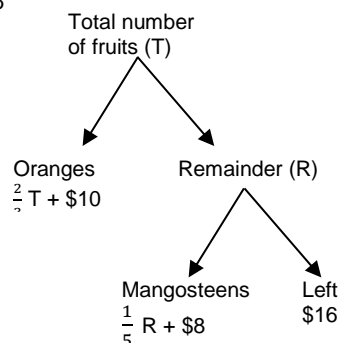
For more review questions, please visit www.onsponge.com.   101115

Question 5 (Cont.)

$\frac{4}{5}$ R = $8 + $16

    = $24

$\frac{1}{5}$ R = $24 ÷ 4

    = $6

$\frac{5}{5}$ R = $6 × 5

    = $30

$\frac{1}{3}$ T = $10 + $30

    = $40

$\frac{3}{3}$ T = 3 × $40

    = $120

(a)   Rachel had **$120** at first.

Amount spent (mangosteens) = $\frac{1}{5}$ R + $8
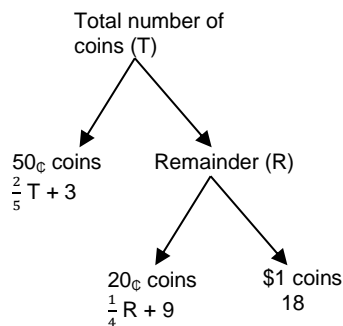
                      = $6 + $8

                      = $14

Number of kg = $14 ÷ $2

               = 7

(b)   She bought **7 kg** of mangosteens.

Question 6

Total number of coins (T)

50¢ coins $\frac{2}{5}$ T + 3   Remainder (R)

20¢ coins $\frac{1}{4}$ R + 9 $1 coins 18

Number of $1 coins = $18 ÷ $1

               = 18

$\frac{3}{4}$ R = 18 + 9

    = 27

$\frac{1}{4}$ R = 27 ÷ 3

    = 9

$\frac{4}{4}$ R = 4 × 9

    = 36

$\frac{3}{5}$ T = 36 + 3

    = 39

$\frac{1}{5}$ T = 39 ÷ 3

    = 13

Number of 20¢ coins = $\frac{1}{4}$ R + 9

                  = 9 + 9

                  = 18

Question 6 (Cont.)

Number of 50¢ coins = $\frac{2}{5}$ T + 3

                = 2 × 13 + 3

                = 29

Total amount = 18 × 0.2 + 29 × 0.5 + 18 × 1

            = 36.1

The total value of all the coins in the purse is **$36.10**.

Ask Yourself

1. 'equal amounts of money left' hints to start solving

    from the end of the problem sum by working backwards.

Think Further

The 'Numerator the Same' concept will still be used to arrive

at the total but the answer will change to $405.

Spent

$\frac{3x3}{10x3}$ C = $\frac{9}{20}$ L

$\frac{9}{30}$ C = $\frac{9}{20}$ L

Difference between Catherine and Lucy = 30u – 20u

                                         = 10u

10u = 225

1u = 225 ÷ 10

    = 22.5

Total spent = 9u × 2

                = 18u

18u = 18 × 22.5

    = 405

They spent **$405** altogether.

Let's Practise 7.6

Question 1

45% = $\frac{45}{100}$

      = $\frac{9}{20}$

$83\frac{1}{3}$ % = $83\frac{1}{3}$ ÷ 100

            = $\frac{5}{6}$

$\frac{9x5}{20x5}$ of Jillian = $\frac{5x9}{6x9}$ of Lenard

$\frac{45}{100}$ of Jillian = $\frac{45}{54}$ of Lenard

Total

J	:	L
100	:	54

Difference = 100u – 54u

                = 46u

46u = 92

1u = 92 ÷ 46

   = 2

154u = 154 × 2

      = 308

Their combined allowance is **$308**.

Question 2

$30\% = \frac{30}{300}$

$\quad = \frac{3}{10}$

$33\frac{1}{3}\% = 33\frac{1}{3} \div 100$

$\quad\quad = \frac{1}{3}$

$\frac{3}{10}$ of Eddie $= \frac{1\times3}{3\times3}$ of Benjamin

$\frac{3}{10}$ of Eddie $= \frac{3}{9}$ of Benjamin

Total

E	:	B
10	:	9

$19u = 380$

$1u = 380 \div 19$

$\quad = 20$

$10u = 10 \times 20$

$\quad\quad = 200$

Eddie has **200 stamps**.

Question 3

Left

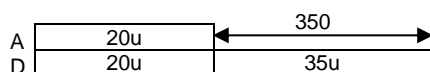$\frac{11\times2}{20\times2}$ of Alba $= \frac{2\times11}{5\times11}$ of Dale

$\frac{22}{40}$ of Alba $= \frac{22}{55}$ of Dale

Total

A	:	D
40	:	55

$\frac{1}{2}$ of Alba $= \frac{1}{2} \times 40u$

$\quad\quad = 20u$

		350
A	20u	
D	20u	35u

$35u = 350$

$1u = 350 \div 35$

$\quad = 10$

$55u = 55 \times 10$

$\quad\quad = 550$

Dale had **$550** at first.

Question 4

Left

$\frac{9}{50}$ of Raymond $= \frac{1\times9}{2\times9}$ of Zack

$\frac{9}{50}$ of Raymond $= \frac{9}{18}$ of Zack

Total

R	:	Z
50	:	18

$\frac{1}{5}$ of Raymond $= \frac{1}{5} \times 50u$

$\quad\quad\quad = 10u$

$\frac{1}{2}$ of Zack $= \frac{1}{2} \times 18u$

$\quad\quad\quad = 9u$

Question 4 (Cont.)

Difference $= 10u - 9u$

$\quad\quad\quad = 1u$

$1u = 10.5$

$50u = 50 \times 10.5$

$\quad\quad = 525$

Raymond had **$525** at first.

Question 5

Remained

$\frac{3}{4}$ of School A is 3 times of $\frac{1}{2}$ of School B.

$\frac{3}{4}$ of School A $= 3 \times \frac{1}{2}$ of School B

$\frac{3}{4}$ of School A $= \frac{3}{2}$ of School B

OR $\frac{3}{4}$ of School A is 3 times of $\frac{1}{2}$ of School B (the numerator of School A is now thrice of the numerator of School B, so there is nothing further needed to be done)

Total

A : B

4 : 2

$2u = 200$

$1u = 200 \div 2$

$\quad = 100$

$4u = 100 \times 4$

$\quad = 400$

There were **400 students** in School A at first.

Question 6

Left

$\frac{9}{10}$ of Jake is 2 times of $\frac{3}{5}$ of Kim.

$\frac{9}{10}$ of Jake $= 2 \times \frac{3}{5}$ of Kim

$\frac{9\times2}{10\times2}$ of Jake $= \frac{6\times3}{5\times3}$ of Kim (making numerators the same)

$\frac{18}{20}$ of Jake $= \frac{18}{15}$ of Kim

Total

J	:	K
20	:	15

$5u = 315$

$1u = 315 \div 5$

$\quad = 63$

Kim at first $= 15u = 15 \times 63$

$\quad\quad\quad = 945$

Amount Kim had left $= \frac{3}{5} \times 945$

$\quad\quad\quad\quad = 567$

Question 6 (Cont.)

OR

By making the numerator of Jake to be twice of the numerator of Kim.

What their numerators (left) should be

J	:	K
2^{x3}	:	1^{x3}
6^{x3}	:	3^{x3}
18	:	9

Left

$\frac{9x2}{10x2}$ of Jake is 2 times of $\frac{3x3}{5x3}$ of Kim.

$\frac{18}{20}$ of Jake is 2 times of $\frac{9}{15}$ of Kim (the numerator of Jake is now twice of the numerator of Kim).

Total

J	:	K
20	:	15

5u = 315

1u = 315 ÷ 5

   = 63

9u = 9 × 63

   = 567

Kim had **$567** left.

Ask Yourself

1.

J	:	G		G	:	A
40	:	100		140	:	100
2^{x7}	:	5^{x7}		7^{x5}	:	5^{x5}
14	:	35		35	:	25

J : G : A
14 : 35 : 25

Difference between Ginny and Annie = 35u − 25u
                                                                    = 10u

Jessie's percentage = $\frac{14}{10} \times 100\%$
                                    = 140%

Think Further

At first
J : G : A
14 : 35 : 25

G + A = 60u

$\frac{1}{5}$ of 60u = 12u

G : A : Total
3 : 1 : 4

4p = 12u

1p = 12u ÷ 4

   = 3u

Annie gave = 3u

Ginny gave = 9u

End
J : G : A
26 : 26 : 22

(a) **Annie** would have the least number of beads in the end.

(b) Most number of beads = Jessie/Ginny

   Difference = 26u − 22u

               = 4u

   Percentage = $\frac{4}{26} \times 100$

           ≈ 15.38%

Let's Practise 7.7

Question 1

J	D		J	K
120	100		60	:	100
6	5		3^{x2}	:	5^{x2}
			6	10

Summary
J : D : K
6 : 5 : 10

5u = 25

1u = 25 ÷ 5

   = 5

21u = 21 × 5

   = 105

They had a total of **105 crayons**.

Question 2

S	J		D	J
110	:	100		100	:	80
11^{x2}	:	10^{x2}		5^{x5}	:	4^{x5}
22	:	20		25	:	20

Summary
S : J : D
22 : 20 : 25

3u = 9

1u = 9 ÷ 3

   = 3

20u = 20 × 3

   = 60

Joey's score was **60**.

Question 3

At first
M	:	W
13^{x4}	:	5^{x4}
52	:	20

Women, end (65%) = $\frac{13}{20} \times 20u$

                    = 13u

Change in the no. of men = 52u − 13u

                    = 39u

Percentage change in the no. of men = $\frac{39}{52} \times 100\%$

                    = 75%

75% of the men must leave.

Question 4

Last week
C	:	M	:	C+M
3^{x4}	:	2^{x4}	:	5^{x4}
12	:	8	:	20

Sold
Last week (C+M)	:	This week (C+M)
4^{x5}	:	5^{x5}
20	:	25

$25u = 150$

$1u = 150 \div 25$

$\quad = 6$

Sold last week $= 20u$

$\qquad = 20 \times 6$

$\qquad = 120$

120 cannoli and mudpies were sold last week.

Question 5

C (PktA)	:	S (Pkt A)	:	Pkt A
3^{x4}	:	2^{x4}	:	5^{x4}
12	:	8	:	20

C (Pkt B)	:	C (Pkt A)
5^{x3}	:	4^{x3}
15	:	12

Pkt A	:	Pkt B
1^{x20}	:	2^{x20}
20	:	40

No. of strawberry cookies in Packet B = 40u – 15u = 25u

No. of strawberry cookies needed in Packet A to be equal

$= 12u - 8u$

$= 4u$

Percentage of strawberry cookies in Packet B to be transferred

$= \frac{4}{25} \times 100\%$

$= 16\%$

She would need to transfer **16%** of the strawberry cookies in Packet B into Packet A.

Question 6

C	:	P + S		P	:	S	:	P + S
9^{x4}	:	11^{x4}		3^{x11}	:	1^{x11}	:	4^{x11}
36	:	44		33	:	11	:	44

	C	:	P	:	S	Total
	36	:	33	:	11	80

Chicken Puff Left $= \frac{1}{4} \times 36u$

$\qquad\qquad\qquad = 9u$

Change				End			
C	:	P	: Total	C	:	P	: Total
9	:	33	: 42	9	:	11	: 20

Percentage sold $= \frac{12}{33} \times 100\%$

$\qquad\qquad\qquad = \mathbf{36\frac{4}{11}\%}$
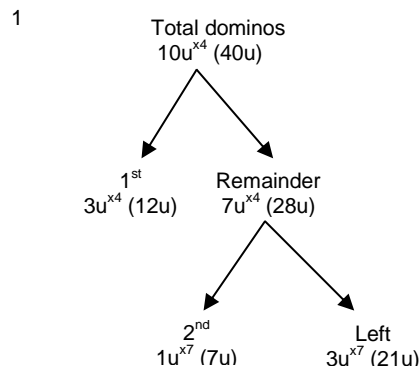
Ask Yourself
1. The total number of items (in this case, dominoes) in Day 1 and Day 2 remain unchanged since Kyle wanted to lay a pattern using all his dominoes.

Think Further

1

$21u = 84$

$1u = 84 \div 21$

$\quad = 4$

$40u = 40 \times 4$

$\quad = 160$

Kyle had **160 dominos** in his collection.

Let's Practise 7.8

Question 1

At first
Complete	:	Incomplete	:	Total
7	:	13	:	20

End
Complete	:	Incomplete	:	Total
3^{x5}	:	1^{x5}	:	4^{x5}
15	:	5	:	20

Ran in 2nd hr = 15u – 7u

$\qquad\qquad = 8u$

$8u = 16.8$

$1u = 16.8 \div 8$

$\quad = 2.1$

$20u = 20 \times 2.1$

$\quad = 42$

The total distance of the marathon was **42 km**.

Question 2

1st week
Not fixed	:	Fixed	:	Total
6^{x7}	:	5^{x7}	:	11^{x7}
42	:	35	:	77

2nd week
Not fixed	:	Fixed	:	Total
2^{x11}	:	5^{x11}	:	7^{x11}
22	:	55	:	77

Question 2 (Cont.)

$55u = 110$

$1u = 110 \div 55$

$\quad = 2$

$77u = 77 \times 2$

$\quad\quad = 154$

The model aeroplane required **154 pieces**.

Question 3

<u>At first</u>

N	:	R	:	Total
2^{x12}	:	5^{x12}	:	7^{x12}
24	:	60	:	84

<u>End</u>

N	:	R	:	Total
7^{x7}	:	5^{x7}	:	12^{x7}
49	:	35	:	84

25u   25u

$25u = 75$

$1u = 75 \div 25$

$\quad = 3$

$84u = 84 \times 3$

$\quad\quad = 252$

The girls shared **252 jelly beans**.

Question 4

<u>At first</u>

K	:	N	:	Total
1^{x4}	:	4^{x4}	:	5^{x4}
4	:	16	:	20

<u>End</u>

K	:	N	:	Total
3^{x5}	:	1^{x5}	:	4^{x5}
15	:	5	:	20

11u   11u

$11u = 66$

$1u = 66 \div 11$

$\quad = 6$

Karen sold (80%) $= \frac{4}{5} \times 15u$

$\quad\quad\quad\quad\quad = 12u$

$12u = 12 \times 6$

$\quad\quad = 72$

Amount collected by Karen $= 72 \times 1.25$

$\quad\quad\quad\quad\quad\quad\quad = 90$

She collected **$90** for the event.

Question 5

<u>At first</u>

B	:	G	:	Total
7^{x5}	:	5^{x5}	:	12^{x5}
35	:	25	:	60

<u>End</u>

B	:	G	:	Total
4^{x12}	:	1^{x12}	:	5^{x12}
48	:	12	:	60

13u   13u

$13u = 52$

$1u = 52 \div 13$

$\quad = 4$

$48u - 12u = 36u$

$36u = 36 \times 4$

$\quad\quad = 144$

144 more boys than girls would visit Germany.

Question 6

<u>At first</u>

R	:	W	:	Total
3^{x4}	:	2^{x4}	:	5^{x4}
12	:	8	:	20

<u>End</u>

R	:	W	:	Total
3^{x5}	:	1^{x5}	:	4^{x5}
15	:	5	:	20

3u   3u

$3u = 120$

$1u = 120 \div 3$

$\quad = 40$

Difference $= 12u - 8u$

$\quad\quad\quad\quad = 4u$

$4u = 4 \times 40$

$\quad\quad = 160$

There were **160 more** red than white ribbons in the box.

Ask Yourself

1. At the start of the lesson in the morning, there were some students in Mrs Wong's class. After recess, 10 boys joined her class for remedial lesson. As a result, the percentage of the number of girls in the classroom decreased from *60% to 45%.* How many girls were there in Mrs Wong's classroom?

Let's Practise 7.9

Question 1

<u>At first</u>

Chocolate : Vanilla

2^{x2}	:	3^{x2}
4	:	6

<u>End</u>

Chocolate : Vanilla

4	:	1

5u

$5u = 25$

$1u = 25 \div 5$

$\quad = 5$

$10u = 10 \times 5$

$\quad\quad = 50$

Jasmine bought **50 cupcakes** for her family.

Question 2

<u>At first</u>

Male : Female

5^{x2}	:	3^{x2}
10	:	6

<u>End</u>

Male : Female

2^{x5}	:	3^{x5}
10	:	15

9u

$9u = 81$

$1u = 81 \div 9$

$\quad = 9$

$6u = 6 \times 9$

$\quad\quad = 54$

There were **54 female** passengers at first.

Question 3

At first			End		
Male	:	Female	Male	:	Female
7^{x2}	:	13^{x2}	2^{x7}	:	3^{x7}
14	:	26	14	:	21

5u

14u + 26u = 40u

40u = 120

1u = 120 ÷ 40

    = 3

5u = 5 × 3

    = 15

15 females left the queue.

Question 4

At first			End		
50-cent	:	20-cent	50-cent	:	20-cent
1^{x3}	:	2^{x3}	3	:	2
3	:	6			

4u

1u = 100

4u = 4 × 100

    = 400 (no. of 20-cents coins used)

400 × 0.2 = 80

John spent **$80** on the toy.

Question 5

At first			End		
Cars	:	Motorcycles + Lorries	Cars	:	Motorcycles + Lorries
2^{x3}	:	3^{x3}	3^{x2}	:	1^{x2}
6	:	9	6	:	2

7u

4u = 40

1u = 40 ÷ 4

    = 10

Number of lorries and motorcycles that left the carpark, 7u =

7 × 10 = 70

Motorcycles that left the carpark = $\frac{3}{5}$ × 70

                                = 42

42 motorcycles left the car park.

Question 6

At first			End		
B	:	M	B	:	M
2^{x3}	:	3^{x3}	6	:	19
6	:	9			

10u

10u = 80

1u = 80 ÷ 10

    = 8

15u = 15 × 8

     = 120

There were **120 hairclips** in the box at first.

Ask Yourself

1. Since William's father's age is not the same every year, the numerator and denominator in comparison at every stage of their ages will differ.

Let's Practise 7.10

Question 1

Now				Future			
J	:	G	: Diff	J	:	G	: Diff
1^{x14}	:	5^{x14}	: 4^{x14}	11^{x4}	:	25^{x4}	: 14^{x4}
14	:	70	: 56	44	:	100	: 56

30u

Jason now, 14u = 13 − 6

              = 7

1u = 7 ÷ 14

    = 0.5

No. of years passed = 44u − 14u

                = 30u

30u = 30 × 0.5

     = 15

In **15 years' time**, Jordon's age will be 44% of Gordon's age.

Question 2

Past (4 yrs ago)			Now	Future (8 yrs later)			
W	: R	: Diff		W	: R	: Diff	
1^{x5}	: 4^{x5}	: 3^{x5}		3^{x3}	: 8^{x3}	: 5^{x3}	
5	: 20	: 15		9	: 24	: 15	

4u

9u − 5u = 4u

4u = 4 + 8

    = 12

1u = 12 ÷ 4

    = 3

Difference between Raymond and Wayne = 15u

15u = 15 × 3

     = 45

Raymond is **45 years older** than Wayne.

Question 3

At first				In the end			
L	:	T	: Diff	L	:	T	: Diff
11	:	20	: 9	5^{x9}	:	6^{x9}	: 1^{x9}
				45	:	54	: 9

34u

Difference = 45u − 11u

          = 34u

34u = 68

1u = 68 ÷ 34

    = 2

20u = 20 × 2

     = 40

There were **40 trees** at first.

Question 4

At first	End

At first
S : V : Diff
7^{x7} : 6^{x7} : 1^{x7}
49 : 42 : 7

End
S : V : Diff
20 : 13 : 7

Total (in the end) = 20u + 13u

= 33u

33u = 165

1u = 165 ÷ 33

= 5

Each type of puffs eaten = 49u – 20u

= 29u

29u = 29 × 5

= 145

145 puffs of each type were eaten.

Question 5

Pills collected every week
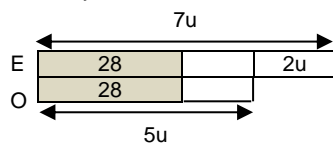
After some time (pills consumed by family)

Number of weeks to consume 364 pills = 364 ÷ 56

= 6.5

Mrs Elly's family consumed more each week = 468 ÷ 6.5

= 72

2u = 72

1u = 72 ÷ 2

= 36

Each week Mrs Elly's family consumed, 7u = 7 × 36

= 252

252 – 28 = 224

224 ÷ 14 = 16

(a) There are **16 family members** in Mrs Elly's family.

5u = 5 × 36

= 180

(b) Each week, Mrs Osman collects **180 vitamin pills**.

Question 6
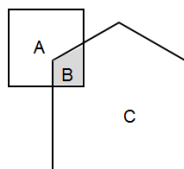
Square = A + B
Five-sided figure = B + C

Question 6 (Cont.)

A+B : C+B : Diff   A : C : Diff

1^{x7} : 3^{x7} : 2^{x7} 3 : 17 : 14
7 : 21 : 14

A : B : C
3 : 4 : 17

4u = 16

1u = 16 ÷ 4

= 4

17u = 17 × 4

= 68

The area of the remaining 5-sided figure is **68 cm²**.

Ask Yourself

1. Yes, all items have changed, including the total and the difference.

Let's Practise 7.11

Question 1

(Actual)	R	J
At first	$6u^{x3}$	$5u^{x5}$
Change	$+50^{x3}$	$+9^{x5}$
In the end	$5p^{x3}$	$3p^{x5}$

(Working)	R	J
At first	18u	25u
Change	+150	+45
In the end	15p	15p

7u = 105

1u = 105 ÷ 7

= 15

6u = 6 × 15

= 90

(a) Rick had **$90** at first.

5u + 9 = 5 × 15 + 9

= 84

(b) Joyce had **$84** in the end.

Question 2

(Actual)	A	B
At first	$3u^{x5}$	$7u^{x4}$
Change	$+17^{x5}$	$+5^{x4}$
In the end	$4p^{x5}$	$5p^{x4}$

(Working)	A	B
At first	15u	28u
Change	+85	+20
In the end	20p	20p

Question 2 (Cont.)

A | 15u | 65 | 20
B | 15u | 13u | 20

20p

13u = 65

1u = 65 ÷ 13

  = 5

10u = 10 × 5

  = 50

(a) There were **50 mangoes** in both boxes at first.

   3u + 17 = 3 × 5 + 17

         = 32

(b) There were **32 mangoes** in Box A in the end.

Question 3

(Actual)	$50¢$	$\$1$
At first	$5u^{x5}$	$4u^{x3}$
Change	-38^{x5}	-20^{x3}
In the end	$3p^{x5}$	$5p^{x3}$

(Working)	$50¢$	$\$1$
At first	25u	12u
Change	−190	−60
In the end	15p	15p

25u

50¢ | 15p | 60 | 130
$1 | 15p | 60

12u | 13u
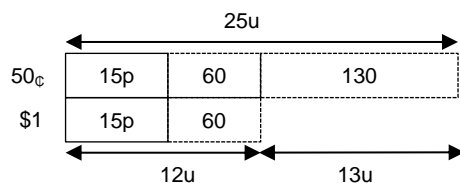
13u = 130

1u = 130 ÷ 13

  = 10

4u = 4 × 10

  = 40

(a) There were **40 $1 coins** at first.

5u − 38 = 5 × 10 − 38

     = 12

12 × $0.50 = $6

(b) There was **$6** worth of 50-cent coins in the end.

Question 4

(Actual)	J	C
At first	$27u^{x2}$	$20u^{x3}$
Change	-39^{x2}	-70^{X3}
In the end	$3p^{x2}$	$2p^{x3}$

(Working)	J	C
At first	54u	60u
Change	−78	−210
In the end	6p	6p

Question 4 (Cont.)

54u | 6u

J | 6p | 78
C | 6p | 78 | 132

60u
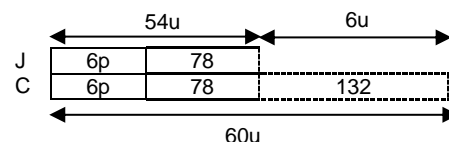
6u = 132

1u = 132 ÷ 6

  = 22

Difference at first, 7u = 7 × 22

            = 154

154 × 7.9 = 1216.6

Joreen spent **$1216.60** more on the shirts than Cailin.

Question 5

(Actual)	A	B
At first	$7u^{x5}$	$5u^{x3}$
Change	-110^{x5}	$+150^{X3}$
In the end	$3p^{x5}$	$5p^{x3}$

(Working)	A	B
At first	35u	15u
Change	−550	+450
In the end	15p	15p

35u

15p

A | 15u | 450 | 550
B | 15u | 450

20u
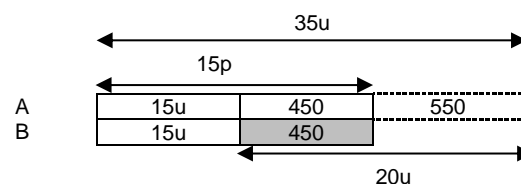
20u = 450 + 550

  = 1000

1u = 1000 ÷ 20

  = 50

Shop A's earnings, 7u – 110 = 7 × 50 – 110

                = 240

Shop A earned **$240** over the two days.

Question 6

(Actual)	Z	S
At first	$5u^{x2}$	$3u^{x3}$
Change	-15^{x2}	$+4^{x3}$
In the end	$3p^{x2}$	$2p^{x3}$

(Working)	Z	S
At first	10u	9u
Change	−30	+12
In the end	6p	6p

10u

6p

Z | 9u | 12 | 30
S | 9u | 12

1u
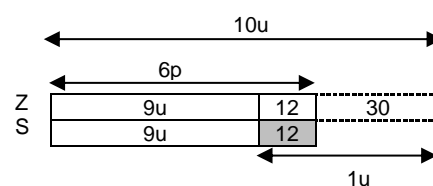
Question 6 (Cont.)

1u = 30 + 12

   = 42

Z, end, 5u − 15 = 5 × 42 − 15

                   = 195

S, end, 3u + 4 = 3 × 42 + 4

                  = 130

Zuwen and Samantha had **195 beads** and **130 beads** in the end.

Ask Yourself

1. The number of units of each item is provided as well as the total value of the items whereas in Guess and Check, the number of units representing each item will not be given.

Let's Practise 7.12

Question 1

Cost of 1 peach = 150% × $1.20

               = $1.80

Items	Quantity of items	×	Value of items ($)	Total value ($)
A	7u	×	1.2	8.4u
P	13u	×	1.8	23.4
Total	20u			31.8u

31.8u = 636

1u = 636 ÷ 31.8

   = 20

(a) 8.4u = 8.4 × 20

         = 168

The apricots cost **$168**.

(b) 13u = 13 × 20

        = 260

He ordered **260 peaches**.

Question 2

Quantity Bought

P	:	T		P	:	B
6$^{×2}$	:	5$^{×2}$		4$^{×3}$	:	5$^{×3}$
12	:	10		12	:	15

        P : T : B

       12 : 10 : 15

Value/Cost of items

Toy : Pullover

 3 : 5

3p = $12

1p = $12 ÷ 3

   = $4

Question 2 (Cont.)

5p = 5 × $4

   = $20

Summary of value/cost

Toy = $12

Book = $12 − $2

     = $10

Pullover = $20

Items	Quantity of items	×	Value of items ($)	Total value ($)
P	12u	×	20	240u
T	10u	×	12	120u
B	15u	×	10	150u
Total	37u			510u

510u = 19 380

1u = 19 380 ÷ 510

   = 38

No. of pullovers, 12u = 12 × 38

                 = 456

No. of toys, 10u = 10 × 38

            = 380

No. of books, 15u = 15 × 38

             = 570

Mrs Poon bought **456 pullovers, 380 toys and 570 books**.

Question 3

Value of items

Pin = $2.50

Band = 150% × $2.50

     = $3.75

Necklace = $2.50 × 2

        = $5

Items	Quantity of items	×	Value of items ($)	Total value ($)
P	5u	×	2.50	12.5u
B	4u	×	3.75	15u
N	1u	×	5	5u
Total	10u			42.5u

Difference in total value between hairbands and hairpins

= 15u − 12.5u

= 2.5u

2.5u = 105

1u = 105 ÷ 2.5

   = 42

Total items sold, 10u = 10 × 42

                = 420

Gillian sold a total of **420 items**.

Question 4

Items	Quantity of items	×	Value of items ($)	Total value ($)
20¢	1u	×	0.2	0.2u
50¢	2u	×	0.5	1u
$1	2u	×	1	2u
Total	5u			3.2u

Difference in total value of 50-cent coins and 20-cent coins

= 1u − 0.2u

= 0.8u

0.8u = 16

1u = 16 ÷ 0.8

   = 20

5u = 5 × 20

   = 100

Wayne had **100 coins altogether**.

Question 5

Items	Quantity of items	×	Value of items ($)	Total value ($)
A	13u	×	0.5	6.5u
P	7u	×	0.4	2.8u
Total	20u			9.3u

9.3u = 195.3

1u = 195.3 ÷ 9.3

   = 21

13u = 13 × 21

    = 273

(a) **273 apples** were sold.

2.8u = 2.8 × 21

    = 58.8

(b) **$58.80** was collected from the sale of the pears only.

Question 6

Items	Quantity of items	×	Value of items ($)	Total value ($)
B	2u	×	8	16u
G	3u	×	6	18u
Total	5u			34u

34u = 5440

1u = 5440 ÷ 34

   = 160

5u = 5 × 160

   = 800

800 students were at the party.

Question 1

	L	:	M	:	N	
At first	$5^{×5}$	:	$2^{×5}$	:	$6^{×5}$	30% of 30u = 9u
	25	:	10	:	30	M received
Change	+3		+6		−9	= 60% of 10u
End	28	:	16	:	21	= 6u

Question 1 (Cont.)

Difference in the end = 28u − 21u

                = 7u

7u = 210

1u = 210 ÷ 7

   = 30

30u = 30 × 30

    = 900

Nina had **900 buttons** at first.

Question 2

End

$\frac{3}{5}$C = 3u + 12

$\frac{1}{5}$C = 1u + 4

$\frac{5}{5}$C = 5u + 20

$\frac{1}{2}$L = 3u

$\frac{2}{2}$L = 6u
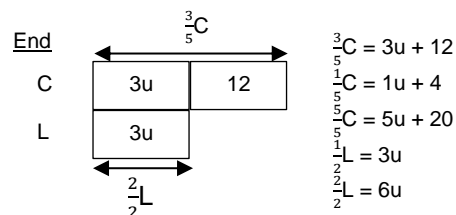
At first
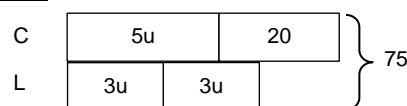
11u = 75 − 20

    = 55

1u = 55 ÷ 11

   = 5

L (given away) = 3 × 5

             = 15

C (given away) = 2 × 5 + 8

             = 18

Difference = 18 − 15

         = 3

3 more boxes of chamomile tea bags were given away than lavender tea bags.

Question 3

Items	Quantity of items	×	Value of items ($)	Total value ($)	
RB	8u	×	1p	8up	(28.8)
D	5u	×	1p + 1.5	5up + 7.5u	(40.5)
Total	13u			13up + 7.5u	(69.3)

8up = 28.8

1up = 28.8 ÷ 8

    = 3.6

5up = 5 × 3.6

    = 18

7.5u = 40.5 − 18

     = 22.5

1u = 22.5 ÷ 7.5

   = 3

(a) 5u = 5 × 3

     = 15

She bought **15 durian puffs**.

Question 3 (Cont.)

(b) Cost of 1 durian puffs = 40.5 ÷ 15

= 2.7

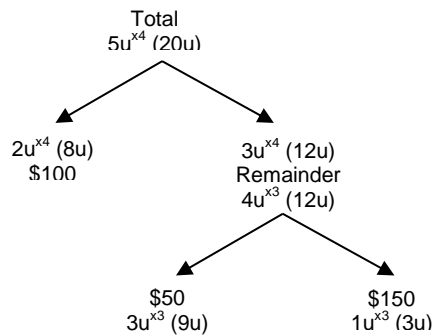Cost of 1 red bean cream puff = 2.7 − 1.5

= 1.20

Each red bean cream puff cost **$1.20**.

Question 4

Total
$5u^{x4}$ *(20u)*

$2u^{x4}$ (8u)
$100

$3u^{x4}$ (12u)
Remainder
$4u^{x3}$ (12u)

$50
$3u^{x3}$ (9u)

$150
$1u^{x3}$ *(3u)*

Items	Quantity of items	×	Value of items ($)	Total value ($)
$50	9u	×	50	450u
$100	8u	×	100	800u
$150	3u		150	450u
Total	20u			1700u

1700u = 20 400

1u = 20 400 ÷ 1700

= 12

3u = 3 × 12

= 36

There were **36 $150 dining vouchers**.

Question 5

P : C   E : P
8^{x3} : 5^{x3} 2^{x3} : 3^{x8}
24 : 15   6 : 24

Summary
P : C : E
8^{x3} : 5^{x3} : 2^{x3}
24 : 15 : 6

(Actual)	P	C
At first	$24u^{x5}$	$15u^{x4}$
Change	-44^{x5}	-10^{x4}
In the end	$4p^{x5}$	$5p^{x4}$

(Working)	P	C
At first	120u	60u
Change	−220	−40
In the end	20p	20p

120u

P	20p	40	180
C	20p	40	

60u | 60u
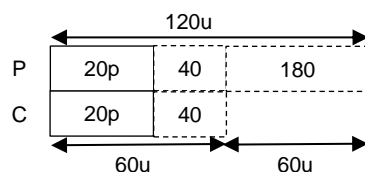
60u = 180

1u = 180 ÷ 60

= 3

Question 5 (Cont.)

16u = 16 × 3

= 48

Evelyn had **48 arrows** at first.

Question 6

(Actual)	W	M
Case 1	$1u^{x2}$	3u
Change	-6^{x2}	−27
Case 2	$1p^{x2}$	2p

(Working)	W	M
Case 1	2u	3u
Change	−12	−27
Case 2	2p	2p

2u

W	2p	12	
M	2p	12	15

1u

3u
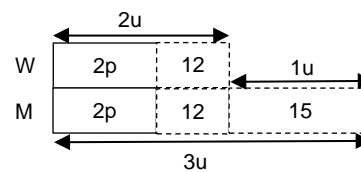
1u = 15

W (at first) = 1u − 6

= 15 − 6

= 9

M (at first) = 3u

= 3 × 15

= 45

Total (at first) = 45 + 9

= 54

There were **54 people** at the exhibition.

Question 7

C : A   W : M : A
4^{x4} : 1^{x4} 3 : 1 : 4
16 : 4

	At first				In the end	
C :	W :	M :	M+C		W :	M+C
16^{x9} :	3^{x9} :	1^{x9} :	17^{x9}		1^{x17} :	7^{x17}
144 :	27 :	9 :	153		17 :	153

Difference (at first) = 27u − 9u

= 18u

18u = 72

1u = 72 ÷ 18

= 4

W (left) = 27u − 17u

= 10u

10u = 10 × 4

= 40

40 women left the room.

Question 8

Case1: N $\xrightarrow{65}$ A   Case1: N $\xrightarrow{5}$ A
N : A : Total   N : A : Total
4^{x2} : 7^{x2} : 11^{x2} 1^{x11} : 1^{x11} : 2^{x11}
8 : 14 : 22   11 : 11 : 22

Question 8 (Cont.)

11u − 8u = 3u

3u = 65 − 5

   = 60

1u = 60 ÷ 3

   = 20

Case 1: 8u + 65 = 8 × 20 + 65

                = 225

Case 2 (check): 11u + 5 = 11 × 20 + 5

                       = 225

Natasha has **225** coloured pencils.

Question 9

$$\begin{array}{ccccc} G & : & B & : & I \\ 1^{x15} & : & 3^{x15} & : & 4^{x15} \\ 15 & : & 45 & : & 60 \end{array} \qquad \begin{array}{ccccc} G & : & B & : & E \\ 7^{x3} & : & 3^{x3} & : & 10^{x3} \\ 21 & : & 9 & : & 30 \end{array}$$

$$\begin{array}{ccc} E & : & I \\ 1^{x30} & : & 2^{x30} \\ 30 & : & 60 \end{array}$$

Boys in Island Junior (end) = $\frac{130}{100}$ × 45u

                         = 58.5u

Girls moved from Emerald Junior = $\frac{1}{3}$ × 21u

                              = 7u

Girls in Island Junior (end) = 15u + 7u

                           = 22u

Difference in boys (end) = 58.5u − 9u

                        = 49.5u

49.5u = 396

1u = 396 ÷ 49.5

   = 8

Total in Island Junior (end) = 58.5u + 22u

                            = 80.5u

80.5u = 80.5 × 8

      = 644

644 children were at Island Junior in the end.

Question 10

$\frac{3}{5}$ J (thrice) = $\frac{2}{7}$ J (Make numerator of Jonas to be thrice that of Gordan)

$\frac{6}{10}$ J (thrice) = $\frac{2}{7}$ J

$$\begin{array}{ccc} J & : & G \\ 10^{x3} & : & 7^{x3} \\ 30 & : & 21 \end{array} \qquad \begin{array}{ccc} J & : & M \\ 3^{x10} & : & 5^{x10} \\ 30 & : & 50 \end{array}$$

Summary

$$\begin{array}{ccccc} J & : & G & : & M \\ 30 & : & 21 & : & 50 \end{array}$$

Total = 30u + 21u + 50u

     = 101u

101u = 202

1u = 202 ÷ 101

   = 2

J (30u) = 30 × 2

        = 60

G (21u) = 21 × 2

        = 42

M (50u) = 50 × 2

        = 100

Jonas, Maddox and Gordon had **60**, **42** and **100** cards respectively.

Question 11

(Actual)	$2	$5
Case 1	12u^{x5}	7u^{x4}
Change	−20^{x5}	+15^{x4}
Case 2	4p^{x5}	5p^{x4}

(Working)	$2	$5
Case 1	60u	28u
Change	−100	+60
Case 2	20p	20p
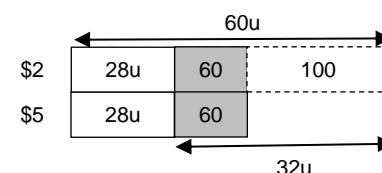
32u = 60 + 100

    = 160

1u = 160 ÷ 32

   = 5

No. of $2-notes (at first) = 12u

                          = 12 × 5

                          = 60

No. of $5-notes (at first) = 7u

                          = 7 × 5

                          = 35

Total value = 60 × $2 + 35 × $5

           = $295

Michelle had **$295** at first.

Question 12

(Actual)	S	E
Case 1	1u^{x5}	7u
Change	+5^{x5}	−11
Case 2	1p^{x5}	5p

(Working)	S	E
Case 1	5u	7u
Change	+25	−11
Case 2	5p	5p

2u = 25 + 11

   = 36
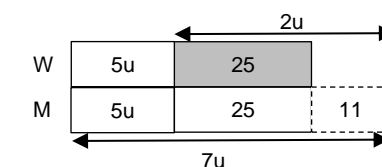
Question 12 (Cont.)

$1u = 36 \div 2$

$\quad = 18$

Stamps (at first) = $1u + 5$

$\qquad = 18 + 5$

$\qquad = 23$

Envelopes (at first) = $7u$

$\qquad = 7 \times 18$

$\qquad = 126$

Difference = $126 - 23$

$\qquad = 103$

Angelica had **103 more** envelopes than stamps.

Answers to Unit 8.1

Let's Get Started 8.1

1. Volume of cuboid = Length × Breadth × Height
$\qquad = 25 \text{ cm} \times 9 \text{ cm} \times 12 \text{ cm}$
$\qquad = \textbf{2700 cm}^\textbf{3}$

2. Volume of cuboid = Length × Breadth × Height
$\qquad = 8 \text{ cm} \times 7 \text{ cm} \times 18 \text{ cm}$
$\qquad = \textbf{1008 cm}^\textbf{3}$

3. Volume of cuboid = Length × Breadth × Height
$\qquad = 32 \text{ cm} \times 32 \text{ cm} \times 40 \text{ cm}$
$\qquad = \textbf{40 960 cm}^\textbf{3}$

Ask Yourself

1. Explore the different ways in which the small boxes can be orientated to fit into the big box.

Let's Practise 8.1

Question 1

Greatest number of blocks that fits its length = $20 \div 6$
$\qquad = 3R2 \text{ cm}$
Greatest number of blocks that fits its width = $16 \div 8$
$\qquad = 2$
Greatest number of blocks that fits its height = $10 \div 4$
$\qquad = 2R2 \text{ cm}$
Total number of wooden blocks = $3 \times 2 \times 2$
$\qquad = 12$
Anna can pack **12 wooden blocks** into the box.

Question 2

Number of cubes that fits its length = $32 \div 2$
$\qquad = 16$
Number of cubes that fits its width
$= 23 \div 2$
$= 11R1 \text{ cm}$ (use the least whole number value only)
Number of cubes that fits its height
$= 13 \div 2$
$= 6R1 \text{ cm}$ (use the least whole number value only)
Total number of cubes = $16 \times 11 \times 6$
$\qquad = 1056$

1056 2-cm cubes can fit into the box.

Answers to Unit 8.1

Question 3

$80\% = 0.8$

Height of cuboid = $0.8 \times 19 \text{ cm}$

$\qquad = 15.2 \text{ cm}$

Volume = $19 \text{ cm} \times 19 \text{ cm} \times 15.2 \text{ cm}$

$\qquad = 5487.2 \text{ cm}^3$

The volume of cuboid is **5487.2 cm$^\textbf{3}$**.

Question 4

Volume of 1 cube = $7 \text{ cm} \times 7 \text{ cm} \times 7 \text{ cm}$

$\qquad = 343 \text{ cm}^3$

Number of cubes that make up the solid = 6

Volume of solid = $6 \times 343 \text{ cm}^3$

$\qquad = 2058 \text{ cm}^3$

(a) The volume of the solid figure is **2058 cm$^\textbf{3}$**.

Area of 1 face = $7 \text{ cm} \times 7 \text{ cm}$

$\qquad = 49 \text{ cm}^2$

Number of faces on the surface = $6 + 6 + 12$

$\qquad = 24$

Total surface area solid = $24 \times 49 \text{ cm}^2$

$\qquad = 1176 \text{ cm}^2$

(b) The total surface area of the solid figure is **1176 cm$^\textbf{2}$**.

Question 5

H	:	L		H	:	B
130	:	100		120	:	100
13$^{\times 6}$	:	10$^{\times 6}$		6$^{\times 13}$	:	5$^{\times 13}$
78	:	60		78	:	65

Summary

	H	:	L	:	B
	78	:	60	:	65

Height = $78u$

$78u = 39 \text{ cm}$

$1u = 39 \text{ cm} \div 78$

$\quad = 0.5 \text{ cm}$

$60u = 60 \times 0.5 \text{ cm}$

$\quad = 30 \text{ cm}$

$65u = 65 \times 0.5 \text{ cm}$

$\quad = 32.5 \text{ cm}$

Volume = $30 \text{ cm} \times 32.5 \text{ cm} \times 39 \text{ cm}$

$\qquad = 38\ 025 \text{ cm}^3$

The volume of the cuboid is **38 025 cm$^\textbf{3}$**.

Question 6

Total number of edges = 20

Length of one edge = $120 \text{ cm} \div 20$

$\qquad = 6 \text{ cm}$

Volume of one cube = $6 \text{ cm} \times 6 \text{ cm} \times 6 \text{ cm}$

$\qquad = 216 \text{ cm}^3$

Question 6 (Cont.)

Volume of solid = 3 × 216 cm^3

$\qquad\qquad\qquad$ = 648 cm^3

The volume of solid is **648 cm^3**.

Question 7

Number of cubes that make up solid = 30

Volume of 1 cube = 3 cm × 3 cm × 3 cm

$\qquad\qquad\qquad\quad$ = 27 cm^3

Volume of figure = 30 × 27 cm^3

$\qquad\qquad\qquad\quad$ = 810 cm^3

(a) The volume of the solid figure is **810 cm^3**.

(b) Since the figure is placed on the floor when the paint is poured onto the solid, the faces at the bottom of the solid will not be coated with paint. So, only **11 cubes** will have only 2 of its faces coated with paint.

Let's Get Started 8.2

(a) Volume of water = 42 cm × 22 cm × 8 cm

$\qquad\qquad\qquad\quad$ = 7392 cm^3

$\qquad\qquad\qquad\quad$ **= 7 ℓ 392 mℓ**

$\quad$ Capacity = 42 cm × 22 cm × 15 cm

$\qquad\qquad\quad$ = 13 860 cm^3

$\qquad\qquad\quad$ **= 13.86 ℓ**

(b) Height of water = $\frac{4}{5}$ × 24 cm

$\qquad\qquad\qquad\quad$ = 19.2 cm

$\quad$ Volume of water = 35 cm × 10 cm × 19.2 cm

$\qquad\qquad\qquad\quad$ = 6720 cm^3

$\qquad\qquad\qquad\quad$ **= 6 ℓ 72 mℓ**

$\quad$ Capacity = 35 cm × 10 cm × 24 cm

$\qquad\qquad\quad$ = 8400 cm^3

$\qquad\qquad\quad$ **= 8.4 ℓ**

(c) Volume of water = 17 cm × 17 cm × 5 cm

$\qquad\qquad\qquad\quad$ = 1445 cm^3

$\qquad\qquad\qquad\quad$ **= 1 ℓ 445 mℓ**

$\quad$ Capacity $\quad$ = 17 cm × 17 cm × 17 cm

$\qquad\qquad\qquad$ = 4913 cm^3

$\qquad\qquad\qquad$ **= 4.913 ℓ**

(d) 3u = 3 cm

$\quad$ 1u = 3 cm ÷ 3

$\qquad$ = 1 cm

$\quad$ 7u = 7 × 1 cm = 7 cm

$\quad$ Volume of water = 10 cm × 10 cm × 7 cm

$\qquad\qquad\qquad\qquad$ = 700 cm^3 = **0 ℓ 700 mℓ**

$\quad$ Capacity = 10 cm × 10 cm × 10 cm

$\qquad\qquad\quad$ = 1000 cm^3 = **1 ℓ**

Ask Yourself

1. Yes. Both refers to the height of saline in the canister. '20% filled with saline' refers to the amount of saline in the canister 'at first' and '$\frac{1}{2}$ full' refers to the amount of saline in the canister 'in the end'.

2. The fraction '$\frac{1}{2}$' refer to half of the height of the rectangular canister.

Let's Practise 8.2

Question 1

Change in height of cooking oil = $\frac{2}{3} - \frac{3}{8}$

$\qquad\qquad\qquad\qquad\qquad$ = $\frac{7}{24}$

$\frac{7}{24}$ of total $\quad$ = 2.1 ℓ

$\frac{1}{24}$ of total $\quad$ = 2.1 ℓ ÷ 7

$\qquad\qquad\quad$ = 0.3 ℓ

Unfilled $\qquad$ = 1 − $\frac{2}{3}$

$\qquad\qquad\qquad$ = $\frac{1}{3}$

$\qquad\qquad\qquad$ = $\frac{8}{24}$

$\frac{8}{24}$ of total $\quad$ = 8 × 0.3 ℓ

$\qquad\qquad\quad$ = 2.4 ℓ

2.4 litres more cooking oil would be needed to completely fill the container.

Question 2

Amount of water in fish tank

= $\frac{4}{7}$ × 80 cm × 50 cm × 28 cm

= 64 000 cm^3

= 64 ℓ

Amount of water left in container

= 68.02 ℓ − 64 ℓ

= 4.02 ℓ

= 4 ℓ 20 mℓ

4 ℓ 20 mℓ of water is left in the cylindrical container.

Question 3

Volume of water in Container M

= 5 cm × 10 cm × 24 cm

= 1200 cm^3

5u = 1200 cm^3

1u = 1200 cm^3 ÷ 5

$\quad$ = 240 cm^3

2u = 2 × 240 cm^3

$\quad$ = 480 cm^3

$\quad$ = 480 mℓ

(a) **480 mℓ** of water was poured into Container N.

Height of water in Container N = 480 cm^3 ÷ 5 cm ÷ 10 cm

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ = 9.6 cm

Question 3 (Cont.)

Height of water remained in Container M = 24 cm − 9.6 cm

= 14.4 cm

(b) The height of the water level in Container M is **14.4 cm**.

Question 4

Volume of water in container at first

$= \frac{3}{4} \times 700$ cm^3

= 525 cm^3

Volume of water poured into tank

= 525 cm^3 ÷ 2

= 262.5 cm^3

Volume of water in tank at first

= 5 cm × 5 cm × 9 cm

= 225 cm^3

Total volume of water in tank, end

= 225 cm^3 + 262.5 cm^3

= 487.5 cm^3

= 487.5 mℓ

There was **487.5 mℓ** of water in the tank now.

Question 5

5 pails = 60 cm × 60 cm × 0.25 cm

= 900 cm^3

1 pail = 900 cm^3 ÷ 5

= 180 cm^3

= 180 mℓ

(a) Each pail can hold **180 mℓ** of petrol.

Height of petrol in the container at first

= 0.3 × 60 cm

= 18 cm

Amount of petrol left in container

= 60 cm × 60 cm × (18 cm − 0.25 cm)

= 63 900 cm^3

= 63.9 ℓ

Time taken to completely drained the petrol

= 63.9 ℓ ÷ 3 ℓ/min

= 21.3 min

(b) It would take **21.3 min** to drain the petrol completely from the container.

Question 6

Volume of orange juice dispensed out

= 15 min × 200 mℓ/min

= 3000 mℓ

= 3 ℓ

Amount of orange juice left in dispenser

= 5.7 ℓ − 3 ℓ = 2.7 ℓ

Percentage left $= \frac{2.7}{5.7} \times 100\%$

≈ 47.37% (2 d.p.)

Question 6 (Cont.)

(a) **47.37%** of the orange juice in the cylindrical dispenser was left.

Amount of orange juice in container in the end

$= \frac{2}{3} \times 18$ cm × 18 cm × 18 cm

= 3888 cm^3

= 3.888 ℓ

Amount of orange juice in container at first

= 3.888 ℓ − 3ℓ

= 0.888 ℓ

(b) There was **0.888 ℓ** of orange juice in the container at first.

Empowered Learning

While every care has been taken to compile this answer booklet, errors may still arise in the course of compilation and production. If you notice any error, kindly write to feedback@onsponge.com so that we can review it.