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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.

Solutions to Unit 1.1 More than/Less than Let's Get Started 1.1

2.

A		48
B		

3.

E		32
D		

4.

F	1u	12	1u	12	1u	12	} 120
G	1u	12					

Ask yourself

- There are 80 more men than women at the seminar at first.

Let's Practise 1.1

Question 1

At first

B		20
R		

End

B	1u	32	20
R	1u	2u	

$$2u = 32$$

$$1u = 32 \div 2$$

$$= 16$$

$$1u + 52 = 16 + 52$$

$$= 68$$

Bernard had **\$68** at first.

Question 2

At first

B		60	} ?
R			

End

B	1u	90	60
R	1u	1u	

$$1u = 90$$

$$4u + 60 = 4 \times 90 + 60$$

$$= 420$$

Penny had **420** ribbons a first.

Solutions to Unit 1.1 (Cont.)

Question 3

At first

F		135
B		

End

	3u		
F	1u	240	135
B	1u	240	390
	4u		

$$3u = 240 + 390$$

$$= 630$$

$$1u = 630 \div 3$$

$$= 210$$

$$F \text{ (at first)} = 210 + 240 + 135$$

$$= 585$$

$$B \text{ (at first)} = 210 + 240$$

$$= 450$$

$$585 + 450 = 1035$$

1035 items were on sale at first.

Question 4

At first

S	1u	116	} 636
C	1u		

$$2u = 636 - 116$$

$$= 520$$

$$1u = 520 \div 2$$

$$= 260$$

$$S \text{ (at first)} = 260 + 116$$

$$= 376$$

$$C \text{ (at first)} = 260$$

End

$$S = 376 - 226$$

$$= 150$$

$$C = 150 \times 4$$

$$= 600$$

$$600 - 260 = 340$$

Andrew bought **340** toy cars.

Question 5

At first

B		50
C		

End

	4u			
B	1u	1u	50	12
C	1u	1u		
	2u			

$$2u = 50 + 12$$

$$= 62$$

$$1u = 62 \div 2$$

$$= 31$$

Solutions to Unit 1.1 (Cont.)

Question 5 (Cont.)

$$2u + 50 = 2 \times 31 + 50$$

$$= 112$$

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

Question 6

At first

S	1u	1u	30
M	1u		

End

		$2u$	
S	1u	12	30
M	1u	12	

$$2u = 12 + 30 + 12$$

$$= 54$$

$$1u = 54 \div 2$$

$$= 27$$

$$1u + 12 = 27 + 12$$

$$= 39$$

Wendy had **39** stickers at first.

Solutions to Unit 1.2 Internal Transfer and Total Unchanged

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

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

Answer

$$45 + 230 + 45 = 320$$

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

Solutions to Unit 1.2 (Cont.)

Ask Yourself

- Mandy has more money than Kurt. (Hence, the bar model representing Mandy is longer than that of Kurt.)
- Mandy gave some money to Kurt.
- The total amount of money they had remained the same.

Think Further

At first

M	1p	80
K	1p	

End

M	1u		
K	1u	1u	1u

$$4u = 440$$

$$1u = 440 \div 4$$

$$= 110$$

$$2p = 440 - 80$$

$$= 360$$

$$1p = 360 \div 2$$

$$= 180$$

$$M \text{ (at first)} = 1p + 80$$

$$= 180 + 80$$

$$= 260$$

$$M \text{ (gave)} = 260 - 110$$

$$= 150$$

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

Let's Practise 1.2

Question 1

At first

A		23
B		

End

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

$$3u = 146 + 23 + 146$$

$$= 315$$

$$1u = 315 \div 3$$

$$= 105$$

$$4u - 146 = 4 \times 105 - 146$$

$$= 274$$

Amos had **274** marbles at first.

Solutions to Unit 1.2 (Cont.)

Question 2

At first

X		204
Y		

End

	6u			
X	1u	123	204	123
Y	1u	123		
	5u			

$$5u = 123 + 204 + 123$$

$$= 450$$

$$1u = 450 \div 5$$

$$= 90$$

$$7u = 7 \times 90$$

$$= 630$$

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

Question 3

At first

D		
S		300

End

	1u			2u	
D		46			
S		46	208		46
	3u				

$$2u = 208$$

$$1u = 208 \div 2$$

$$= 104$$

$$4u = 4 \times 104$$

$$= 416$$

There were **416** participants altogether.

Question 4

At first

\$2		80
\$1		

End

	2u			
\$2		30	35	15
\$1		30		
	1u		1u	

$$1u = 35$$

$$\text{No. of \$2-notes} = 35 \times 2$$

$$= 70$$

$$\text{No. of \$1-coins} = 50 - 15$$

$$= 35$$

$$\text{Amount of money} = 70 \times \$2 + 35 \times \$1$$

$$= \$175$$

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

Solutions to Unit 1.2 (Cont.)

Question 5

At first

A			
B			

End

	5u						
A	1u	50	1u	50	1u	50	50
B	1u	50					
	4u						

$$2u = 4 \times 50$$

$$= 200$$

$$1u = 200 \div 2$$

$$= 100$$

$$5u - 50 = 5 \times 100 - 50$$

$$= 450$$

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

Question 6

At first

A				
B				

End

	7u							
A	1u	30	1u	30	1u	30	1u	30
B	1u	30						
	6u							

$$3u = 5 \times 30$$

$$= 150$$

$$1u = 150 \div 3$$

$$= 50$$

$$1u + 30 = 50 + 30$$

$$= 80$$

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

Solutions to Unit 1.3 Equal Stage

Let's Get Started 1.3

1.

At first

A	
B	

End

A	1u	23
B	1u	23
	55	
	2u	

$$2u = 23 + 55$$

$$= 78$$

$$1u = 78 \div 2$$

$$= 39$$

Solutions to Unit 1.3 (Cont.)

2.

End

A	
B	

At first

A	1u	38	
B	1u	38	20

$$2u = 38 + 20$$

$$= 58$$

$$1u = 58 \div 2$$

$$= 29$$

3.

End

E	1u
F	1u

At first

E	1u		124	} 235
F	1u	1u		

$$3u = 235 - 124$$

$$= 111$$

$$1u = 111 \div 3$$

$$= 37$$

4.

At first

G	
H	

End

G	1u	10	12
H	1u	10	12

$$1u = 10$$

Ask Yourself

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

Think Further

We can solve from the beginning because a comparison between Billy and Anna was provided. It was challenging to solve from 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	

Solutions to Unit 1.3 (Cont.)

Question 1 (Cont.)

End

W	1u	30	
M	1u	30	12

$$1u = 30 + 12$$

$$= 42$$

$$1u + 30 = 42 + 30$$

$$= 72$$

$$\text{Total} = 72 \times 2$$

$$= 144$$

144 people were at the opening ceremony at first.

Question 2

Monday

A	
B	

Tuesday

A	1u	16	29
B	1u	16	

$$3u = 16 + 29$$

$$= 45$$

$$1u = 45 \div 3$$

$$= 15$$

$$1u + 16 = 15 + 16$$

$$= 31$$

$$\text{Total coins at first} = 31 \times 2$$

$$= 62$$

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

Question 3

At first

A	
B	

End

A	1u	30	6
B	1u	30	6

$$3u = 30$$

$$1u = 30 \div 3$$

$$= 10$$

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

$$= 46$$

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

Solutions to Unit 1.4 (Cont.)

Question 3 (Cont.)

$$\begin{aligned}
 5u &= 34 + 36 \\
 &= 70 \\
 1u &= 70 \div 5 \\
 &= 14 \\
 1u + 34 &= 14 + 34 \\
 &= 48
 \end{aligned}$$

Dylan had **48** cards.

Question 4

At first

A		26
B		

End

A	1u	14	26
B	1u	14	4u

$$\begin{aligned}
 4u &= 14 + 26 \\
 &= 40
 \end{aligned}$$

$$\begin{aligned}
 1u &= 40 \div 4 \\
 &= 10
 \end{aligned}$$

$$\begin{aligned}
 6u &= 6 \times 10 \\
 &= 60
 \end{aligned}$$

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

Question 5

At first

P		142
C		

End

P	1u	38	142
C	1u	38	

$$2u = 38$$

$$\begin{aligned}
 1u &= 38 \div 2 \\
 &= 19
 \end{aligned}$$

$$\begin{aligned}
 3u &= 3 \times 19 \\
 &= 57
 \end{aligned}$$

Celine had **57** buttons.

Question 6

At first

P		240
T		

End

P	1u	30	240
T	1u	1u	

$$1u = 30$$

$$\begin{aligned}
 1u + 270 &= 30 + 270 \\
 &= 300
 \end{aligned}$$

Percy brought **\$300** to shop.

Solutions to Unit 1.5 Difference Unchanged

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 realise that the age difference between the student and the teacher remains the same throughout.

Ask Yourself

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

Think Further

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

$$\begin{aligned}
 2u &= 64 - 28 - 6 - 6 \\
 &= 24
 \end{aligned}$$

$$\begin{aligned}
 1u &= 24 \div 2 \\
 &= 12
 \end{aligned}$$

$$\begin{aligned}
 \text{Josh's age in 9 years' time} &= 12 + 9 \\
 &= 21
 \end{aligned}$$

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

Question 2

M	1u	12
Y	1u	

$$\begin{aligned}
 2u &= 14 - 12 \\
 &= 2
 \end{aligned}$$

$$\begin{aligned}
 1u &= 2 \div 2 \\
 &= 1
 \end{aligned}$$

$$\begin{aligned}
 \text{M (now)} &= 1 + 12 \\
 &= 13
 \end{aligned}$$

$$\begin{aligned}
 \text{M (in 3 years' time)} &= 13 + 3 \\
 &= 16
 \end{aligned}$$

Mary will be **16 years old** in 3 years' time.

Question 3

6 years' ago

$$K = 3u$$

$$S = 1u$$

$$\text{Difference} = 2u$$

$$2u = 24$$

$$\begin{aligned}
 1u &= 24 \div 2 \\
 &= 12
 \end{aligned}$$

$$\begin{aligned}
 \text{In 10 years' time} &= 3 \times 12 + 10 + 6 \\
 &= 52
 \end{aligned}$$

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

Solutions to Unit 1.5 (Cont.)

Question 4

At first

Shirts = 1210

Shorts = 1910

Difference = 700

$14u = 700$

$1u = 700 \div 14$

$= 50$

Shirts sold = $1210 - 50$

$= 1160$

Total sold = 1160×2

$= 2320$

2320 shirts and pairs of shorts were sold altogether.

End (left)

Shirts = $1u$

Shorts = $15u$

Difference = $14u$

Question 5

At first

$P = 1u$

$R = 5u$

Difference = $4u$

$4u = 60$

$1u = 60 \div 4$

$= 15$

Pens sold = $15 - 12$

$= 3$

Amount of money received = $(3 \times \$3) + (3 \times \$2)$

$= \$15$

Mr Kim received **\$15** from the sale of the two items.

End (left)

$P = 72 \div 6$

$= 12$

$R = 72$

Difference = 60

Question 6

At first

$J = 200$

$H = 840$

Difference = 640

$2u = 640$

$1u = 640 \div 2$

$= 320$

(a) Each boy received = $320 - 200$

$= 120$

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

Both boys (received) = 2×120

$= 240$

(b) $300 - 240 = 60$

Ian was left with **60** marbles.

End (left)

$J = 1u$

$H = 3u$

Difference = $2u$

Solutions to Unit 1.6 Repeated Items

Let's Get Started 1.6

1.

A	1u	1u	1u	1u	1u	1u
B	1u	1u				
C	1u					

(Ben is repeated.)

2.

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

(Kenny is repeated.)

Solutions to Unit 1.6 (Cont.)

3.

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

G	1u	1u
W	1u	

F (3u)

(Female is repeated.)

4. $A = 2u \times 2 (4u)$
 $B + C = 1u \times 2 (2u)$

$B = 1u$

$C = 1u$

$B + C = 2u$

Summary

$A = 4u$

$B = 1u$

$C = 1u$

(Ben and Cecil are repeated.)

Ask Yourself

- The number of children is being repeated as boys and girls.
- It is repeated as a group (boys and girls).

Think Further

B	1u	1u
G	1u	
A		200

$6u = 220 + 200$

$= 420$

$1u = 420 \div 6$

$= 70$

$3u - 200 = 3 \times 70 - 200$

$= 210 - 200$

$= 10$

There were **10** adults at the open-air movie event.

Let's Practise 1.6

Question 1

	G	W
F	1u	1u
M	1u	1u

$10u = 300$

$1u = 300 \div 10$

$= 30$

$5u = 5 \times 30$

$= 150$

There were **150** females.

Question 2

$C = 1u$

$A + B = 4u$

$A = 1u \times 4 (4u)$

$B = 2u \times 4 (8u)$

$A + B = 3u \times 4 (12u)$

Difference = $3u - 1u$

$= 2u$

$2u = 80$

$1u = 80 \div 2$

$= 40$

Summary

$A = 1u$

$B = 3u$

$C = 1u$

Total = $1u + 3u + 1u$

$= 5u$

Solutions to Unit 1.6 (Cont.)

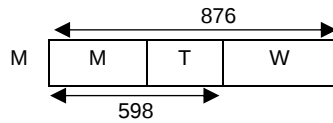
Question 2 (Cont.)

$$5u = 5 \times 40$$

$$= 200$$

The three girls had **\$200** altogether.

Question 3



$$\text{Wed} = 876 - 598$$

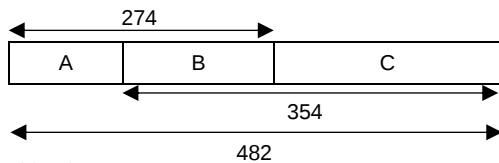
$$= 278$$

$$\text{Mon} = 660 - 278$$

$$= 382$$

382 cups of bubble tea were sold on Monday.

Question 4



$$C = 482 - 274$$

$$= 208$$

$$B = 354 - 208$$

$$= 146$$

Bonita sold **146** funfair tickets.

Question 5

At first

A	
O	
P	

In the end

A	1u	1u	23
O	1u	1u	23
P	1u	15	23

$$5u = 90 + 15$$

$$= 105$$

$$1u = 105 \div 5$$

$$= 21$$

$$1u + 23 = 21 + 23$$

$$= 44$$

44 oranges were used.

Question 6

At first

1 st	
2 nd	
3 rd	
4 th	
5 th	

In the end

1 st	1u	18
2 nd	1u	18
3 rd	1u	18
4 th	1u	18
5 th	1u	18

Solutions to Unit 1.6 (Cont.)

Question 6 (Cont.)

$$5u = 2u + 36$$

$$3u = 36$$

$$1u = 36 \div 3$$

$$= 12$$

$$1u + 18 = 12 + 18$$

$$= 30$$

There were **30** marbles in each tin at first.

Solutions to Unit 1.7 Quantity x Value

Let's Get Started 1.7

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

Ask Yourself

- 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	$\times$	Value of items (Cents)	Total value (Cents)
20-cent	3u	$\times$	20	60u
50-cent	1u	$\times$	50	50u
Total	4u			110u

$$110u = 6600$$

$$1u = 6600 \div 110$$

$$= 60$$

$$3u = 3 \times 60$$

$$= 180$$

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

Question 2

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

$$\text{Difference} = 450u - 50u$$

$$= 400u$$

$$400u = 1200$$

$$1u = 1200 \div 400$$

$$= 3$$

$$4u = 4 \times 3$$

$$= 12$$

12 people will be receiving the red packets.

Solutions to Unit 1.7 (Cont.)

Question 3

1 pair of sport shoes = 2×23
= 46

$Sl = 3u$
 $Sa = 1u$
 $Sa = 1u$
 $Sp = 1u$

Summary
 $Sl = 3u$
 $Sa = 1u$
 $Sp = 1u$

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

$$117u = 468$$

$$1u = 468 \div 117$$

$$= 4$$

$$48u - 23u = 25u$$

$$25u = 25 \times 4$$

$$= 100$$

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

Question 4

$NP = 4u$
 $P = 1u$
 $OC = 1u \times 2 (2u)$
 $NP = 2u \times 2 (4u)$

Summary
 $NP = 4u$
 $P = 1u$
 $OC = 2u$

Items	Quantity of items	x	Value of items (Coupons)	Unit Value (Coupons)
NP	4u	x	3	12u
P	1u	x	8	8u
OC	2u	x	12	24u
Total	7u			44u

$$24u - 8u = 16u$$

$$16u = 144$$

$$1u = 144 \div 16$$

$$= 9$$

$$7u = 7 \times 9$$

$$= 63$$

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

Question 5

$7 - 12 \text{ years old} = 3u$
 $13 - 16 \text{ years old} = 1u$
 $1 - 6 \text{ years old} = 2u \times 3 (6u)$
 $7 - 12 \text{ years old} = 1u \times 3 (3u)$

Summary
 $1 - 6 \text{ yr old} = 6u$
 $7 - 12 \text{ yr old} = 3u$
 $13 - 16 \text{ yr old} = 1u$

Solutions to Unit 1.7 (Cont.)

Question 5 (Cont.)

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

$$48u = 1440$$

$$1u = 1440 \div 48$$

$$= 30$$

$$18u = 18 \times 30$$

$$= 540$$

\$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	x	Value of items (\$)	Unit Value (\$)
A	1u	x	2	2u
B	3u	x	1	3u
G	2u	x	1	2u
Total	6u			7u

$$7u = 1470$$

$$1u = 1470 \div 7$$

$$= 210$$

$$5u = 5 \times 210$$

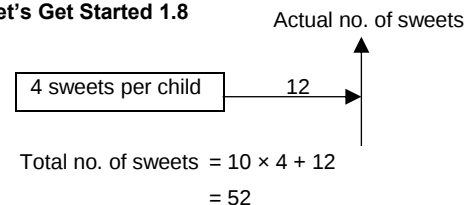
$$= 1050$$

1050 children were at the event.

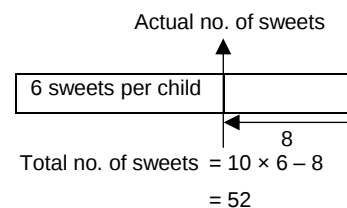
Solutions to Unit 1.8 Gap & Difference

Let's Get Started 1.8

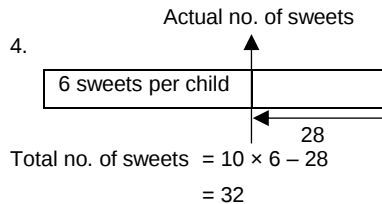
2.



3.



Solutions to Unit 1.8 (Cont.)



Ask Yourself

- The keywords are 'If-If' with 'short of' or 'left'.
- It involves both shortage and excess.

Think Further

Using Case 1:

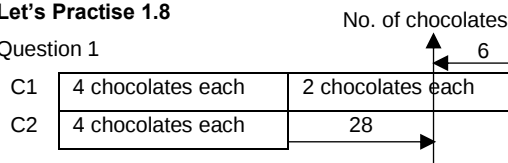
$$\begin{aligned} \text{No. of coconut candies} &= 8 \times 6 + 14 \\ &= 62 \end{aligned}$$

Check your answer using Case 2:

$$\begin{aligned} \text{No. of coconut candies} &= 8 \times 9 - 10 \\ &= 62 \end{aligned}$$

Let's Practise 1.8

Question 1



$$\begin{aligned} \text{Gap} &= 6 + 28 \\ &= 34 \end{aligned}$$

Difference = 2 chocolates each

$$\begin{aligned} \text{(a) No. of pupils} &= 34 \div 2 \\ &= 17 \end{aligned}$$

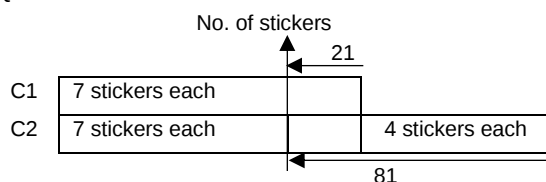
There were **17** pupils in Cynthia's class.

(b) No. of chocolates

$$\begin{aligned} \text{C1} &= 17 \times 6 - 6 \\ &= 96 \\ \text{C2} &= 17 \times 4 + 28 \\ &= 96 \text{ (Checked)} \end{aligned}$$

Cynthia bought **96** chocolates.

Question 2



$$\begin{aligned} \text{Gap} &= 81 - 21 \\ &= 60 \end{aligned}$$

Difference = 4 stickers each

$$\begin{aligned} \text{(a) No. of pages} &= 60 \div 4 \\ &= 15 \end{aligned}$$

There were **15** pages in Suzy's sticker album.

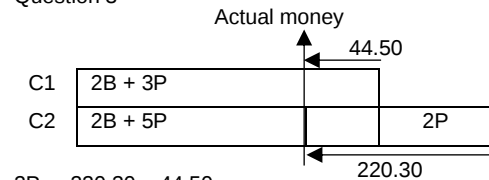
(b) No. of stickers

$$\begin{aligned} \text{C1} &= 15 \times 7 - 21 \\ &= 84 \\ \text{C2} &= 15 \times 11 - 81 \\ &= 84 \text{ (Checked)} \end{aligned}$$

Suzy has **84** stickers.

Solutions to Unit 1.8 (Cont.)

Question 3



$$\begin{aligned} 2P &= 220.30 - 44.50 \\ &= 175.80 \end{aligned}$$

$$\begin{aligned} 1P &= 175.80 \div 2 \\ &= 87.90 \end{aligned}$$

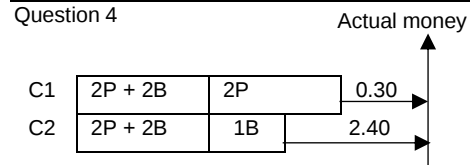
Madeleine's money

$$\begin{aligned} \text{C1} &= (2 \times \$65.40) + (3 \times \$87.90) - \$44.50 \\ &= \$350 \end{aligned}$$

$$\begin{aligned} \text{C2} &= (2 \times \$65.40) + (5 \times \$87.90) - \$220.30 \\ &= \$350 \text{ (Checked)} \end{aligned}$$

Madeleine has **\$350**.

Question 4



$$\begin{aligned} \text{(a) } 1B &= \$5.60 - \$2.10 \\ &= \$3.50 \end{aligned}$$

A bag of chips cost **\$3.50**.

(b) Geraldine's money

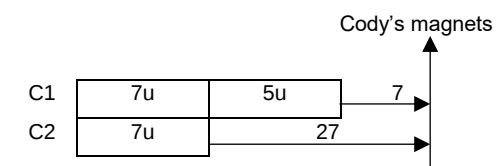
$$\begin{aligned} \text{C1} &= (4 \times \$2.80) + (2 \times \$3.50) + \$0.30 \\ &= \$18.50 \end{aligned}$$

$$\begin{aligned} \text{C2} &= (2 \times \$2.80) + (3 \times \$3.50) + \$2.40 \\ &= \$18.50 \text{ (Checked)} \end{aligned}$$

Geraldine has **\$18.50**.

Question 5

$$\begin{aligned} \text{C1: } C &\xrightarrow{7} P & \text{C2: } C &\xrightarrow{27} P \\ C &= 3u^{x4} (12u) & C &= 1u^{x7} (7u) \\ P &= 4u^{x4} (16u) & P &= 3u^{x7} (21u) \\ \text{Total} &= 7u^{x4} (28u) & \text{Total} &= 4u^{x7} (28u) \end{aligned}$$



$$\begin{aligned} 5u &= 27 - 7 \\ &= 20 \end{aligned}$$

$$\begin{aligned} 1u &= 20 \div 5 \\ &= 4 \end{aligned}$$

Cody's magnets

$$\begin{aligned} \text{C1} &= 12 \times 4 + 7 \\ &= 55 \end{aligned}$$

$$\begin{aligned} \text{C2} &= 7 \times 4 + 27 \\ &= 55 \text{ (Checked)} \end{aligned}$$

Cody had **55** button magnets.

Solutions to Unit 1.8 (Cont.)

Question 6

C1: $D \xrightarrow{23} S$

$$D = 3u \times 9 \text{ (27u)}$$

$$S = 5u \times 9 \text{ (45u)}$$

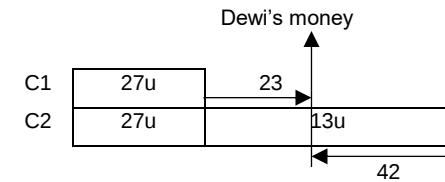
$$\text{Total} = 8u \times 9 \text{ (72u)}$$

C2: $S \xrightarrow{42} D$

$$D = 5u \times 8 \text{ (40u)}$$

$$S = 4u \times 8 \text{ (32u)}$$

$$\text{Total} = 9u \times 8 \text{ (72u)}$$



$$13u = 23 + 42$$

$$= 65$$

$$1u = 65 \div 13$$

$$= 5$$

Dewi's money

$$C1 = (27 \times \$5) + \$23$$

$$= \$158$$

$$C2 = (40 \times \$5) - \$42$$

$$= \$158 \text{ (Checked)}$$

Dewi had **\$158**.

Solutions to Review Questions on Chapter 1

Question 1

(a) Siti

$$7 \text{ days} = \$39 - \$18$$

$$= \$21$$

$$1 \text{ day} = \$21 \div 7$$

$$= \$3$$

Siti saved **\$3** each day.

$$(b) \text{ Difference} = \$1762 - (15 \times \$5) - \$39$$

$$= \$1648$$

$$\text{No. of days} = 1648 \div 8$$

$$= 206$$

$$\text{Total no. of days} = 2 + 6 + 7 + 206$$

$$= 221$$

Tina would have saved for **221** days.

Question 2

P	1u	13	5	
Q	1u	13	5	9
R	1u	13		
S	1u	13	5	9
				79

$$1u + 106 = 3u + 18 + 27 + 13$$

$$1u + 106 = 3u + 58$$

$$2u = 106 - 58$$

$$= 48$$

$$1u = 48 \div 2$$

$$= 24$$

24 sweets were added into each box.

Question 3

Multiples of 3:

60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99

Add 1:

61, 64, 67, 70, 73, 76, 79, 82, 85, 88, 91, 94, 97, 100

Solutions to Review Questions on Chapter 1 (Cont.)

Question 3 (Cont.)

Multiples of 5: 60, 65, 70, 75, 80, 85, 90, 95, 100

Add 1: 61, 66, 71, 76, 81, 86, 91, 96

Common multiples in the two cases:

61, 76, 91

However, only 91 is divisible by 7.

Greta ordered **91** cupcakes.

Question 4

End

M	120	} 360
A	120	
J	120	

At first

M	1u	20	70	20	} 360
A	1u	20	70	20	
J	1u	20	70		

$$1u = 120 - 20 - 70$$

$$= 30$$

$$(a) J \text{ (at first)} = 30$$

Jane had **30** erasers at first.

$$(b) A \text{ (at first)} = 30 + 20 + 70 + 20 + 50$$

$$= 190$$

Allen had **190** erasers at first.

Question 5

At first

D	50	250	
J	50	250	250

Change

D	
J	

End

D	1u	150	
J	1u	150	150

$$(a) \text{ Dylan had } \mathbf{50} \text{ stickers at first.}$$

$$(b) \text{ Jonas had } \mathbf{550} \text{ stickers at first.}$$

Question 6

$$A = 2u \times 7 \text{ (14u)}$$

$$C = 1u \times 7 \text{ (7u)}$$

$$M = 2u \times 5 \text{ (10u)}$$

$$B = 1u \times 5 \text{ (5u)}$$

Summary

$$M = 10u$$

$$W = 4u$$

$$B = 5u$$

$$G = 2u$$

$$\text{Total} = 21u$$

$$M = 5u \times 2 \text{ (10u)}$$

$$G = 1u \times 2 \text{ (2u)}$$

$$\text{Difference} = 4u - 2u$$

$$= 2u$$

$$2u = 250$$

$$1u = 250 \div 2$$

$$= 125$$

Solutions to Review Questions on Chapter 1 (Cont.)

Question 6 (Cont.)

(a) $21u = 21 \times 125$

$= 2625$

There were **2625** people at the carnival.

(b) Males = $10u + 5u$

$= 15u$

Females = $4u + 2u$

$= 6u$

Difference = $15u - 6u$

$= 9u$

$9u = 9 \times 125$

$= 1125$

There were **1125** more males than females at the carnival.

Question 7

No. of animals = $720 \div 2$

$= 360$

No. of horses	Horses' legs	No. of birds	Birds' legs	Total legs	Check
360	$360 \times 4 = 1440$	0	0	1440	x
359	$359 \times 4 = 1436$	1	2	1438	x
209	$209 \times 4 = 836$	151	302	1138	✓

Target difference = $1440 - 1138$

$= 302$

No. of birds = $302 \div 2$

$= 151$

No. of hens = $(151 + 7) \div 2$

$= 79$

There were **79** hens on the farm.

Question 8

HP	1u	9	$\times 3$
PH	1u	$\times 8$	

3u	27
3u	5u

$5u = 27$

$1u = 27 \div 5$

$= 5.40$

$8u = 8 \times 5.40$

$= 43.20$

Mrs Tyler had **\$43.20**.

Question 9

At first

J		80
E		

End

J	1u	35	3u 80	35
E	1u	35		

$5u = 35 + 80 + 35$

$= 150$

Solutions to Review Questions on Chapter 1 (Cont.)

Question 9 (Cont.)

$1u = 150 \div 3$

$= 50$

Elaine had **\$50** in the end.

Question 10

No. of damaged	Fee	No. of good	Fee	Total fee	Check
690	4830	0	0	4830	x
689	4823	1	12	4835	x
106	742	584	7008	7750	✓

Target difference = $7750 - 4830$

$= 2920$

No. of parcels in good condition = $2920 \div 5$

$= 584$

He delivered **584** parcels in good condition.

Question 11

Total	
6 big boxes	14 small boxes

(a) $3B + 8S = 45$

$6B + 16S = 90$

$6B = 14S$

$14S + 16S = 90$

$1S = 90 \div 30$

$= 3$

There were **3** and **7** cupcakes in each small and big box respectively.

(b) $14S = \$189$

$1S = \$189 \div 14$

$= \$13.50$

She sold each small box for **\$13.50**.

Question 12

$3P + 2F = 4.80$

$2P + 4F = 6.40$

$1P + 2F = 6.40 \div 2$

$= 3.20$

$2P = 4.80 - 3.20$

$= 1.60$

$1P = 1.60 \div 2$

$= 0.80$

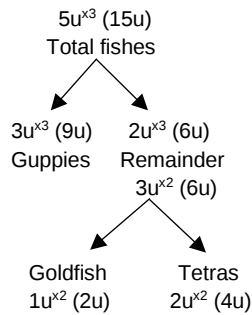
Each pen cost **\$0.80**.

Solutions to Unit 2.1 Branching (Direct)

Let's Get Started 2.1

S/N	Branch Diagram
2.	<pre> 3u^{x2} (6u) Total pages ├── 1u^{x2} (2u) 1st day └── 2u^{x2} (4u) Remainder ├── 4u │ ├── 2nd day 1u │ └── Left 3u = 90 </pre>

3.

**Think Further**

1. $5u - 2u = 3u$

$3u = 72$

$1u = 72 \div 3$

$= 24$

$15u = 15 \times 24$

$= 360$

Anthony had **\$360** at first.

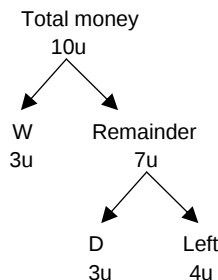
$$\begin{aligned}
 2. \quad \text{Money on food and shoes} &= \frac{1}{3} + \frac{1}{5} \\
 &= \frac{5}{15} + \frac{3}{15} \\
 &= \frac{8}{15}
 \end{aligned}$$

$$\begin{aligned}
 \text{Money left} &= 1 - \frac{8}{15} \\
 &= \frac{7}{15}
 \end{aligned}$$

$\frac{7}{15}$ of total = 70

$\frac{1}{15}$ of total = 10

$$\begin{aligned}
 \frac{15}{15} \text{ of total} &= 10 \times 15 \\
 &= 150
 \end{aligned}$$

Anthony had **\$150** at first.**Let's Practise 2.1****Question 1**

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

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

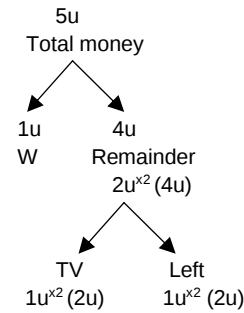
(b) $4u = 400$

$1u = 400 \div 4$

$= 100$

$10u = 10 \times 100$

$= 1000$

Felicity had **\$1000** at first.**Question 2**

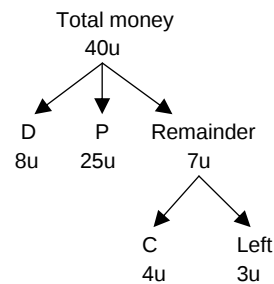
(a) Fraction spent on TV set = $\frac{2}{5}$

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

(b) $2u = 1440$

$1u = 1440 \div 2$

$= 720$

The watch cost **\$720**.**Question 3**

Purse : $\frac{5}{8} = \frac{25}{40}$

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

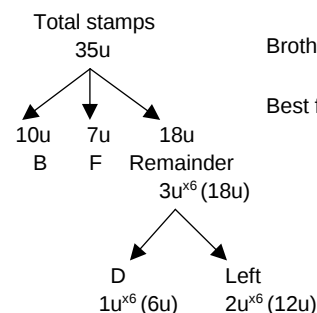
$3u = 183$

$1u = 183 \div 3$

$= 61$

$25u = 25 \times 61$

$= 1525$

Rebecca spent **\$1525** on the purse.**Question 4**

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

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

$12u = 36$

$1u = 36 \div 12$

$= 3$

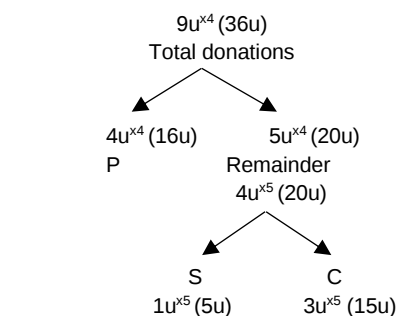
$35u = 35 \times 3$

$= 105$

Mabel had **105** stamps at first.

Solutions to Unit 2.1 (Cont.)

Question 5



$$15u = 240\,000$$

$$1u = 240\,000 \div 15$$

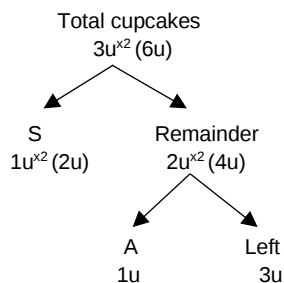
$$= 16\,000$$

$$36u = 36 \times 16\,000$$

$$= 576\,000$$

\$576 000 was raised during the event.

Question 6



$$\begin{aligned} \text{(a) Fraction to orphanage} &= \frac{3}{6} \\ &= \frac{1}{2} \end{aligned}$$

$$\begin{aligned} \text{(b) } 3u &= 285 \\ 1u &= 285 \div 3 \\ &= 95 \\ 2u &= 2 \times 95 \\ &= 190 \end{aligned}$$

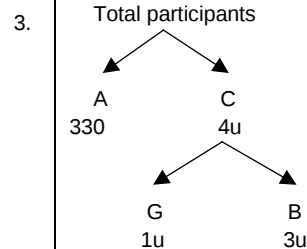
190 cupcakes were for Sally's birthday party.

Solutions to Unit 2.2 Branching (Working Backwards)

Let's Get Started 2.2

S/N	Branch Diagram
2.	Total monthly savings Bag \$60 Remainder 3u Basketball 2u Left 1u Working backwards: $\begin{aligned} \frac{1}{4} \text{ of total} &= 1u \\ \frac{4}{4} \text{ of total} &= 4u \\ \text{Bag} &= 4u - 3u \\ &= 1u \end{aligned}$

Solutions to Unit 2.2 (Cont.)



Working backwards:

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

$$\frac{5}{5} \text{ of total} = 15u$$

$$\begin{aligned} \text{Adults} &= 15u - 4u \\ &= 11u \end{aligned}$$

Ask Yourself

- A value is given at the beginning for one of the branches. 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

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

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

$$\begin{aligned} \text{Money spent on plates} &= 9u - 5u \\ &= 4u \end{aligned}$$

$$3S = 1P$$

$$12S = 4P$$

$$2u \text{ of money} = 4P$$

$$4u \text{ of money} = 8P$$

$$8P = 156$$

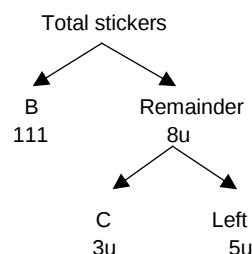
$$1P = 156 \div 8$$

$$= 19.50$$

Each plate cost **\$19.50**.

Let's Practise 2.2

Question 1



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

$$\frac{9}{9} \text{ of stickers} = 9 \times 5u$$

$$= 45u$$

$$B = 45u - 8u$$

$$= 37u$$

$$37u = 111$$

Solutions to Unit 2.2 (Cont.)

Question 1 (Cont.)

$$1u = 111 \div 37$$

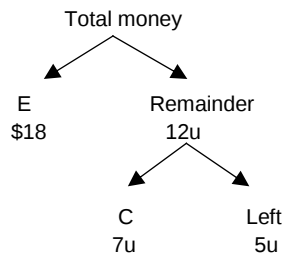
$$= 3$$

$$45u = 45 \times 3$$

$$= 135$$

Ken had **135** stickers at first.

Question 2



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

$$\frac{3}{3} \text{ of total} = 3 \times 5$$

$$= 15u$$

$$E = 15u - 12u$$

$$= 3u$$

$$3u = 18$$

$$1u = 18 \div 3$$

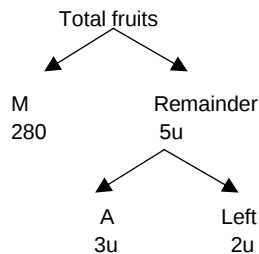
$$= 6$$

$$7u = 7 \times 6$$

$$= 42$$

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

Question 3



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

$$\frac{6}{6} \text{ of total} = 6 \times 2u$$

$$= 12u$$

$$M = 12u - 5u$$

$$= 7u$$

$$7u = 280$$

$$1u = 280 \div 7$$

$$= 40$$

$$\text{Apples sold in afternoon} = 3u$$

$$= 3 \times 40$$

$$= 120$$

$$\text{Number of packs of apples sold} = 120 \div 6$$

$$= 20$$

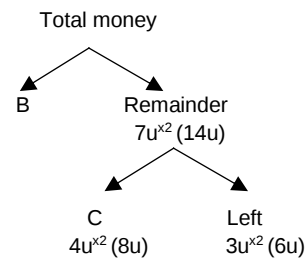
$$\text{Amount received} = 20 \times 2.50$$

$$= 50$$

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

Solutions to Unit 2.2 (Cont.)

Question 4



$$\frac{2}{5} \text{ of total} = 3u^x2 (6u)$$

$$\frac{1}{5} \text{ of total} = 6u \div 2$$

$$= 3u$$

$$\frac{5}{5} \text{ of total} = 5 \times 3u$$

$$= 15u$$

$$B = 15u - 14u$$

$$= 1u$$

$$\text{Difference between crayons and books} = 8u - 1u$$

$$= 7u$$

$$7u = 28$$

$$1u = 28 \div 7$$

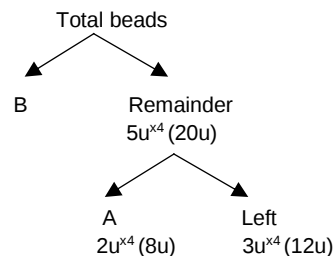
$$= 4$$

$$6u = 6 \times 4$$

$$= 24$$

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

Question 5



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

$$\frac{1}{9} \text{ of total} = 12u \div 4$$

$$= 3u$$

$$\frac{9}{9} \text{ of total} = 9 \times 3u$$

$$= 27u$$

$$B = 27u - 20u$$

$$= 7u$$

$$B + \text{left} = 7u + 12u$$

$$= 19u$$

$$19u = 209$$

$$1u = 209 \div 19$$

$$= 11$$

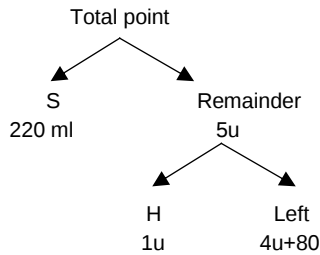
$$27u = 27 \times 11$$

$$= 297$$

Caitlin had **297** beads at first.

Solutions to Unit 2.2 (Cont.)

Question 6



$$\frac{2}{3} \text{ of total} = 4u + 80$$

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

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

$$S = 1u + 120$$

$$1u = 220 - 120$$

$$= 100$$

$$6u + 120 = 6 \times 100 + 120$$

$$= 720$$

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

Solutions to Unit 2.3 Branching (With Additional Amount)

Let's Get Started 2.3

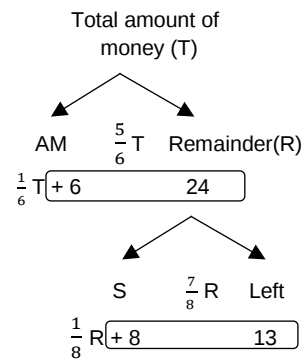
S/N	Branch Diagram
2.	<pre> graph TD Total[Total jelly beans] --> S["S ((1/4)T + 7)"] Total --> Remainder[Remainder] Remainder --> Coc["Coc ((1/3)R - 2)"] Remainder --> Cot[Cot 25] </pre>
3.	<pre> graph TD Total[Total students] --> Fo["Fo ((1/2)T + 3)"] Total --> Remainder[Remainder] Remainder --> Fl["Fl ((3/4)R - 4)"] Remainder --> H[H 22] </pre>

Ask Yourself

- The key words are 'of the remaining/remainder' which hint on the use of the Branching approach.
- A fraction and a whole number more/fewer than is given in the question compared to previous units.
- 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.
- We shall start solving the sum from the last level of the branches and work upwards/backwards.

Solutions to Unit 2.3 (Cont.)

Question 1



$$\frac{7}{8} \text{ of remainder} = 8 + 13$$

$$= 21$$

$$\frac{1}{8} \text{ of remainder} = 21 \div 7$$

$$= 3$$

$$\frac{8}{8} \text{ of remainder} = 8 \times 3$$

$$= 24$$

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

$$= 30$$

$$\frac{1}{6} \text{ of total} = 30 \div 5$$

$$= 6$$

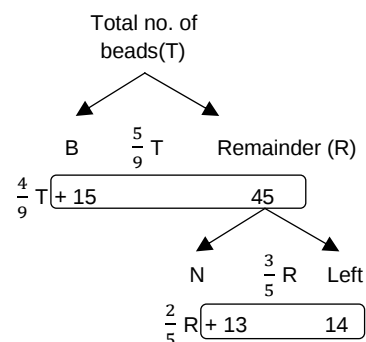
$$\text{Art materials} = \frac{1}{6} T + 6$$

$$= 6 + 6$$

$$= 12$$

The art materials cost **\$12**.

Question 2



$$\frac{3}{5} \text{ of remainder} = 13 + 14$$

$$= 27$$

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

$$= 9$$

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

$$= 45$$

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

$$= 60$$

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

$$= 12$$

Solutions to Unit 2.3 (Cont.)

Question 2 (Cont.)

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

$$= 12 \times 4 + 15$$

$$= 63$$

$$N = 45 - 14$$

$$= 31$$

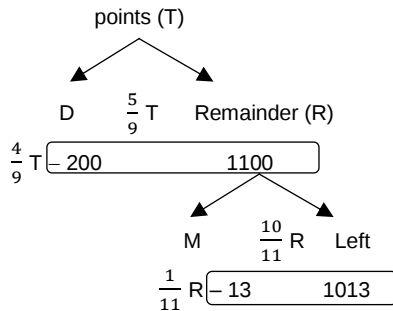
$$\text{Total beads used} = 63 + 31$$

$$= 94$$

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

Question 3

Total no. of



$$\frac{10}{11} \text{ of remainder} = 1013 - 13$$

$$= 1000$$

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

$$= 100$$

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

$$= 1100$$

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

$$= 900$$

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

$$= 180$$

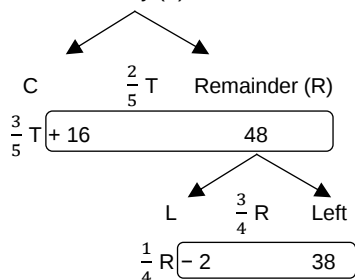
$$\frac{9}{9} \text{ of total} = 9 \times 180$$

$$= 1620$$

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

Question 4

Total amount of money (T)



$$\frac{3}{4} \text{ of remainder} = 38 - 2$$

$$= 36$$

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

$$= 12$$

Solutions to Unit 2.3 (Cont.)

Question 4 (Cont.)

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

$$= 48$$

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

$$= 64$$

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

$$= 32$$

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

$$= 3 \times 32 + 16$$

$$= 112$$

$$L = 48 - 38$$

$$= 10$$

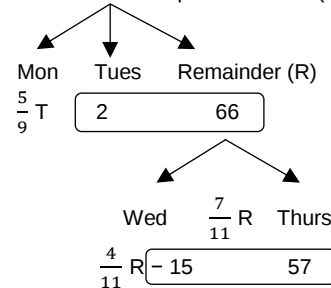
$$\text{Difference} = 112 - 10$$

$$= 102$$

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

Question 5

Total no. of problem sums (T)



$$\frac{7}{11} \text{ of remainder} = 57 - 15$$

$$= 42$$

$$\frac{1}{11} \text{ of remainder} = 42 \div 7$$

$$= 6$$

$$\frac{11}{11} \text{ of remainder} = 11 \times 6$$

$$= 66$$

$$\frac{4}{9} \text{ of total} = 66 + 2$$

$$= 68$$

$$\frac{1}{9} \text{ of total} = 68 \div 9$$

$$= 17$$

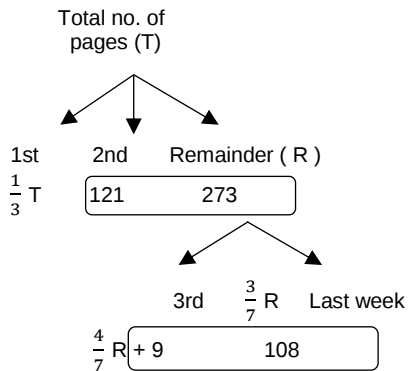
$$\frac{9}{9} \text{ of total} = 9 \times 17$$

$$= 153$$

Mike was given **153** questions at first.

Solutions to Unit 2.3 (Cont.)

Question 6



$$\frac{3}{7} \text{ of remainder} = 108 + 9$$

$$= 117$$

$$\frac{1}{7} \text{ of remainder} = 117 \div 7$$

$$= 39$$

$$\frac{7}{7} \text{ of remainder} = 7 \times 39$$

$$= 273$$

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

$$= 394$$

$$\frac{1}{3} \text{ of total} = 394 \div 3$$

$$= 197$$

$$\frac{3}{3} \text{ of total} = 3 \times 197$$

$$= 591$$

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

Solutions to Unit 2.4 Repeated Items

Let's Get Started 2.4

S/N	Model-drawing approach	Unitary approach
2.		$G = 3u \times 2 (6u)$ $D = 2u \times 2 (4u)$ $D = 4u$ $O = 3u$ Summary $G = 6u$ $D = 4u$ $O = 3u$
3.		$A = 2u \times 2 (4u)$ $C = 3u \times 2 (6u)$ $C = 6u$ $B = 5u$ Summary $A = 4u$ $B = 5u$ $C = 6u$

Solutions to Unit 2.4 (Cont.)

S/N	Model-drawing approach	Unitary approach
4.		$B = 1u \times 2 (2u)$ $G = 4u \times 2 (8u)$ $B+G = 5u \times 2 (10u)$ $B+G = 2u \times 5 (10u)$ $A = 5u \times 5 (25u)$ 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

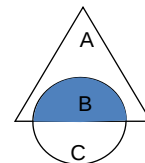
1.

$$\begin{array}{l}
 X + Y = 1u \times 7 (7u) \\
 Y + Z = 2u \times 7 (14u) \\
 Y = 2u \times 2 (4u) \\
 Y + Z = 7u \times 2 (14u)
 \end{array}
 \left.
 \begin{array}{l}
 \\
 \\
 \\
 \end{array}
 \right\}
 \begin{array}{l}
 \text{Summary} \\
 X : 7u - 4u = 3u \\
 Y : 4u \\
 Z : 14u - 4u = 10u \\
 \text{Total} = 3u + 4u + 10u \\
 = 17u
 \end{array}$$

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

Let's Practise 2.4

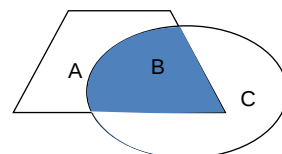
Question 1



$$\begin{array}{l}
 A + B = 3u \times 5 (15u) \\
 C + B = 4u \times 5 (20u) \\
 B = 3u \times 4 (12u) \\
 C = 2u \times 4 (8u) \\
 B + C = 5u \times 4 (20u)
 \end{array}
 \left.
 \begin{array}{l}
 \\
 \\
 \\
 \end{array}
 \right\}
 \begin{array}{l}
 \text{Summary} \\
 A = 3u \\
 B = 12u \\
 C = 8u
 \end{array}$$

$$\text{Fraction of figure shaded} = \frac{12}{23}$$

Question 2



$$\begin{array}{l}
 A + B = 3u \times 3 = (9u) \\
 C + B = 7u \times 3 = (21u) \\
 B = 1u \times 7 (7u) \\
 C = 2u \times 7 (14u)
 \end{array}
 \left.
 \begin{array}{l}
 \\
 \\
 \\
 \end{array}
 \right\}
 \begin{array}{l}
 \text{Summary} \\
 A = 2u \\
 B = 7u \\
 C = 14u
 \end{array}$$

Solutions to Unit 2.4 (Cont.)

Question 2 (Cont.)

$$B + C = 3u^{x7} (21u)$$

Shaded part, B, $7u = 42$

$$1u = 42 \div 7$$

$$= 6$$

Difference in area between the four-sided figure (A+B) and the oval (B+C)

$$= 21u - 9u$$

$$= 12u$$

$$12u = 12 \times 6$$

$$= 72$$

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

Question 3

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

$$7u = 21$$

$$1u = 21 \div 7$$

$$= 3$$

$$2u = 2 \times 3$$

$$= 6$$

Jason had **6** cousins.

Question 4

T = 2u ^{x4} (8u)	}	Summary
Sh = 9u ^{x4} (36u)		T = 8u
So = 3u ^{x9} (27u)		Sh = 36u
Sh = 4u ^{x9} (36u)		So = 27u

$$\begin{aligned} \text{Difference between socks and trousers} &= 27u - 8u \\ &= 19u \end{aligned}$$

$$19u = 38$$

$$1u = 38 \div 19$$

$$= 2$$

$$71u = 71 \times 2$$

$$= 142$$

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

Question 5

\$50 = 3u ^{x3} (9u)	}	Summary
\$10 = 4u ^{x3} (12u)		\$50 = 9u
\$10 + \$50 = 7u ^{x3} (21u)		\$10 = 12u
\$10 + \$50 = 3u ^{x7} (21u)		\$2 = 7u
\$2 = 1u ^{x7} (7u)		

$$12u - 7u = 5u$$

$$5u = 15$$

$$1u = 15 \div 5$$

$$= 3$$

Solutions to Unit 2.4 (Cont.)

Question 5 (Cont.)

$$\text{Number of \$50-notes} = 9u = 9 \times 3$$

$$= 27$$

$$\text{Total value of \$50-notes} = 27 \times 50$$

$$= 1350$$

$$\text{Number of \$10-notes} = 12u$$

$$= 12 \times 3$$

$$= 36$$

$$\text{Total value of \$10-notes} = 36 \times 10$$

$$= 360$$

$$\text{Number of \$2-notes} = 7u$$

$$= 7 \times 3$$

$$= 21$$

$$\text{Total value of \$2-notes} = 21 \times 2$$

$$= 42$$

$$\text{Money in the end} = 1350 + 360 + 42$$

$$= 1752$$

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

Question 6

A = 1u ^{x3} (3u)	}	Summary
B + C + D = 8u ^{x3} (24u)		A = 3u
B = 1u ^{x6} (6u)		B = 6u
C + D = 3u ^{x6} (18u)		C = 10u
B + C + D = 4u ^{x6} (24u)		D = 8u
C = 5u ^{x2} (10u)		Total = 3u + 6u + 10u + 8u
D = 4u ^{x2} (8u)		= 27u
C + D = 9u ^{x2} (18u)		

$$C + D = 10u + 8u$$

$$= 18u$$

$$A + B = 3u + 6u$$

$$= 9u$$

$$\text{Difference} = 18u - 9u$$

$$= 9u$$

$$9u = 288$$

$$1u = 288 \div 9$$

$$= 32$$

$$27u = 27 \times 32$$

$$= 864$$

The girls have **\$864**.

Solutions to Unit 2.5 One Item Unchanged

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 $A = 2u^{x4} (8u)$ $B = 3u^{x4} (12u)$	A loses 40 marbles	B has 4 times as many marbles as A. $A = 1u^{x3} (3u)$ $B = 4u^{x3} (12u)$	The number of marbles that B has.	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. $A+O = 2u^{x3} (6u)$ $P = 3u^{x3} (9u)$	25 pears are added to the stall	$\frac{7}{10}$ of the fruits are pears. The rest are apples and oranges. $A+O = 3u^{x2} (6u)$ $P = 7u^{x2} (14u)$	The number of apples and oranges.	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

At first

$$P = 2u^{x4} (8u)$$

$$S + A = 7u^{x4} (28)$$

End

$$P = 1u^{x7} (7u)$$

$$S + A = 4u^{x7} (28u)$$

$$1u = 12$$

$$\text{Total} = 8u + 28u$$

$$= 36u$$

$$36u = 36 \times 12$$

$$= 432$$

Mrs Han had **432** fruits.

Let's Practise 2.5

Question 1

At first

$$P = 1u^{x4} (4u)$$

$$M = 3u^{x4} (12u)$$

End

$$P = 3u^{x3} (9u)$$

$$M = 4u^{x3} (12u)$$

$$\text{Difference} = 9u - 4u$$

$$= 5u$$

Solutions to Unit 2.5 (Cont.)

Question 1 (Cont.)

$$5u = 10$$

$$1u = 10 \div 5$$

$$= 2$$

$$12u = 12 \times 2$$

$$= 24$$

The puppy's mother was **24 kg**.

Question 2

At first

$$B = 1u^{x4} (4u)$$

$$G = 2u^{x4} (8u)$$

End

$$B = 4u$$

$$G = 5u$$

$$\text{Difference} = 8u - 5u$$

$$= 3u$$

$$4u = 40$$

$$1u = 40 \div 4$$

$$= 10$$

$$3u = 3 \times 10$$

$$= 30$$

30 girls who had left the hall.

Question 3

At first

$$R = 3u^{x4} (12u)$$

$$S = 7u^{x4} (28u)$$

End

$$R = 4u^{x3} (12u)$$

$$S = 5u^{x3} (15u)$$

$$\text{Difference} = 28u - 15u$$

$$= 13u$$

$$13u = 39$$

$$1u = 39 \div 13$$

$$= 3$$

$$\text{Difference at first} = 28u - 12u$$

$$= 16u$$

$$16u = 16 \times 3$$

$$= 48$$

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

Question 4

At first

$$A = 5u^{x3} (15u)$$

$$B = 3u^{x3} (9u)$$

$$\text{Difference} = 20u - 9u$$

$$= 11u$$

End

$$A = 3u^{x5} (15u)$$

$$B = 4u^{x5} (20u)$$

$$11u = 33$$

$$1u = 33 \div 11$$

$$= 3$$

$$15u = 15 \times 3$$

$$= 45$$

45 customers were in Restaurant A.

Solutions to Unit 2.5 (Cont.)

Question 5

At first

$$E = 2u^3 (6u)$$

$$A+S = 3u^3 (9u)$$

End

$$E = 3u^2 (6u)$$

$$A+S = 1u^2 (2u)$$

$$\begin{aligned} \text{Difference} &= 9u - 2u \\ &= 7u \end{aligned}$$

$$7u = 42$$

$$1u = 42 \div 7$$

$$= 6$$

$$\text{Total at first} = 6u + 9u$$

$$= 15u$$

$$15u = 15 \times 6$$

$$= 90$$

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

Question 6

At first

$$S+M = 4u^3 (12u)$$

$$W = 5u^3 (15u)$$

End

$$S+M = 3u^4 (12u)$$

$$W = 5u^4 (20u)$$

$$\begin{aligned} \text{Difference} &= 20u - 15u \\ &= 5u \end{aligned}$$

$$5u = 300$$

$$1u = 300 \div 5$$

$$= 60$$

$$20u = 20 \times 60$$

$$= 1200$$

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

Solutions to Unit 2.6 Total Unchanged

Let's Get Started 2.6

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

Think Further

1.

At first

$$A = 1u^3 (3u)$$

$$C = 3u^3 (9u)$$

$$\text{Difference} = 2u^3 (6u)$$

$$\begin{aligned} \text{Difference} &= 10u - 9u \\ &= 1u \end{aligned}$$

End

$$A = 2u^2 (4u)$$

$$C = 5u^2 (10u)$$

$$\text{Difference} = 3u^2 (6u)$$

Solutions to Unit 2.6 (Cont.)

$$1u = 28$$

$$10u = 10 \times 28$$

$$= 280$$

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

Let's Practise 2.6

Question 1

At first

$$O = 1u^7 (7u)$$

$$R = 5u^7 (35u)$$

$$\text{Total} = 6u^7 (42u)$$

$$\begin{aligned} \text{Difference} &= 18u - 7u \\ &= 11u \end{aligned}$$

End

$$O = 3u^6 (18u)$$

$$R = 4u^6 (24u)$$

$$\text{Total} = 7u^6 (42u)$$

$$11u = 44$$

$$1u = 44 \div 11$$

$$= 4$$

$$35u = 35 \times 4$$

$$= 140$$

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

Question 2

At first

$$B = 2u^9 (18u)$$

$$G = 3u^9 (27u)$$

$$\text{Total} = 5u^9 (45u)$$

$$\begin{aligned} \text{Difference} &= 20u - 18u \\ &= 2u \end{aligned}$$

End

$$B = 4u^5 (20u)$$

$$G = 5u^5 (25u)$$

$$\text{Total} = 9u^5 (45u)$$

$$2u = 12$$

$$1u = 12 \div 2$$

$$= 6$$

$$18u = 18 \times 6$$

$$= 108$$

There were **108** boys in the gym.

Question 3

At first

$$P = 3u^8 (24u)$$

$$M = 4u^8 (32u)$$

$$\text{Total} = 7u^8 (56u)$$

$$\begin{aligned} \text{Difference} &= 35u - 24 \\ &= 11u \end{aligned}$$

End

$$P = 5u^7 (35u)$$

$$M = 3u^7 (21u)$$

$$\text{Total} = 8u^7 (56u)$$

$$11u = 77$$

$$1u = 77 \div 11$$

$$= 7$$

$$24u = 24 \times 7$$

$$= 168$$

Paul had **168** ants.

Solutions to Unit 2.6 (Cont.)

Question 4

At first

$$A = 4u^{x7} (28u)$$

$$N = 5u^{x7} (35u)$$

$$\text{Total} = 9u^{x7} (63u)$$

$$\begin{aligned} \text{Difference} &= 28u - 18u \\ &= 10u \end{aligned}$$

At first

$$A = 2u^{x9} (18u)$$

$$N = 5u^{x9} (45u)$$

$$\text{Total} = 7u^{x9} (63u)$$

$$10u = 40$$

$$1u = 40 \div 10$$

$$= 4$$

$$28u = 28 \times 4$$

$$= 112$$

Alisha had **112** stickers at first.

Question 5

30 min

$$C = 1u$$

$$I = 9u$$

$$\text{Total} = 10u$$

$$\begin{aligned} \text{Difference} &= 4u - 1u \\ &= 3u \end{aligned}$$

45 min

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

$$I = 3u^{x2} (6u)$$

$$\text{Total} = 5u^{x2} (10u)$$

$$3u = 12$$

$$1u = 12 \div 3$$

$$= 4$$

$$10u = 10 \times 4$$

$$= 40$$

There were **40** questions.

Question 6

At first

$$U = 9u$$

$$P = 5u$$

$$\text{Total} = 14u$$

$$\begin{aligned} \text{Difference} &= 9u - 8u \\ &= 1u \end{aligned}$$

45 min

$$U = 4u^{x2} (8u)$$

$$P = 3u^{x2} (6u)$$

$$\text{Total} = 7u^{x2} (14u)$$

$$1u = 4$$

$$14u = 14 \times 4$$

$$= 56$$

There were **56** cars in the workshop.

Solutions to Unit 2.7 Difference Unchanged

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

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

Let's Practise 2.7

Question 1

At first

$$A = 2u^{x4} (8u)$$

$$C = 5u^{x4} (20u)$$

$$\text{Difference} = 3u^{x4} (12u)$$

$$\begin{aligned} \text{Difference} &= 8u - 3u \\ &= 5u \end{aligned}$$

End

$$A = 1u^{x3} (3u)$$

$$C = 5u^{x3} (15u)$$

$$\text{Difference} = 4u^{x3} (12u)$$

$$5u = 145$$

$$1u = 145 \div 5$$

$$= 29$$

$$28u = 28 \times 29$$

$$= 812$$

There were **812** people in the conference hall at first.

Question 2

At first

$$\text{Difference} = 8 \text{ metres}$$

End

$$L = 13u$$

$$S = 8u$$

$$\text{Difference} = 5u$$

$$5u = 8$$

$$1u = 8 \div 5$$

$$= 1.6$$

$$21u = 1.6 \times 21$$

$$= 33.6$$

$$\begin{aligned} \text{Total length removed} &= 34 - 33.6 \\ &= 0.4 \end{aligned}$$

Solutions to Unit 2.7 (Cont.)

Question 2 (Cont.)

Length removed from each = $0.4 \div 2$
 $= 0.2$

0.2 m was cut off from each piece of rope.

Question 3

Now

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

$$F = 3u^{\times 3} (9u)$$

$$\text{Difference} = 2u^{\times 3} (6u)$$

5 years later

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

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

$$\text{Difference} = 3u^{\times 2} (6u)$$

$$1u = 5$$

Now

$$\text{Jasper, } 3u = 3 \times 5$$

$$= 15$$

$$\text{Father, } 9u = 9 \times 5$$

$$= 45$$

Jasper's and his father's present ages are **15 years old** and **45 years old** respectively.

Question 4

? years ago

$$G = 3u$$

$$N = 7u$$

$$\text{Difference} = 4u$$

Now

$$G = 4u^{\times 4} (16u)$$

$$N = 5u^{\times 4} (20u)$$

$$\text{Difference} = 1u^{\times 4} (4u)$$

$$\begin{aligned} \text{Sum of their ages now} &= 136 - 14 - 14 \\ &= 108 \end{aligned}$$

$$16u + 20u = 108$$

$$36u = 108$$

$$1u = 108 \div 36$$

$$= 3$$

$$\text{Change} = 16u - 3u$$

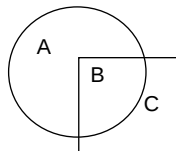
$$= 13u$$

$$13u = 13 \times 3$$

$$= 39$$

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

Question 5



At first

$$A + B = 3u^{\times 2} (6u)$$

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

$$\text{Difference} = 2u^{\times 2} (4u)$$

End

$$A = 3u$$

$$C = 7u$$

$$\text{Difference} = 4u$$

Solutions to Unit 2.7 (Cont.)

Question 5 (Cont.)

$$\begin{aligned} \text{Shaded part (B)} &= 6u - 3u \\ &= 3u \end{aligned}$$

$$3u = 36$$

$$1u = 36 \div 3$$

$$= 12$$

$$A + B + C = 3u + 3u + 7u$$

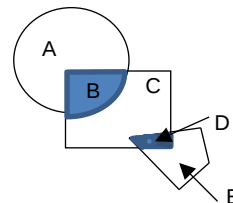
$$= 13u$$

$$13u = 13 \times 12$$

$$= 156$$

The area of the figure is **156 cm²**.

Question 6



At first

$$A + B + C + D = 5u^{\times 2} (10u)$$

$$B + C + D + E = 7u^{\times 2} (14u)$$

$$\text{Difference} = 2u^{\times 2} (4u)$$

End

$$A + C = 5u$$

$$C + E = 9u$$

$$\text{Difference} = 4u$$

$$\begin{aligned} \text{Shaded part (B+D)} &= 14u - 9u \\ &= 5u \end{aligned}$$

$$5u = 45$$

$$1u = 45 \div 5$$

$$= 9$$

Unshaded area of square and the quadrilateral

$$= C + E$$

$$= 9u$$

$$= 9 \times 9$$

$$= 81$$

The area of the unshaded part of the square and quadrilateral is **81 cm²**.

Solutions to Unit 2.8 Numerators the Same

Let's Get Started 2.8

S/N	Model drawing	Numerators the Same
3.	J $4u^{\times 3} (12u)$ 3u³ (9u) K $3u^{\times 4} (12u)$ 4u⁴ (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

Solutions to Unit 2.8 (Cont.)

S/N	Model drawing	Numerators the Same
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

- When phrase "is equal to" is between two given fractions.

Think Further

- $32u + 35u = 201$
 $67u = 201$
 $1u = 201 \div 67$
 $= 3$
 Muffins sold = $(32u + 35u) - (20u \times 2)$
 $= 27u$
 $27u = 27 \times 3$
 $= 81$

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

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

Let's Practise 2.8

Question 1

Left

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

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

At first

Shop A = 14u

Shop B = 25u

$$\text{Difference} = 25u - 14u$$

$$= 11u$$

$$11u = 396$$

$$1u = 396 \div 11$$

$$= 36$$

$$25u = 25 \times 36$$

$$= 900$$

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

Solutions to Unit 2.8 (Cont.)

Question 2

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

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

At first

$$D = 40u$$

$$L = 18u$$

$$\text{Difference} = 40u - 18u$$

$$= 22u$$

$$22u = 44$$

$$1u = 44 \div 22$$

$$= 2$$

$$\text{Total} = 40u + 18u$$

$$= 58u$$

$$58u = 58 \times 2$$

$$= 116$$

Their total allowance is **\$116**.

Question 3

Left

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

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

At first

$$J = 11u$$

$$D = 14u$$

$$\text{Difference} = 14u - 11u$$

$$= 3u$$

$$3u = 36$$

$$1u = 36 \div 3$$

$$= 12$$

$$8u = 8 \times 12$$

$$= 96$$

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

Question 4

Left

$$\frac{1 \times 4}{7 \times 4} R \text{ is twice of } \frac{2}{5} W$$

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

At first

$$R = 28u$$

$$W = 5u$$

$$\text{Difference} = 28u - 5u$$

$$= 23u$$

$$23u = 46$$

$$1u = 46 \div 23$$

$$= 2$$

$$28u = 2 \times 28$$

$$= 56$$

Roy had **56** toy cars.

Solutions to Unit 2.8 (Cont.)

Question 5

Left

$$K = 1u^{\times 3} (3u) \quad C = 2u^{\times 3} (6u)$$

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

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

At first

$$K = 5u$$

$$C = 9u$$

$$\text{Total} = 5u + 9u$$

$$= 14u$$

$$14u = 350$$

$$1u = 350 \div 14$$

$$= 25$$

$$\text{Difference} = 9u - 5u$$

$$= 4u$$

$$4u = 4 \times 25$$

$$= 100$$

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

Question 6

End

$$X = 3u^{\times 6} (18u) \quad Z = 1u^{\times 6} (6u)$$

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

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

At first

$$X = 30u$$

$$Z = 11u$$

$$\text{Total} = 30u + 11u$$

$$= 41u$$

$$41u = 656$$

$$1u = 656 \div 41$$

$$= 16$$

$$(a) 30u = 30 \times 16$$

$$= 480$$

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

$$(b) Z's \text{ deposit amount} = 5u$$

$$= 5 \times 16$$

$$= 80$$

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

$$\text{Savings (in the end)} = \$80 \times 5$$

$$= \$400$$

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

Solutions to Unit 2.9 Quantity x Value

Let's Get Started 2.9

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

Solutions to Unit 2.9 (Cont.)

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

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

Ask Yourself

1. In Quantity $\times$ 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 2.9

Question 1

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

$$9u = 225$$

$$1u = 225 \div 9$$

$$= 25$$

$$4u = 4 \times 25$$

$$= 100$$

There were **100** bicycles altogether.

Question 2

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

$$(a) 98u = 9800$$

$$1u = 9800 \div 98$$

$$= 100$$

$$12u = 12 \times 100$$

$$= 1200$$

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

$$(b) \text{Difference} = 50u - 48u$$

$$= 2u$$

$$2u = 2 \times 100$$

$$= 200$$

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

Question 3

$$\left. \begin{array}{l} R = 1u \\ C = 2u \\ R = 1u \\ V = 1u \end{array} \right\} \begin{array}{l} \text{Summary} \\ R = 1u \\ C = 2u \\ V = 1u \end{array}$$

Solutions to Unit 2.9 (Cont.)

Question 3 (Cont.)

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

$$5.1u = 153$$

$$1u = 153 \div 5.1$$

$$= 30$$

$$2u = 2 \times 30$$

$$= 60$$

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

Question 4

A = 1u	}	Summary
O = 1u		
P = 4u		
A = 1u		
		A = 1u
		O = 1u
		P = 4u

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

$$3.3u = 39.6$$

$$1u = 39.6 \div 3.3$$

$$= 12$$

$$\begin{aligned} \text{Total spent on apples and oranges} &= 0.4u + 0.5u \\ &= 0.9u \end{aligned}$$

$$\begin{aligned} \text{Difference} &= 2.4u - 0.9u \\ &= 1.5u \end{aligned}$$

$$\begin{aligned} 1.5u &= 1.5u \times 12 \\ &= 18 \end{aligned}$$

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

Question 5

B = 4u	}	Summary
R = 3u		
S = 3u ^{x3} (9u)		
R = 1u ^{x3} (3u)		
		R = 3u
		B = 4u
		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

$$700u = 14\,000$$

$$\begin{aligned} 1u &= 14\,000 \div 700 \\ &= 20 \end{aligned}$$

$$\begin{aligned} 160u &= 160 \times 20 \\ &= 3200 \end{aligned}$$

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

Solutions to Unit 2.9 (Cont.)

Question 5 (Cont.)

$$\text{Difference} = 9u - 3u$$

$$= 6u$$

$$6u = 6 \times 20$$

$$= 120$$

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

Question 6

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

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

$$B = 15u$$

$$G = 12u$$

$$\begin{aligned} \text{Total} &= 15u + 12u \\ &= 27u \end{aligned}$$

$$\begin{aligned} A &= \frac{1}{3} \times 27u \\ &= 9u \end{aligned}$$

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

$$\begin{aligned} \text{Difference} &= 90u - 60u \\ &= 30u \end{aligned}$$

$$30u = 3000$$

$$\begin{aligned} 1u &= 3000 \div 30 \\ &= 100 \end{aligned}$$

$$\begin{aligned} \text{(a)} \quad 210u &= 210 \times 100 \\ &= 21\,000 \end{aligned}$$

The total amount collected from the donations is **\$21 000**.

$$\begin{aligned} \text{(b)} \quad \text{Total adults and girls} &= 9u + 12u \\ &= 21u \end{aligned}$$

$$\begin{aligned} 21u &= 21 \times 100 \\ &= 2100 \end{aligned}$$

There is a total of **2100** adults and girls.

Solutions to Review Questions on Chapter 2

Question 1

$$A + B = 3u^{\times 6} (18u)$$

$$C = 2u^{\times 6} (12u)$$

$$\text{Total} = 5u^{\times 6} (30u)$$

$$A + C = 5u^{\times 5} (25u)$$

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

$$\text{Total} = 6u^{\times 5} (30u)$$

Summary

$$A = 13u$$

$$B = 5u$$

$$C = 12u$$

$$\text{Total} = 30u$$

$$12u = 144$$

$$\begin{aligned} 1u &= 144 \div 12 \\ &= 12 \end{aligned}$$

$$\begin{aligned} 30u &= 30 \times 12 \\ &= 360 \end{aligned}$$

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

Solutions to Review Questions on Chapter 2 (Cont.)

Question 2

$$\begin{aligned} J + E &= 3u^{\times 6} \text{ (18u)} \\ G + R &= 4u^{\times 6} \text{ (24u)} \\ \text{Total} &= 7u^{\times 6} \text{ (42u)} \end{aligned}$$

$$\begin{aligned} J + E + G &= 5u^{\times 7} \text{ (35u)} \\ R &= 1u^{\times 7} \text{ (7u)} \\ \text{Total} &= 6u^{\times 7} \text{ (42u)} \end{aligned}$$

$$\begin{aligned} J &= 1u^{\times 3} \text{ (3u)} \\ E &= 5u^{\times 3} \text{ (15u)} \\ J+E &= 6u^{\times 3} \text{ (18u)} \end{aligned}$$

Summary

$$\begin{aligned} J &= 3u \\ E &= 15u \\ G &= 17u \\ R &= 7u \\ \text{Total} &= 42u \end{aligned}$$

$$\begin{aligned} \text{Difference between G and E} &= 17u - 15u \\ &= 2u \end{aligned}$$

$$2u = 16$$

$$\begin{aligned} 1u &= 16 \div 2 \\ &= 8 \end{aligned}$$

$$\begin{aligned} 42u &= 42 \times 8 \\ &= 336 \end{aligned}$$

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

Question 3

At first	Change	End
R = $2u^{\times 2}$ (4u)	R = 5u	R = 2u
M = $1u^{\times 2}$ (2u)	M = 1u	M = 4u

$$2u = 8$$

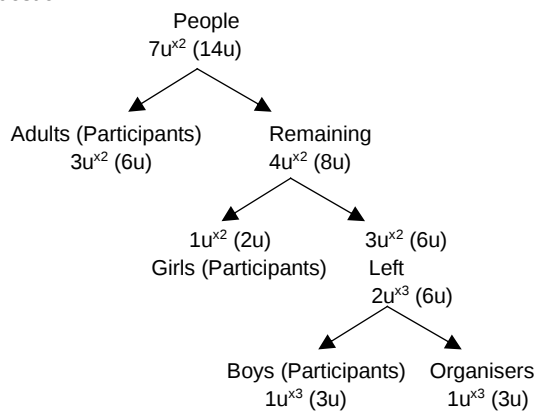
$$\begin{aligned} 1u &= 8 \div 2 \\ &= 4 \end{aligned}$$

$$\begin{aligned} R \text{ (at first)} &= 4 \times 4 \\ &= 16 \end{aligned}$$

$$\begin{aligned} M \text{ (at first)} &= 2 \times 4 \\ &= 8 \end{aligned}$$

Robert and Melvin had **16** and **8** magnets respectively at first.

Question 4



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) $40u = 400$

$$\begin{aligned} 1u &= 400 \div 40 \\ &= 10 \end{aligned}$$

$$\begin{aligned} 18u &= 18 \times 10 \\ &= 180 \end{aligned}$$

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

Solutions to Review Questions on Chapter 2 (Cont.)

Question 4 (Cont.)

$$\begin{aligned} \text{(b) } 3u &= 3 \times 10 \\ &= 30 \end{aligned}$$

30 people were event organisers.

$$\begin{aligned} \text{(c) } 14u &= 14 \times 10 \\ &= 140 \end{aligned}$$

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

Question 5

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

$$\frac{6}{15} A = \frac{9}{8} B$$

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

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

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

$$\frac{12}{16} B = \frac{64}{343} C$$

$$B = 16u$$

$$C = 21u$$

Summary

$$A = 30u$$

$$B = 16u$$

$$C = 21u$$

$$\begin{aligned} \text{Difference} &= 30u - 21u \\ &= 9u \end{aligned}$$

$$9u = 45$$

$$\begin{aligned} 1u &= 45 \div 9 \\ &= 5 \end{aligned}$$

$$\begin{aligned} 16u &= 16 \times 5 \\ &= 80 \end{aligned}$$

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

Question 6

$$P = 3u$$

$$E + R = 7u$$

$$\text{Total} = 10u$$

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

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

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

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

$$14u = 28$$

$$\begin{aligned} 1u &= 28 \div 14 \\ &= 2 \end{aligned}$$

$$\begin{aligned} 10u &= 10 \times 2 \\ &= 20 \end{aligned}$$

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

Question 7

$$\begin{aligned} \text{Fraction of ducks left} &= 1 - \frac{5}{7} \\ &= \frac{2}{7} \end{aligned}$$

$$\begin{aligned} \text{Fraction of chickens left} &= 1 - \frac{2}{5} \\ &= \frac{3}{5} \end{aligned}$$

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

$$\frac{6}{10} C = \frac{8}{343} D$$

$$C = 10u$$

$$D = 21u$$

Solutions to Review Questions on Chapter 2 (Cont.)

Question 7 (Cont.)

$$\begin{aligned}\text{Total (at first)} &= 10u + 21u \\ &= 31u\end{aligned}$$

$$\begin{aligned}\text{Remained} &= 6u + 6u \\ &= 12u\end{aligned}$$

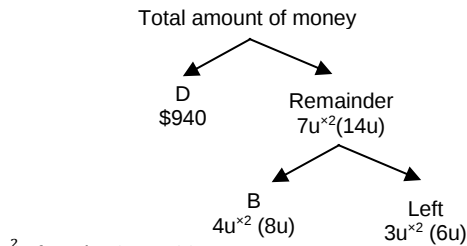
$$12u = 840$$

$$\begin{aligned}1u &= 840 \div 12 \\ &= 70\end{aligned}$$

$$\begin{aligned}31u &= 31 \times 70 \\ &= 2170\end{aligned}$$

There were a total of **2170** animals at Farmer Oei's farm at first.

Question 8



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

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

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

$$\begin{aligned}\text{Dress} &= 27u + 810 - 14u \\ &= 13u + 810\end{aligned}$$

$$\begin{aligned}13u &= 940 - 810 \\ &= 130\end{aligned}$$

$$\begin{aligned}1u &= 130 \div 13 \\ &= 10\end{aligned}$$

$$\begin{aligned}27u + 810 &= 27 \times 10 + 810 \\ &= 1080\end{aligned}$$

Niki had **\$1080** at first.

Question 9

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

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

$$N = 22u$$

$$E = 27u$$

$$\begin{aligned}\text{Total} &= 22u + 27u \\ &= 49u\end{aligned}$$

$$\begin{aligned}\text{Spent} &= 6u + 6u \\ &= 12u\end{aligned}$$

$$\begin{aligned}\text{Left} &= 49u - 12u \\ &= 37u\end{aligned}$$

$$37u = 3700$$

$$\begin{aligned}1u &= 3700 \div 37 \\ &= 100\end{aligned}$$

$$\begin{aligned}22u &= 22 \times 100 \\ &= 2200\end{aligned}$$

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

Question 10

R	3u	
C	3u	15
P	1u	5

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

Solutions to Review Questions on Chapter 2 (Cont.)

Question 10 (Cont.)

$$\begin{aligned}22.4u &= 179 - 67 \\ &= 112\end{aligned}$$

$$\begin{aligned}1u &= 112 \div 22.4 \\ &= 5\end{aligned}$$

$$\begin{aligned}7u + 20 &= 7 \times 5 + 20 \\ &= 55\end{aligned}$$

They sell **55** pieces of tokiwado daily.

Question 11

End

A	
N	

At first

	9u		
A	8u	65	89
N	8u	65	

$$\begin{aligned}1u &= 65 + 89 \\ &= 154\end{aligned}$$

$$\begin{aligned}A &= 9 \times 154 \\ &= 1386\end{aligned}$$

$$\begin{aligned}N &= 8 \times 154 \\ &= 1232\end{aligned}$$

Alyssa and Nerissa had **\$1386** and **\$1232** respectively.

Question 12

$$L = 5u$$

$$K = 6u$$

$$I = 5u$$

In the end

	3p		
L		10	
I		10	60
	5p		

$$2p = 60$$

$$\begin{aligned}1p &= 60 \div 2 \\ &= 30\end{aligned}$$

$$\begin{aligned}3p &= 3 \times 30 \\ &= 90\end{aligned}$$

$$\begin{aligned}L \text{ (at first)} &= 90 - 10 \\ &= 80\end{aligned}$$

$$5u = 80$$

$$\begin{aligned}1u &= 80 \div 5 \\ &= 16\end{aligned}$$

$$\begin{aligned}6u &= 6 \times 16 \\ &= 96\end{aligned}$$

$$\begin{aligned}K \text{ (end)} &= 96 - 10 - 70 \\ &= 16\end{aligned}$$

Kevin had **16** cards in the end.

Solutions to Unit 3.1 Repeated Items

Let's Get Started 3.1

Step1	What item(s) is/are repeated?	Step 2
S : H P : S 1 ^{x4} : 6 ^{x4} 9 : 4 4 : 24	S	S : H : P 4 : 24 : 9
C : D A : C+D 5 : 9 2 ^{x2} : 7 ^{x2} 4 : 14	C + D	A : C : D 4 : 5 : 9

Solutions to Unit 3.1 (Cont.)

Step 1	What item(s) is/are repeated?	Step 2
$X : Y : Z$ $9^{x^2} : 2^{x^2} : 4^{x^2}$ $18 : 4 : 8$ $W : X+Y$ $5^{x^{11}} : 2^{x^{11}}$ $55 : 22$	$X + Y$	$X : Y : Z$ $18 : 4 : 8$

Ask Yourself

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

$$\begin{array}{lcl} J : D & & J : K \\ 1^{x^3} : 8^{x^3} & & 3 : 1 \\ 3 : 24 & & \end{array}$$

Summary
 $J : D : K$
 $3 : 24 : 1$

$$\text{Total} = 3u + 24u + 1u$$

$$= 28u$$

$$28u = 280$$

$$1u = 280 \div 28$$

$$= 10$$

$$\text{Difference} = 24u - 1u$$

$$= 23u$$

$$23u = 23 \times 10$$

$$= 230$$

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

Question 2

$$\begin{array}{lcl} B : A & & A : C \\ 3^{x^4} : 5^{x^4} & & 4^{x^5} : 1^{x^5} \\ 12 : 20 & & 20 : 5 \end{array}$$

Summary

$$A : B : C : \text{Total}$$

$$20 : 12 : 5 : 37$$

$$\text{Difference} = 20u - 12u$$

$$= 8u$$

$$8u = 160$$

$$1u = 160 \div 8$$

$$= 20$$

$$37u = 37 \times 20$$

$$= 740$$

The sum of money was **\$740**.

Solutions to Unit 3.1 (Cont.)

Question 3

$$\begin{array}{lcl} J : E+G : \text{Total} & & E : J+G : \text{Total} \\ 1^{x^{13}} : 4^{x^{13}} : 5^{x^{13}} & & 3^{x^5} : 10^{x^5} : 13^{x^5} \\ 13 : 52 : 65 & & 15 : 50 : 65 \end{array}$$

Summary
 $E : G : J$
 $15 : 37 : 13$

$$65u = 130$$

$$1u = 130 \div 65$$

$$= 2$$

$$\text{Difference} = 37u - 13u$$

$$= 24u$$

$$24u = 24 \times 2$$

$$= 48$$

Grace has **48** more playing cards than Jason.

Question 4

$$\begin{array}{lcl} G : C+J : \text{Total} & & J : G+C : \text{Total} \\ 2^{x^4} : 3^{x^4} : 5^{x^4} & & 1^{x^5} : 3^{x^5} : 4^{x^5} \\ 8 : 12 : 20 & & 5 : 15 : 20 \end{array}$$

Summary
 $C : G : J$
 $7 : 8 : 5$

$$\text{Total} = 7u + 8u + 5u$$

$$= 20u$$

$$20u = 560$$

$$1u = 560 \div 20$$

$$= 28$$

$$\text{Difference} = 8u - 5u$$

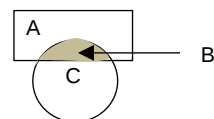
$$= 3u$$

$$3u = 3 \times 28$$

$$= 84$$

Gillian contributed **\$84** more than Joan.

Question 5



$$\begin{array}{lcl} A : B : A+B & & A+B : B+C \\ 2^{x^2} : 1^{x^2} : 3^{x^2} & & 2^{x^3} : 1^{x^3} \\ 4 : 2 : 6 & & 6 : 3 \end{array}$$

Summary

$$A : B : C$$

$$4 : 2 : 3$$

$$7u = 49$$

$$1u = 49 \div 7$$

$$= 7$$

$$\text{Shaded B} = 2u$$

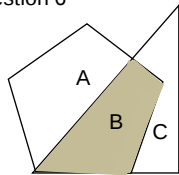
$$2u = 2 \times 7$$

$$= 14$$

The area of the shaded part of the figure is **14 cm²**.

Solutions to Unit 3.1 (Cont.)

Question 6



$$\begin{array}{l} B : C \quad B : A \\ 6^{x^2} : 5^{x^2} \quad 4^{x^3} : 3^{x^3} \\ 12 : 10 \quad 12 : 9 \end{array}$$

Summary
A : B : C
9 : 12 : 10

$$\begin{aligned} \text{Unshaded} &= 9u + 10u \\ &= 19u \end{aligned}$$

$$19u = 38$$

$$\begin{aligned} 1u &= 38 \div 19 \\ &= 2 \end{aligned}$$

$$\text{Shaded part B} = 12u$$

$$\begin{aligned} 12u &= 12 \times 2 \\ &= 24 \end{aligned}$$

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

Solutions to Unit 3.2 Family of Change

Let's Get Started 3.2

At first	End (As a result)	What has not changed?	Find the value of 1 unit.
C : D $2^{x^3} : 5^{x^3}$ 6 : 15	C : D 6 : 17	C	$17u - 15u = 2u$ $2u = 4$ $1u = 2$
E : F $4^{x^3} : 7^{x^3}$ 12 : 21	E : F $2^{x^7} : 3^{x^7}$ 14 : 21	F	$14u - 12u = 2u$ $2u = 22$ $1u = 11$
H : K : Total $3^{x^{15}} : 5^{x^{15}} : 8^{x^{15}}$ 45 : 75 : 120	H : K : Total $8^{x^8} : 7^{x^8} : 15^{x^8}$ 64 : 56 : 120	Total (H+K)	$64u - 45u = 19$ $19u = 95$ $1u = 5$
A : O+P $5^{x^2} : 3^{x^2}$ 10 : 6	A : O+P $1^{x^3} : 2^{x^3}$ 3 : 6	O + P	$10u - 3u = 7u$ $7u = 21$ $1u = 3$

Ask yourself

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

- Amount of money Patrick had in the end

$$= (10 \times 2 \times 0.1) + (8 \times 2 \times 1)$$

$$= \$18$$

Solutions to Unit 3.2 (Cont.)

Let's Practise 3.2

Question 1

$$\begin{array}{l} \text{At first} \quad \quad \quad \text{End} \\ G : B \quad \quad \quad G : B \\ 2^{x^3} : 3^{x^3} \quad \quad \quad 3^{x^2} : 1^{x^2} \\ 6 : 9 \quad \quad \quad 6 : 2 \end{array}$$

$7u = 14$
 $1u = 14 \div 7$
 $= 2$
 $8u = 8 \times 2$
 $= 16$

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

Question 2

$$\begin{array}{l} \text{At first} \quad \quad \quad \text{End} \\ F : B \quad \quad \quad F : B \\ 4^{x^3} : 1^{x^3} \quad \quad \quad 3^{x^4} : 2^{x^4} \\ 12 : 3 \quad \quad \quad 12 : 8 \end{array}$$

$5u$

$$\begin{aligned} \text{Total, end} &= 12u + 8u \\ &= 20u \end{aligned}$$

$$20u = 1000$$

$$\begin{aligned} 1u &= 100 \div 20 \\ &= 50 \end{aligned}$$

$$\begin{aligned} 5u &= 5 \times 50 \\ &= 250 \end{aligned}$$

$$\begin{aligned} \text{Cost for the bean curds ordered} &= 250 \times \$0.80 \\ &= \$200 \end{aligned}$$

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

Question 3

$$\begin{array}{l} \text{At first} \quad \quad \quad \text{End} \\ P : C : \text{Total} \quad \quad \quad P : C : \text{Total} \\ 3^{x^3} : 7^{x^3} : 10^{x^3} \quad \quad \quad 1^{x^{10}} : 2^{x^{10}} : 3^{x^{10}} \\ 9 : 21 : 30 \quad \quad \quad 10 : 20 : 30 \end{array}$$

$1u$ $1u$

Difference, at first = $21u - 9u$
 $= 12u$

$$12u = 24$$

$$\begin{aligned} 1u &= 24 \div 12 \\ &= 2 \end{aligned}$$

$$\begin{aligned} \text{Total (end)} &= 30u \\ &= 30 \times 2 \\ &= 60 \end{aligned}$$

There was a total of **60** toys on the display shelves in the end.

Question 4

$$\begin{array}{l} \text{At first} \quad \quad \quad \text{End} \\ A : M : \text{Total} \quad \quad \quad A : M : \text{Total} \\ 2^{x^4} : 3^{x^4} : 5^{x^4} \quad \quad \quad 3^{x^5} : 1^{x^5} : 4^{x^5} \\ 8 : 12 : 20 \quad \quad \quad 15 : 5 : 20 \end{array}$$

$7u$ $7u$

$7u = 84$
 $1u = 84 \div 7$
 $= 12$

Solutions to Unit 3.2 (Cont.)

Question 4 (Cont.)

$$10u = 10 \times 12$$

$$= 120$$

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

Question 5

At first			In the end		
A	C	Diff	A	C	Diff
90	300	210	1u	4u	3u

$$3u = 210$$

$$1u = 210 \div 3$$

$$= 70$$

$$\begin{aligned} \text{Total (at first)} &= 90 + 300 \\ &= 390 \end{aligned}$$

$$\begin{aligned} \text{Total (end)} &= 5 \times 70 \\ &= 350 \end{aligned}$$

$$\begin{aligned} \text{Total left} &= 390 - 350 \\ &= 40 \end{aligned}$$

40 adults and children altogether left the exhibition hall.

Question 6

At first			In the end		
R	L	Diff	A	C	Diff
320	260	60	3u	4u	1u

$$1u = 60$$

$$\begin{aligned} \text{Total (at first)} &= 320 + 260 \\ &= 580 \end{aligned}$$

$$\begin{aligned} \text{Total (end)} &= 7 \times 60 \\ &= 420 \end{aligned}$$

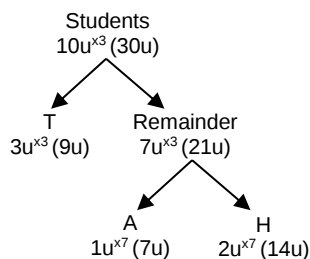
$$\begin{aligned} \text{Total spent} &= 580 - 420 \\ &= 160 \end{aligned}$$

Richard and Larvy spent **\$160** altogether.

Solutions to Unit 3.3 Branching

Let's Get Started 3.3

2. Branch Diagram



$$14u = 42$$

$$1u = 42 \div 14$$

$$= 3$$

$$\begin{aligned} \text{Total voted} &= 30u \\ &= 30 \times 3 \\ &= 90 \end{aligned}$$

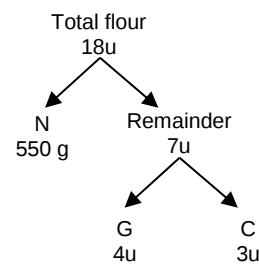
Ask Yourself

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

Solutions to Unit 3.3 (Cont.)

Let's Practise 3.3

Question 1



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

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

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

$$\text{Noodles} = 18u - 7u$$

$$= 11u$$

$$11u = 550$$

$$1u = 550 \div 11$$

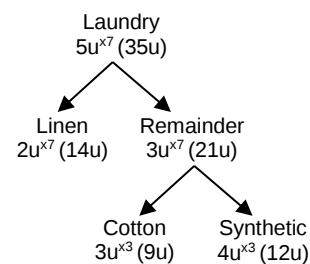
$$= 50$$

$$3u = 3 \times 50$$

$$= 150$$

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

Question 2



$$(a) \text{ Fraction} = \frac{9}{35}$$

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

$$(b) 12u = 24$$

$$1u = 24 \div 12$$

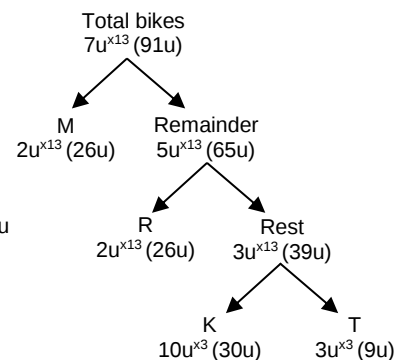
$$= 2$$

$$35u = 35 \times 2$$

$$= 70$$

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

Question 3



$$30u - 26u = 4u$$

$$4u = 16$$

$$1u = 16 \div 4$$

$$= 4$$

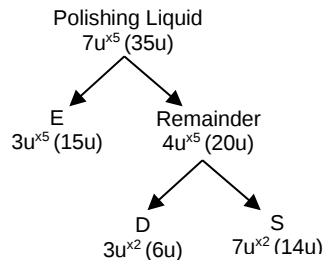
$$9u = 9 \times 4$$

$$= 36$$

There were **36** trick bikes.

Solutions to Unit 3.3 (Cont.)

Question 4



$$\begin{aligned}\text{Difference between exterior and dashboard} &= 15u - 6u \\ &= 9u\end{aligned}$$

$$9u = 0.18$$

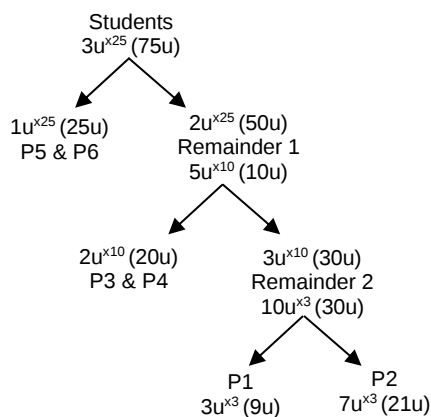
$$\begin{aligned}1u &= 0.18 \div 9 \\ &= 0.02\end{aligned}$$

$$\begin{aligned}\text{Amount of polish} &= 35u \\ &= 35 \times 0.02 \\ &= 0.7\end{aligned}$$

$$0.7 \ell = 700 \text{ m}\ell$$

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

Question 5



$$\begin{aligned}\text{Difference} &= 25u - 9u \\ &= 16u\end{aligned}$$

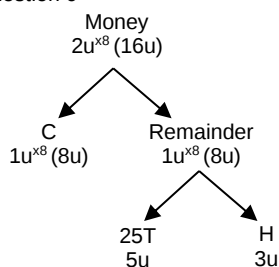
$$16u = 208$$

$$\begin{aligned}1u &= 208 \div 16 \\ &= 13\end{aligned}$$

$$\begin{aligned}75u &= 75 \times 13 \\ &= 975\end{aligned}$$

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

Question 6



Solutions to Unit 3.3 (Cont.)

Question 6 (Cont.)

$$3 \text{ cheese buns} = 1 \text{ tuna bun}$$

$$75 \text{ cheese buns} = 25 \text{ tuna buns}$$

$$3u \text{ of money} = 25 \text{ tuna buns}$$

$$5u \text{ of money} = 75 \text{ cheese buns}$$

$$1u \text{ of money} = 15 \text{ cheese buns}$$

$$\begin{aligned}8u \text{ of money} &= 8 \times 15 \\ &= 120 \text{ cheese buns}\end{aligned}$$

Donald bought **120** cheese buns.

Alternative solution

$$\text{Sum of money} = 25 \text{ tuna buns}$$

$$\begin{aligned}1u \text{ of money} &= 25 \div 5 \\ &= 5 \text{ tuna buns}\end{aligned}$$

$$\begin{aligned}8u \text{ of money} &= 8 \times 5 \\ &= 40 \text{ tuna buns}\end{aligned}$$

$$\begin{aligned}\text{Total cheese buns} &= 40 \times 3 \\ &= 120 \text{ cheese buns}\end{aligned}$$

Solutions to Unit 3.4 Quantity x Value

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.

$$\begin{aligned}\text{Difference} &= 2.5u - 1.8u \\ &= 0.7u\end{aligned}$$

$$0.7u = 301$$

$$1u = 301 \div 0.7 = 430$$

$$\begin{aligned}1.8u &= 1.8 \times 430 \\ &= 774\end{aligned}$$

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

Let's Practise 3.4

Question 1

Items	Quantity of items	$\times$	Value of items (\$)	Total value (\$)
50-cent	3u	$\times$	0.5	1.5u
20-cent	2u	$\times$	0.2	0.4u
Total	5u			1.9u

$$1.9u = 19$$

$$\begin{aligned}1u &= 19 \div 1.9 \\ &= 10\end{aligned}$$

$$\begin{aligned}1.5u &= 1.5 \times 10 \\ &= 15\end{aligned}$$

The value of the 50-cents is **\$15**.

Question 2

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

Solutions to Unit 3.4 (Cont.)

Question 2 (Cont.)

$$11u = 451$$

$$1u = 451 \div 11$$

$$= 41$$

$$9.5u = 9.5 \times 41$$

$$= 389.5$$

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

Question 3

Late : On time

4 : 16

1 : 4

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

$$24.25u = 9700$$

$$1u = 9700 \div 24.25$$

$$= 400$$

$$4u = 4 \times 400$$

$$= 1600$$

1600 pizzas were delivered on time last month.

Question 4

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

$$334u = 78\ 156$$

$$1u = 78\ 156 \div 334$$

$$= 234$$

$$3u = 3 \times 234$$

$$= 702$$

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

$$\text{Difference} = 87\ 636 - 78\ 156$$

$$= 9480$$

No. of another \$158 tickets needed to be sold

$$= 9480 \div 158$$

$$= 60$$

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

Question 5

Items	Quantity of items	$\times$	Value of items (stickers)	Total value (stickers)
C	485	$\times$	2u	970u
T	520	$\times$	3u	1560u
Total	1005			2530u

$$2530u = 7590$$

Solutions to Unit 3.4 (Cont.)

Question 5 (Cont.)

$$1u = 7590 \div 2530$$

$$= 3$$

$$(a) 2u = 2 \times 3$$

$$= 6$$

6 stickers were stamped on each cap.

$$(b) 3u = 3 \times 3$$

$$= 9$$

9 stickers were stamped on each T-shirt.

Question 6

Items	Quantity of items	$\times$	Value of items (mooncakes)	Total value (mooncakes)
A	121	$\times$	2u	242u
C	96	$\times$	1u	96u
Total	217			338u

$$338u = 676$$

$$1u = 676 \div 338$$

$$= 2$$

$$2u = 2 \times 2$$

$$= 4$$

Each adult received **4** mooncakes.

Solutions to Review Questions on Chapter 3

Question 1

$$L : E + S$$

$$E : S : E + S$$

$$3^{x9} : 7^{x9}$$

$$4^{x7} : 5^{x7} : 9^{x7}$$

$$27 : 63$$

$$28 : 35 : 63$$

Summary

$$L : E : S$$

$$27 : 28 : 35$$

At first

In the end

$$L : E$$

$$L : E$$

$$27 : 28$$

$$5^{x7} : 4^{x7}$$

$$27 : 28$$

$$35 : 28$$

$$\text{Total (end)} = 35u + 28u + 35u$$

$$= 98u$$

$$98u = 588$$

$$1u = 588 \div 98$$

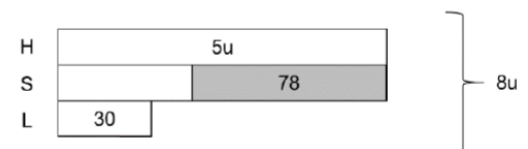
$$= 6$$

$$35u = 35 \times 6$$

$$= 210$$

Lynette had **210** coins.

Question 2



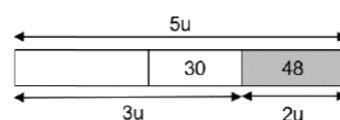
$$H : S + L : \text{Total (H + S + L)}$$

$$5$$

$$3$$

$$8$$

Combining the model of S and L,



Solutions to Review Questions on Chapter 3 (Cont.)

Question 2 (Cont.)

$$2u = 48$$

$$1u = 48 \div 2$$

$$= 24$$

$$5u = 5 \times 24$$

$$= 120$$

$$S = 5u - 78$$

$$= 120 - 78$$

$$= 42$$

The cost of the pair of shoes is **\$42**.

Question 3

T : C	T : O
2^{x^3} : 3^{x^3}	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

$$\text{Total mass} = 6u + 9u + 5u$$

$$= 20u$$

$$20u = 11.2$$

$$1u = 11.2 \div 20$$

$$= 0.56$$

$$12u = 12 \times 0.56$$

$$= 6.72$$

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

Question 4

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

Summary

G : F : W
10 : 3 : 12

$$\text{Geetha spent} = 10u - 3u$$

$$= 7u$$

$$\text{Total (end)} = 3u + 3u + 12u$$

$$= 18u$$

$$18u = 234$$

$$1u = 234 \div 18$$

$$= 13$$

$$7u = 7 \times 13$$

$$= 91$$

Geetha spent **\$91**.

Solutions to Review Questions on Chapter 3 (Cont.)

Question 5

At first	In the end
A : C	A : C
5^{x^4} : 4^{x^4}	4^{x^5} : 3^{x^5}
20 : 16	20 : 15

1u

$$1u = 3$$

$$\text{Total (at first)} = 20u + 16u$$

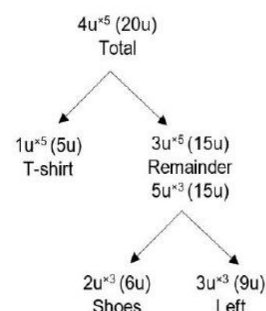
$$= 36u$$

$$36u = 36 \times 3$$

$$= 108$$

The total number of angel fish and clown fish in the aquarium at first was **108**.

Question 6



Before John received \$120

Total (end) :	Total (at first)
9 :	20

After John received \$120

Total (end) :	Total (at first)
5^{x^5} :	4^{x^5}
25 :	20

+16u

$$16u = 120$$

$$1u = 120 \div 16$$

$$= 7.5$$

$$\text{Total (at first)} = 20u$$

$$= 20 \times 7.5$$

$$= 150$$

John had **\$150** at first.

Question 7

$$\text{Profit per pair} = 12 - 7$$

$$= 5$$

$$\text{Profit (1 set of 5 pairs)} = 5 \times 4 - 7$$

$$= 13$$

$$\text{Profit (80 sets of 5 pairs)} = 80 \times 13$$

$$= 1040$$

$$\text{Remaining earnings} = 1540 - 1040$$

$$= 500$$

$$(a) \text{ No. of pairs sold singly} = 500 \div 5$$

$$= 100$$

100 pairs of sandals were not sold in sets of 5.

$$\text{Total no. of pairs} = 100 + (80 \times 5)$$

$$= 500$$

$$(b) \text{ Total cost} = 500 \times 7$$

$$= 3500$$

Daniel paid **\$3500** for all the pairs of sandals.

Solutions to Review Questions on Chapter 3 (Cont.)

Question 8

$$\begin{array}{lcl} L & : & K \\ 4^{x^3} & : & 5^{x^3} \\ 12 & : & 15 \end{array} \quad \begin{array}{lcl} K & : & A \\ 3^{x^5} & : & 5^{x^5} \\ 15 & : & 25 \end{array}$$

Summary

$$\begin{array}{lcl} L & : & K : A \\ 12 & : & 15 : 25 \end{array}$$

At first			In the end		
L	K	Total	L	K	Total
12^x	15^x	27^{x^2}	1^{x^2}	1^{x^2}	2
$\frac{12}{2}$	$\frac{15}{2}$		$\frac{1}{7}$	$\frac{1}{7}$	
24	30	54	27	27	54
$\xrightarrow{3u}$			$\xrightarrow{3u}$		

$$3u = 12$$

$$\begin{aligned} 1u &= 12 \div 3 \\ &= 4 \end{aligned}$$

$$\begin{aligned} \text{Difference} &= 50u - 27u \\ &= 23u \end{aligned}$$

$$\begin{aligned} 23u &= 23 \times 4 \\ &= 92 \end{aligned}$$

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

Solutions to Unit 4.1 Average

Let's Get Started

1.

$$\begin{aligned} \text{Average} &= \frac{115+36+280+41+9+1001}{6} \\ &= \frac{1482}{6} \\ &= 247 \end{aligned}$$

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

2.

$$\begin{aligned} \text{Average} &= \frac{(60 \times 3) + (75 \times 12) + (85 \times 8) + (90 \times 4)}{(3+12+8+4)} \\ &= \frac{2120}{27} \\ &= \mathbf{78.5} \text{ (1 d.p.)} \end{aligned}$$

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

3.

$$\begin{aligned} \text{Average} &= \frac{(480 \times 5) + (495 \times 10) + (510 \times 11) + (570 \times 6) + (595 \times 2)}{(5+10+11+6+2)} \\ &= \frac{17570}{34} \\ &= 516.76 \text{ (2 d.p.)} \end{aligned}$$

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

Ask Yourself

- 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.

Solutions to Unit 4.1 (Cont.)

Let's Practise 4.1

Question 1

$$\begin{aligned} \text{Total marks (4 subjects)} &= 65 \times 4 \\ &= 260 \end{aligned}$$

$$\begin{aligned} \text{Total marks (English + Science)} &= 65 + 64 \\ &= 129 \end{aligned}$$

$$\begin{aligned} \text{Total marks (Math + Chinese)} &= 260 - 129 \\ &= 131 \end{aligned}$$

M	1u	5	} 131
C	1u		

$$\begin{aligned} 2u &= 131 - 5 \\ &= 126 \end{aligned}$$

$$\begin{aligned} 1u &= 126 \div 2 \\ &= 63 \end{aligned}$$

$$\begin{aligned} 1u + 5 &= 63 + 5 \\ &= 68 \end{aligned}$$

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

Question 2

$$\begin{aligned} \text{Total number of hotdogs sold from 1st June to 4th June} &= 50 \times 4 \\ &= 200 \end{aligned}$$

$$\begin{aligned} \text{Total number of hotdogs sold from 5th June to 9th June} &= 5 \times 24 \\ &= 120 \end{aligned}$$

$$\begin{aligned} \text{Total number of hotdogs sold from 10th June to 20th June} &= \$240 \div \$2 \\ &= 120 \end{aligned}$$

$$\begin{aligned} \text{Total number of hotdogs from 1st June to 20th June} &= 200 + 120 + 120 \\ &= 440 \end{aligned}$$

$$\begin{aligned} \text{Average number of hotdogs in 20 days} &= 440 \div 20 \\ &= 22 \end{aligned}$$

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

Question 3

$$\begin{aligned} \text{Total number of pens bought} &= (3 \times 5) + (5 \times 20) + (7 \times 5) + (9 \times 10) \\ &= 240 \end{aligned}$$

$$\begin{aligned} \text{Total number of children} &= 5 + 20 + 5 + 10 \\ &= 40 \end{aligned}$$

$$\begin{aligned} \text{Average number of pens} &= 240 \div 40 \\ &= 6 \end{aligned}$$

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

Question 4

At first (Mon)

End (Fri)

R	:	N	:	Total	R	:	N	:	Total
$3^{x^{11}}$	:	4	:	$7^{x^{11}}$	9^{x^7}	:	2^{x^7}	:	11^{x^7}
		$\times 11$							
33	:	44	:	77	63	:	14	:	77

$$\begin{aligned} \text{No. of pages read on Friday} &= 63u - 33u \\ &= 30u \end{aligned}$$

Solutions to Unit 4.1 (Cont.)

Question 4 (Cont.)

$$30u = 60$$

$$1u = 60 \div 30$$

$$= 2$$

$$77u = 77 \times 2$$

$$= 154$$

$$\text{Average} = 154 \div 7$$

$$= 22$$

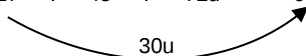
John would need to read an average of **22 pages** each day.

Question 5

At first

End

S	:	N	:	Total	S	:	N	:	Total
3×9	:	5×9	:	8×9	8×8	:	1×8	:	9×8
27	:	45	:	72u	64	:	8	:	72u



$$\begin{aligned} \text{Apples sold in the next 3 days} &= 64u - 27u \\ &= 37u \end{aligned}$$

$$37u = 111$$

$$1u = 111 \div 37$$

$$= 3$$

$$72u = 72 \times 3$$

$$= 216$$

$$\text{Average} = 216 \div 9$$

$$= 24$$

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

Question 6

$$\begin{aligned} \text{Total score of 23 students} &= 23 \times 76.5 \\ &= 1759.5 \end{aligned}$$

$$\begin{aligned} \text{Total score of next 2 highest score} &= 2 \times 82.25 \\ &= 164.5 \end{aligned}$$

$$\begin{aligned} \text{Total score of the top 3 highest scores} &= 95 + 164.5 \\ &= 259.5 \end{aligned}$$

$$\begin{aligned} \text{Total score of 20 students} &= 1759.5 - 259.5 \\ &= 1500 \end{aligned}$$

$$\begin{aligned} \text{Average score of the remaining students} &= 1500 \div 20 \\ &= 75 \end{aligned}$$

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

$$\begin{aligned} \text{New average score} &= 76.5 + 0.5 \\ &= 77 \end{aligned}$$

$$\begin{aligned} \text{New total score} &= 77 \times 24 \\ &= 1848 \end{aligned}$$

$$\begin{aligned} \text{New score} &= 1848 - 1759.5 \\ &= 88.5 \end{aligned}$$

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

Solutions to Unit 4.2 Average with Unknown Items

Let's Get Started

(a)

	Number of girls	Average	Total
Before	6	8	$6 \times 8 = 48$
After	7	9	$7 \times 9 = 63$

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

Solutions to Unit 4.2 (Cont.)

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

$$12u = 1695 - 1275$$

$$= 420$$

$$1u = 420 \div 12$$

$$= 35$$

$$1u + 15 = 35 + 15$$

$$= 50$$

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

$$2u = 88 - 68$$

$$= 20$$

$$1u = 20 \div 2$$

$$= 10$$

$$\text{Days read in all} = 1u + 4$$

$$= 10 + 4$$

$$= 14$$

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

$$3.4u - 3.2u = 0.2u$$

$$0.2u = 5.8 - 3.4$$

$$= 2.4$$

$$1u = 2.4 \div 0.2$$

$$= 12$$

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

Solutions to Unit 4.2 (Cont.)

Question 3 (Cont.)

Method 2

$$\begin{aligned}\text{Difference in mass of the new baby} &= 5.8 - 3.4 \\ &= 2.4\end{aligned}$$

$$\begin{aligned}\text{Average change with the new baby} &= 3.4 - 3.2 \\ &= 0.2\end{aligned}$$

$$\begin{aligned}\text{Number of babies} &= 2.4 \div 0.2 \\ &= 12\end{aligned}$$

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

Question 4

Method 1

	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

$$\begin{aligned}3.25u &= 51 - 31.5 \\ &= 19.5\end{aligned}$$

$$\begin{aligned}1u &= 19.5 \div 3.25 \\ &= 6\end{aligned}$$

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

Method 2

$$\begin{aligned}\text{Difference in the cost of 1 pair of silver and 1 pair of gold-plated chopsticks} &= (\$16 + \$35) - (\$15.75 \times 2) \\ &= \$19.50\end{aligned}$$

$$\begin{aligned}\text{Average change} &= \$15.75 - \$12.50 \\ &= \$3.25\end{aligned}$$

$$\begin{aligned}\text{Number of stainless steel chopsticks bought} &= \$19.50 \div \$3.25 \\ &= 6\end{aligned}$$

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	

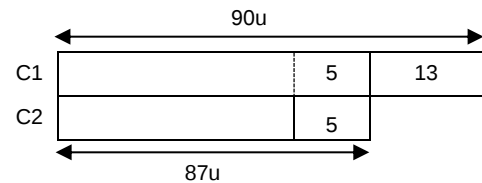
$$\begin{aligned}2u &= 48 - 38 \\ &= 10 \\ 1u &= 10 \div 2 \\ &= 5\end{aligned}$$

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

Solutions to Unit 4.2 (Cont.)

Question 6

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



$$\begin{aligned}\text{Difference} &= 90u - 87u \\ &= 3u\end{aligned}$$

$$\begin{aligned}\text{Gap} &= 5 + 13 \\ &= 18\end{aligned}$$

$$\begin{aligned}3u &= 18 \\ 1u &= 18 \div 3 \\ &= 6\end{aligned}$$

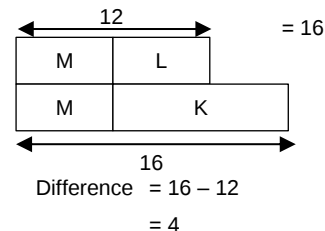
$$6 - 1 = 5$$

Harith has **5** friends.

Solutions to Unit 4.3 Average with Repeated Items

Let's Get Started

1. Total seashells of M and K = 8×2



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

$$\begin{aligned}\text{Number of seashells Kim had} &= 7 + 4 \\ &= 11\end{aligned}$$

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

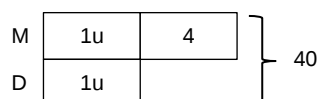
2. Total number of cars of D and M = 20×2

$$= 40$$

$$\begin{aligned}\text{Total number of cars of D, M and K} &= 19 \times 3 \\ &= 57\end{aligned}$$

$$\begin{aligned}\text{Number of cars Keith had} &= 57 - 40 \\ &= 17\end{aligned}$$

- (a) Keith had **17** toy cars.



$$\begin{aligned}2u &= 40 - 4 \\ &= 36\end{aligned}$$

$$\begin{aligned}1u &= 36 \div 2 \\ &= 18\end{aligned}$$

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

Solutions to Unit 4.3 (Cont.)

Ask Yourself

1. The repeated items are Louisa and Fanny.

Let's Practise 4.3

Question 1

$$\begin{aligned}\text{Total tags (D + C)} &= 203 \times 2 \\ &= 406 \\ \text{Total tags (E + C)} &= 194 \times 2 \\ &= 388 \\ \text{Total tags (E + D)} &= 181 \times 2 \\ &= 362 \\ \text{Total tags (2D + 2C + 2E)} &= 406 + 388 + 362 \\ &= 1156 \\ \text{Total tags (D + C + E)} &= 1156 \div 2 \\ &= 578\end{aligned}$$

$$\begin{aligned}E &= 578 - 406 \\ &= 172\end{aligned}$$

$$\begin{aligned}C &= 388 - 172 \\ &= 216\end{aligned}$$

$$\begin{aligned}D &= 362 - 172 \\ &= 190\end{aligned}$$

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

Question 2

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

$$\begin{aligned}\text{Ada's score} &= 219 - 154 \\ &= 65\end{aligned}$$

$$\begin{aligned}\text{Risa's score} &= 138 - 65 \\ &= 73\end{aligned}$$

$$\begin{aligned}\text{Mayo's score} &= 143 - 73 \\ &= 70\end{aligned}$$

$$\begin{aligned}\text{Sally's score} &= 154 - 70 \\ &= 84\end{aligned}$$

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

Question 3

$$\begin{aligned}\text{Total number of door knobs produced by A and B weekly} &= 3486 \times 2 \\ &= 6972 \\ \text{Total number of door knobs produced by A and C weekly} &= 6586 \times 2 \\ &= 13\,172 \\ \text{Difference in the number of door knobs produced between B and C weekly} &= 13\,172 - 6972 \\ &= 6200 \\ \text{Difference in units between B and C} &= 7u - 2u \\ &= 5u \\ 5u &= 6200\end{aligned}$$

Solutions to Unit 4.3 (Cont.)

Question 3 (Cont.)

$$\begin{aligned}1u &= 6200 \div 5 \\ &= 1240 \\ 2u &= 2 \times 1240 \\ &= 2480 \text{ (Factory B)} \\ \text{Factory A} &= 6972 - 2480 \\ &= 4492\end{aligned}$$

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

Question 4

L	1u	3	8	15
R	1u	3	8	
E	1u	3		
H	1u			

$$\begin{aligned}\text{Total number of perfume bottles collected} &= 4 \times 25 \\ &= 100\end{aligned}$$

$$(3 \times 3) + (2 \times 8) + 15 = 40$$

$$\begin{aligned}4u &= 100 - 40 \\ &= 60\end{aligned}$$

$$\begin{aligned}1u &= 60 \div 4 \\ &= 15\end{aligned}$$

$$\begin{aligned}\text{Total number of perfume bottles collect by R+E+H} &= 3u + 14 \\ &= 3 \times 15 + 14 \\ &= 59\end{aligned}$$

$$\begin{aligned}\text{Average number of perfume bottles collect by R+E+H} &= 59 \div 3 \\ &= 19\frac{2}{3} \\ &\approx 20 \text{ (nearest whole number)}\end{aligned}$$

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

Solutions to Unit 4.4 Rate

Let's Get Started 4.4

2. (a) $200\,000 \text{ km} \div 8 = 25\,000 \text{ km}$
 (b) $25\,000 \text{ km} \times 4 = 100\,000 \text{ km}$
3. (a) **\$2.50**
 (b) 1.45 p.m. to 2.45 p.m. → \$2.50
 2.45 p.m. to 3.15 p.m. → \$1.00
 Total parking fee = \$2.50 + \$1.00
 = **\$3.50**
 (c) 1.45 p.m. to 2.45 p.m. → \$2.50
 2.45 p.m. to 3.15 p.m. → \$1.00
 3.15 p.m. to 3.30 p.m. → \$1.00
 Total parking fee = \$2.50 + \$1.00 + \$1.00
 = **\$4.50**

Ask Yourself

1. Break down the time using a timeline.

Let's Practise 4.4

$$\begin{aligned}\text{Question 1} \\ 3.40 \text{ p.m. to } 4.40 \text{ p.m.} &\rightarrow \$8.50 \\ 4.40 \text{ p.m. to } 5.10 \text{ p.m.} &\rightarrow \$3.50 \\ 5.10 \text{ p.m. to } 5.40 \text{ p.m.} &\rightarrow \$3.50 \\ 5.40 \text{ p.m. to } 6.10 \text{ p.m.} &\rightarrow \$3.50 \\ 6.10 \text{ p.m. to } 6.25 \text{ p.m.} &\rightarrow \$3.50 \\ \text{Total amount paid} &= \$8.50 + (4 \times \$3.50) \\ &= \$22.50\end{aligned}$$

Kyra had to pay **\$22.50**.

Solutions to Unit 4.4 (Cont.)

Question 2

Plan A	Plan B
First 30 min $\rightarrow 30 \times \$0.15$ $= \$4.50$	First 30 min $\rightarrow 30 \times \$0.20$ $= \$6$
3 h 40 min = 220 min	3 h 40 min = 220 min
Subsequent time = 220 min – 30 min = 190 min	Subsequent time = 220 min – 30 min = 190 min
Subsequent charges $\rightarrow \$0.25 \times 190$ = \$47.50	Subsequent charges $\rightarrow \$0.15 \times 190$ = \$28.50
Total charges = \$20 + \$4.50 + \$47.50 = \$72	Total charges = \$25 + \$6 + \$28.50 = \$59.50

Difference = \$72 – \$59.50
= \$12.50

The difference she had to pay is **\$12.50**.

Question 3

0.5 hour $\rightarrow$ 2100 toys

1 hour $\rightarrow$ 4200 toys

2 hours $\rightarrow$ 8400 toys

It can make **8400** toys in 2 hours.

Question 4

80 words $\rightarrow$ 1.5 min

400 words $\rightarrow 5 \times 1.5$ min = 7.5 min

She would take **7.5 min**.

Question 5

First 1 kg $\rightarrow$ \$4.50

Subsequent

1 kg $\rightarrow$ \$3.50

1 kg $\rightarrow$ \$3.50

750 g $\rightarrow$ \$3.50

Total $\rightarrow \$4.50 + (3 \times \$3.50) = \$15$

Sam has to pay **\$15**.

Question 6

60 min $\rightarrow$ 960 litres

1 min $\rightarrow$ 960 litres $\div$ 60 = 16 litres

5 min $\rightarrow 5 \times 16$ litres = 80 litres

There is **80 litres** of water in the tank after 5 minutes.

Solutions to Unit 5.1 Finding Unknown Angles

Let's Get Started

- Using the property that the sum of angles on a straight line is 180° ,
 $52^\circ + 60^\circ = 112^\circ$
 $\angle y = 180^\circ - 112^\circ$
 $= 68^\circ$
- Using the property that vertically opposite angles between straight lines are equal (or the same),
 $\angle p = 46^\circ$, and
 $\angle q = 39^\circ$.

Ask Yourself

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

Solutions to Unit 5.1 (Cont.)

Think Further

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

$$\begin{array}{ccc} \angle a & : & \angle c \\ 2^{x2} & : & 1^{x2} \\ 4 & : & 2 \end{array} \quad \begin{array}{ccc} \angle b & : & \angle c \\ 3 & : & 2 \end{array}$$

Summary

$$\begin{array}{ccc} \angle a & : & \angle c & : & \angle b \\ 4 & : & 2 & : & 3 \end{array}$$

Let's Practise 5.1

Question 1

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

$$\angle a + \angle b + 120^\circ = 180^\circ$$

$$\begin{aligned} \angle a + \angle b &= 180 - 120^\circ \\ &= 60^\circ \end{aligned}$$

$$3u = 60^\circ$$

$$\begin{aligned} 1u &= 60^\circ \div 3 \\ &= 20^\circ \end{aligned}$$

$$\begin{aligned} \angle a &= 2u \\ &= 2 \times 20^\circ \\ &= 40^\circ \end{aligned}$$

$$\begin{aligned} \angle b &= 1u \\ &= 20^\circ \end{aligned}$$

Question 2

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

$$\angle m + \angle n + 90^\circ = 180^\circ$$

$$\begin{aligned} \angle m + \angle n &= 180^\circ - 90^\circ \\ &= 90^\circ \end{aligned}$$

$$5u = 90^\circ$$

$$\begin{aligned} 1u &= 90^\circ \div 5 \\ &= 18^\circ \end{aligned}$$

$$\begin{aligned} \angle m &= 2u \\ &= 2 \times 18^\circ \\ &= 36^\circ \end{aligned}$$

$$\begin{aligned} \angle n &= 3u \\ &= 3 \times 18^\circ \\ &= 54^\circ \end{aligned}$$

Question 3

Using the property of vertically opposite angles,

$$\angle a + \angle b = 126^\circ$$

$$3u = 126^\circ$$

$$\begin{aligned} 1u &= 126^\circ \div 3 \\ &= 42^\circ \end{aligned}$$

$$\begin{aligned} \angle a &= 2u \\ &= 2 \times 42^\circ \\ &= 84^\circ \end{aligned}$$

$$\angle b = 42^\circ$$

Question 4

Using the property of vertically opposite angles,

$$\angle m + \angle n + 40^\circ = 135^\circ$$

Solutions to Unit 5.1 (Cont.)

Question 4 (Cont.)

$$\begin{aligned}\angle m + \angle n &= 135^\circ - 40^\circ \\ &= 95^\circ\end{aligned}$$

$$5u = 95^\circ$$

$$\begin{aligned}1u &= 95^\circ \div 5 \\ &= 19^\circ\end{aligned}$$

$$\begin{aligned}\angle m &= 3 \times 19^\circ \\ &= 57^\circ\end{aligned}$$

$$\begin{aligned}\angle n &= 2 \times 19^\circ \\ &= 38^\circ\end{aligned}$$

Question 5

Using the property of vertically opposite angles,

$$\angle a = 88^\circ$$

$$\begin{aligned}\angle b &= 88^\circ \div 2 \\ &= 44^\circ \text{ (given: half that of } \angle a)\end{aligned}$$

$$\begin{aligned}\angle a + \angle b &= 88^\circ + 44^\circ \\ &= 132^\circ\end{aligned}$$

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

$$\begin{aligned}\angle a + \angle b + \angle c &= 180^\circ \\ \angle c &= 180^\circ - 132^\circ \\ &= 48^\circ\end{aligned}$$

Question 6

$\angle XNY = 115^\circ$ (Vertically opposite angles)

$$\begin{aligned}\angle a &= 180^\circ - 115^\circ - 42.5^\circ \\ &= 22.5^\circ \text{ (Sum of angles in a triangle)}\end{aligned}$$

$$\angle b = 92.5^\circ \text{ (Exterior angles)}$$

$$\begin{aligned}\angle MKY &= 180^\circ - 45^\circ - 92.5^\circ \\ &= 42.5^\circ \text{ (Angles on a straight line)}\end{aligned}$$

$$\begin{aligned}\angle c &= 115^\circ + 42.5^\circ \\ &= 157.5^\circ \text{ (Exterior Angles)}\end{aligned}$$

Solutions to Unit 5.2 Finding Angles in Plane Figures

Let's Get Started

Question 1

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

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

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

Question 2

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

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

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

Question 3

(a) There is **1 pair** of parallel lines i.e. $CD \parallel BA$.

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

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

Question 4

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

$$\angle SRU + 37^\circ = 180^\circ$$

Solutions to Unit 5.2 (Cont.)

Question 4 (Cont.)

$$\begin{aligned}\angle SRU &= 180^\circ - 37^\circ \\ &= 143^\circ\end{aligned}$$

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

$$\angle QRS + 143^\circ + 68^\circ = 360^\circ$$

$$143^\circ + 68^\circ = 211^\circ$$

$$\begin{aligned}\angle QRS &= 360^\circ - 211^\circ \\ &= 149^\circ\end{aligned}$$

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

$$\angle k + \angle QRS = 180^\circ$$

$$\angle k + 149^\circ = 180^\circ$$

$$\begin{aligned}\angle k &= 180^\circ - 149^\circ \\ &= 31^\circ\end{aligned}$$

Question 5

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

$$\angle a + 52^\circ + 55^\circ = 180^\circ$$

$$55^\circ + 52^\circ = 107^\circ$$

$$\begin{aligned}\angle a &= 180^\circ - 107^\circ \\ &= 73^\circ\end{aligned}$$

Method 1

$$\angle a + 52^\circ + \angle c = 180^\circ \text{ (Internal angles)}$$

$$73^\circ + 52^\circ + \angle c = 180^\circ$$

$$73^\circ + 52^\circ = 125^\circ$$

$$\begin{aligned}\angle c &= 180^\circ - 125^\circ \\ &= 55^\circ\end{aligned}$$

Method 2

Using the property of corresponding angles,

$$\angle c = 55^\circ$$

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

$$\angle b + 55^\circ + 73^\circ = 180^\circ$$

$$55^\circ + 73^\circ = 128^\circ$$

$$\begin{aligned}\angle b &= 180^\circ - 128^\circ \\ &= 52^\circ\end{aligned}$$

Question 6

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

$$107^\circ + \angle BCD = 180^\circ$$

$$\begin{aligned}\angle BCD &= 180^\circ - 107^\circ \\ &= 73^\circ\end{aligned}$$

$$\angle DCF = 73^\circ$$

$$\angle n + 73^\circ = 180^\circ$$

$$\angle n = 180^\circ - 73^\circ$$

$$\angle n = 107^\circ \text{ (Interior Angles)}$$

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

$$\angle n + \angle m = 180^\circ$$

$$\begin{aligned}\angle m &= 180^\circ - 107^\circ \\ &= 73^\circ\end{aligned}$$

Solutions to Unit 5.2 (Cont.)

Ask Yourself

- Sum of angles on a straight line. Yes, we can find the angle directly.
- Sum of angles in a triangle.
- 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) $\angle CBD = 45^\circ$

$$\angle BDC = 45^\circ$$

$$\angle CBD = \angle BDC$$

$$= 45^\circ$$

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

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

Question 2

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

$$\angle BED + 65^\circ = 180^\circ$$

$$\angle BED = 180^\circ - 65^\circ$$

$$= 115^\circ$$

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

$$\angle DBE = \angle EDB$$

$$= \frac{180^\circ - 115^\circ}{2}$$

$$= 32.5^\circ$$

Question 3

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

$$\angle ECH + 70^\circ + 90^\circ = 20^\circ$$

$$70^\circ + 90^\circ = 160^\circ$$

$$\angle ECH = 180^\circ - 160^\circ$$

$$= 20^\circ$$

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

$$\angle ACB = 45^\circ$$

$$\angle ACE = 45^\circ - 20^\circ$$

$$= 25^\circ$$

Question 4

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

$$\angle HED = 180^\circ - 60^\circ$$

$$= 120^\circ$$

$$\angle HDE = 45^\circ$$

$$\angle DHE = 180^\circ - 120^\circ - 45^\circ$$

$$= 15^\circ$$

$$\angle BHC = 180^\circ - 90^\circ - 45^\circ - 15^\circ$$

$$= 30^\circ$$

$$\angle HBC = \frac{180^\circ - 30^\circ}{2}$$

$$= 75^\circ$$

Solutions to Unit 5.2 (Cont.)

Question 5

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

$$\angle BFD + \angle BDF + 30^\circ = 180^\circ$$

$$\angle BFD = \angle BDF$$

$$= \frac{180^\circ - 30^\circ}{2}$$

$$= 75^\circ$$

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

$$\angle ADE + 40^\circ + 90^\circ = 180^\circ$$

$$40^\circ + 90^\circ = 130^\circ$$

$$\angle ADE = 180^\circ - 130^\circ$$

$$= 50^\circ$$

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

$$\angle BDC + 50^\circ + 75^\circ = 180^\circ$$

$$50^\circ + 75^\circ = 125^\circ$$

$$\angle BDC = 180^\circ - 125^\circ$$

$$= 55^\circ$$

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

$$\angle DBC + 55^\circ + 90^\circ = 180^\circ$$

$$55^\circ + 90^\circ = 145^\circ$$

$$\angle DBC = 180^\circ - 145^\circ$$

$$= 35^\circ$$

Question 6

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

$$\angle CFD + 65^\circ + 90^\circ = 180^\circ$$

$$65^\circ + 90^\circ = 155^\circ$$

$$\angle CFD = 180^\circ - 155^\circ$$

$$= 25^\circ$$

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

$$\angle BFC + 25^\circ = 45^\circ$$

$$\angle BFC = 45^\circ - 25^\circ$$

$$= 20^\circ$$

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.

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

$$= 67.5^\circ$$

$$\angle EDB = 67.5^\circ - 30^\circ$$

$$= 37.5^\circ$$

Question 8

$$\angle EDB = 118^\circ$$

$$\angle EBD = \frac{180^\circ - 118^\circ}{2}$$

$$= 31^\circ$$

$$\angle BDC = 180^\circ - 118^\circ$$

$$= 62^\circ \text{ (Angles on a straight line)}$$

Solutions to Unit 5.2 (Cont.)**Question 8 (Cont.)**

$$\begin{aligned}\angle DBC &= 180^\circ - 62^\circ - 62^\circ \\ &= 56^\circ \\ \angle EBC &= 31^\circ + 56^\circ \\ &= \mathbf{87^\circ}\end{aligned}$$

Question 9

$$\begin{aligned}\angle BEC &= 180^\circ - 100^\circ - 10^\circ \\ &= \mathbf{70^\circ} \text{ (Sum of angles in a triangle)} \\ &= \angle AFD \text{ (Corresponding angles)}\end{aligned}$$

Question 10

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

$$\begin{aligned}\angle AEC &= 75^\circ \\ \text{(a) } \angle AED &= 180^\circ - 75^\circ \\ &= \mathbf{105^\circ} \\ \angle AEF &= 35^\circ \text{ (Alternate angles)} \\ \text{(b) } \angle FEC &= 75^\circ - 35^\circ \\ &= \mathbf{40^\circ}\end{aligned}$$

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,

$$\text{(a) } \angle CDB = \mathbf{60^\circ}$$

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

$$\begin{aligned}\angle BAE &= 60^\circ \\ \text{(b) } \angle EAK &= 60^\circ - 50^\circ \\ &= \mathbf{10^\circ}\end{aligned}$$

Question 12

$$\begin{aligned}\angle EFC &= 180^\circ - 50^\circ \\ &= 130^\circ \text{ (Interior angles)} \\ \angle GFA &= 130^\circ \text{ (Vertically opposite angles)} \\ \angle AGF &= \frac{180^\circ - 130^\circ}{2} \\ &= 25^\circ \text{ (Sum of angles in an isosceles triangle)} \\ \angle GHB &= 180^\circ - 25^\circ - 78^\circ \\ &= \mathbf{77^\circ} \text{ (Sum of angles in a triangle)}\end{aligned}$$

Question 13

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

$$\begin{aligned}30^\circ + 30^\circ &= 60^\circ \\ \angle ACB &= 180^\circ - 60^\circ \\ &= 120^\circ\end{aligned}$$

Using the property of vertically opposite angles,

$$\begin{aligned}\angle DCE &= 120^\circ \\ \angle CDE &= \angle CED \\ &= \frac{180^\circ - 120^\circ}{2} \\ &= 30^\circ\end{aligned}$$

Using the property of vertically opposite angles,

$$\begin{aligned}\angle FEK &= 30^\circ \\ \angle GEK &= 30^\circ - 18^\circ \\ &= 12^\circ\end{aligned}$$

Solutions to Unit 5.2 (Cont.)**Question 13 (Cont.)**

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

$$\begin{aligned}\angle EGK &= 180^\circ - 105^\circ \\ &= 75^\circ\end{aligned}$$

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

$$\begin{aligned}12^\circ + 75^\circ &= 87^\circ \\ \angle GKE &= 180^\circ - 87^\circ \\ &= 93^\circ \\ \angle GKJ &= 180^\circ - 93^\circ \\ &= \mathbf{87^\circ}\end{aligned}$$

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

$$\begin{aligned}30^\circ + 93^\circ &= 123^\circ \\ \angle EFK &= 180^\circ - 123^\circ \\ &= \mathbf{57^\circ}\end{aligned}$$

Question 14

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

$$\begin{aligned}\angle ACD &= 180^\circ - 47^\circ \\ &= 133^\circ\end{aligned}$$

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

$$\begin{aligned}\angle ADC &= 180^\circ - 133^\circ - 13^\circ \\ &= \mathbf{34^\circ} \\ \angle CAB &= 180^\circ - 78^\circ \times 2 \\ &= 47^\circ \\ \angle GAD &= 47^\circ - 13^\circ \\ &= \mathbf{34^\circ}\end{aligned}$$

Question 15

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

$$\begin{aligned}\angle BFG &= \angle BGF \\ &= \frac{180^\circ - 24^\circ}{2} \\ &= 78^\circ\end{aligned}$$

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

$$\begin{aligned}78^\circ + 39^\circ + 49^\circ &= 166^\circ \\ \angle CFD &= 180^\circ - 166^\circ \\ &= \mathbf{14^\circ} \\ \angle CDE &= 63^\circ \text{ (Corresponding angles)} \\ \angle DCF &= 180^\circ - 63^\circ \\ &= \mathbf{117^\circ} \text{ (Interior angles)}\end{aligned}$$

Solutions to Unit 6.1 Triangles with Common Base or Height

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

Solutions to Unit 6.1 (Cont.)

$$\begin{aligned}\text{Area of B} &= \frac{1}{2} \times 6 \text{ cm} \times 1 \text{ cm} \\ &= 3 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of C} &= \frac{1}{2} \times 2 \text{ cm} \times 4 \text{ cm} \\ &= 4 \text{ cm}^2\end{aligned}$$

5. (a) Area of the shaded triangle

$$\begin{aligned}&= \frac{1}{2} \times 6 \text{ cm} \times 5 \text{ cm} \\ &= 15 \text{ cm}^2\end{aligned}$$

- (b) Area of the shaded triangle

$$\begin{aligned}&= \frac{1}{2} \times 5 \text{ cm} \times 6 \text{ cm} \\ &= 15 \text{ cm}^2\end{aligned}$$

Let's Get Started 6.1

2. (a) Method 1

$$\begin{aligned}\text{Area of Triangle A} &= \frac{1}{2} \times 22 \text{ cm} \times 20 \text{ cm} \\ &= 220 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of Triangle B} &= \frac{1}{2} \times 22 \text{ cm} \times 30 \text{ cm} \\ &= 330 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Total area of Triangles A and B} \\ &= 220 \text{ cm}^2 + 330 \text{ cm}^2 \\ &= \mathbf{550 \text{ cm}^2}\end{aligned}$$

Method 2

$$\begin{aligned}\text{Total area} &= \frac{1}{2} \times 22 \text{ cm} \times 50 \text{ cm} \\ &= 550 \text{ cm}^2\end{aligned}$$

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

$$\begin{aligned}\text{3. Area of the shaded part} &= \frac{1}{2} \times 10 \text{ cm} \times 5 \text{ cm} \\ &= \mathbf{25 \text{ cm}^2}\end{aligned}$$

OR

$$\begin{aligned}&\frac{1}{2} \times \text{common base} \times \text{combined height} \\ &= \frac{1}{2} \times 5 \text{ cm} \times 10 \text{ cm} \\ &= \mathbf{25 \text{ cm}^2}\end{aligned}$$

$$\begin{aligned}\text{4. Area of Triangle ABC} &= \frac{1}{2} \times 20 \text{ cm} \times (25 - 12) \text{ cm} \\ &= 130 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of Triangle ABD} &= \frac{1}{2} \times 20 \text{ cm} \times 25 \text{ cm} \\ &= 250 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Ratio} &= 130 : 250 \\ &= \mathbf{13 : 25}\end{aligned}$$

(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

$$\begin{aligned}&= \frac{1}{2} \times 12 \text{ cm} \times (14 - 5) \text{ cm} + \frac{1}{2} \times 12 \text{ cm} \times (10 - 5) \text{ cm} \\ &= \mathbf{84 \text{ cm}^2}\end{aligned}$$

Solutions to Unit 6.1 (Cont.)

Ask Yourself

1. The height of both triangles are the same.

Let's Practise 6.1

Question 1

Total area of the unshaded triangles

$$\begin{aligned}&= \frac{1}{2} \times 20 \text{ cm} \times 10 \text{ cm} \\ &= \mathbf{100 \text{ cm}^2}\end{aligned}$$

Question 2

Total area of the unshaded triangles

$$\begin{aligned}&= \frac{1}{2} \times 24 \text{ cm} \times 18 \text{ cm} \\ &= \mathbf{216 \text{ cm}^2}\end{aligned}$$

Question 3

Total area of the shaded triangles

$$\begin{aligned}&= \frac{1}{2} \times (9 + 7 + 3) \text{ cm} \times 6 \text{ cm} \\ &= \mathbf{57 \text{ cm}^2}\end{aligned}$$

Question 4

Total area of the 3 shaded triangles

$$\begin{aligned}&= \frac{1}{2} \times (15 + 2) \text{ cm} \times 18 \text{ cm} \\ &= \mathbf{153 \text{ cm}^2}\end{aligned}$$

Question 5

Total area of the shaded triangles

$$\begin{aligned}&= \frac{1}{2} \times 20 \text{ cm} \times (10 + 5) \text{ cm} \\ &= \mathbf{150 \text{ cm}^2}\end{aligned}$$

Question 6

Total area of the shaded triangles

$$\begin{aligned}&= \frac{1}{2} \times 32 \text{ cm} \times 28 \text{ cm} \\ &= \mathbf{448 \text{ cm}^2}\end{aligned}$$

Question 7

Total area of the shaded triangles

$$\begin{aligned}&= \frac{1}{2} \times (10 + 15) \text{ cm} \times 20 \text{ cm} \\ &= \mathbf{250 \text{ cm}^2}\end{aligned}$$

Question 8

Total area of the unshaded triangles

$$\begin{aligned}&= \frac{1}{2} \times 15 \text{ cm} \times 48 \text{ cm} \\ &= \mathbf{360 \text{ cm}^2}\end{aligned}$$

Question 9

Total area of the shaded triangles

$$\begin{aligned}&= \frac{1}{2} \times (10 + 8) \text{ cm} \times 20 \text{ cm} \\ &= \mathbf{180 \text{ cm}^2}\end{aligned}$$

Question 10

Total area of the unshaded parts of the figure

$$\begin{aligned}&= (11 + 20) \text{ cm} \times 18 \text{ cm} - \frac{1}{2} \times 20 \text{ cm} \times 18 \text{ cm} \\ &= \mathbf{378 \text{ cm}^2}\end{aligned}$$

Question 11

Total area of the shaded parts

$$\begin{aligned}&= \frac{1}{2} \times (26 + 26) \text{ cm} \times 26 \text{ cm} \\ &= \mathbf{676 \text{ cm}^2}\end{aligned}$$

Question 12

Area of A = Area of B + C

$$\begin{aligned}\text{Area of A} &= \frac{1}{2} \times 18 \text{ cm} \times 18 \text{ cm} \\ &= 162 \text{ cm}^2\end{aligned}$$

Solutions to Unit 6.1 (Cont.)

Question 12 (Cont.)

$$\begin{aligned}\text{Area of D + E} &= \frac{1}{2} \times (18 + 18) \text{ cm} \times 18 \text{ cm} \\ &= 324 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Total area of the shaded parts (A + B + C + D + E)} &= 162 \text{ cm}^2 + 162 \text{ cm}^2 + 324 \text{ cm}^2 \\ &= \mathbf{648 \text{ cm}^2}\end{aligned}$$

Question 13

$$\begin{aligned}\text{Length of square} &= \sqrt{64} \text{ cm} \\ &= 8 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{PX} &= \text{PY} \\ &= 8 \text{ cm} \div 2 \\ &= 4 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Area of Triangle PXY} &= \frac{1}{2} \times 4 \text{ cm} \times 4 \text{ cm} \\ &= 8 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of Triangle RSY} &= \frac{1}{2} \times 8 \text{ cm} \times 4 \text{ cm} \\ &= 16 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of Triangle QRX} &= \frac{1}{2} \times 4 \text{ cm} \times 8 \text{ cm} \\ &= 16 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of the shaded triangle} &= 64 \text{ cm}^2 - 8 \text{ cm}^2 - 16 \text{ cm}^2 - 16 \text{ cm}^2 \\ &= \mathbf{24 \text{ cm}^2}\end{aligned}$$

Solutions to Unit 6.2 Triangles with Composite Figures

Let's Get Started 6.2

1. Area of the square

$$\begin{aligned}&= 2 \times \frac{1}{2} \times 48 \text{ cm} \times (48 \div 2) \text{ cm} \\ &= \mathbf{1152 \text{ cm}^2}\end{aligned}$$

2. Height of each identical triangle = $20 \div 2$

$$= 10$$

$$\begin{aligned}\text{Area of figure} &= 8 \times \frac{1}{2} \times 9 \text{ cm} \times 10 \text{ cm} \\ &= \mathbf{360 \text{ cm}^2}\end{aligned}$$

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

$$= \mathbf{450 \text{ cm}^2}$$

Ask Yourself

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

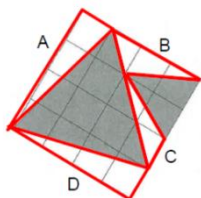
Think Further

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

$$\frac{1}{2} \times \text{base length} \times \text{height}$$

Let's Practise 6.2

Question 1



$$\begin{aligned}\text{Area of Figure} &= 24 \text{ cm} \times 24 \text{ cm} \\ &= 576 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of Triangle A} &= \frac{1}{2} \times 24 \text{ cm} \times 6 \text{ cm} \\ &= 72 \text{ cm}^2\end{aligned}$$

Solutions to Unit 6.2 (Cont.)

Question 1 (Cont.)

$$\begin{aligned}\text{Area of Triangle B} &= \frac{1}{2} \times 18 \text{ cm} \times 6 \text{ cm} \\ &= 54 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of Triangle C} &= \frac{1}{2} \times 12 \text{ cm} \times 6 \text{ cm} \\ &= 36 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of Triangle D is the same as Area of Triangle A} \\ &= 72 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of shaded area} \\ &= 576 \text{ cm}^2 - 72 \text{ cm}^2 - 54 \text{ cm}^2 - 36 \text{ cm}^2 - 72 \text{ cm}^2 \\ &= \mathbf{324 \text{ cm}^2}\end{aligned}$$

Question 2

Area of shaded Triangle A

$$\begin{aligned}&= \frac{1}{2} \times 6 \text{ cm} \times (12 - 5) \text{ cm} \\ &= \mathbf{21 \text{ cm}^2}\end{aligned}$$

Area of shaded Triangle B

$$\begin{aligned}&= \frac{1}{2} \times 11 \text{ cm} \times 12 \text{ cm} + \frac{1}{2} \times 11 \text{ cm} \times 8 \text{ cm} \\ &= \mathbf{110 \text{ cm}^2}\end{aligned}$$

Question 3

$$\begin{aligned}\text{Total units} &= 4u + 3u + 2u \\ &= 9u\end{aligned}$$

$$9u = 36 \text{ cm}$$

$$1u = 36 \text{ cm} \div 9$$

$$= 4 \text{ cm}$$

$$\text{AH} = 4 \times 4 \text{ cm}$$

$$= 16 \text{ cm}$$

$$\text{HG} = 3 \times 4 \text{ cm}$$

$$= 12 \text{ cm}$$

$$\text{GF} = 2 \times 4 \text{ cm}$$

$$= 8 \text{ cm}$$

Total area of Triangle ABH and Triangle BHC

$$= \frac{1}{2} \times 16 \text{ cm} \times 10 \text{ cm}$$

$$= 80 \text{ cm}^2$$

Area of Triangle BCH and Triangle DCE

$$= \frac{1}{2} \times 12 \text{ cm} \times 10 \text{ cm}$$

$$= 60 \text{ cm}^2$$

$$\begin{aligned}\text{Area of Triangle EGF} &= \frac{1}{2} \times 8 \text{ cm} \times 10 \text{ cm} \\ &= 40 \text{ cm}^2\end{aligned}$$

Area of the figure

$$\begin{aligned}&= 80 \text{ cm}^2 + 60 \text{ cm}^2 + 40 \text{ cm}^2 + 110 \text{ cm}^2 \\ &= \mathbf{290 \text{ cm}^2}\end{aligned}$$

Question 4

$$\begin{array}{lcl} \text{AB} & : & \text{EF} & \text{CD} & : & \text{AB} \\ 1^{\times 3} & : & 2^{\times 3} & 2 & : & 3 \\ 3 & : & 6 & & & \end{array}$$

Summary ratio

$$\begin{array}{lcl} \text{AB} & : & \text{EF} & : & \text{CD} \\ 3 & : & 6 & : & 2 \end{array}$$

$$\text{Difference} = 6u - 2u = 4u$$

$$4u = 12 \text{ cm}$$

$$1u = 12 \text{ cm} \div 4$$

$$= 3 \text{ cm}$$

Solutions to Unit 6.2 (Cont.)

Question 4 (Cont.)

$$\begin{aligned} AB &= 3 \times 3 \text{ cm} \\ &= 9 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Area of figure} &= \frac{1}{2} \times 10 \text{ cm} \times (9 + 12) \text{ cm} \\ &= \mathbf{105 \text{ cm}^2} \end{aligned}$$

Alternative solution

$$\begin{aligned} \text{Area of Triangle AEH} &= \frac{1}{2} \times 10 \text{ cm} \times 9 \text{ cm} \\ &= 45 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of Triangle EGC} &= \frac{1}{2} \times 10 \text{ cm} \times (18 \text{ cm} - 6 \text{ cm}) \\ &= 60 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of figure} &= 45 \text{ cm}^2 + 60 \text{ cm}^2 \\ &= \mathbf{105 \text{ cm}^2} \end{aligned}$$

Question 5

$$\begin{aligned} AB &= \frac{3}{8} \times 200 \text{ m} \\ &= 75 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{(a) Cost of building the picnic area} &= 75 \text{ m} \times 75 \text{ m} \times \$20 \\ &= \mathbf{\$112\,500} \end{aligned}$$

$$\begin{aligned} \text{(b) Cost of fencing the fountain} &= (250 \text{ m} + 150 \text{ m} + 200 \text{ m}) \times \$12 \\ &= \mathbf{\$7200} \end{aligned}$$

Question 6

$$\begin{aligned} \text{Area of square} &= 20 \text{ m} \times 20 \text{ m} \\ &= 400 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of A} &= 400 \text{ m}^2 - \frac{1}{2} \times 20 \text{ m} \times (20 - 7) \text{ m}^2 \\ &= 270 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of C} &= \frac{1}{2} \times 20 \text{ m} \times (15 - 13) \text{ m} \\ &= 20 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Difference} &= 270 \text{ m}^2 - 20 \text{ m}^2 \\ &= \mathbf{250 \text{ m}^2} \end{aligned}$$

Question 7

$$\begin{aligned} \text{Base length of Triangle B and Triangle C} &= 70 \text{ m}^2 \times 2 \div 7 \text{ m} \\ &= 20 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Area of A} &= 28 \text{ m} \times 20 \text{ m} - 70 \text{ m}^2 \\ &= 490 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of D} &= \frac{1}{2} \times (28 \text{ m} - 21 \text{ m}) \times 8 \text{ m} \\ &= 28 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Sum of areas of A and D} &= 490 \text{ m}^2 + 28 \text{ m}^2 \\ &= \mathbf{518 \text{ m}^2} \end{aligned}$$

Question 8

$$\begin{aligned} \text{Area of Rectangle FBCD} &= 2 \times 52 \text{ cm}^2 \\ &= 104 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of Triangle ABF} &= \frac{1}{2} \times 52 \text{ cm}^2 \\ &= 26 \text{ cm}^2 \end{aligned}$$

$$\text{Area of Triangle FDE} = 52 \text{ cm}^2$$

$$\begin{aligned} \text{Area of figure} &= 104 \text{ cm}^2 + 52 \text{ cm}^2 + 26 \text{ cm}^2 \\ &= \mathbf{182 \text{ cm}^2} \end{aligned}$$

Question 9

$$\begin{aligned} \text{Area of the entire figure} &= 3 \times 100 \text{ cm}^2 \\ &= \mathbf{300 \text{ cm}^2} \end{aligned}$$

Solutions to Unit 6.2 (Cont.)

Question 10

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

$$\begin{aligned} \text{Length of small square} &= \sqrt{144} \\ &= 12 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Area of big square} &= 24 \text{ cm} \times 24 \text{ cm} \\ &= 576 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of unshaded parts} &= \frac{1}{2} \times 24 \text{ cm} \times 24 \text{ cm} \\ &= 288 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Fraction} &= \frac{576 - (288 + 144)}{576} \\ &= \frac{1}{4} \end{aligned}$$

$\frac{1}{4}$ of the figure is made up of the shaded triangles.

Question 11

Area of Triangle BCJ and Triangle CDE

$$\begin{aligned} &= 2 \times \frac{1}{2} \times 20 \text{ cm} \times 10 \text{ cm} \\ &= 200 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of Triangle GJE} &= \frac{1}{2} \times 30 \text{ cm} \times 10 \text{ cm} \\ &= 150 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of Triangle ABG} &= \frac{1}{2} \times 20 \text{ cm} \times 20 \text{ cm} \\ &= 200 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of two big squares} &= 2 \times 20 \text{ cm} \times 20 \text{ cm} \\ &= 800 \text{ cm}^2 \end{aligned}$$

Total area of shaded parts

$$\begin{aligned} &= 800 \text{ cm}^2 - (150 \text{ cm}^2 + 200 \text{ cm}^2 + 200 \text{ cm}^2) \\ &= \mathbf{250 \text{ cm}^2} \end{aligned}$$

Question 12

Area of unshaded parts of Triangle ABC

$$\begin{aligned} &= \frac{1}{2} \times 36 \text{ cm} \times (18 - 5) \text{ cm} - 125 \text{ cm}^2 \\ &= \mathbf{109 \text{ cm}^2} \end{aligned}$$

Question 13

Area of A + B + D = Area of C + F + E

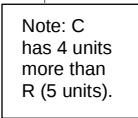
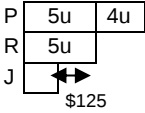
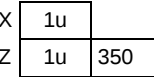
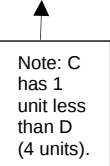
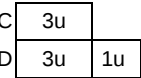
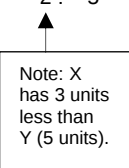
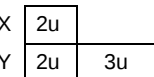
$$\begin{aligned} \text{Area of A + B + D} &= 22 \text{ cm}^2 + 24 \text{ cm}^2 + 16 \text{ cm}^2 \\ &= 62 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of F} &= 62 \text{ cm}^2 - 21 \text{ cm}^2 - 18 \text{ cm}^2 \\ &= \mathbf{23 \text{ cm}^2} \end{aligned}$$

Solutions to Unit 7.1 More than/Less than

Let's Get Started 7.1

S/N	Sentence	Ratio Comparison	Model drawing
2	E has 50% more money than F.	$\begin{array}{ccc} E & : & F \\ 3 & : & 2 \end{array}$ Note: E has 1 unit more than F (2 units).	

3	P has 80% more than R. R has \$125 more than J.	$P : R$ $9 : 5$  $R = 5u$ $J = 5u - \$125$	
4	X has \$350 less than Z.		
5	C has 25% less money than D.	$C : D$ $3 : 4$ 	
6	X has 60% less money than Y.	$X : Y$ $2 : 5$ 	

Ask Yourself

- Convert the percentage given into a fraction in its

simplest form i.e. $20\% = \frac{1}{5}$.

C	:	K	:	Total	C	:	K	:	Total
20	:	100	:			:		:	
1^{x5}	:	5^{x5}	:	6^{x5}	2^{x6}	:	3^{x6}	:	5^{x6}
5	:	25	:	30	12	:	18	:	30

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

- 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

"Joe would have 20% more stamps than Roy"

can be rephrased as:

'Joe would have 120% as many stamps as Roy' or

'Roy would have $83\frac{1}{3}\%$ ($\frac{5}{6} \times 100\%$) as many stamps as

Joe.'

Solutions to Unit 7.1

Let's Practise 7.1

Question 1

<u>At first</u>			<u>End</u>						
G	:	C	:	Total	G	:	C	:	Total
100	:	125	:		125	:	100	:	
4	:	5	:	9	5	:	4	:	9

$$1u = 125$$

$$9u = 9 \times 125$$

$$= 1125$$

They have **1125** cards altogether.

Question 2

B	:	A
100	:	130
10	:	13

$$13u = 65$$

$$1u = 65 \div 13$$

$$= 5$$

$$3u = 5 \times 3$$

$$= 15$$

The difference between the two numbers is **15**.

Question 3

$$\text{Percentage of girls are boys} = \frac{50}{40} \times 100\%$$

$$= 125\%$$

125% of the girls are the number of boys.

Question 4

B	:	G	:	C	C	:	A
50	:	100	:		10	:	90
1	:	2	:	3	1^{x3}	:	9^{x3}
					3	:	27

Summary

B	:	G	:	A
1	:	2	:	27

$$27u = 540$$

$$1u = 540 \div 27$$

$$= 20$$

$$2u = 2 \times 20$$

$$= 40$$

There were **40** girls.

Question 5

<u>At first</u>				<u>End</u>			
C	:	K	: Total	C	:	K	: Total
20	:	100			:		
1^{x5}	:	5^{x5}	: 6^{x5}	2^{x6}	:	3^{x6}	: 5^{x6}
5	:	25	: 30	12	:	18	: 30

$$25u - 18u = 7u$$

$$7u = 210$$

$$1u = 210 \div 7$$

$$= 30$$

$$C \text{ (end), } 12u = 12 \times 30$$

$$= 360$$

$$K \text{ (end), } 18u = 18 \times 30$$

$$= 540$$

Cliff and Kevin had **360** and **540** marbles in the end respectively.

Solutions to Unit 7.1 (Cont.)

Question 6

Last Year
Daughter : Yvonne
20 : 100
1 : 5

Total age (last yr), $6u = 50 - 2$
 $= 48$

$1u = 48 \div 6$
 $= 8$

Daughter's age (3 yrs' time) $= 8 + 4$
 $= 12$

Her daughter will be **12 years old** in 3 years' time.

Solutions to Unit 7.2 Equal Stage

Ask Yourself

- 'same number of stamps' at first hints that we have to solve the problem sum from the beginning.

Think Further

- 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 stamps in the end.

Let's Practise 7.2

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	

$3u = 45$

$1u = 45 \div 3$
 $= 15$

$16u = 16 \times 15$
 $= 240$

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		

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**.

Solutions to Unit 7.2 (Cont.)

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		

$19u = 38$

$1u = 38 \div 19$
 $= 2$

$20u = 20 \times 2$
 $= 40$

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	

7 p.m.

T	7u	3u	2u	6u
C	7u	3u		

$8u = 32$

$1u = 32 \div 8$
 $= 4$

More tables than chairs $= 18u - 7u$
 $= 11u$

$11u = 11 \times 4$
 $= 44$

There were **44** more tables than chairs in the end.

Question 5

At end

W	7u
B	7u

At first

W	7u	70
B	7u	3u

$3u = 70 - 40$
 $= 30$

Solutions to Unit 7.2 (Cont.)

Question 5 (Cont.)

$$1u = 30 \div 3$$

$$= 10$$

$$7u + 70 = 7 \times 10 + 70$$

$$= 140$$

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 →

$$3u = 51 - 24$$

$$= 27$$

$$1u = 27 \div 3$$

$$= 9$$

$$\text{Value of 20¢ used} = 27 \times 0.2$$

$$= 5.4$$

$$\text{Value of 50¢ used} = 51 \times 0.5$$

$$= 25.5$$

$$\text{Cost of present} = 25.5 + 5.4$$

$$= 30.9$$

The present cost **\$30.90**.

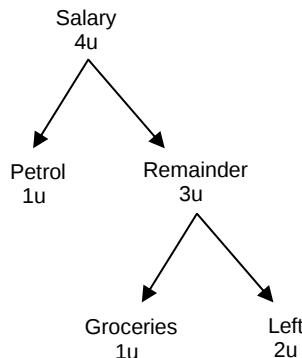
Solutions to Unit 7.3 Branching

Ask Yourself

- Yes. The keywords are "of the remaining".
- Units are used.

Let's Practise 7.3

Question 1



$$\begin{aligned} \text{(a) Percentage of salary on grocery} &= \frac{1}{4} \times 100\% \\ &= 25\% \end{aligned}$$

She spent **25%** of her salary on groceries.

$$\text{(b) } 2u = 560$$

$$1u = 560 \div 2$$

$$= 280$$

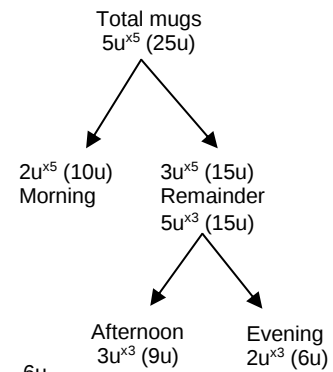
$$4u = 4 \times 280$$

$$= 1120$$

Her monthly salary was **\$1120**.

Solutions to Unit 7.3 (Cont.)

Question 2



$$\begin{aligned} \text{Difference} &= 10u - 6u \\ &= 4u \end{aligned}$$

$$4u = 40$$

$$1u = 40 \div 4$$

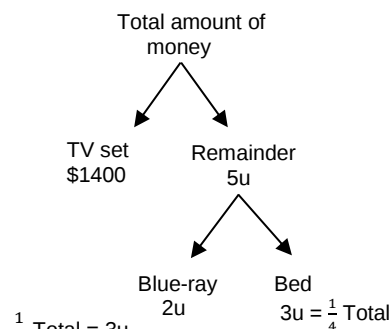
$$= 10$$

$$25u = 25 \times 10$$

$$= 250$$

He sold **250** mugs altogether at the flea market.

Question 3



$$\frac{1}{4} \text{ Total} = 3u$$

$$\frac{4}{4} \text{ Total} = 4 \times 3u$$

$$= 12u$$

$$\text{TV set} = 12u - 5u$$

$$= 7u$$

$$7u = 1400$$

$$1u = 1400 \div 7$$

$$= 200$$

$$3u \text{ (Bed)} = 3 \times 200$$

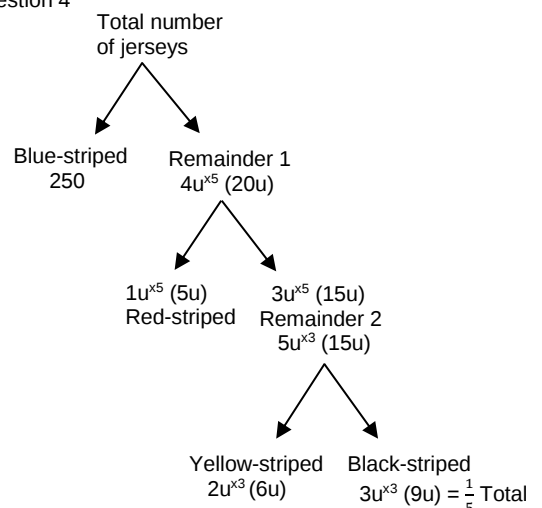
$$= 600$$

$$\text{Difference} = 1400 - 600$$

$$= 800$$

The TV set cost **\$800** more than the bed.

Question 4



Solutions to Unit 7.3 (Cont.)

Question 4 (Cont.)

$$\frac{1}{5} \text{ Total} = 9u$$

$$\frac{5}{5} \text{ Total} = 5 \times 9u$$

$$= 45u$$

$$\text{Blue-striped} = 45u - 20u$$

$$= 25u$$

$$25u = 250$$

$$1u = 250 \div 25$$

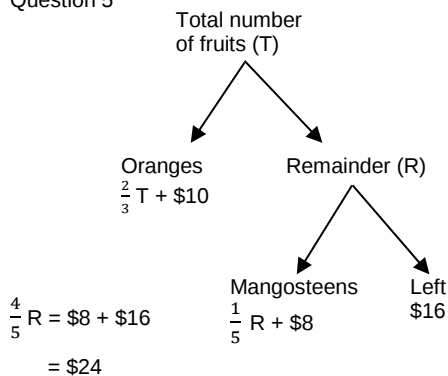
$$= 10$$

$$30u = 30 \times 10$$

$$= 300$$

300 red and blue-striped jerseys were sold altogether.

Question 5



$$\frac{1}{5} R = \$24 \div 4$$

$$= \$6$$

$$\frac{5}{5} R = 5 \times \$6$$

$$= \$30$$

$$\frac{1}{3} T = \$10 + \$30$$

$$= \$40$$

$$\frac{3}{3} T = 3 \times \$40$$

$$= \$120$$

(a) Rachel had **\$120** at first.

$$\text{Amount spent (mangosteens)} = \frac{1}{5} R + \$8$$

$$= \$6 + \$8$$

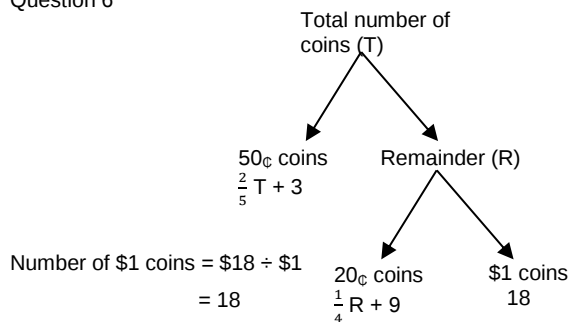
$$= \$14$$

$$\text{Number of kg} = \$14 \div \$2$$

$$= 7$$

(b) She bought **7 kg** of mangosteens.

Question 6



Solutions to Unit 7.3 (Cont.)

Question 6 (Cont.)

$$\frac{3}{4} R = 18 + 9$$

$$= 27$$

$$\frac{1}{4} R = 27 \div 3$$

$$= 9$$

$$\frac{4}{4} R = 4 \times 9$$

$$= 36$$

$$\frac{3}{5} T = 36 + 3$$

$$= 39$$

$$\frac{1}{5} T = 39 \div 3$$

$$= 13$$

$$\text{Number of 20¢ coins} = \frac{1}{4} R + 9$$

$$= 9 + 9$$

$$= 18$$

$$\text{Number of 50¢ coins} = \frac{2}{5} T + 3$$

$$= 2 \times 13 + 3$$

$$= 29$$

$$\text{Total amount} = 18 \times 0.2 + 29 \times 0.5 + 18 \times 1$$

$$= 36.1$$

The total value of all the coins in the purse is **\$36.10**.

Solutions to Unit 7.4 Repeated Items

Ask Yourself

- Ginny
- Make the units representing Ginny the same in both ratios.

Think Further

At first

$$J : G : A$$

$$14 : 35 : 25$$

$$G + A = 60u$$

$$\frac{1}{5} \text{ of } 60u = 12u$$

$$G : A : \text{Total}$$

$$3 : 1 : 4$$

$$4p = 12u$$

$$1p = 12u \div 4$$

$$= 3u$$

$$\text{Annie gave} = 3u$$

$$\text{Ginny gave} = 9u$$

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

$$\text{Difference} = 26u - 22u$$

$$= 4u$$

$$\text{Percentage} = \frac{4}{26} \times 100$$

$$\approx \mathbf{15.38\%}$$

Solutions to Unit 7.4 (Cont.)

Let's Practise 7.4

Question 1

S	:	J		J	:	D
40	:	100		50	:	100
2	:	5		1^{x5}	:	2^{x5}
				5	:	10

Summary

S	:	J	:	D
2	:	5	:	10

$$8u = 40$$

$$1u = 40 \div 8$$

$$= 5$$

$$5u = 5 \times 5$$

$$= 25$$

Joey's score was **25**.

Question 2

J	:	D		K	:	D
120	:	100		200	:	100
6	:	5		2^{x5}	:	1^{x5}
				10	:	5

Summary

J	:	D	:	K
6	:	5	:	10

$$5u = 25$$

$$1u = 25 \div 5$$

$$= 5$$

$$21u = 21 \times 5$$

$$= 105$$

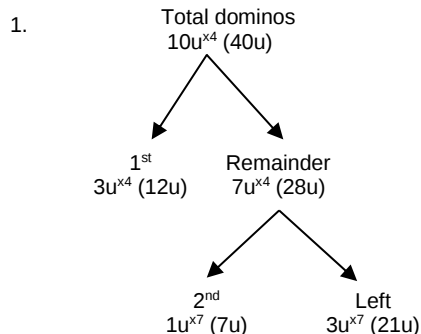
They had a total of **105** crayons.

Solutions to Unit 7.5 Family of Change

Ask Yourself

- 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



$$21u = 84$$

$$1u = 84 \div 21$$

$$= 4$$

$$40u = 40 \times 4$$

$$= 160$$

Kyle had **160** dominoes in his collection.

Let's Practise 7.5

Question 1

At first

Complete	:	Incomplete	:	Total
7	:	13	:	20

End

Complete	:	Incomplete	:	Total
3^{x5}	:	1^{x5}	:	4^{x5}
15	:	5	:	20

Solutions to Unit 7.5 (Cont.)

Question 1 (Cont.)

$$\text{Ran in 2nd hour} = 15u - 7u$$

$$= 8u$$

$$8u = 16.8$$

$$1u = 16.8 \div 8$$

$$= 2.1$$

$$20u = 20 \times 2.1$$

$$= 42$$

The total distance of the running event 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

$$55u = 110$$

$$1u = 110 \div 55$$

$$= 2$$

$$77u = 77 \times 2$$

$$= 154$$

The model aeroplane required **154** pieces.

Question 3

At first

Chocolate : Vanilla

2^{x2}	:	3^{x2}
4	:	6

End

Chocolate : Vanilla

4	:	1
---	---	---

$$5u = 25$$

$$1u = 25 \div 5$$

$$= 5$$

$$10u = 10 \times 5$$

$$= 50$$

Jasmine bought **50** cupcakes for her family.

Question 4

At first

Male : Female

5^{x2}	:	3^{x2}
10	:	6

End

Male : Female

2^{x5}	:	3^{x5}
10	:	15

$$9u = 81$$

$$1u = 81 \div 9$$

$$= 9$$

$$6u = 6 \times 9$$

$$= 54$$

There were **54** female passengers at the terminal at first.

Question 5

Now

J	:	G	:	Diff
1^{x14}	:	5^{x14}	:	4^{x14}
14	:	70	:	56

Future

J	:	G	:	Diff
11^{x4}	:	25^{x4}	:	14^{x4}
44	:	100	:	56

$$30u$$

Solutions to Unit 7.5 (Cont.)

Question 5 (Cont.)

$$\begin{aligned}\text{Jason now, } 14u &= 13 - 6 \\ &= 7\end{aligned}$$

$$\begin{aligned}1u &= 7 \div 14 \\ &= 0.5\end{aligned}$$

$$\begin{aligned}\text{No. of years passed} &= 44u - 14u \\ &= 30u\end{aligned}$$

$$\begin{aligned}30u &= 30 \times 0.5 \\ &= 15\end{aligned}$$

In **15 years' time**, Jordon's age will be 44% of Gordon's age.

Question 6

Past (4 yrs ago)	Now	Future (8 yrs later)
W : R : Diff $1^{x5} : 4^{x5} : 3^{x5}$ 5 : 20 : 15		W : R : Diff $3^{x3} : 8^{x3} : 5^{x3}$ 9 : 24 : 15

$$9u - 5u = 4u$$

$$\begin{aligned}4u &= 4 + 8 \\ &= 12\end{aligned}$$

$$\begin{aligned}1u &= 12 \div 4 \\ &= 3\end{aligned}$$

Difference between Raymond and Wayne = 15u

$$\begin{aligned}15u &= 15 \times 3 \\ &= 45\end{aligned}$$

Raymond is **45 years older** than Wayne.

Solutions to Unit 7.6 Quantity x Value

Ask Yourself

- 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 7.6

Question 1

Items	Quantity of items	x	Value of items (\$)	Total value (\$)
B	2u	x	8	16u
G	3u	x	6	18u
Total	5u			34u

$$34u = 5440$$

$$\begin{aligned}1u &= 5440 \div 34 \\ &= 160\end{aligned}$$

$$\begin{aligned}5u &= 5 \times 160 \\ &= 800\end{aligned}$$

800 students were at the party.

Question 2

$$\begin{aligned}\text{Cost of 1 peach} &= 150\% \times \$1.20 \\ &= \$1.80\end{aligned}$$

Items	Quantity of items	x	Value of items (\$)	Total value (\$)
A	7u	x	1.2	8.4u
P	13u	x	1.8	23.4
Total	20u			31.8u

$$31.8u = 636$$

$$\begin{aligned}1u &= 636 \div 31.8 \\ &= 20\end{aligned}$$

Solutions to Unit 7.6 (Cont.)

Question 2 (Cont.)

$$\begin{aligned}\text{(a) } 8.4u &= 8.4 \times 20 \\ &= 168\end{aligned}$$

The apricots cost **\$168**.

$$\begin{aligned}\text{(b) } 13u &= 13 \times 20 \\ &= 260\end{aligned}$$

He ordered **260** peaches.

Question 3

Quantity Bought

P : T	P : B
$6^{x2} : 5^{x2}$	$4^{x3} : 5^{x3}$
12 : 10	12 : 15

$$\begin{aligned}P : T : B \\ 12 : 10 : 15\end{aligned}$$

Value/Cost of items

$$\begin{aligned}\text{Toy : Pullover} \\ 3 : 5\end{aligned}$$

$$3p = \$12$$

$$\begin{aligned}1p &= \$12 \div 3 \\ &= \$4\end{aligned}$$

$$\begin{aligned}5p &= 5 \times \$4 \\ &= \$20\end{aligned}$$

Summary of value/cost

$$\text{Toy} = \$12$$

$$\begin{aligned}\text{Book} &= \$12 - \$2 \\ &= \$10\end{aligned}$$

$$\text{Pullover} = \$20$$

Items	Quantity of items	x	Value of items (\$)	Total value (\$)
P	12u	x	20	240u
T	10u	x	12	120u
B	15u	x	10	150u
Total	37u			510u

$$510u = 19\,380$$

$$\begin{aligned}1u &= 19\,380 \div 510 \\ &= 38\end{aligned}$$

$$\begin{aligned}\text{No. of pullovers, } 12u &= 12 \times 38 \\ &= 456\end{aligned}$$

$$\begin{aligned}\text{No. of toys, } 10u &= 10 \times 38 \\ &= 380\end{aligned}$$

$$\begin{aligned}\text{No. of books, } 15u &= 15 \times 38 \\ &= 570\end{aligned}$$

Mrs Poon bought **456** pullovers, **380** toys and **570** books.

Question 4

Value of items

$$\text{Pin} = \$2.50$$

$$\begin{aligned}\text{Band} &= 150\% \times \$2.50 \\ &= \$3.75\end{aligned}$$

$$\begin{aligned}\text{Necklace} &= \$2.50 \times 2 \\ &= \$5\end{aligned}$$

Items	Quantity of items	x	Value of items (\$)	Total value (\$)
P	5u	x	2.50	12.5u
B	4u	x	3.75	15u
N	1u	x	5	5u
Total	10u			42.5u

Solutions to Unit 7.6 (Cont.)

Question 4 (Cont.)

Difference in total value between hairbands and hairpins

$$= 15u - 12.5u$$

$$= 2.5u$$

$$2.5u = 105$$

$$1u = 105 \div 2.5$$

$$= 42$$

Total items sold, $10u = 10 \times 42$

$$= 420$$

Gillian sold a total of **420** items.

Question 5

Items	Quantity of items	$\times$	Value of items (\$)	Total value (\$)
20¢	1u	$\times$	0.2	0.2u
50¢	2u	$\times$	0.5	1u
\$1	2u	$\times$	1	2u
Total	5u			3.2u

Difference in total value of 50-cent coins and 20-cent coins

$$= 1u - 0.2u$$

$$= 0.8u$$

$$0.8u = 16$$

$$1u = 16 \div 0.8$$

$$= 20$$

$$5u = 5 \times 20$$

$$= 100$$

Wayne had **100** coins altogether.

Question 6

Items	Quantity of items	$\times$	Value of items (\$)	Total value (\$)
A	13u	$\times$	0.5	6.5u
P	7u	$\times$	0.4	2.8u
Total	20u			9.3u

$$9.3u = 195.3$$

$$1u = 195.3 \div 9.3$$

$$= 21$$

$$13u = 13 \times 21$$

$$= 273$$

(a) **273** apples were sold.

$$2.8u = 2.8 \times 21$$

$$= 58.8$$

(b) **\$58.80** was collected from the sale of the pears only.

Solutions to Review Questions on Chapter 7

Question 1

	L	:	M	:	N	
At first	5^{x5}	:	2^{x5}	:	6^{x5}	30% of $30u = 9u$
	25	:	10	:	30	
Change	+3		+6		-9	M received
End	28	:	16	:	21	= 60% of $10u$ = $6u$

Difference in the end = $28u - 21u$

$$= 7u$$

$$7u = 210$$

$$1u = 210 \div 7$$

$$= 30$$

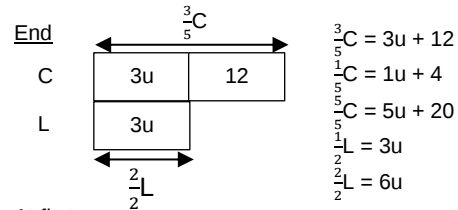
$$30u = 30 \times 30$$

$$= 900$$

Nina had **900** buttons at first.

Solutions to Review Questions on Chapter 7 (Cont.)

Question 2



$$11u = 75 - 20$$

$$= 55$$

$$1u = 55 \div 11$$

$$= 5$$

$$L \text{ (given away)} = 3 \times 5$$

$$= 15$$

$$C \text{ (given away)} = 2 \times 5 + 8$$

$$= 18$$

$$\text{Difference} = 18 - 15$$

$$= 3$$

3 more boxes of camomile tea bags than lavender tea bags were given away.

Question 3

Items	Quantity of items	$\times$	Value of items (\$)	Total value (\$)	
RB	8u	$\times$	1p	8up	(28.8)
D	5u	$\times$	$1p + 1.5$	$5up + 7.5u$	(40.5)
Total	13u			$13up + 7.5u$	(69.3)

$$8up = 28.8$$

$$1up = 28.8 \div 8$$

$$= 3.6$$

$$5up = 5 \times 3.6$$

$$= 18$$

$$7.5u = 40.5 - 18$$

$$= 22.5$$

$$1u = 22.5 \div 7.5$$

$$= 3$$

$$(a) 5u = 5 \times 3$$

$$= 15$$

She bought **15** durian puffs.

$$(b) \text{ Cost of 1 durian puffs} = 40.5 \div 15$$

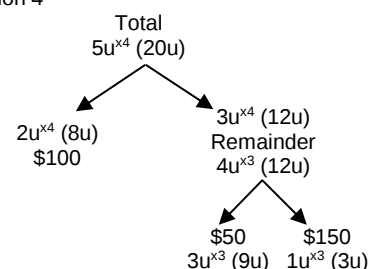
$$= 2.7$$

$$\text{Cost of 1 red bean cream puff} = 2.7 - 1.5$$

$$= 1.20$$

Each red bean cream puff cost **\$1.20**.

Question 4



Solutions to Review Questions on Chapter 7 (Cont.)

Question 4 (Cont.)

Items	Quantity of items	$\times$	Value of items (\$)	Total value (\$)
\$50	9u	$\times$	50	450u
\$100	8u	$\times$	100	800u
\$150	3u		150	450u
Total	20u			1700u

$$1700u = 20\,400$$

$$1u = 20\,400 \div 1700$$

$$= 12$$

$$3u = 3 \times 12$$

$$= 36$$

There were **36 \$150** dining vouchers.

Question 5

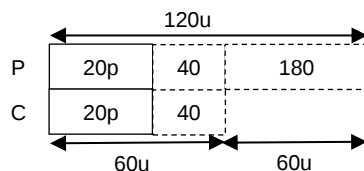
P	:	C		E	:	P
8^{x^3}	:	5^{x^3}	:	2^{x^3}	:	3^{x^8}
24	:	15	:	6	:	24

Summary

P	:	C	:	E
8^{x^3}	:	5^{x^3}	:	2^{x^3}
24	:	15	:	6

(Actual)	P	C
At first	$24u^{x^5}$	$15u^{x^4}$
Change	-44^{x^5}	-10^{x^4}
In the end	$4p^{x^5}$	$5p^{x^4}$

(Working)	P	C
At first	120u	60u
Change	-220	-40
In the end	20p	20p



$$60u = 180$$

$$1u = 180 \div 60$$

$$= 3$$

$$16u = 16 \times 3$$

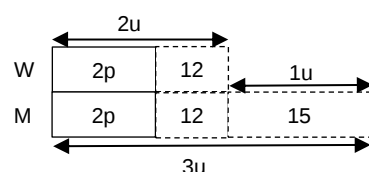
$$= 48$$

Evelyn had **48** arrows at first.

Question 6

(Actual)	W	M
Case 1	$1u^{x^2}$	3u
Change	-6^{x^2}	-27
Case 2	$1p^{x^2}$	2p

(Working)	W	M
Case 1	2u	3u
Change	-12	-27
Case 2	2p	2p



$$1u = 15$$

Solutions to Review Questions on Chapter 7 (Cont.)

Question 6 (Cont.)

$$W \text{ (at first)} = 1u - 6$$

$$= 15 - 6$$

$$= 9$$

$$M \text{ (at first)} = 3u$$

$$= 3 \times 15$$

$$= 45$$

$$\text{Total (at first)} = 45 + 9$$

$$= 54$$

There were **54** people at the exhibition.

Question 7

C	:	A		W	:	M	:	A
4^{x^4}	:	1^{x^4}	:	3	:	1	:	4
16	:	4	:		:		:	

		At first				In the end		
C	:	W	:	M	:	M+C		W : M+C
16^{x^9}	:	3^{x^9}	:	1^{x^9}	:	17^{x^9}		$1^{x^{17}}$: $7^{x^{17}}$
144	:	27	:	9	:	153		17 : 153

$$\text{Difference (at first)} = 27u - 9u$$

$$= 18u$$

$$18u = 72$$

$$1u = 72 \div 18$$

$$= 4$$

$$W \text{ (left)} = 27u - 17u$$

$$= 10u$$

$$10u = 10 \times 4$$

$$= 40$$

40 women left the room.

Question 8

Case1: $N \xrightarrow{65} A$				Case1: $N \xrightarrow{5} A$			
N	:	A	Total	N	:	A	Total
4^{x^2}	:	7^{x^2}	11^{x^2}	$1^{x^{11}}$	:	$1^{x^{11}}$	$2^{x^{11}}$
8	:	14	22	11	:	11	22

$$11u - 8u = 3u$$

$$3u = 65 - 5$$

$$= 60$$

$$1u = 60 \div 3$$

$$= 20$$

$$\text{Case 1: } 8u + 65 = 8 \times 20 + 65$$

$$= 225$$

$$\text{Case 2 (check): } 11u + 5 = 11 \times 20 + 5$$

$$= 225$$

Natasha has **225** coloured pencils.

Question 9

G	:	B	:	I		G	:	B	:	E
$1^{x^{15}}$	:	$3^{x^{15}}$	:	$4^{x^{15}}$		7^{x^3}	:	3^{x^3}	:	10^{x^3}
15	:	45	:	60		21	:	9	:	30

E	:	I
$1^{x^{30}}$	:	$2^{x^{30}}$
30	:	60

Solutions to Review Questions on Chapter 7 (Cont.)

Question 9 (Cont.)

$$\begin{aligned}\text{Boys in Island Junior (end)} &= \frac{130}{100} \times 45u \\ &= 58.5u\end{aligned}$$

$$\begin{aligned}\text{Girls moved from Emerald Junior} &= \frac{1}{3} \times 21u \\ &= 7u\end{aligned}$$

$$\begin{aligned}\text{Girls in Island Junior (end)} &= 15u + 7u \\ &= 22u\end{aligned}$$

$$\begin{aligned}\text{Difference in boys (end)} &= 58.5u - 9u \\ &= 49.5u\end{aligned}$$

$$49.5u = 396$$

$$\begin{aligned}1u &= 396 \div 49.5 \\ &= 8\end{aligned}$$

$$\begin{aligned}\text{Total in Island Junior (end)} &= 58.5u + 22u \\ &= 80.5u\end{aligned}$$

$$\begin{aligned}80.5u &= 80.5 \times 8 \\ &= 644\end{aligned}$$

644 children were at Island Junior School in the end.

Question 10

$\frac{3}{5}$ J (thrice) = $\frac{2}{7}$ J (Make numerator of Jonas to be thrice that of Gordon)

$$\frac{6}{10} \text{ J (thrice)} = \frac{2}{7} \text{ J}$$

$$\begin{array}{ccc} \text{J} & : & \text{G} \\ 10^{x3} & : & 7^{x3} \\ 30 & : & 21 \end{array} \quad \begin{array}{ccc} \text{J} & : & \text{M} \\ 3^{x10} & : & 5^{x10} \\ 30 & : & 50 \end{array}$$

Summary

$$\begin{array}{ccc} \text{J} & : & \text{G} & : & \text{M} \\ 30 & : & 21 & : & 50 \end{array}$$

$$\begin{aligned}\text{Total} &= 30u + 21u + 50u \\ &= 101u\end{aligned}$$

$$101u = 202$$

$$\begin{aligned}1u &= 202 \div 101 \\ &= 2\end{aligned}$$

$$\begin{aligned}\text{J (30u)} &= 30 \times 2 \\ &= 60\end{aligned}$$

$$\begin{aligned}\text{G (21u)} &= 21 \times 2 \\ &= 42\end{aligned}$$

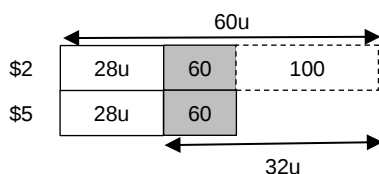
$$\begin{aligned}\text{M (50u)} &= 50 \times 2 \\ &= 100\end{aligned}$$

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



Solutions to Review Questions on Chapter 7 (Cont.)

Question 11 (Cont.)

$$32u = 60 + 100$$

$$= 160$$

$$1u = 160 \div 32$$

$$= 5$$

$$\begin{aligned}\text{No. of \$2-notes (at first)} &= 12u \\ &= 12 \times 5 \\ &= 60\end{aligned}$$

$$\begin{aligned}\text{No. of \$5-notes (at first)} &= 7u \\ &= 7 \times 5 \\ &= 35\end{aligned}$$

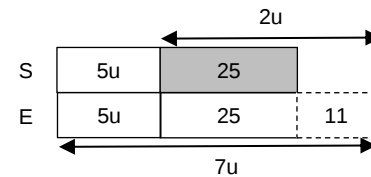
$$\begin{aligned}\text{Total value} &= 60 \times \$2 + 35 \times \$5 \\ &= \$295\end{aligned}$$

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



$$\begin{aligned}2u &= 25 + 11 \\ &= 36\end{aligned}$$

$$\begin{aligned}1u &= 36 \div 2 \\ &= 18\end{aligned}$$

$$\begin{aligned}\text{Stamps (at first)} &= 1u + 5 \\ &= 18 + 5 \\ &= 23\end{aligned}$$

$$\begin{aligned}\text{Envelopes (at first)} &= 7u \\ &= 7 \times 18 \\ &= 126\end{aligned}$$

$$\begin{aligned}\text{Difference} &= 126 - 23 \\ &= 103\end{aligned}$$

Angelica had **103** more envelopes than stamps.

Solutions to Unit 8.1 Volume of Cubes and Cuboids

Let's Get Started 8.1

$$\begin{aligned}\text{1. Volume of cuboid} &= \text{Length} \times \text{Breadth} \times \text{Height} \\ &= 25 \text{ cm} \times 9 \text{ cm} \times 12 \text{ cm} \\ &= \mathbf{2700 \text{ cm}^3}\end{aligned}$$

$$\begin{aligned}\text{2. Volume of cuboid} &= \text{Length} \times \text{Breadth} \times \text{Height} \\ &= 8 \text{ cm} \times 7 \text{ cm} \times 18 \text{ cm} \\ &= \mathbf{1008 \text{ cm}^3}\end{aligned}$$

$$\begin{aligned}\text{3. Volume of cuboid} &= \text{Length} \times \text{Breadth} \times \text{Height} \\ &= 32 \text{ cm} \times 32 \text{ cm} \times 40 \text{ cm} \\ &= \mathbf{40\,960 \text{ cm}^3}\end{aligned}$$

Ask Yourself

- Explore the different ways in which the small boxes can be orientated to fit into the big box.

Solutions to Unit 8.1 (Cont.)

Let's Practise 8.1

Question 1

$$\begin{aligned}\text{Greatest number of blocks that fits its length} &= 20 \div 6 \\ &= 3\text{R}2 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Greatest number of blocks that fits its width} &= 16 \div 8 \\ &= 2\end{aligned}$$

$$\begin{aligned}\text{Greatest number of blocks that fits its height} &= 10 \div 4 \\ &= 2\text{R}2 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Total number of wooden blocks} &= 3 \times 2 \times 2 \\ &= 12\end{aligned}$$

Anna can pack **12** wooden blocks into the box.

Question 2

$$\begin{aligned}\text{Number of cubes that fits its length} &= 32 \div 2 \\ &= 16\end{aligned}$$

$$\begin{aligned}\text{Number of cubes that fits its width} &= 23 \div 2 \\ &= 11\text{R}1 \text{ cm (use the least whole number value only)}\end{aligned}$$

$$\begin{aligned}\text{Number of cubes that fits its height} &= 13 \div 2 \\ &= 6\text{R}1 \text{ cm (use the least whole number value only)}\end{aligned}$$

$$\begin{aligned}\text{Total number of cubes} &= 16 \times 11 \times 6 \\ &= 1056\end{aligned}$$

1056 2-cm cubes can fit into the box.

Question 3

$$80\% = 0.8$$

$$\begin{aligned}\text{Height of cuboid} &= 0.8 \times 19 \text{ cm} \\ &= 15.2 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Volume} &= 19 \text{ cm} \times 19 \text{ cm} \times 15.2 \text{ cm} \\ &= 5487.2 \text{ cm}^3\end{aligned}$$

The volume of cuboid is **5487.2 cm³**.

Question 4

$$\begin{aligned}\text{Volume of 1 cube} &= 7 \text{ cm} \times 7 \text{ cm} \times 7 \text{ cm} \\ &= 343 \text{ cm}^3\end{aligned}$$

$$\text{Number of cubes that make up the solid} = 6$$

$$\begin{aligned}\text{Volume of solid} &= 6 \times 343 \text{ cm}^3 \\ &= 2058 \text{ cm}^3\end{aligned}$$

(a) The volume of the solid figure is **2058 cm³**.

$$\begin{aligned}\text{Area of 1 face} &= 7 \text{ cm} \times 7 \text{ cm} \\ &= 49 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Number of faces on the surface} &= 6 + 6 + 12 \\ &= 24\end{aligned}$$

$$\begin{aligned}\text{Total surface area solid} &= 24 \times 49 \text{ cm}^2 \\ &= 1176 \text{ cm}^2\end{aligned}$$

(b) The total surface area of the solid figure is **1176 cm²**.

Question 5

H	:	L		H	:	B
130	:	100		120	:	100
13 ^{x6}	:	10 ^{x6}		6 ^{x13}	:	5 ^{x13}
78	:	60		78	:	65

Summary

H	:	L	:	B
78	:	60	:	65

$$\text{Height} = 78u$$

$$78u = 39 \text{ cm}$$

$$\begin{aligned}1u &= 39 \text{ cm} \div 78 \\ &= 0.5 \text{ cm}\end{aligned}$$

$$\begin{aligned}60u &= 60 \times 0.5 \text{ cm} \\ &= 30 \text{ cm}\end{aligned}$$

Solutions to Unit 8.1 (Cont.)

Question 5 (Cont.)

$$\begin{aligned}65u &= 65 \times 0.5 \text{ cm} \\ &= 32.5 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Volume} &= 30 \text{ cm} \times 32.5 \text{ cm} \times 39 \text{ cm} \\ &= 38\,025 \text{ cm}^3\end{aligned}$$

The volume of the cuboid is **38 025 cm³**.

Question 6

$$\text{Total number of edges} = 20$$

$$\begin{aligned}\text{Length of one edge} &= 120 \text{ cm} \div 20 \\ &= 6 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Volume of one cube} &= 6 \text{ cm} \times 6 \text{ cm} \times 6 \text{ cm} \\ &= 216 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume of solid} &= 3 \times 216 \text{ cm}^3 \\ &= 648 \text{ cm}^3\end{aligned}$$

The volume of solid is **648 cm³**.

Question 7

$$\text{Number of cubes that make up solid} = 30$$

$$\begin{aligned}\text{Volume of 1 cube} &= 3 \text{ cm} \times 3 \text{ cm} \times 3 \text{ cm} \\ &= 27 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume of figure} &= 30 \times 27 \text{ cm}^3 \\ &= 810 \text{ cm}^3\end{aligned}$$

(a) The volume of the solid figure is **810 cm³**.

(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 **10 cubes** will have only 2 of its faces coated with paint.

Solutions to Unit 8.2 Volume of Liquids

Let's Get Started 8.2

$$\begin{aligned}\text{(a) Volume of water} &= 42 \text{ cm} \times 22 \text{ cm} \times 8 \text{ cm} \\ &= 7392 \text{ cm}^3\end{aligned}$$

$$= \mathbf{7\,l\,392\,m\ell}$$

$$\begin{aligned}\text{Capacity} &= 42 \text{ cm} \times 22 \text{ cm} \times 15 \text{ cm} \\ &= 13\,860 \text{ cm}^3 \\ &= \mathbf{13.86\,l}\end{aligned}$$

$$\begin{aligned}\text{(b) Height of water} &= \frac{4}{5} \times 24 \text{ cm} \\ &= 19.2 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Volume of water} &= 35 \text{ cm} \times 10 \text{ cm} \times 19.2 \text{ cm} \\ &= 6720 \text{ cm}^3 \\ &= \mathbf{6\,l\,72\,m\ell}\end{aligned}$$

$$\begin{aligned}\text{Capacity} &= 35 \text{ cm} \times 10 \text{ cm} \times 24 \text{ cm} \\ &= 8400 \text{ cm}^3 \\ &= \mathbf{8.4\,l}\end{aligned}$$

$$\begin{aligned}\text{(c) Volume of water} &= 17 \text{ cm} \times 17 \text{ cm} \times 5 \text{ cm} \\ &= 1445 \text{ cm}^3 \\ &= \mathbf{1\,l\,445\,m\ell}\end{aligned}$$

$$\begin{aligned}\text{Capacity} &= 17 \text{ cm} \times 17 \text{ cm} \times 17 \text{ cm} \\ &= 4913 \text{ cm}^3 \\ &= \mathbf{4.913\,l}\end{aligned}$$

$$\begin{aligned}\text{(d) } 3u &= 3 \text{ cm} \\ 1u &= 3 \text{ cm} \div 3 \\ &= 1 \text{ cm} \\ 7u &= 7 \times 1 \text{ cm} \\ &= 7 \text{ cm}\end{aligned}$$

Solutions to Unit 8.2 (Cont.)

$$\begin{aligned}\text{Volume of water} &= 10 \text{ cm} \times 10 \text{ cm} \times 7 \text{ cm} \\ &= 700 \text{ cm}^3 \\ &= \mathbf{0 \text{ l } 700 \text{ mL}}\end{aligned}$$

$$\begin{aligned}\text{Capacity} &= 10 \text{ cm} \times 10 \text{ cm} \times 10 \text{ cm} \\ &= 1000 \text{ cm}^3 \\ &= \mathbf{1 \text{ l}}\end{aligned}$$

Ask Yourself

- 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'.
- The fraction ' $\frac{1}{2}$ ' refer to half of the height of the rectangular canister.

Let's Practise 8.2**Question 1**

$$\begin{aligned}\text{Change in height of cooking oil} &= \frac{2}{3} - \frac{3}{8} \\ &= \frac{7}{24}\end{aligned}$$

$$\frac{7}{24} \text{ of total} = 2.1 \text{ l}$$

$$\begin{aligned}\frac{1}{24} \text{ of total} &= 2.1 \text{ l} \div 7 \\ &= 0.3 \text{ l}\end{aligned}$$

$$\begin{aligned}\text{Unfilled} &= 1 - \frac{2}{3} \\ &= \frac{1}{3} \\ &= \frac{8}{24}\end{aligned}$$

$$\begin{aligned}\frac{8}{24} \text{ of total} &= 8 \times 0.3 \text{ l} \\ &= 2.4 \text{ l}\end{aligned}$$

2.4 litres more cooking oil would be needed to completely fill the container.

Question 2

Amount of water in fish tank

$$\begin{aligned}&= \frac{4}{7} \times 80 \text{ cm} \times 50 \text{ cm} \times 28 \text{ cm} \\ &= 64\,000 \text{ cm}^3 \\ &= 64 \text{ l}\end{aligned}$$

Amount of water left in container

$$\begin{aligned}&= 68.02 \text{ l} - 64 \text{ l} \\ &= 4.02 \text{ l} \\ &= 4 \text{ l } 20 \text{ mL}\end{aligned}$$

4 l 20 mL of water is left in the cylindrical container.

Question 3

Volume of water in Container M

$$\begin{aligned}&= 5 \text{ cm} \times 10 \text{ cm} \times 24 \text{ cm} \\ &= 1200 \text{ cm}^3 \\ 5u &= 1200 \text{ cm}^3 \\ 1u &= 1200 \text{ cm}^3 \div 5 \\ &= 240 \text{ cm}^3 \\ 2u &= 2 \times 240 \text{ cm}^3 \\ &= 480 \text{ cm}^3 \\ &= 480 \text{ mL}\end{aligned}$$

(a) **480 mL** of water was poured into Container N.

$$\begin{aligned}\text{Height of water in Container N} &= 480 \text{ cm}^3 \div 5 \text{ cm} \div 10 \text{ cm} \\ &= 9.6 \text{ cm}\end{aligned}$$

Solutions to Unit 8.2 (Cont.)**Question 3 (Cont.)**

$$\begin{aligned}\text{Height of water remained in Container M} &= 24 \text{ cm} - 9.6 \text{ cm} \\ &= 14.4 \text{ cm}\end{aligned}$$

(b) The height of the water level is **14.4 cm**.

Question 4

Volume of water in container at first

$$\begin{aligned}&= \frac{3}{4} \times 700 \text{ cm}^3 \\ &= 525 \text{ cm}^3\end{aligned}$$

Volume of water poured into tank

$$\begin{aligned}&= 525 \text{ cm}^3 \div 2 \\ &= 262.5 \text{ cm}^3\end{aligned}$$

Volume of water in tank at first

$$\begin{aligned}&= 5 \text{ cm} \times 5 \text{ cm} \times 9 \text{ cm} \\ &= 225 \text{ cm}^3\end{aligned}$$

Total volume of water in tank, end

$$\begin{aligned}&= 225 \text{ cm}^3 + 262.5 \text{ cm}^3 \\ &= 487.5 \text{ cm}^3 \\ &= 487.5 \text{ mL}\end{aligned}$$

There was **487.5 mL** of water in the tank now.

Question 5

$$\begin{aligned}5 \text{ pails} &= 60 \text{ cm} \times 60 \text{ cm} \times 0.25 \text{ cm} \\ &= 900 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}1 \text{ pail} &= 900 \text{ cm}^3 \div 5 \\ &= 180 \text{ cm}^3 \\ &= 180 \text{ mL}\end{aligned}$$

(a) Each pail can hold **180 mL** of petrol.

Height of petrol in the container at first

$$\begin{aligned}&= 0.3 \times 60 \text{ cm} \\ &= 18 \text{ cm}\end{aligned}$$

Amount of petrol left in container

$$\begin{aligned}&= 60 \text{ cm} \times 60 \text{ cm} \times (18 \text{ cm} - 0.25 \text{ cm}) \\ &= 63\,900 \text{ cm}^3 \\ &= 63.9 \text{ l}\end{aligned}$$

Time taken to completely drained the petrol

$$\begin{aligned}&= 63.9 \text{ l} \div 3 \text{ l/min} \\ &= 21.3 \text{ min}\end{aligned}$$

(b) It would take **21.3 min** to drain the petrol completely from the container.

Question 6

Volume of orange juice dispensed out

$$\begin{aligned}&= 15 \text{ min} \times 200 \text{ mL/min} \\ &= 3000 \text{ mL} \\ &= 3 \text{ l}\end{aligned}$$

Amount of orange juice left in dispenser

$$\begin{aligned}&= 5.7 \text{ l} - 3 \text{ l} \\ &= 2.7 \text{ l}\end{aligned}$$

$$\text{Percentage left} = \frac{2.7}{5.7} \times 100\%$$

$$\approx 47.37\% \text{ (2 d.p.)}$$

(a) **47.37%** of the orange juice in the cylindrical dispenser was left.

Solutions to Unit 8.2 (Cont.)

Question 6 (Cont.)

Amount of orange juice in container in the end

$$= \frac{2}{3} \times 18 \text{ cm} \times 18 \text{ cm} \times 18 \text{ cm}$$

$$= 3888 \text{ cm}^3$$

$$= 3.888 \text{ l}$$

Amount of orange juice in container at first

$$= 3.888 \text{ l} - 3 \text{ l}$$

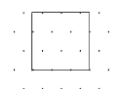
$$= 0.888 \text{ l}$$

(b) There was **0.888 l** of orange juice in the container at first.

Solutions to Unit 8.3 Drawing Cubes and Cuboids Using Isometric Grids

Let's Get Started 8.3

1.



2.

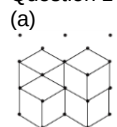


3. (a) 6
(c) 11

- (b) 11
(d) 27

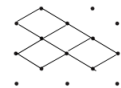
Let's Practise 8.3

Question 1

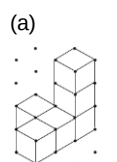


- (b) 5 cubes

(c)

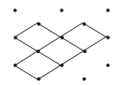


Question 2



- (b) 6 cubes

(c)



Question 3

- (a) 5 cubes

- (b) Volume of 1 cube = $2 \text{ cm} \times 2 \text{ cm} \times 2 \text{ cm}$
 $= 8 \text{ cm}^3$
 Volume of solid = $5 \times 8 \text{ cm}^3$
 $= 40 \text{ cm}^3$

Question 4

- (a) 6 cubes

- (b) Volume of 1 cube = $2 \text{ cm} \times 2 \text{ cm} \times 2 \text{ cm}$
 $= 8 \text{ cm}^3$
 Volume of solid = $6 \times 8 \text{ cm}^3$
 $= 48 \text{ cm}^3$

Solutions to Unit 8.3 (Cont.)

Question 5

- (a) Volume of 1 cube = $3 \text{ cm} \times 3 \text{ cm} \times 3 \text{ cm}$
 $= 27 \text{ cm}^3$
 Volume of solid = $7 \times 27 \text{ cm}^3$
 $= 189 \text{ cm}^3$
- (b) Area of 1 face = $3 \text{ cm} \times 3 \text{ cm}$
 $= 9 \text{ cm}^2$
 Area of solid = $13 \times 9 \text{ cm}^2$
 $= 117 \text{ cm}^2$

Question 6

- (a) Volume of 1 cube = $3 \text{ cm} \times 3 \text{ cm} \times 3 \text{ cm}$
 $= 27 \text{ cm}^3$
 Volume of solid = $10 \times 27 \text{ cm}^3$
 $= 270 \text{ cm}^3$
- (b) Area of 1 face = $3 \text{ cm} \times 3 \text{ cm}$
 $= 9 \text{ cm}^2$
 Area of solid = $21 \times 9 \text{ cm}^2$
 $= 189 \text{ cm}^2$

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