6 Primary

Based on Latest Math Syllabus

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onSponge

Essential
Problem Solving Skills

Answer Booklet

P6 Solutions

In all solutions, u represents units and p represents parts

Chapter **1** **Recap of EPSS Primary 5**

Question 1

A	:	B+C+D		B+C	:	D	:	B+C+D
$2^{\times 5}$	:	$3^{\times 5}$		$1^{\times 3}$	:	$4^{\times 3}$	:	$5^{\times 3}$
10	:	15		3	:	12	:	15

Summary

A	:	B+C	:	D
10	:	3	:	12

Total = 10u + 15u

= 25u

25u = 1000

1u = 1000 ÷ 25

= 40

12u = 12 × 40

= 480

Daniel's contribution was **$480**.

Question 2

A	:	C		M	:	W	:	A		B	:	G	:	C
$3^{\times 10}$	:	$2^{\times 10}$		$1^{\times 6}$	:	$4^{\times 6}$	:	$5^{\times 6}$		9	:	11	:	20
30	:	20		6	:	24	:	30						

Summary

M	:	W	:	B	:	G
6	:	24	:	9	:	11

Difference (W and B) = 24u – 9u

= 15u

15u = 75

1u = 75 ÷ 15

= 5

Total = 30u + 20u

= 50u

50u = 50 × 5

= 250

There are **250 people** in the tour group.

Question 1

	At first				In the end	
G	:	V+F		G	:	V+F
$3^{\times 7}$	:	$5^{\times 7}$		$7^{\times 3}$	:	$13^{\times 3}$
21	:	35		21	:	39

Change = 39u – 35u

= 4u

4u = 12

1u = 12 ÷ 4

= 3

Question 1 (cont.)

Total (end) = 21u + 39u

= 60u

60u = 60 × 3

= 180

The music department had **180 instruments** in the end.

Question 2

A	:	C		B	:	G	:	C
$3^{\times 2}$	:	$7^{\times 2}$		$1^{\times 7}$	:	$1^{\times 7}$	:	$2^{\times 7}$
6	:	14		7	:	7	:	14

Summary

A	:	B	:	G
6	:	7	:	7

	At first				In the end	
A+B	:	G		A+B	:	G
$13^{\times 4}$	:	$7^{\times 4}$		$1^{\times 7}$	:	$4^{\times 7}$
52	:	28		7	:	28

Change = 52u – 7u

= 45u

45u = 90

1u = 90 ÷ 45

= 2

28u = 28 × 2

= 56

There are **56 girls** in the swimming pool.

Question 1

B+C	:	A+B	:	Diff		A	:	C	:	Diff
$7^{\times 2}$	:	$5^{\times 2}$	:	$2^{\times 2}$		3	:	7	:	4
14	:	10	:	4						

Summary

A	:	B	:	C
3	:	7	:	7

7u = 77

1u = 77 ÷ 7

= 11

Total = 3u + 7u + 7u

= 17u

17u = 17 × 11

= 187

The total area of the figure is **187 cm^2**.

Question 2

	6 years' ago					6 years' time		
E	:	T	:	Diff		E	:	T	:	Diff
3	:	5	:	2		$2^{\times 2}$	:	$3^{\times 2}$	:	$1^{\times 2}$
						4	:	6	:	2

Question 2 (cont.)

1u = 6 + 6

   = 12

Total age (6 years' ago) = 3u + 5u

                     = 8u

Total age (now) = 8u + 12

                 = 8 × 12 + 12

                 = 108

The sum of their current ages is **108 years**.

Question 1

(Actual)	**S**	**C**
At first	$4u^{x3}$	$9u^{x5}$
Change	$+ 30^{x3}$	$- 15^{x5}$
In the end	$5p^{x3}$	$3p^{x5}$

(Working)	**S**	**C**
At first	12u	45u
Change	+ 90	− 75
In the end	15p	15p
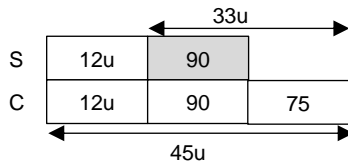
45u − 12u = 90 + 75

33u = 165

1u = 165 ÷ 33

   = 5

4u = 4 × 5

   = 20

Shelly had **20 figurines** at first.

Question 2

(Actual)	**P**	**Q**
At first	$3u^{x2}$	$4u^{x3}$
Change	$- 30^{x2}$	$- 140^{x3}$
In the end	$3p^{x2}$	$2p^{x3}$

(Working)	**P**	**Q**
At first	6u	12u
Change	− 60	− 420
In the end	6p	6p
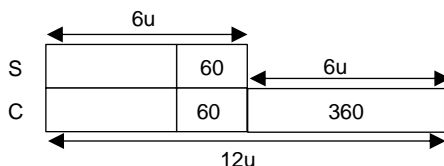
6u = 360

1u = 360 ÷ 6

   = 60

4u − 140 = 4 × 60 − 140

        = 100

There was **100 _l_** of water in Tank Q in the end.

Question 1

B	:	T		C	:	B
5	:	1		2^{x5}	:	1^{x5}
				10	:	5

Summary

B	:	T	:	C
5	:	1	:	10

Items	Quantity	×	Value ($)	Total value ($)
B	5u	×	22	110u
T	1u	×	12	12u
C	10u	×	32	320u
Total	16u			442u

442u = 884

1u = 884 ÷ 442

   = 2

16u = 16 × 2

    = 32

He bought a total of **32 ties, belts and cufflinks**.

Question 2

Items	Quantity	×	Value ($)	Total value ($)
C	24	×	7u	168u
S	14	×	2u	28u
Total	38			196u

196u = 215.6

1u = 215.6 ÷ 196

   = 1.1

7u = 7 × 1.1

   = 7.7

A cup cost **$7.70**.
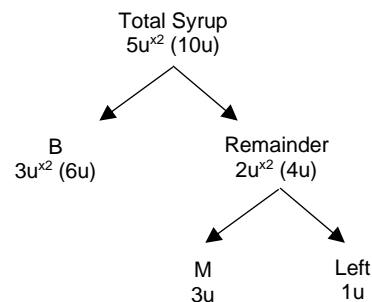
Question 1

1u = 210

6u = 210 × 6

   = 1260

$\frac{7}{10}$ of bottle = 1260

$\frac{1}{10}$ of bottle = 1260 ÷ 7

           = 180

$\frac{3}{10}$ of bottle = 3 × 180

           = 540

540 − 210 = 330

Mrs Wong would need to prepare **330 m_l_ more** to fill up the bottle completely.

Question 2

Total papers

1st
$\frac{5}{8}$ T + 3

Remainder
24

2nd
$\frac{1}{4}$ R + 3
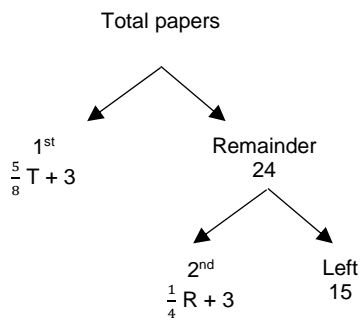
Left
15

$\frac{3}{4}$ R = 3 + 15

= 18

$\frac{1}{4}$ R = 18 ÷ 3

= 6

$\frac{4}{4}$ R = 6 × 4

= 24

$\frac{3}{8}$ T = 24 + 3

= 27

$\frac{1}{8}$ T = 27 ÷ 3

= 9

$\frac{8}{8}$ T = 8 × 9

= 36

Lina used **72 pieces** of origami paper.

Question 3

Total flour
7.8 kg (65u)

Cu
(30u)

Remainder 1
5u$^{×5}$ (35u)

Co
2u$^{×7}$ (14u)

Remainder 2
3u$^{×7}$ (21u)
7u$^{×3}$ (21u)

P
2u$^{×3}$ (6u)
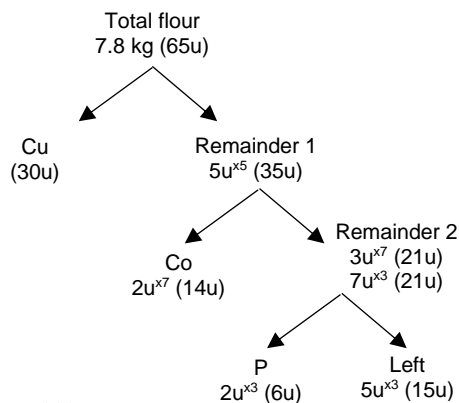
Left
5u$^{×3}$ (15u)

7.8 kg = 7800 g

65u = 7800

1u = 7800 ÷ 65

= 120

15u = 15 × 120

= 1800

1800 g = 1 kg 800 g

There were **1 kg 800 g** of flour left in the container.

Question 1

$\frac{2}{3}$ M = $\frac{3}{5}$ F
$\frac{6}{9}$ M = $\frac{6}{10}$ F

M	:	W
9	:	10

Total = 9u + 10u

= 19u

19u = 190

1u = 190 ÷ 19

= 10

Total children = 3u + 4u

= 7u

7u = 7 × 10

= 70

There were **70 children** at the engagement party.

Question 2

$\frac{9}{10}$ S = $\frac{3}{4}$ M $\frac{9}{10}$ S = $\frac{4}{5}$ C
$\frac{9}{10}$ S = $\frac{9}{12}$ M $\frac{36}{40}$ S = $\frac{36}{45}$ C

S	:	M		S	:	C
10$^{×4}$	:	12$^{×4}$		40	:	45
40	:	48				

Summary

S	:	M	:	C
40	:	48	:	45

48u = 96

1u = 96 ÷ 48

= 2

Total = 40u + 48u + 45u

= 133u

133u = 133 × 2

= 266

Karen's total score was **266 marks**.

Let's Get Started

2.

At first

$$\frac{2}{2}T$$
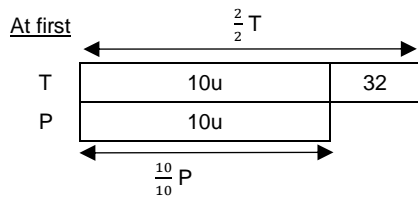
	At first	Sold	In the end (Left)
T	$\frac{2}{2}$ (10u + 32)	$\frac{1}{2}$ (5u + 16)	$\frac{1}{2}$ (5u + 16)
P	$\frac{10}{10}$ (10u)	$\frac{3}{10}$ (3u)	$\frac{7}{10}$ (7u)

In the end

3.

In the end

$$\frac{1}{4}R$$
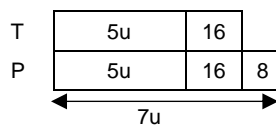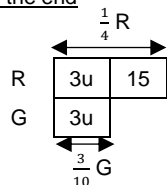
	In the end	Sold	At first
R	$\frac{1}{4}$ (3u + 15)	$\frac{3}{4}$ (9u + 45)	$\frac{4}{4}$ (12u + 60)
G	$\frac{3}{10}$ (3u)	$\frac{7}{10}$ (7u)	$\frac{10}{10}$ (10u)

At first

4.

At first

$$\frac{8}{8}K$$
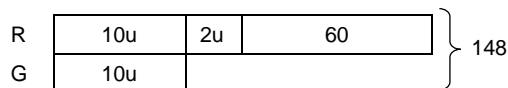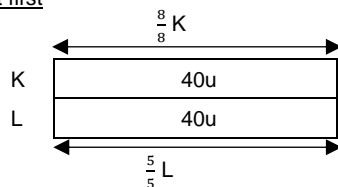
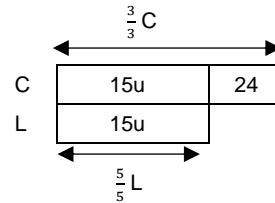|	At first	Spent	In the end ((Left)
K	$\frac{8}{8}$ (40u)	$\frac{1}{8}$ (5u)	$\frac{7}{8}$ (35u)
L	$\frac{5}{5}$ (40u)	$\frac{2}{5}$ (16u)	$\frac{3}{5}$ (24u)

In the end
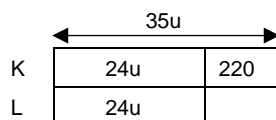
Let's Learn

Ask Yourself
1. There is sufficient information given at the beginning of the question to form a relationship to solve the question.
2. The problem should be solved using the Model-drawing approach as it involves the keywords "more than/less than" as well as a whole number.
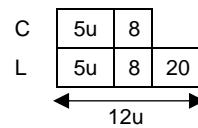
Answer to Advanced Model Drawing (More than/Less than)

Question 1

At first

$$\frac{3}{3}C$$

	At first	Cleared	In the end (Left)
C	$\frac{3}{3}$ (15u + 24)	$\frac{2}{3}$ (10u + 16)	$\frac{1}{3}$ (5u + 8)
L	$\frac{5}{5}$ (15u)	$\frac{1}{5}$ (3u)	$\frac{4}{5}$ (12u)

In the end

7u = 8 + 20

   = 28

1u = 28 ÷ 7

   = 4

10u + 16 = 10 × 4 + 16

       = 56

56 cars cleared the gantry.

Question 2

At first

$$\frac{8}{8}B$$
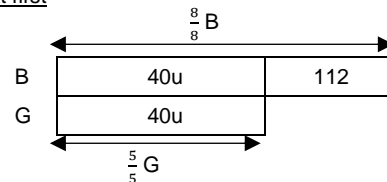
	Total	Took part	Did not
B	$\frac{8}{8}$ (40u + 112)	$\frac{5}{8}$ (25u + 70)	$\frac{3}{8}$ (15u + 42)
G	$\frac{5}{5}$ (40u)	$\frac{2}{5}$ (16u)	$\frac{3}{5}$ (24u)

In the end

Question 2 (Cont.)

24u – 15u = 9u

9u = 27

1u = 27 ÷ 9

    = 3

Total (took part) = 25u + 70 + 16u

                = 41u + 70

41u + 70 = 41 × 3 + 70

        = 193

193 students took part in the performance.
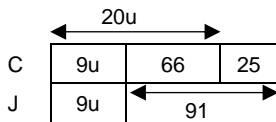

Question 3

At first
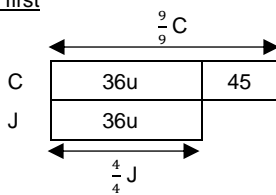
	At first	Sold	In the end (Left)
C	$\frac{9}{9}$ (36u + 45)	$\frac{5}{9}$ (20u + 25)	$\frac{4}{9}$ (16u + 20)
J	$\frac{4}{4}$ (36u)	$\frac{1}{4}$ (9u)	$\frac{3}{4}$ (27u)

Sold

20u – 9u = 11u

11u = 66

1u = 66 ÷ 11

    = 6

Total (end) = 16u + 20 + 27u

            = 43u + 20

43u + 20 = 43 × 6 + 20

        = 278

278 crossword puzzle books and jigsaw puzzles remained in total.

Question 4

In the end

Question 4 (Cont.)

		At first
T	$\frac{3}{5}$ (12u + 30)	$\frac{5}{5}$ (20u + 50)
S	$\frac{4}{5}$ (12u)	$\frac{5}{5}$ (15u)

At first
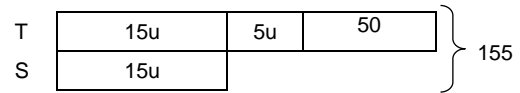
35u = 155 – 50

    = 105

1u = 105 ÷ 35

    = 3

T (at first) = 20 × 3 + 50

            = 110

T (left) = $\frac{7}{10}$ × 110

        = 77

77 table lamps remained.

Question 1

At first

In the end

2u = 300 – 74

    = 226

1u = 226 ÷ 2

    = 113

D (end) = 7 × 113 – 200

        = 591

Deanna had **$591** in the end.

Question 2

At first

Question 2 (Cont.)

<u>In the end</u>

Y	10u	15u	
M	7u	18u	} 78
F	48		

$10u + 7u + 25u = 78 + 48$

$42u = 126$

$1u = 126 \div 42$

$\quad = 3$

$25u = 25 \times 3$

$\quad\ = 75$

Each of them received **75 pins** at first.

Question 1

<u>In the end</u>

D	15u
W	15u
S	15u

<u>At first</u>

D		56		
W	15u		5u	
S	15u		9u	} 298

$15u + 15u + 15u + 5u + 9u = 298 + 56$

$59u = 354$

$1u = 354 \div 59$

$\quad = 6$

D (at first) $= 15 \times 6 - 56$

$\quad\quad\quad = 34$

Davis had **34 cards** at first.

Question 2

<u>In the end</u>

I	
D	
S	
R	

<u>At first</u>

I	20u	8u	
D	252		
S			222
R	28u	7u	

Question 2 (Cont.)

$28u = 252$

$1u = 252 \div 28$

$\quad = 9$

Total (at first) $= 20u + 252 + 252 + 222 + 35u$

$\quad\quad\quad\quad\quad = 20 \times 9 + 726 + 35 \times 9$

$\quad\quad\quad\quad\quad = 1221$

They made **1221 balloons** altogether at first.

Question 1

K	1u	72		
C	3u		216	} 25u
S	3u			

$\frac{3}{25}$ of total $= 3u$

$\frac{1}{25}$ of total $= 1u$

$\frac{25}{25}$ of total $= 25u$

$25u - 3u - 3u - 1u = 216 + 72$

$18u = 288$

$1u = 288 \div 18$

$\quad = 16$

$25u = 25 \times 16$

$\quad\ = 400$

There are **400 buns** in the bakery shop.

Question 2

H	2u	6	23
R	2u	6	
B	2u	6	15
N	2u		

$5u = 6 + 15 + 6 + 23$

$\quad = 50$

$1u = 50 \div 5$

$\quad = 10$

$2u + 6 = 2 \times 10 + 6$

$\quad\quad\quad = 26$

There are **26 rings** in the shop.

Question 1

B	10u	200
K	10u	

	At first	Change	End
B	$\frac{10}{10}$ (10u + 200)	$\frac{3}{10}$ (3u + 60)	$\frac{7}{10}$ (7u + 140)
K	10u	+(3u + 60)	13u + 60

In the end

B	7u	126	14	
K	13u		14	46

13u – 7u = 126
6u = 126
1u = 126 ÷ 6
= 21
3u + 60 = 3 × 21 + 60
= 123

123 people had moved to Kusu Beach.

Question 2

At first

A	12u	48
B	12u	

	At first	Change	End
A	12u	+(5u + 20)	17u + 20
B	$\frac{12}{12}$ (12u + 48)	$\frac{5}{12}$ (5u + 20)	$\frac{7}{12}$ (7u + 28)

In the end

17u

A	7u	28	2	18	2
B	7u	28			

17u – 7u = 28 + 2
10u = 30
1u = 30 ÷ 10
= 3
22u + 48 = 24 × 3 + 48
= 120

There are **120 children** altogether in both campsites.

Question 3

At first

L	5u	
M	5u	2400

Question 3 (Cont.)

At first

	At first	Change	
L	$\frac{5}{5}$ (5u + 2400)	$\frac{3}{5}$ (3u + 1440)	$\frac{2}{5}$ (2u + 960)
M	5u	+(3u + 1440)	8u + 1440

2nd change

		Change	End
L	2u + 960	+(2u + 360)	4u + 1320
M	$\frac{4}{4}$ (8u + 1440)	$\frac{1}{4}$ (2u + 360)	$\frac{3}{4}$ (6u + 1080)

In the end

L	4u	52	1080	188
M	4u	52	1080	

2u = 52
1u = 52 ÷ 2
= 26
3u + 1440 = 3 × 26 + 1440
= 1518

Lynette transferred **$1518** to Michelle.

Question 4

At first

H	5u	45
L	5u	

	At first	Change	
H	$\frac{5}{5}$ (5u + 45)	$\frac{1}{5}$ (1u + 9)	$\frac{4}{5}$ (4u + 36)
L	5u	+(1u + 9)	6u + 9

2nd Change

		Change	End
H	4u + 36	+(4u + 6)	8u + 42
L	$\frac{3}{3}$ (6u + 9)	$\frac{2}{3}$ (4u + 6)	$\frac{1}{3}$ (2u + 3)

In the end

6u

H	2u	3	27	42
L	2u	3		

6u = 3 + 27
= 30
1u = 30 ÷ 6
= 5
1u + 9 = 5 + 9
= 14

Mrs Hagen gave Letilia **14 dumplings**.

Let's Get Started 3.1

1.

Figure no.	1	2	3	4	5	6	…	18
No. of dots	2	5	8	11	14			

+3   +3   +3   +3

(a)   Difference is 3.

(b)   Test (Figure 1): $1 \times 3 - 1 = 2$

Test (Figure 2): $2 \times 3 - 1 = 5$

Unique term: Figure no. $\times 3 - 1$

(c)   No. of dots in Figure 6 $= 6 \times 3 - 1$

$= 17$

No. of dots in Figure 18 $= 18 \times 3 - 1$

$= 53$

2. (a) Difference $= 7 - 3$

$= 4$

(b) Unique term (No. of dots) = Fig no. $\times 4 - 1$

(c) No. of dots in Figure 6 $= 6 \times 4 - 1$

$= 23$

No. of dots in Figure 15 $= 15 \times 4 - 1$

$= 59$

Let's Learn 3.1

Ask yourself

1.   There is an increase in the number of squares by 1.
This is a number pattern involving common difference.

2.   General pattern: Number of squares is the same as
the Figure Number.

Think Further

(a)

Figure no.	Pattern to find (No. of squares)	Pattern to find (No. of circles)
1	1 × 2	1 × 4 + 2
2	2 × 2	2 × 4 + 2
3	3 × 2	3 × 4 + 2
4	4 × 2	4 × 4 + 2 = 18
5	5 × 2	5 × 4 + 2 = 22

(b) Unique term (No. of circles) = Figure no. $\times 4 + 2$

Let's Practise 3.1

Question 1

(a)

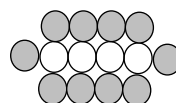| Figure no.	No. of triangles	Total no. of dots
1	2	10
2	4	14
3	6	18
4	8	22
5	10	26

Question 1 (Cont.)

(b)   Unique term (No. of triangles) = Figure no. $\times 2$

No. of triangles in Figure 83 $= 83 \times 2$

$= \textbf{166}$

(c)   Unique term (Total no. of dots) = Figure no. $\times 4 + 6$

Working backwards

Figure no. $\times 4 = 282 - 6$

$= 276$

Figure no. $= 276 \div 4$

$= 69$

There will be 282 dots in **Figure 69**.

Question 2

(a)

(b) (i) Unique term (No. of shaded coins)

= Figure no. $\times 2 + 2$

Working Backwards

$A \times 2 = 40 - 2$

$= 38$

$A = 38 \div 2$

$= \textbf{19}$

(ii) Unique term (No. of unshaded coins)

= Figure no.

$B = \textbf{19}$

(iii) Unique term (Total no. of coins)

= Figure no. $\times 3 + 2$

$C = 19 \times 3 + 2$

$= \textbf{59}$

Question 3

(a) Unique term (No. of matchsticks) = Figure no. $\times 5 + 1$

No. of matchsticks in Figure 5 $= 5 \times 5 + 1$

$= \textbf{26}$

(b) Working backwards

Figure no. $\times 5 = 131 - 1$

$= 130$

Figure no. $= 130 \div 5$

$= 26$

The figure number formed is **Figure 26**.

Question 4

(a)
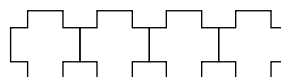
Question 4 (Cont.)

(b) Working backwards

Figure no. x 10 = 182 – 2

$\qquad$ = 180

Figure no. = 180 ÷ 10

$\qquad$ = **18**

Unique term (No. of squares) = Figure no. x 10 + 2

No. of squares in Figure 500 = 500 x 10 + 2

$\qquad$ = **5002**

Figure No.	Number of squares
1	12
2	22
3	21
…	…
18	182
500	**5002**

Let's Get Started 3.2

1. (a)
    1 = 1 x 1

    4 = 2 x 2

    9 = 3 x 3

    16 = 4 x 4

    (b)
    Figure 1: 1 x 1 = 1

    Figure 2: 2 x 2 = 4

    Figure 3: 3 x 3 = 9

    The number of dots in each figure is the square of its figure number or it can be represented as (Figure no. x Figure no.).

    (c)
    No of dots in Figure 5 = 5 x 5

    $\qquad$ = **25**

    No of dots in Figure 6 = 6 x 6

    $\qquad$ = **36**

    No of dots in Figure 13 = 13 x 13

    $\qquad$ = **169**

2.

(a) Figure 1 = 1 x 1 = 1

Figure 2 = 2 x 2 = 4

Figure 3 = 3 x 3 = 9

Figure 4 = 4 x 4 = 16

The number of squares in each figure is the square of its figure number.

(b) Unique term (No. of squares) = Figure no. x Figure no.

Let's Learn 3.2

Ask Yourself

1. There is an increase in the number of squares. This type of number pattern is known as square numbers.

2. General pattern: No. of dots = Figure no. x Figure no.

Think Further

(a)

Figure no.	No. of dots	Pattern to find no. of dots
1	2	$1^2 + 1$
2	5	$2^2 + 1$
3	10	$3^2 + 1$
4	17	$4^2 + 1$
5	26	$5^2 + 1$

(b) Unique term (No. of dots)

$\qquad$ = Figure no. x Figure no. + 1

Let's Practise 3.2

Question 1

Figure no.	Number of dots	Pattern to find number of dots
1	1	1 x 1
2	4	2 x 2
3	9	3 x 3
4	16	4 x 4
5	(a)	5 x 5
…		
(b)	81	

(a) No. of dots (Figure 5) = 5 × 5

$\qquad$ = **25**

(b) Figure no. = $\sqrt{81}$

$\qquad$ = **9**

(c) Figure no. = $\sqrt{256}$

$\qquad$ = **16**

Question 2

(a)
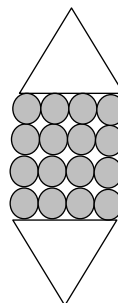
(b) Unique term (No. of circles) = Figure no. x Figure no.

No. of circles = 11 x 11

$\qquad$ = **121**

(c) No. of triangles = 2

No. of circles = 402 – 2

$\qquad$ = 400

Question 2 (Cont.)

Working backwards

Figure no. = $\sqrt{400}$

= 20

There will be 402 circles and triangles in **Figure 20**.

Question 3
(a)

Figure no.	Number of shaded rectangles	Number of unshaded rectangles	Total number of rectangles
1	2	2	4
2	5	4	9
3	8	8	16
4	13	12	25

Odd No. Figures
No. of shaded rectangles = No. of unshaded rectangles
= Total no. of rectangles ÷ 2

Even No. Figures
No. of shaded rectangles = (Total no. of rectangles + 1) ÷2
No. of unshaded rectangles = No. of shaded rectangles −1

(a) Figure 16 (Even No. Figure)
Total no. of rectangles = (16 + 1) × (16 + 1)
= 289
No. of shaded rectangles = (289 + 1) ÷ 2
= **145**

(b) Check: 722 + 722 = 1444 (Square no.? Yes.

$\sqrt{1444} = 38$)
Hence, it is an Odd No. Figure.
Figure No. = 38 − 1
= **37**

(c) *The question has an error. Please change the question to "What is the total number of rectangles in a figure if there are 1058 shaded rectangles?"*

1058 + 1058 = 2116 (Square no.? Yes. $\sqrt{2116} = 46$)

Hence, the total number of rectangles is **2116.**

Question 4

(a) Unique term (No. of unshaded squares)

= (Fig no. − 1) × (Fig no. − 1)
No. of unshaded squares in Figure 16 = 15 × 15
= 225

There are **225 unshaded squares** in Figure 16.
(b) No. of unshaded squares in Figure 42 = 41 × 41
= 168

Area of unshaded squares = 1681 × 25
= 42 025
The area of the unshaded squares in Figure 42 is
42 025 cm².

Question 4 (Cont.)
(c) Unique term (No. of shaded squares) = Figure no.
Working backwards
No. of unshaded squares = 1225 ÷ 25
= 49
= 7^2
No. of shaded squares = 7 + 1
= 8
There are **8 shaded squares.**
(d) No of shaded squares = 65
No of unshaded squares = $(65 − 1)^2$
= 4096
Perimeter
= 5 × (65 × 4)
= 1300
The perimeter of the figure in Pattern 65 is **1300 cm**.

Question 5

(a) No. of cubes in Figure 3 = 1 + 4 + 9
= 14
No. of cubes in Figure 4 = 1 + 4 + 9 + 16
= 30

Difference = 30 − 14
= 16
16 more cubes are needed to make Figure 4.
(b) Difference = (9 × 9) + (10 × 10)
= **181**
(c) No. of cubes in Layer 18 = 18 × 18
= **324**

Question 6
(a) Unique term (No. of fishes)
= (Day no. − 1) × (Day no. − 1) + 7
No. of fishes in Day 45 = 44 × 44 + 7
= 1943
There will be **1943 fishes** on Day 45.
(b) Working backwards
3488 − 7 = 3481
$\sqrt{3481} = 59$
Fig no. = 59 + 1
= 60
There will be 3488 fishes on **Day 60**.
(c) No. of sets = 1573 ÷ 6.5
= 242
No. of fish = 4 × 242
= 968
Working backwards
968 − 7 = 961
$\sqrt{961} = 31$
Fig no. = 31 + 1
= 32
Berlin's father will earn $1573 on **Day 32**.

Let's Get Started 3.3

1.
(a) There is a consecutive increase by 1 from one figure number to the next.

(b)

Figure 1 $= \frac{(1 \times 2)}{2}$

$= 1$

Figure 2 $= \frac{(2 \times 3)}{2}$

$= 3$

The number of dots in the consecutive figures follows the rule of triangle number where $\frac{Figure\ no. \times (Figure\ no. + 1)}{2}$.

2.

(a) Figure 1 $= \frac{(1 \times 2)}{2}$

$= 1$

Figure 2 $= \frac{(2 \times 3)}{2}$

$= 3$

Figure 3 $= \frac{(3 \times 4)}{2}$

$= 6$

The number of squares in the consecutive figures follows the rule of triangle number where $\frac{Figure\ no. \times (Figure\ no. + 1)}{2}$.

(b) Unique term: $\frac{Figure\ no. \times (Figure\ no. + 1)}{2}$

Let's Practise 3.3

Question 1

(a) Unique term (Total no. of circles)$= \frac{Figure\ no. \times (Figure\ no. + 1)}{2}$

Total no. of circles in Figure 12 $= \frac{12 \times 13}{2}$

$= 78$

There are **78 circles** in Figure 12.

(b) Working backwards

$1540 \times 2 = 3080$

$\sqrt{3080} \approx 55$

Test 1: $54 \times 55 = 2970$

Test 2: $55 \times 56 = 3080$

There are 1540 circles in **Figure 55**.

Question 2

(a) Unique term (Total no. of apples)$= \frac{Figure\ no. \times (Figure\ no. + 1)}{2}$

Total no. of apples in Figure 10 $= \frac{10 \times 11}{2} \times 10$

$= 550$

There are **550 apples** harvested on the 10th day.

(b) $1530 \div 10 = 153$

$\frac{Figure\ no. \times (Figure\ no. + 1)}{2} = 153$

Figure no. $\times$ (Figure no. + 1) = 306

$\sqrt{306} = 17.49286$

≈ 17

Question 2 (Cont.)

(Check) $17 \times 18 = 306$

Figure no. = 17

1035 apples were harvested on the **17th day.**

Question 3

(a) Unique term (Total no. of triangles)

= Figure no. $\times$ Figure no.

Total no. of triangles in Figure 22 = 22×22

$= 484$

There are **484 triangles** in Figure 22.

(b) Working backwards

$\sqrt{961} = 31$

There will be a total of 961 triangles in **Figure 31**.

(c) Working backwards

Figure no. $= \sqrt{121}$

$= 11$

Unique term (No. of shaded triangles) $= \frac{Fig\ no. \times (Fig\ no. + 1)}{2}$

No. of shaded triangles in Figure 11 $= \frac{11 \times 12}{2}$

$= 66$

There are **66 shaded triangles**.

(d) Unique term (No. of unshaded triangles)

$= \frac{(Fig\ no. - 1) \times Fig\ no.}{2}$

Working backwards

$2485 \times 2 = 4970$

$\sqrt{4970} \approx 70$

Test 1: $69 \times 70 = 4830$

Test 2: $70 \times 71 = 4970$

There will be 2485 unshaded triangles in **Figure 71**.

Question 4

(a) Unique term (Total no. of crosses)

$= \frac{Figure\ no. \times (Figure\ no. + 1)}{2}$

Total no. of crosses (Figure 5) $= \frac{5 \times 6}{2}$

$= \mathbf{15}$

No. of unshaded crosses = 15 – 4

$= \mathbf{11}$

Unique term (No. of shaded crosses) = Fig no. – 1

No. of shaded crosses (Figure 8) = 8 – 1

$= \mathbf{7}$

Total no. of crosses (Figure 8) $= \frac{8 \times 9}{2}$

$= \mathbf{36}$

No. of unshaded crosses = 36 – 7

$= \mathbf{29}$

(b) Total no. of crosses (Figure 29) $= \frac{29 \times 30}{2}$

$= 435$

There is a total of **435 crosses** in Figure 29.

Question 4 (Cont.)

(c) Working backwards

741 × 2 = 1482

$\sqrt{1482} \approx 38$

Test 1: 37 × 38 = 1406

Test 2: 38 × 39 = 1482

There will be 741 crosses in **Figure 38**.

(d) Working backwards

2080 × 2 = 4160

$\sqrt{4160} \approx 64$

Test 1: 63 × 64 = 4032

Test 2: 64 × 65 = 4160

No. of shaded crosses (Figure 64) = 64 − 1

= 63

No. of unshaded crosses = 2080 − 63

= 2017

There are **2017 unshaded crosses**.

Question 5

(a) No. of blocks at Layer 12 = (12 − 1) × 2

= 22

Number on the extreme right of Layer 12

= 1 + (2 + 4 + 6 + …+ 22)

= 1 + 2(1 + 2 + 3 + …+ 11)

= 1 + 2[$\frac{11+1}{2} \times 11$]

= **133**

(b) No. of blocks at Layer 68

= (68 − 1) × 2

= 134

Number on the extreme right of Layer 68

= 1 + (2 + 4 + 6 + …+ 134)

= 1 + 2(1 + 2 + 3 +…+ 67)

= 1 + 2[$\frac{(67+1)}{2} \times 67$]

= **4557**

(c) 1261 − 1 = 1260

1260 ÷ 2 = 630

$\frac{Fig\ no.}{2} \times (Fig\ no. +1) = 630$

(Fig no.) × (Fig no. + 1) = 1260

$\sqrt{1260}$ = 35.4964787

Test : 35 × 36 = 1260

35 + 1 = 36

In **Layer 36**, the number 1261 will be on the extreme

right of the layer.

Question 5 (Cont.)

(d) 2163 − 1 = 2162

2162 ÷ 2 = 1081

$\frac{Fig\ No.}{2} \times (Fig\ No. +1) = 1081$

(Fig No.) × (Fig No. +1) = 2162

$\sqrt{2162}$ = 46.4973

Test: 46 × 47 = 2162

Layer: 46 + 1 = 47

46 × 2 = 92

2162 − 91 = 2071

2071 + 1 = 2072

The number on the extreme left of the layer is **2072**.

Chapter **4** **Circles**

Let's Get Started 4.1

1. Area of shaded part

= 25 cm × 25 cm − $\frac{1}{4}$ × π × 25 cm × 25 cm

≈ **134 cm²**

2. Area of shaded part

= $\frac{1}{4}$ × π × 5 cm × 5 cm − $\frac{1}{2}$ × 5 cm × 5 cm

≈ **7 cm²**

Let's Learn 4.1

Ask Yourself
1. The figures are 1 large quadrant of radius 20 cm, 1 small quadrant of radius 8 cm and a rectangle measuring 8 cm by 20 cm.

Let's Practise 4.1

Question 1

Area of shaded parts

= 36 cm × 36 cm − π × 18 cm × 18 cm

≈ 278 cm²

The area of the shaded parts is **278 cm²**.

Question 2

Perimeter of unshaded Region Q = 2 × π × 12 cm

≈ 75 cm

The perimeter of the unshaded Region Q is **75 cm**.

Area of unshaded Region Q

= 24 cm × 24 cm − π × 12 cm × 12 cm

≈ 124 cm²

The area of unshaded Region Q is **124 cm²**.

Question 3

Perimeter of shaded region

= $\frac{3}{2}$ × 2 × 3.14 × 12 cm + 36 cm + 24 cm + 36 cm

= 209.04 cm

The perimeter of the shaded region is **209.04 cm**.

Question 3 (Cont.)

Area of shaded region

= 24 cm × 36 cm − $\frac{3}{2}$ × 3.14 × 12 cm × 12 cm

= 185.76 cm^2

The area of the shaded region is **185.76 cm^2**.

Question 4

Area of shaded part

= 2 × ($\frac{1}{4}$ × π × 5 cm × 5 cm − $\frac{1}{2}$ × 5 cm × 5 cm)

= 14 cm^2

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

Question 5

Area of shaded region

= 7 × [($\frac{1}{4}$ × π × 20 cm × 20 cm) − ($\frac{1}{2}$ × 20 cm × 20 cm)]

= 700π − 1400 cm^2

Area of unshaded regions

= π (20 cm × 20 cm) − (700π − 1400)

≈ 458 cm^2

The area of the shaded region is **458 cm^2**.

Question 6

Perimeter of large semicircle

= ($\frac{1}{2}$ × π × 36) + 36

= 18 (π + 2)

Perimeter of small semicircle

= ($\frac{1}{2}$ × π × 12) + 12

= 6 (π + 2)

Perimeter of large semicircle : Perimeter of small semicircle

= 18(π + 2) : 6(π + 2)

= **3 : 1**

Area of the large semicircle

= $\frac{1}{2}$ × π × 18^2

= 162 π

Area of small semicircle

= $\frac{1}{2}$ × π × 6^2

= 18 π

Area of the large semicircle : Area of the small semicircle

= 162 π : 18 π

= **9 : 1**

Question 7

Diameter of small circle = 16 cm

Diameter of medium circle = 32 cm

Area of shaded region

= π × 32 cm × 32 cm − 2 × π × 8 cm × 8 cm − π × 16 cm × 16 cm

= 640π cm^2

The area of the shaded region is **640π cm^2**.

Question 8

Area of A

= 2 × ($\frac{1}{4}$ × π × 10 cm × 10 cm − $\frac{1}{2}$ × 10 cm × 10 cm)

= 2 × (25π − 50)

= (50π − 100) cm^2

The area of Part A is **(50π – 100) cm^2**.

Area of C

= $\frac{1}{4}$ × π × 20 cm × 20 cm − $\frac{1}{2}$ × π × 10 cm × 10 cm − 10 cm × 10 cm

= (100π − 50π − 100) cm^2

= (50π − 100) cm^2

The area of Part C is **(50π – 100) cm^2**.

Question 9

Area of quadrant

= $\frac{1}{4}$ × $\frac{22}{7}$ × 41 cm × 41 cm

= 1386 cm^2

Area of 1 small square

= 21 cm × 21 cm

= 441 cm^2

Area of the figure

= 2 (1386 cm^2 – 441 cm^2) + 3 × 441 cm^2

= 3213 cm^2

The area of the shaded part is **3213 cm^2**.

Let's Learn 4.2

Ask Yourself

1. Yes. The figure is made up of 2 semicircles of diameter 20 cm enclosed in a square of side 20 cm.
2. Yes. Lines are needed to make the shapes that form the figure more distinct.

Let's Practise 4.2

Question 1

Area of the shaded part

= 2 × $\frac{1}{2}$ × 36 cm × 18 cm

= 648 cm^2

The area of the shaded parts is **648 cm^2**.

Question 2

Area of the big circle

= π × 21 cm × 21 cm

= $\frac{22}{7}$ × 21 cm × 21 cm

= 1386 cm²

Question 2 (Cont.)

Area of small circles

$= \frac{22}{7} \times 7$ cm $\times 7$ cm $\times 7$

$= \frac{22}{7} \times 49$ cm² $\times 7$

$= 1078$ cm²

Area of shaded parts

$= \frac{1386 - 1078}{12} \times 2$

$= 51\frac{1}{3}$

The area of the shaded parts is $51\frac{1}{3}$ **cm².**

Question 3

Area of the shaded parts = 3.14 × 10 cm × 10 cm

= 314 cm²

The area of the shaded parts is **314 cm²**.

Question 4

Area of figure = $1\frac{1}{4} \times \frac{22}{7} \times 7$ cm × 7 cm

= 192.5 cm²
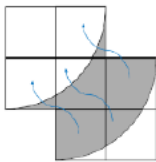
The area of the figure is **192.5 cm²**.

Perimeter of figure = $1\frac{1}{4} \times 2 \times \frac{22}{7} \times 7$ cm + 14 cm

= 69 cm

The perimeter of the figure is **69 cm**.

Question 5

Area of shaded figure (3 small squares) = 192 cm²

Area of 1 small square = 192 cm² ÷ 3

= 64 cm²

Side of square = $\sqrt{64}$ cm²

= 8 cm

Radius of quadrant = 2 × 8 cm

= 16 cm

Perimeter of shaded parts

$= \frac{1}{2} \times 2 \times 3.14 \times 16$ cm + 4 × 8 cm

= 82.24 cm

The perimeter of the shaded parts is **82.24 cm**.

Question 1

(a) AB = 4u, BC = 3u

Perimeter = 4u + 3u + 4u + 3u

= 14u

14u = 84 cm

1u = 84 cm ÷ 14

= 6 cm

3u = 3 × 6 cm

= 18 cm

The length of each small rectangle is **18 cm**.

(b) BC = 3 × 6 cm

= 18 cm

Area of ABCD = 24 cm × 18 cm

= 432 cm²

Area of shaded portions

= 432 cm² − ($\frac{1}{4}$ × 3.14 × 18 cm × 18 cm) + 6 cm × 6 cm

= 213.66 cm²

The area of the shaded portions is **213.66 cm²**.

Question 2

(a) Circumference of ABC = $\frac{1}{2}$ × 2 × 3.14 × 3 cm

= 9.42 cm

Circumference of CDE = $\frac{1}{2}$ × 2 × 3.14 × 4 cm

= 12.56 cm

Circumference of ACE = $\frac{1}{2}$ × 2 × 3.14 × 5 cm

= 15.7 cm

Perimeter of PQRS = 4 × $\sqrt{50}$ cm

Perimeter of shaded regions

= 9.42 cm + 12.56 cm + 15.7 cm + 4 × $\sqrt{50}$ cm

≈ 65.96 cm

The perimeter of the shaded regions is **65.96 cm**.

(b) Area of PQRS = $\frac{1}{2}$ × 10 cm × 5 cm × 2

= 50 cm²

Area of unshaded part in semicircle ACE not covered

by triangle ACE

= $\frac{1}{2}$ × 3.14 × 5 cm × 5 cm − $\frac{1}{2}$ × 6 cm × 8 cm

= 15.25 cm²

Area of shaded parts in semicircles ABC and CDE

= $\frac{1}{2}$ × 3.14 × 3 cm × 3 cm + $\frac{1}{2}$ × 3.14 × 4 cm × 4 cm −

15.25 cm²

= 24 cm²

Total area of shaded regions = 50 cm² + 24 cm²

= 74 cm²

The total area of the 3 shaded regions is **74 cm²**.

Question 3

(a) OL = 5 cm − 2 cm

= 3 cm

The length OL is **3 cm**.

(b) Area of shaded triangle $= \frac{1}{2} \times$ 4 cm × 3 cm

= 6 cm²

Area of shaded $\frac{3}{4}$ - circle $= \frac{3}{4} \times \pi \times$ 5 cm × 5 cm

= 18.75π cm²

Area of shaded parts = 6 cm² + 18.75π cm²

≈ 64.9 cm²

The area of the shaded parts is **64.9 cm²**.

Question 4

Area of the shaded parts

$= \frac{1}{2} \times \pi \times (9)^2 + 2 \times \frac{1}{2} \times$ 9 × 9

= 208.2345 cm²

≈ 208.2 cm²

The area of shaded parts is **208.2 cm²**.

Question 5

A + B = 110 cm²

A + B + C = 180 cm²

C = 180 − 110

= 70 cm²

B + C + D = 130 cm²

B + D = 130 − 70

= **60 cm²**

The area of shaded parts is **60 cm²**.

Question 6

Area of the shaded part

$= \left(\frac{1}{2} \times 7.5 \times 12\right) + [\left(\frac{1}{4} \times \pi \times (7.5)^2\right) - \left(\frac{1}{2} \times 7.5 \times 7.5\right)]$

= 45 + 16.0536

= 61.05 cm²

The area of shaded parts is **61.05 cm²**.

Question 7

Area of 4 half-rugby

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

$= 4 \times (4\pi - 8)$ cm²

$= (16\pi - 32)$ cm²

Area of shaded parts in the square

$= (\frac{1}{2} \times 16$ cm × 8 cm × 2$) - (\pi \times 4$ cm × 4 cm$) - (2 \times \frac{1}{2} \times$

8 cm × 4 cm)

$= (96 - 16\pi)$ cm²

Area of shaded parts

$= 16\pi - 32 + (96 - 16\pi)$

= 64 cm²

The total area of the shaded parts is **64 cm²**.

Question 8

Area of shaded parts

$$= 32 \times 16 - 8\left[\left(\frac{1}{4} \times 3.14 \times 8^2\right) - \left(\frac{1}{2} \times 8 \times 8\right)\right]$$

$$= 512 - 8 \times 18.24$$

$$= 366.08$$

The total area of the shaded parts is **366.08 cm².**

Chapter 5 Speed

Let's Get Started 5.1

1. (a) Distance = 90 × 2

= 180

Distance travelled for the first part of her journey was **180 km**.

(b) Total distance = 3 × 180

= 540

The total distance of her journey was **540 km**.

(c) Distance travelled = 540 − 180

= 360

Speed = 360 ÷ 5

= 72

Jaime's speed for the last part of the journey was **72 km/h**.

(d) Average speed for whole journey = 540 ÷ 7

$= 77\frac{1}{7}$

Jaime's average speed for the whole journey was **$77\frac{1}{7}$ km/h**.

2. (a) $\frac{3}{4}$ Total = 300 km

$\frac{1}{4}$ Total = 300 km ÷ 3

= 100 km

$\frac{4}{4}$ Total = 4 × 100 km

= 400 km

Town A and Town B is **400 km** apart.

(b) Time taken = 100 ÷ 80

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

He took **$1\frac{1}{4}$ h** to travel the first part of the journey.

(c) Time taken = 400 ÷ 100

= 4

He took **4 h** to travel from Town A to Town B.

Let's Learn 5.1

Ask Yourself

1. The entire journey is made up of 4 parts.
2. Yes. At any part of the journey, there is only one
   unknown where the other two variables are given.

Let's Practise 5.1

Question 1

Speed for the 2nd part of the journey = 150 ÷ 1.5

= 100

Mr Wong was travelling at a constant speed of **100 km/h**.

Question 2

$\frac{1}{5}$ Total = 2.6 km

$\frac{3}{5}$ Total = 2.6 km × 3

= 7.8 km

Time taken for $\frac{3}{5}$ of journey = 7.8 ÷ 12

= $\frac{13}{20}$ (h)

= 39 (min)

Time taken for $\frac{1}{2}$ of remaining journey = 2.6 ÷ 13

= $\frac{1}{5}$ (h)

= 12 (min)

Time taken = 39 + 12 + 15

= 66

Alice took **1 h 6 min** to complete the whole journey.

Question 3

1st part of journey = $\frac{7}{20}$ of Total

2nd part of journey = $\frac{2}{5}$ of Total

= $\frac{8}{20}$ of Total

3rd part of journey = $1 - \frac{7}{20} - \frac{8}{20}$

= $\frac{5}{20}$ (of Total)

$\frac{7}{20}$ Total = 84 km

$\frac{1}{20}$ Total = 84 km ÷ 7

= 12 km

$\frac{5}{20}$ Total = 5 × 12 km

= 60 km

Speed for last part of journey = 60 ÷ 1

= 60

His average speed for the last part of the journey was
60 km/h.

Question 4

Distance (1st part) = 59 km/h × $\frac{1}{2}$ h

= 29.5 km

Distance (middle part) = 352 km – 126 km – 29.5 km

= 196.5 km

Time take (last part) = 126 km ÷ 72 km/h

= $1\frac{3}{4}$ h

= 1 h 45 min

Time taken (middle part)

= 5 h 15 min – 30 min – 1 h 45 min

= 3 h

Average speed (middle part) = 196.5 km ÷ 3 h

= 65.5 km/h

The average speed for the middle part of the journey was
65.5 km/h.

Question 5

Distance (A to B to C) = 6 km/h × $\frac{2}{5}$ h

= 2.4 km

Total distance = 2.4 km × 2

= 4.8 km

Total time taken = 24 min + 12 min

= 36 min

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

Belinda's average speed = 4.8 km ÷ $\frac{3}{5}$ h

= 8 km/h

Belinda's average speed to walk around the rectangular
path was **8 km/h**.

Let's Get Started 5.2

Scenario A

(a) sum; total distance
(b) Sunny; Hector; 20 m/min
(c) meet
(d) 100 m
(e) 80 m

Scenario B

(a) Sunny; 20 m/min
(b) 1000 m or 1 km
(c) 9 min
(d) 600 m
(e) 760 m
(f) 20 m
(g) 19 min
(h) 1.36 km

Let's Learn 5.2

Ask Yourself

1. The total distance travelled is the same.

Let's Practise 5.2

Question 1

Time taken to meet = 544 ÷ (64 + 72)

= 4 (hours)

4 hours after 5 p.m. is 9 p.m.

They will meet each other at **9 p.m.**

Question 2

Distance bus travelled in 15 min = 100 km/h × $\frac{1}{4}$ h

= 25 km

Distance lorry travelled in 15 min = 80 km/h × $\frac{1}{4}$ h

= 20 km

Distance between two towns = 25 km + 20 km

= 45 km

The distance between the two towns is **45 km**.

Question 3

(a) Time taken to meet = 217.5 ÷ (80 + 65)

= 1.5 (hours)

1.5 hours after 09 30 was 11 00.

They met at **11 00**.

(b) Distance Adrian travelled more = 1.5 h × 15 km/h

= 22.5 km

Adrian had travelled **22.5 km** further than Ben when they met each other.

Question 4

Distance Tom covered at 3 p.m. = 70 km/h × 4 h

= 280 km

Distance Bill covered at 3 p.m. = 440 km − 280 km

= 160 km

Bills speed = 160 km ÷ 4 h

= 40 km/h

Bill's speed was **40 km/h**.

Question 5

Time taken to meet = 1600 ÷ (120 + 80)

= 8 (seconds)

Distance Bala covered in 8 s = 120 m/s × 8 s

= 960 m

Distance more to reach Point P = 1600 m − 960 m

= 640 m

Bala will have to cycle a further **640 m**.

Let's Get Started 5.3

Case 1:

	Alex	Benson	Ratio
Time taken	480 ÷ 80 = 6 (h)	480 ÷ 60 = 8 (h)	A : B 3 : 4

Case 2:

	Alex	Benson	Ratio
Speed	80	60	A : B 4 : 3
Distance travelled	80 × 4 = 320 (km)	60 × 4 = 240 (km)	A : B 320 : 240 4 : 3

Case 3:

	Alex	Benson	Ratio
Time taken	4 h	2 h	A : B 2 : 1
Distance travelled	50 × 4 = 200 (km)	50 × 2 = 100 (km)	A : B 200 : 100 2 : 1

Circle "opposite"

Circle "the same"

Circle "the same"

Let's Learn 5.3

Ask Yourself

1. Distance travelled is the common/the same.

Let's Practise 5.3

Question 1

S_J	:	S_T		T_J	:	T_T
3	:	4		4	:	3

4 − 3 = 1

1u = $\frac{1}{2}$ h

3u = 3 × $\frac{1}{2}$ h

= $1\frac{1}{2}$ h

Tom would have travelled for **$1\frac{1}{2}$ hours** before he

overtook Julianna.

Question 2

S_J	:	S_B		D_J	:	D_B
54	:	63		54	:	63
6	:	7		6	:	7

60 mins = 54 km

1 min = $\frac{54}{60}$

20 mins = $\frac{54}{60}$ × 20

= 18

1u = 18 km

Question 2 (Cont.)

7u = 7 × 18 km

   = 126 km

Time taken by Ben $= \frac{126}{63}$

                  = 2 h

2 h after 06 20 = **08 20**

Ben will overtake John at **08 20**.

Question 3

Common distance

T_L	:	T_F		S_L	:	S_F
28	:	16		4	:	7
7	:	4				

Difference (Speed) = 7u – 4u

                      = 3u

3u = 24

1u = 24 ÷ 3

   = 8

4u = 4 × 8

   = 32

(a) Linda's speed was **32 m/min**.

   Distance of the race = 32 m/min × 28 min

                      = 896 m

(b) The distance of the race is **896 m**.

Question 4

Common distance

S_A	:	S_B		T_A	:	T_B
4	:	5		5	:	4

5u = 6 (h)

1u = 6 ÷ 5

   = 1.2 (h)

4u = 4 × 1.2

   = 4.8 (h)

   = 4 h 48 min

Time difference = 5 h – 4 h 48 min

               = 12 min

Train B reached Station Q **12 minutes** ahead of Train A.

Question 5

(a) 7 a.m. to 7.12 a.m. = 12 min

   Distance travelled by Jaycee = 100 × 12

                                 = 1200 m

   Distance travelled by Delroy = 1200 + 240

                                 = 1440 m

   Delroy's speed $= \frac{1440}{12}$

                   = 120 m/min

   Delroy's speed was **120 m/min.**

Question 5 (Cont.)

(b) Common distance

Speed			Time		
J : D			J : D		
100 : 120			6 : 5		
5 : 6					

1u = 40

5u = 40 × 5

   = 200

Distance of the race = 200 × 120

                      = 24 000 m

                      = **24 km**

Answer to Chapter 5 Review Questions

Question 1

(a) 56 × 1.5 = 84 km

   Kumar's speed = 84 ÷ $1\frac{1}{4}$

                = 67.2 km/h

   Mr Kumar's speed was **67.2 km/h.**

(b) 67.2 × 1.5 = 100.8 km

   84 + 100.8 + 56 = 240.8 km

   Time taken by Mr Lim $= \frac{240.8}{56}$

                     = 4 h 18 min

   4h 18 min before 7.45 p.m. is 3.27 pm or 15 27.

   Mr Lim left Town Y at **15 27**.

Question 2

(a) 11.30 am to 2.10 pm = 2 h 40 mins

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

                              = $\frac{8}{3}$ h

   $70 \times \frac{8}{3} = \frac{560}{3}$ km

   $350 - 35 - \frac{560}{3} = \frac{385}{3}$ km

   $\frac{385}{3} + 45 = \frac{520}{3}$ km

   Bill's speed $= \frac{520}{3} \div \frac{8}{3}$

               = 65 km/h

   Bill's speed was **65 km/h.**

(b) 70 + 65 = 135

   Time taken to meet $= \frac{350-35}{135}$

                      = $\frac{7}{3}$ h

                      = $2\frac{1}{3}$ h

   $2\frac{1}{3}$ h after 11.30 a.m.

   = 1.50 p.m.

   Tom and Bill met at **1.50 p.m.**

Question 3

Speed	Time
Y : X	Y : X
5 : 4	4 : 5

1u = 10 min

5u = 50 min

50 mins after 9 a.m. = 9.50 a.m.

Train X reached Station B at **9.50 a.m.**

Question 4

60 × 2 = 120

120 + 25 = 145

5u = 145 km

1u = 145 ÷ 5

$\quad$ = 29 km

7u = 7 × 29 km

$\quad$ = 203 km

Time taken to travel from Town X to Town Y = $\frac{203}{60}$ h

$$= 3\frac{23}{60} \text{ h}$$

$$= 3 \text{ h } 23 \text{ min}$$

It would take the van **3 h 23 min** to travel from Town X to Town Y.

Question 5

(a) Difference for $\frac{1}{3}$ of the journey = 25 km

$\quad$ Difference for $\frac{3}{3}$ of the journey = 25 × 3

$$= 75 \text{ km}$$

$\quad$ 10 km = 1 h

$\quad$ 75 km = $\frac{1}{10} \times 75$

$$= 7.5 \text{ h}$$

$\quad$ It took Mr Cheong **7.5 hours** to complete the journey.

(b) Mr Soon's speed = $\frac{450}{7.5} + 10$

$$= 70 \text{ km/h}$$

$\quad$ Time taken by Mr Soon = $\frac{450}{70}$

$$= 6\frac{3}{7} \text{ h}$$

$$\approx 6 \text{ h } 26 \text{ min}$$

$\quad$ Mr Soon took **6 h 26 min** to complete the journey.

Question 6

(a) 3u = 36 km

$\quad$ 1u = 36 ÷ 3

$\quad\quad$ = 12 km

$\quad$ 2u = 12 × 2

$\quad\quad$ = 24 km

Time taken for the 1st 36 km = $\frac{36}{108}$

$$= \frac{1}{3} \text{ h}$$

Question 6 (Cont.)

Time taken for the remaining 24 km = $\frac{24}{72}$

$$= \frac{1}{3} \text{ h}$$

Total time taken = $\frac{1}{3} + \frac{1}{3}$

$$= \frac{2}{3} \text{ h}$$

$$= 40 \text{ min}$$

40 min before 1.20 p.m. = **12.40 p.m.**

(b) Average speed of the van = $\frac{36+24}{\frac{2}{3}}$

$$= \textbf{90 km/h}$$

Chapter 6 Simultaneous

Let's Get Started

2. $\quad \frac{1}{4}C + \frac{1}{10}L = 26$

$\quad\quad \frac{4}{4}C + \frac{10}{10}L = 140$

3. $\quad \frac{1}{2}S1 + \frac{1}{4}S2 = 130$

$\quad\quad \frac{2}{2}S1 + \frac{4}{4}S2 = 360$

Let's Learn

Ask Yourself

1. The fractions or relationship of the unknown can be formed.

Let's Practise

Question 1

$\frac{1}{5}$ B + $\frac{1}{4}$ F = 32 …(1)

$\frac{5}{5}$ B + $\frac{4}{4}$ F = 130 …(2)

Multiply (1) by 5,

$\frac{5}{5}$ B + $\frac{5}{4}$ F = 160 …(3)

(3) − (2),

$\frac{1}{4}$ F = 160 − 130

$\quad$ = 30

$\frac{4}{4}$ F = 4 × 30

$\quad$ = 120

There are **120 fridge magnets** in the box.

Question 2

$\frac{2}{7}$ C + $\frac{3}{10}$ S = 68 …(1)

$\frac{7}{7}$ C + $\frac{10}{10}$ S = 231…(2)

Multiply (1) by 10 and (2) by 3,

$\frac{20}{7}$ C + $\frac{30}{10}$ S = 680 …(3)

$\frac{21}{7}$ C + $\frac{30}{10}$ S = 693…(4)

(4) – (3),

$\frac{1}{7}$ C = 693 – 680

$\quad$ = 13

$\frac{5}{7}$ C = 5 × 13

$\quad$ = 65

65 cupcakes were eaten.

Question 3

40P = 25N

8P = 5N

32P = 20N

Total items in the box (based on N) = 20 + 3

$\qquad\qquad\qquad\qquad\qquad$ = 23

Max no. of N to be added = 25 – 23

$\qquad\qquad\qquad\qquad\qquad$ = 2

2 more nail-clippers can be added to the box.

Question 4

52P = 38B

26P = 19B

Total items bought (based on B) = 19 + 14

$\qquad\qquad\qquad\qquad\qquad$ = 33

Additional bookmarks she can buy = 38 – 33

$\qquad\qquad\qquad\qquad\qquad$ = 5

Jennifer can buy **5 more** bookmarks with her remaining money.

Question 5

7B + 2C = 10.3 …(1)

6B + 5C = 13.1 …(2)

Multiply (1) by 5 and (2) by 2,

35B + 10C = 51.5 …(1)

12B + 10C = 26.2 …(2)

(1) – (2),

23B = 25.3

1B = 25.3 ÷ 23

$\quad$ = 1.1

12B = 12 × 1.1

$\quad$ = 13.2

10C = 26.2 – 13.2

$\quad$ = 13

1C = 13 ÷ 10

$\quad$ = 1.3

Question 5 (Cont.)

12C = 12 × 1.3

$\quad$ = 15.6

12B + 12C = 13.2 + 15.6

$\qquad\qquad$ = 28.8

1 dozen bottles of soft drink and 1 dozen cartons of milk cost **$28.80**.

Question 6

6S = 8P

2S + 5P = 12.65

6S + 15P = 12.65 × 3

$\qquad\qquad$ = 37.95

8P + 15P = 37.95

23P = 37.95

1P = 37.95 ÷ 23

$\quad$ = 1.65

5P = 5 × 1.65

$\quad$ = 8.25

2S = 12.65 – 8.25

$\quad$ = 4.4

1S = 4.4 ÷ 2

$\quad$ = 2.2

1S + 1P = 2.2 + 1.65

$\qquad$ = 3.85

1GB = 3.85

7GB = 3.85 × 7

$\quad$ = 26.95

Ali spent **$26.95** on the goodie bags

Chapter 7 Pie Chart

Let's Get Started

1. Durian = $\frac{135}{360}$ × 16

$\quad$ = 6

6 children like durian ice cream.

2. Walk = 1600 ÷ 4

$\quad$ = 400

400 students walk to school.

Let's Learn

Ask Yourself

1. Fractions

Let's Practise

Question 1

$M + C = \frac{1}{4} + \frac{9}{20}$

$= \frac{7}{10}$

$V + B = 1 - \frac{7}{10}$

$= \frac{3}{10}$

No. of vans = 400 ÷ 2

= 200

No. of vans and bicycles = 400 + 200

= 600

$\frac{3}{10}$ Total = 600

$\frac{1}{10}$ Total = 600 ÷ 3

= 200

Total = 10 × 200

= 2000

Percentage of bicycles = $\frac{400}{2000}$ × 100%

= 20%

20% of the vehicles were bicycles.

Question 2

Rent = $\frac{1}{2} - \frac{1}{12} - \frac{1}{4}$

$= \frac{1}{6}$

(a) $\frac{1}{6}$ of her money was spent on rent.

Savings = 50% − 2.5%

= 47.5%

(b) She saved **47.5%** of her money monthly.

$\frac{1}{6}$ Total = 850

Total = 6 x 850

= 5100

Savings a year = 47.5% x 5100 x 6

= 14 535

(c) She would save **$14 535** in half a year.

Question 3

Fraction of hamsters = $1 - \frac{1}{4} - \frac{1}{12} - \frac{1}{3}$

$= \frac{1}{3}$

Difference between hamsters and birds = $\frac{1}{3} - \frac{1}{4}$

$= \frac{1}{12}$

Percentage difference = $\frac{1}{12}$ × 100%

$= 8\frac{1}{3}\%$

There are **$8\frac{1}{3}$% more** hamsters than birds.

Question 4

(a) Fraction of boys = $1 - \frac{3}{20} - \frac{3}{10} - \frac{1}{10}$

$= \frac{9}{20}$

$\frac{9}{20}$ of the people who attended the event were boys.

(b) $\frac{9}{20}$ Total = 180

$\frac{1}{20}$ Total = 180 ÷ 9

= 20

$\frac{20}{20}$ Total = 20 × 20

= 400

400 people attended the event last December.

(c) 80% = 400

1% = 400 ÷ 80

= 5

100% = 5 x 100

= 500

500 people attended the event in the previous year.

Question 5

(a) Percentage of Tiramisu and butter cakes sold

= 50% − 15% − 10%

= **25%**

(b) 5u = 25%

1u = 25% ÷ 5

= 5%

3u = 3 × 5%

= 15%

50% = 80

1% = 80 ÷ 50

= 1.6

15% = 15 × 1.6

= 24

24 Tiramisu cakes were sold.

Question 6

(a) 25% = 16 + 14

= 30

100% = 4 × 30

= 120

120 students took part in the survey.

(b) Oranges + Durians = 60

Oranges = $\frac{2}{3}$ × 60

= 40

Fraction = $\frac{40}{120}$

$= \frac{1}{3}$

$\frac{1}{3}$ of the students preferred oranges.

Chapter 8 — Algebra

Let's Get Started

1.

Value of x	Value of $68 + x$
1	$68 + 1 = 69$
2	$68 + 2 = 70$
3	$68 + 3 = 71$
4	$68 + 4 = 72$

2.

Value of a	Value of b	Value of $\frac{a+b}{2}$
12	10	$\frac{12+10}{2} = 11$
21	11	$\frac{21+11}{2} = 16$
28	12	$\frac{28+12}{2} = 20$
35	13	$\frac{35+13}{2} = 24$
40	0	$\frac{40+0}{2} = 20$

3.

	Algebraic expression
(a)	$x + 12$
(b)	$y - 12$
(c)	$\frac{a+2a+7a}{2} = 5a$
(d)	$4m$
(e)	$5x + 4$

Let's Learn

Ask Yourself

1. Add the values.
2. Add the total values. Then divide the result by the quantity that make up the total value.
3. Let Michelle's number of sweets be x.

Think Further

1. The solution changes to the following:

   Michelle = 8m sweets

   Total no. of sweets eaten $= 4m + 8m$

   $\qquad\qquad = 12m$

   Average $= \frac{12m}{2}$

   $\qquad\quad = 6m$

   Both girls ate an average of **$6m$ sweets**.

Let's Practise

Question 1

Total no. of pencils $= 10 + p + 3p$

$\qquad\qquad = 10 + 4p$

Average $= \frac{10+4p}{3}$

The girls bought an average of ($\frac{10+4p}{3}$) **pencils**.

Question 2

K | 5x |
A | 5x | 7 |

Total mass $= 5x$ kg $+ (5x + 7)$ kg

$\qquad\qquad = (10x + 7)$ kg

Average mass $= \frac{10x+7}{2}$ kg

Their average mass was ($\frac{10x+7}{2}$) **kg.**

Question 3

Mia's cookies $= 8a - 16$

$\qquad\qquad = 8 \times 17 - 16$

$\qquad\qquad = 120$

Anita's cookies $= 8 \times 17$

$\qquad\qquad = 136$

Anita and Mia had **136** and **120 cookies** respectively.

Question 4

No. of plates sold on Tue $= (4k + 2 + 2k)$

$\qquad\qquad = (6k + 2)$

No. of plates sold on Wed $= (6k + 2) + (4k + 2)$

$\qquad\qquad = (8k + 4)$

Total no. of plates sold $= (6k + 2) + (8k + 4) + (4k + 2)$

$\qquad\qquad = (18k + 8)$

Lena sold a total of **$(18k + 8)$ plates** of chicken rice over the 3 days.

Question 5

Let the number of stamps Ursula has be m.

U | m |
K | m | m | m |
C | m | m | m | 8 |

Total stamps $= m + 3m + (3m + 8)$

$\qquad\qquad = 7m + 8$

(a) They had **$(7m + 8)$ stamps**.

$\quad 7m + 8 = 7 \times 9 + 8$

$\qquad\qquad = 71$

(b) They had **71 stamps** altogether.

Question 6

(a) Total (at first) $= (39y + 6)$ stickers

   Mr Lee had **$(39y + 6)$ stickers** at first.

(b) Total (at first) $= 39 \times 4 + 6$

$\qquad\qquad = 162$

   Mr Lee had **162 stickers** at first.

Question 7

Weiqi's age = $\frac{1}{3}n$

(a) Natalie's age = $\frac{1}{3}n - 4$

Natalie is $(\frac{1}{3}n - 4)$ **years old.**

(b) Total ages = $n + \frac{1}{3}n + \frac{1}{3}n - 4$

$\qquad\qquad = 15 + 5 + 5 - 4$

$\qquad\qquad = 21$

Their total age is **21 years.**

Question 8

Perimeter (units) = 3u + 2u + 3u + 2u

$\qquad\qquad\qquad = 10u$

10u = 2h

$2u = \frac{2h}{5}$

The breadth of the rectangle is $\frac{2h}{5}$ **cm** or **0.4h cm.**

Question 9

N	4h		
P	4h	4h	
R	4h	4h	15

$\quad$ 20h + 15 = 115

$\qquad$ 20h = 115 − 15

$\qquad\qquad = 100$

$\qquad\quad h = 100 ÷ 20$

$\qquad\qquad = 5$

$\qquad$ 8h = 8 × 5

$\qquad\qquad = 40$

Peter has **40 magnets**.

Question 10

Saleha's age now $= 3p + 5$

Melanie's age now $= \frac{3p+5}{4}$

Melanie's age in 3 years' time $= \left(\frac{3p+5}{4} + 3\right)$

$\qquad\qquad\qquad = \left(\frac{3p+5}{4} + \frac{12}{4}\right)$

$\qquad\qquad\qquad = \left(\frac{3p+5+12}{4}\right)$

$\qquad\qquad\qquad = \frac{3p+17}{4}$

(a) Melanie will be $\left(\frac{3p+17}{4}\right)$ in 3 years' time.

Melanie's age in 8 years' time $= \left(\frac{3p+5}{4} + 8\right)$

Saleha's age in 8 years' time $= 3p + 13$

Total ages $\qquad = \frac{3p+5}{4} + 8 + 3p + 13$

$\qquad\qquad = \frac{3p+5}{4} + \frac{32}{4} + \frac{12p}{4} + \frac{52}{4}$

$\qquad\qquad = \left(\frac{15p+89}{4}\right)$

$\qquad\qquad = \frac{15×5+89}{4}$

$\qquad\qquad = 41$

(b) Their total ages in 8 years' time is **41 years**.

Chapter 9 — Mixed Review Questions

Question 1

Case 1: 80 pears left			Case 2: 400 pears left		
A	:	P	A	:	P
20	:	60	60	:	20
$1^{×3}$	:	$3^{×3}$	3	:	1
3	:	9			

Decrease of 8u

8u = 400 − 80

$\quad = 320$

1u = 320 ÷ 8

$\quad = 40$

9u + 80 = 9 × 40 + 80

$\qquad\quad = 440$

There are **440 pears** at the stall.

Question 2

At first $\qquad\qquad$ End

C : J : A $\qquad\qquad$ C : J : A

$2^{×2}$: $6^{×2}$: $9^{×2}$ $\qquad$ 7 : 15 : 21

4 : 12 : 18

$\quad$ 8 $\quad$ 6 $\qquad\qquad\qquad$ 8 $\quad$ 6

Difference = 7u − 4u

$\qquad\qquad = 3u$

3u = 90

1u = 90 ÷ 3

$\quad = 30$

Total (in the end) = 7u + 15u + 21u

$\qquad\qquad\qquad = 43u$

43u = 43 × 30

$\quad = 1290$

The 3 girls have **$1290** now.

Question 3

Case 1 : Scott → $16 to Omera

S : O : Total

$1^{×2}$: $3^{×2}$: $4^{×2}$

2 : 6 : 8

Case 2 : Omera → $23 to Scott

S : O : Total

$\qquad$ 3u $\qquad$ 5 : 3 : 8

Omera's Actual

Case 1	3u	3u	
Case 2	3u		

$16

$23

Gap $39
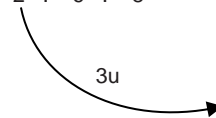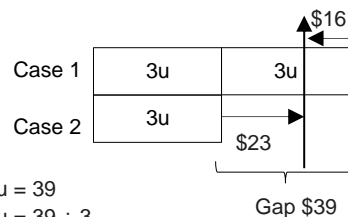
3u = 39

1u = 39 ÷ 3

$\quad = 13$

Omera = 6u − 16

$\qquad = 6 × 13 − 16$

$\qquad = 62$

Omera has **$62.**

Question 4

Commission received for first 100 jerseys

$= 100 \times 20$

$= \$2000$

Commission earned from the remaining jerseys sold

$= 2828 - 2000$

$= 828$

No. of jerseys sold for the \$828 commission $= 828 \div 36$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad = 23$

Total jerseys sold $= 100 + 23$

$\qquad\qquad\qquad = 123$

Fred sold **123 jerseys**.

Question 5

Items	Quantity	×	Value ($)	Total value ($)
\$5-stamps (Arun)	1u	×	5	5u
\$2-stamps (Kavita)	1u + 30	×	2	2u + 60
Total	2u + 30			7u + 60

\$5 stamps	2u	3u	
\$2 stamps	2u	60	180
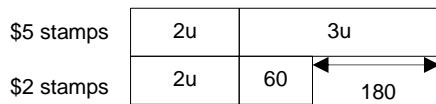
$3u = 60 + 180$

$\quad = 240$

$1u = 240 \div 3$

$\quad = 80$

Arun has **80 stamps**.

Question 6

2-m	:	3-m	2-m	:	Incorrect
$1^{\times 2}$	:	$3^{\times 2}$	2	:	1
2	:	6			

Items	Quantity	×	Value (Marks)	Total value (Marks)
Correct answer (2-mark qn)	2u	×	2	4u
Correct answer (3-mark qn)	6u	×	3	18u
Total	8u			22u

$22u = 176$

$1u = 176 \div 22$

$\quad = 8$

Total correct $= 8u$

$\qquad\qquad\quad = 8 \times 8$

$\qquad\qquad\quad = 64$

Incorrect + Unanswered questions $= 75 - 64$

$\qquad\qquad\qquad\qquad\qquad\qquad = 11$

Unanswered questions $= 11 - 8$

$\qquad\qquad\qquad\qquad = 3$

3 questions were left unanswered.

Question 7

A (now)	:	R (before)	:	Total
3	:	1	:	4
A (before)	:	R (now)	:	Total
$1^{\times 2}$	:	$1^{\times 2}$	:	$2^{\times 2}$
2	:	2	:	4

Total current age $= 5u$

$\qquad\qquad\qquad\quad = 30$

$1u = 30 \div 5$

$\quad = 6$

A now $= 3u$

$\qquad = 3 \times 6$

$\qquad = 18$

(c) Alda is **18 years old** now.

Now				Future			
A	:	R	: Diff	A	:	R	: Diff
3	:	2	: 1	5	:	4	: 1

Difference = 2u

$2u = 2 \times 6$

$\quad = 12$

(b) In **12 years' time**, Rena's age will be 80% of Alda's age.

Question 8
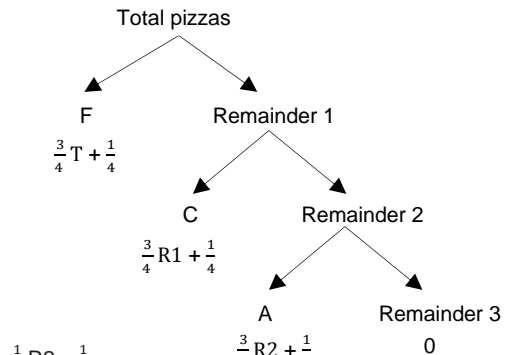
$\frac{1}{4}R2 = \frac{1}{4}$

$\frac{4}{4}R2 = 4 \times \frac{1}{4}$

$\qquad = 1$

$\frac{1}{4}R1 = 1 + \frac{1}{4}$

$\qquad = 1\frac{1}{4}$

$\frac{4}{4}R1 = 4 \times \frac{5}{4}$

$\qquad = 5$

$\frac{1}{4}T = 5 + \frac{1}{4}$

$\qquad = 5\frac{1}{4}$

$\frac{4}{4}T = 4 \times \frac{21}{4}$

$\qquad = 21$

Althea bought **21 pizzas.**

Question 9

(Actual)	P	W
At first	$3u^{\times 5}$	$4u^{\times 3}$
Change	$-18^{\times 5}$	$-10^{\times 3}$
End	$3p^{\times 5}$	$5p^{\times 3}$

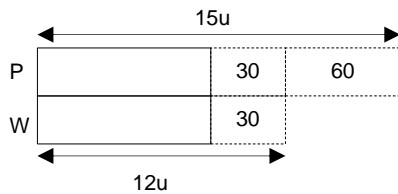| (Working)	P	W
At first	$15u$	$12u$
Change	-90	-30
End	$15p$	$15p$

$3u = 90 - 30$

$\quad = 60$

$1u = 60 \div 3$

$\quad = 20$

$3u = 3 \times 20$

$\quad = 60$

There are **60 pink meringues** in the jar.

Question 10

At first	Silver	Platinum	Total
Shop A	$\frac{2}{5}A = 32$	$\frac{3}{5}A = 48$	$\frac{5}{5}A = 80$
Shop B	$\frac{3}{10}B = 36$	$\frac{7}{10}B = 84$	$\frac{10}{10}B = 120$
Total	$32 + 36$ $= 68$	$48 + 84$ $= 132$	$80 + 120$ $= 200$
End			
Shop A	$\frac{2}{5}A$	$\frac{3}{5}A$	$\frac{5}{5}A$
Shop B	$\frac{7}{25}B$	$\frac{18}{25}B$	$\frac{25}{25}B$
	68	132	200

$\frac{2}{5}A + \frac{7}{25}B = 68$ --------------- (1) $\times 3$

$\frac{3}{5}A + \frac{18}{25}B = 132$ --------------- (2) $\times 2$

$\frac{6}{5}A + \frac{21}{25}B = 204$ --------------- (3)

$\frac{6}{5}A + \frac{36}{25}B = 264$ --------------- (4)

(4) − (3)

$\frac{15}{25}B = 60$

$\frac{1}{25}B = 4$

$\frac{18}{25}B = 72$

Difference $= 84 - 72$

$\quad\quad\quad = 12$

The owner of Shop B passed **12 platinum bracelets** to Shop A.
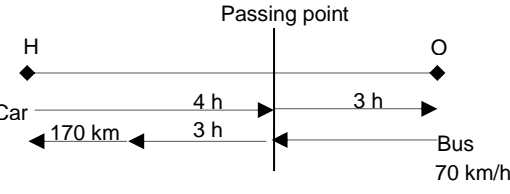
Question 11

Distance bus covered in 3 h = 3 h ✕ 70 km/h

$\quad\quad\quad\quad = 210$ km

Distance bus covered from where they passed each other to H = 210 + 170

$\quad\quad = 380$

Speed of car = 380 ÷ 4

$\quad\quad\quad = 95$

Distance between two towns = 7 h ✕ 95 km/h

$\quad\quad\quad\quad\quad = 665$ km

The distance between the 2 towns is **665 km.**

Question 12
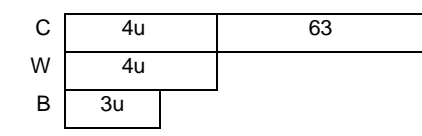
$\frac{1}{5}$ of total = 4u

Total = 20u

20u − 11u = 63

9u = 63

1u = 63 ÷ 9

$\quad = 7$

20u = 20 ✕ 7

$\quad = 140$

There were **140 muffins** in the box altogether.

Question 13

Case 1:			Case 2:		
Sarah 360 muffins left			Sarah 72 muffins left		
S	:	J	S	:	J
25	:	50	50	:	25
1	:	2	$2^{\times 2}$	:	$1^{\times 2}$
			4	:	2

3u
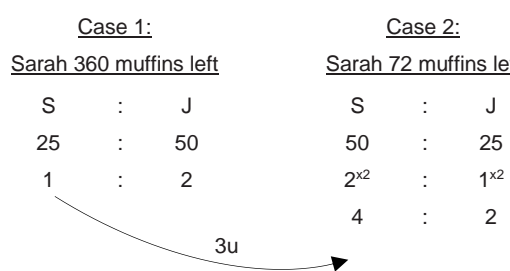
$3u = 360 - 72$

$\quad = 288$

$1u = 288 \div 3$

$\quad = 96$

Sarah = 1u + 360

$\quad\quad = 1 \times 96 + 360$

$\quad\quad = 456$

Check

Sarah = 4u + 72

$\quad\quad = 4 \times 96 + 72$

$\quad\quad = 456$

Sarah baked **456 muffins**.

Question 14

S	5152	266	
B	5152		10 570

Total cost of pairs of boots = 5152

Total cost of pairs of sneakers = 5152 + 266

$$= 5418$$

Items	Units	×	Value ($)	Total value($)
Boots	2u	×	?	5152
Sneakers	3u	×	?	5418
Total	5u			10 570

Cost of 3u of sneakers = 5418

Cost of 1u of sneakers = 5418 ÷ 3

$$= 1806$$

Cost of 2u of boots = 5152

Cost of 1u of boots = 5152 ÷ 2

$$= 2576$$

B	1806	770
S	1806	

1u = 770 ÷ 55

= 14

No. of pairs of sneakers = 3u

$$= 3 \times 14$$

$$= 42$$

Cost of 1 pair of sneakers = 5418 ÷ 42

$$= 129$$

The cost of 1 pair of sneakers was **$129.**

Question 15

Candle A (7.30 a.m. to 1.30 p.m.) = 6 hours

Candle B (9 a.m. to 1 p.m.) = 4 hours

Rate of burning in 1 hour,

Candle A = $\frac{1}{6}$

Candle B = $\frac{1}{4}$

Fraction of Candle A left unburnt at 11. 30 a.m.

(11.30 a.m. to 1.30 p.m.) = $\frac{1}{6} \times 2$

$$= \frac{1}{3}$$

Fraction of Candle B left unburnt at 11.30 a.m.

(11.30 a.m. to 1 p.m.) = $\frac{1}{4} \times 1.5$

$$= \frac{3}{8}$$

$\frac{3}{9}$ A = $\frac{3}{8}$ B

A : B

9 : 8

1u = 3

Length of Candle A = 9u

$$= 9 \times 3$$

$$= 27$$

The original length of Candle A was **27 cm** respectively.

Question 16

In 2021

L	1u	
A	1u	3u

In 6 years' time

L	6	1u			
A	6	1u	6	1u	8

2u = 6 + 8

= 14

1u = 7

Abigail (in 2021) = 4u

$$= 4 \times 7$$

$$= 28$$

Abigail (in 2031) = 28 + 10

$$= 38$$

Abigail will be **38 years old** in the year 2031.

Question 17

A : B+C+D : Total   B : A+C+D : Total   C : A+B+D : Total

$1^{\times 20}$: $2^{\times 20}$: $3^{\times 20}$ $1^{\times 15}$: $3^{\times 15}$: $4^{\times 15}$ $1^{\times 12}$: $4^{\times 12}$: $5^{\times 12}$

20 : 40 : 60   15 : 45 : 60   12 : 48 : 60

Summary

A : B : C : D

20 : 15 : 12 : 13

13u = 78

1u = 78 ÷ 13

= 6

Ali and Bryan = 20u + 15u

$$= 35u$$

35u = 35 × 6

= 210

Ali and Bryan have **210 marbles** altogether.

Question 18

Common volume

$\frac{3}{10}$ R = $\frac{1}{4}$ S

$\frac{3}{10}$ R = $\frac{3}{12}$ S

R : S

10 : 12

Difference = 12u – 10u

$$= 2u$$

2u = 48

1u = 48 ÷ 2

= 24

10u = 10 × 24
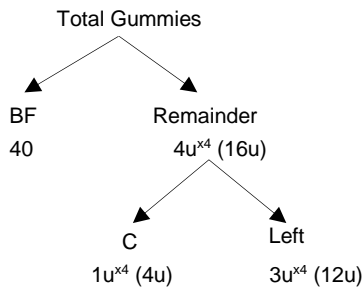
= 240

Height of rectangular tank = 240 ÷ (8 × 6)

$$= 5$$

The height of the rectangular tank is **5 m.**

Question 19

Total Gummies

BF
40

Remainder
$4u^{x4}$ (16u)

C
$1u^{x4}$ (4u)

Left
$3u^{x4}$ (12u)

$\frac{4}{7}$ T = $3u^{x4}$ (12u)

$\frac{1}{7}$ T = 12u ÷ 4

= 3u

$\frac{7}{7}$ T = 7 × 3u

= 21u

Friend = 21u − 16u

= 5u

5u = 40

1u = 40 ÷ 5

= 8

21u = 21 × 8

= 168

There were **168 gummies** in the bag at first

Question 20

9 steps

W		81
R		
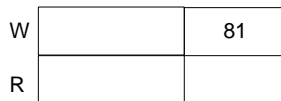
9 more run than 9 walk = 100 − 19

= 81 (seconds)

1 more run than 1 walk = 81 ÷ 9

= 9 (seconds)

10 more run than 10 walk = 10 × 9

= 90 (seconds)

To convert 10 run to 10 walk, take Luther 90 s more.

Time taken to walk 1 flight = 100 + 90

= 190 (seconds)

Time taken to walk 2 flights = 190 × 2

= 380 (seconds)

Luther would take **380 s** to walk up both flights of stairs.

Question 21

At first

A : B

3 : 5

Since Box B has 110 more apples than Box A,
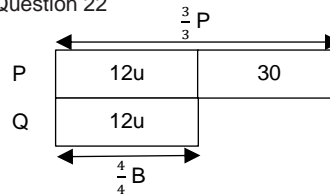
2u = 110

1u = 110 ÷ 2

= 55

Question 21 (Cont.)

Total apples = 8u

= 8 × 55

= 440

Red apples = $\frac{3}{4}$ × 440

= 330

There were **330 red apples**.

Question 22

	12u	30
	12u	

$\frac{3}{3}$ P = 12u + 30

$\frac{1}{3}$ P = 4u + 10 (red marbles)

$\frac{4}{4}$ Q = 12u

$\frac{3}{4}$ Q = 9u (red marbles)

4u + 9u = 62 − 10

13u = 52

1u = 52 ÷ 13

= 4

12u + 30 = 12 × 4 + 30

= 78

There were **78 marbles** in Box P.

Question 23

Case 1 :	Case 2 :
Gretel gives 4 boxes	Keith gives 4 boxes

G	:	K	:	Total		G	:	K	:	Total
2^{x3} :		5^{x3} :		7^{x3}		8	:	13 :		21
6	:	15	:	21						
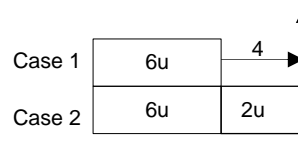
Gretel's Actual

Case 1	6u	4
Case 2	6u	2u

2u = 4

1u = 4 ÷ 2 = 2

Gretel

C1: 6u + 4 = 6 × 2 + 4

= 16

C2: 8u = 8 × 2

= 16

Keith

C1: 15u = 15 × 2

= 30

C2: 13u + 4 = 13 × 2 + 4

= 30

Gretel and Keith have **16 boxes of cookies and 30 boxes** of cookies respectively.

Question 24

Case 1	5B + 8C ($31)	1 B
Case 2	5B + 8C ($31)	1C

Actual money $0.40

Gap $1

$0.60

B | 1u | 1 | × 5
C | 1u | | × 8

} 31
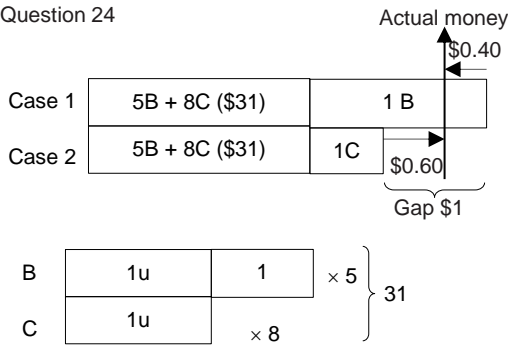
$5u + 8u = 31 − 5$

$\quad = 26$

$13u = 26$

$1u = 26 ÷ 13$

$\quad = 2$

$2u + 1 = 2 × 2 + 1$

$\quad\quad = 5$

The total cost of 1 bracelet and 1 hairclip is **$5**.

Question 25

Choco	Gum	Mint	Total
88 × 4 = 352	12 × 7 = 84	0 × 22 = 0	436
86 × 4 = 344	13 × 7 = 91	1 × 22 = 22	457
56 × 4 = 224	28 × 7 = 196	16 × 22 = 352	772

+ 21

Diff between 772 and 436 = 336

Gap of 336 divided by 21 = 336 ÷ 21

$\quad\quad\quad\quad = 16$
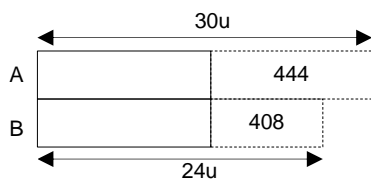
Graham ordered **28 gumballs**.

Question 26

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

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

(Actual)	A	B
At first	15u$^{×2}$	8u$^{×3}$
Change	−222$^{×2}$	−136$^{×3}$
End	3p$^{×2}$	2p$^{×3}$
(Working)	**A**	**B**
At first	30u	24u
Change	−444	−408
End	6p	6p

30u

A | | 444
B | | 408

24u

$6u = 36$

$1u = 36 ÷ 6$

$\quad = 6$

Total tarts at first = 15u + 8u

$\quad\quad\quad\quad\quad = 23u$

Question 26 (Cont.)

$23u = 23 × 6$

$\quad = 138$

There were **138 mini tarts** in both boxes at first.

Question 27

Items	Change	End	At first
(3) L	$-\frac{1}{5}$ (1u)	$\frac{6}{5}$ (6u)	$\frac{5}{5}$ (5u)
(2) J	$-\frac{1}{2}$ (6u)	$\frac{1}{2}$ (6u)	$\frac{2}{2}$ (12u)
(1) K	+3 (9u)	4 (12u)	1 (3u)

	K	:	J	:	L
End	1u$^{×6}$	:	1u$^{×6}$	:	1u$^{×6}$
	6u	:	6u	:	6u
Rev(3)					−1u
	6u	:	6u	:	5u
Rev(2)			+ 6u		
	6u$^{×2}$	:	12u$^{×2}$	:	5u$^{×2}$
	12u	:	24u	:	10u
Rev(1)	− 9u				
At first	3u	:	24u	:	10u

Total (at first) = 3u + 24u + 10u

$\quad\quad\quad\quad\quad = 37u$

$37u = 14\ 060$

$1u = 14\ 060 ÷ 37$

$\quad = 380$

Lenny at first = 10u

$\quad\quad\quad\quad = 10 × 380$

$\quad\quad\quad\quad = 3800$

Lenny saved **$3800** at first.

Question 28

Salary $4236

General
18u + 96

Remainder
7u$^{×4}$ (28u)

Parents
4u$^{×4}$ (16u)

Saved
3u$^{×4}$ (12u)

$\frac{1}{6}$

G | 3u | 16
S | 3u |

$\frac{1}{4}$

$\frac{1}{6} G = 3u + 16$

$\frac{6}{6} G = 18u + 96$
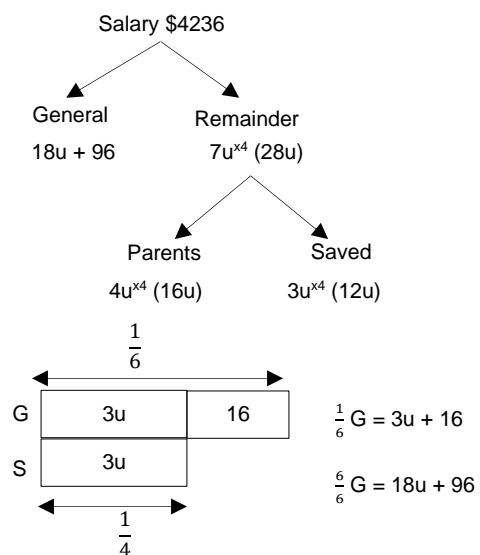
$18u + 96 + 28u = 4236$

$46u = 4236 − 96$

$\quad\quad = 4140$

$1u = 4140 ÷ 46$

$\quad = 90$

Question 28 (Cont.)

General = 18u + 96

$\qquad$ = 18 × 90 + 96

$\qquad$ = 1716

Sienna's monthly general expenses was **$1716.**

Question 29

At first
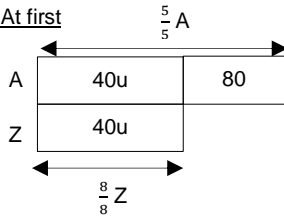
	Spent	End	At first
Zeph	$\frac{1}{8}$ (5u)	$\frac{7}{8}$ (35u)	$\frac{8}{8}$ (40u)
Adelia	$\frac{2}{5}$ (16u + 32)	$\frac{3}{5}$ (24u + 48)	$\frac{5}{5}$ (40u + 80)
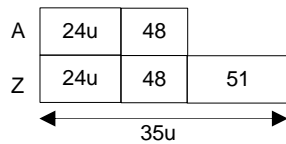
End

11u = 51 + 48

$\qquad$ = 99

1u = 99 ÷ 11

$\qquad$ = 9

Adelia at first = 40u + 80

$\qquad$ = 440

Adelia had **$440** at first.

Question 30

In 1 h

Fred = $\frac{1}{3}$ journey

William = $\frac{1}{4}$ journey

In 30 min

$\frac{1}{3} ÷ 2 = \frac{1}{6}$ journey

$\frac{1}{4} ÷ 2 = \frac{1}{8}$ journey

$\frac{24}{24} − \frac{1}{6} − \frac{1}{8} = \frac{17}{24}$

$\frac{17}{24}$ journey = 170

$\frac{1}{24}$ journey = 170 ÷ 17

$\qquad$ = 10

$\frac{24}{24}$ journey = 24 × 10

$\qquad$ = 240

Fred's speed = 240 ÷ 3

$\qquad$ = 80

Fred's speed was **80 km/h.**

Question 31

1 group of $72 = $9 (discount)

Amount to pay for every group = $72 − $9

$\qquad$ = $63

No. of groups of $63 = $840 ÷ $63

$\qquad$ = 13 R $21

13 groups of $63 = 13 × $9

$\qquad$ = $117 (discount)

Amelia was given **$117 discount.**

Question 32

Items	Quantity	×	Value ($)	Total value ($)
On time	15u	×	5	75u
Late	4u	×	3.5	14u
Total	19u			89u

89u = 7298

1u = 7298 ÷ 89

$\qquad$ = 82

Late = 4u

$\qquad$ = 4 × 82

$\qquad$ = 328

(a) **328 parcels** were delivered late.

$\qquad$ Difference in cost of 1 parcel = 5 – 3.5

$\qquad\qquad$ = 1.5

$\qquad$ Difference in total cost = 328 × 1.5

$\qquad\qquad$ = 492

(b) The company would collect an additional **$492.**

Question 33

R : P+N $\qquad$ P : N : P + N

$5^{×4}$: $7^{×4}$ $\qquad$ $1^{×7}$: $3^{×7}$: $4^{×7}$

20 : 28 $\qquad$ 7 : 21 : 28

Summary Ratio

R : N : P

20 : 21 : 7

Items	Quantity	×	Value($)	Total($)
R	20u	×	2	40u
N	21u	×	8	168u
P	7u	×	4	28u
Total	48u			236u

236u = 708

1u = 708 ÷ 236

$\qquad$ = 3

Total items = 48u

$\qquad$ = 48 × 3

$\qquad$ = 144

Sumitha bought **144 items** altogether.

Question 34

At first				End			
J :	F :	Total		J :	F :	Total	
3^{x3} :	1^{x3} :	4^{x3}		2^{x4} :	1^{x4} :	3^{x4}	
9 :	3 :	12		8 :	4 :	12	

1u

$1u = 77$

$8u = 8 \times 77$

$\quad = 616$

Jonas had **616 comic books** left.

Question 35

Diff in savings $= 5 - 2$

$\qquad\qquad = 3$

No. of days $= 180 \div 3$

$\qquad\qquad = 60$

(a) Alfred took **60 days** to save $180 less than Bruce.

Total no. of days from Dec to Mar $= 31 \times 3 + 28$

$\qquad\qquad\qquad\qquad\qquad = 121$

Total savings $= 2 \times 121 + 5 \times 121$

$\qquad\qquad\qquad = 847$

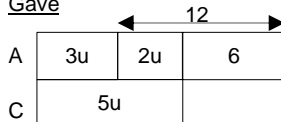(b) Both of them would have save **$847** altogether at the end of March.

Question 36

At first

$\frac{5}{5}$ A
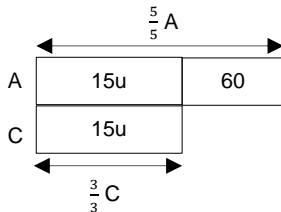
	Gave	End	At first
A	$\frac{1}{5}$ (3u + 12)	$\frac{4}{5}$ (12u + 48)	$\frac{5}{5}$ (15u + 60)
C	$\frac{1}{3}$ (5u)	$\frac{2}{3}$ (10u)	$\frac{3}{3}$ (15u)

Gave

$2u = 12 - 6$

$\quad = 6$

$1u = 6 \div 2$

$\quad = 3$

Apples Pie remained $= 12u + 48$

$\qquad\qquad\qquad = 12 \times 3 + 48$

$\qquad\qquad\qquad = 84$

84 apple pies remained in the end.

Question 37

Speed		Time	
S1 :	S2	T1 :	T2
60 :	80	4 :	3
3 :	4		

$1u$ of time $= 6 + 8$

$\qquad\qquad = 14$

$4u$ of time $= 4 \times 14$

$\qquad\qquad = 56$

Time taken to reach on time $= 56 - 6$

$\qquad\qquad\qquad\qquad\qquad = 50$

Check

$3u$ of time $= 3 \times 14$

$\qquad\qquad = 42$

Time taken to reach on time $= 42 + 8$

$\qquad\qquad\qquad\qquad\qquad = 50$

Time to reach $= 50$ min after 7.30 a.m.

$\qquad\qquad = 8.20$ a.m.

(a) Logan needs to reach his office at **8.20 a.m**. to be on time.

Distance $= 60 \times \frac{56}{60}$

$\qquad\quad = 56$

Check

Distance $= 80 \times \frac{42}{60}$

$\qquad\quad = 56$

(b) The distance between Logan's office and his house is **56 km.**

Question 38

	Sold	Left	At first
A	$\frac{1}{5}$	$\frac{4}{5}$	$\frac{5}{5}$
M	$\frac{3}{25}$	$\frac{22}{25}$	$\frac{25}{25}$

Left

$\frac{4}{5} A = \frac{22}{25} M$

Q

$\frac{44}{55} A = \frac{44}{50} M$

A :	M :	A+M		S :	A+M
55 :	50 :	105		2^{x35} :	3^{35}
				70 :	105

Summary

A :	M :	S
55 :	50 :	70

Question 38 (Cont.)

Apples and mango strudel left = 88u

88u = 352

1u = 352 ÷ 88

   = 4

Strawberry = 70u

         = 70 × 4

         = 280

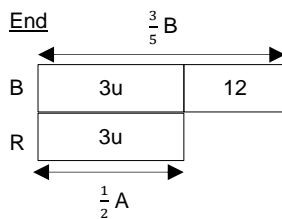(a) There were **280 strawberry strudels**.

Sold = 11u + 6u

     = 17u

17u = 17 × 4

    = 68
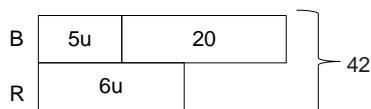
(b) **68 strudels** were sold.

Question 39

$$\underline{\text{End}} \qquad \tfrac{3}{5}\,\text{B}$$

	Gave	Left	At first
Blue	$\tfrac{2}{5}$ (2u + 8)	$\tfrac{3}{5}$ (3u + 12)	$\tfrac{5}{5}$ (5u + 20)
Red	$\tfrac{1}{2}$ (3u)	$\tfrac{1}{2}$ (3u)	$\tfrac{2}{2}$ (6u)

At first

11u = 42 − 20
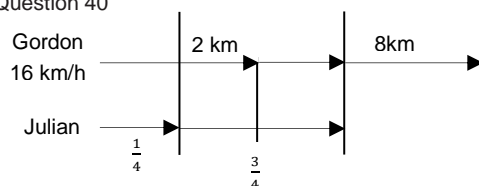
    = 22

1u = 22 ÷ 11

   = 2

Red pens gave away = 3u

              = 3 × 2

              = 6

Amira gave away **6 red pens.**

Question 40

When Julian reached the finish line, Gordon would be

8 km ahead of him (assuming Gordon continues running).

Question 40 (Cont.)

Time taken for Gordon 8 km = 8 ÷ 16

$$= \tfrac{1}{2}\,\text{h}$$

Time Julian reached the finishing line, $\tfrac{1}{2}$ h after 11.45 a.m.

= 12.15 p.m.

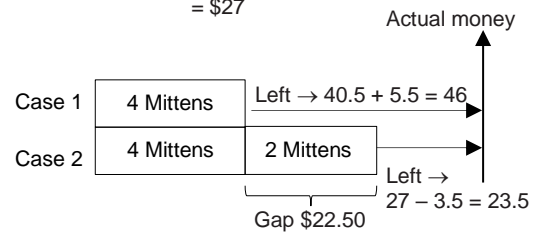Julian reached the finishing line at **12.15 p.m.**

Question 41

1 bootie = $6.75

Case 1, 6 Booties = 6 × $6.75

             = $40.50

Case 2, 4 Booties = 4 × $6.75

             = $27

2 mittens = 46 − 23.5

        = 22.5

1 mitten = 22.5 ÷ 2

       = 11.25

Using Case 1,

Cassandra's $ = 4M + 46

             = 4 × 11.25 + 46

             = 91

Check

6M + 23.5 = 6 × 11.25 + 23.5

          = 91

Cassandra has **$91.**

Question 42

$\tfrac{1}{4}$ R = $\tfrac{1}{3}$ G

(Actual)	R	G
At first	$4u^{\times 5}$	$3u^{\times 2}$
Change	$-206^{\times 5}$	$+80^{\times 2}$
End	$2p^{\times 5}$	$5p^{\times 2}$
(Working)	**R**	**G**
At first	20u	6u
Change	−1030	+160
End	10p	10p
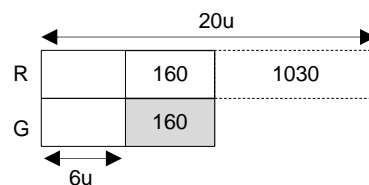
Question 42 (Cont.)

14u = 160 + 1030

    = 1190

1u = 1190 ÷ 14

    = 85

Ryan at first = 4u

            = 4 × 85

            = 340

(a) Ryan had **$340** at first.

Gillian in the end = 3u + 80

                   = 3 × 85 + 80

                   = 335

(b) Gillian had **$335** in the end.
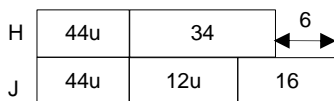
Question 43

At first
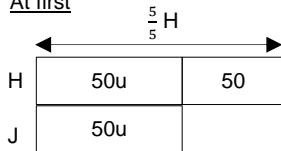
	At first (1)	Change	End (1)
H	50u + 50 ($\frac{5}{5}H$)	Gave 20u + 20 ($\frac{2}{5}H$)	30u + 30 ($\frac{3}{5}H$)
J	50u	Received 20u + 20	70u + 20

	At first (2)	Change	End (2)
H	30u + 30	Received 14u + 4	44u + 34
J	70u + 20 ($\frac{5}{5}J$)	Gave 14u + 4 ($\frac{1}{5}J$)	56u + 16 ($\frac{4}{5}J$)

End (2)

12u = 34 + 6 − 16

= 24

1u = 24 ÷ 12

    = 2

Helena at first = 50u + 50

                = 50 × 2 + 50

                = 150

Helena had **$150** at first.

Question 44

No. of qns answered = 30 − 4

                     = 26

Question 44 (Cont.)

Total marks for 26 questions = 34 + (4 × 1)

                                  = 38

Correct	Wrong	Total
26 × 3 = 78	0 x 2 = 0 (deduct)	78
25 × 3 = 75	1 x 2 = 2 (deduct)	73
18 × 3 = 54	8 x 2 = 16 (deduct)	38

Diff between the total marks = 78 − 38

                            = 40

Difference between 1 correct and 1 wrong = 78 − 73

                                           = 5

No. of qns answered wrongly = 40 ÷ 5

                                = 8

No. of qns answered correctly = 26 − 8

                                   = 18

Tony answered **18 questions** correctly.

Question 45

Case 1:			Case 2:		
Sharifah 800 cookies left			Sharifah 1700 cookies left		
S	:	D	S	:	D
6	:	3	3	:	6
$2^{×2}$	:	$1^{×2}$	1	:	2
4	:	2			

3u

3u = 1700 − 800

   = 900

1u = 900 ÷ 3

   = 300

Sharifah = 4u + 800

          = 4 × 300 + 800

          = 2000

Check

Sharifah = 1u + 1700

          = 1 × 300 + 1700

          = 2000

No. of boxes = 2000 ÷ 50

               = 40

Sharifah baked **40 boxes** of cookies.

Question 46

(Actual)	**Apples**	**Oranges**
At first	$2u^{×7}$	$3u^{×3}$
Change	$−20^{×7}$	$+30^{×3}$
End	$3p^{×7}$	$7p^{×3}$

Question 46 (Cont.)

(Working)	Apples	Oranges
At First	14u	9u
Change	−140	+90
End	21p	21p

Work model from end
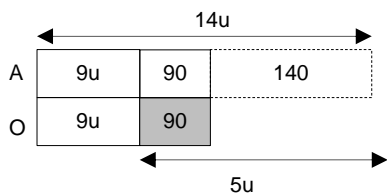
$5u = 140 + 90$

   $= 230$

$1u = 230 \div 5$

   $= 46$

Apples at first $= 2u - 20$

   $= 2 \times 46 - 20$

   $= 72$

Oranges at first $= 3u$

   $= 3 \times 46$

   $= 138$

Farmer Sam has **72 apples** in the crate.