SpongeTips to Excel!

Solving problem sums can be enjoyable as the process helps you to:

Gain the knowledge and skills to confidently solve problems in everyday life eg:

- ✓ measuring your height and working out how much you've grown.
- ✓ on car journeys - playing number-plate games, adding and subtracting with road signs, thinking about speed by dividing distance by time.
- ✓ at the shops - weighing fruit and vegetables, budgeting with pocket money, working out the relative value of products by comparing prices and weight.
- ✓ in the kitchen - with weighing and measuring, and temperature and timings.
- ✓ making models and origami shapes.

Sharpen your thinking so you can outwit your friends in riddles, puzzles and games.
Think creatively for more ways to tackle a problem that will amaze your family members and friends.

It's really easy to become an excellent problem sum solver. Simply use **BRISK**!

B*elieve in yourself*	No problem is too difficult for anyone including you! It may be challenging but that's what makes it interesting. Imagine playing an easy computer game…you will soon be bored! So brace up and tell yourself, "I can do it!"
R*ead to understand*	Never rush through a question even if it looks really easy because you might just miss the important point or fall into the trap set by the author/examiner (Yes, they do set traps!). Read every sentence of the entire problem until you understand and know what you are going to solve.
I*dentify key facts*	All information found in the problem is important. It gives clues to help you solve the problem just like a detective would need clues to solve a mystery. As you read through line by line, list the facts given in the problem to help guide and lead you to the solution.
S*queeze and write*	You need all the clues to solve the problem. So 'squeeze' out every possible clue from the problem sum and write them one at a time, point by point, onto the empty space provided. Do you know that every correct clue/fact stated in your answer will score you points? So go on….'squeeze' and write!
K*eep questioning*	For every fact you have written out, ask yourself, "Is there a computation here that I must make that will lead me closer to the solution?". If the answer is yes, then work it out, check the working and if it is accurate, you are one step closer to the solution. Otherwise, move to the next fact and repeat the process. Before you know it, there's the solution! Once you have arrived at your solution, don't be in a hurry to move on. Take one more look to see if the answer is logically correct. Should the answer look illogical eg "There are 2⅓ boys in the class", then you will have to go back and repeat the steps of **BRISK** until you arrive at an answer that is logical based on the facts given.

Answers for P6 Conquer Problem Sums
For full solutions, please visit www.onsponge.com to download.

Chapter 1 More Than/Less Than

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

Qn 1	120	Qn 2	126	
Qn 3	$200	Qn 4	108	
Qn 5	36	Qn 6	24	
Qn 7	96	Qn 8	28	
Qn 9	1200	Qn 10	200	
Qn 11	255	Qn 12	144	
Qn 13	$396	Qn 14	$740	
Qn 15	320			
Qn 16	M - $1700, J - $600			
Qn 17	B - $1200, J - $360			

Chapter 2 Patterns

Unit 2.1 – Equal Intervals

Qn 1 (a) 14, 18, 22 (b) (i) 38 (ii) 1802
Qn 2 (a) 7, 9, 11 (b) (i) 41 (ii) 401
Qn 3 (a) 22, 10, 32 (b) 202
Qn 4 (a) 8, 16, 34, 57 (b) 202
    (c) 701 (d) 63
Qn 5 (a) 14, 17, 20, 23 (b) 302
    (c) 602

Qn 6 (a) 20, 28 (b) 84 (c) 804
    (d) 31st
Qn 7 (a) 64 (b) 274 (c) 61
Qn 8 (a) 18 (b) 82 (c) 402
    (d) Diagram 92

Qn 9 (a) 18, 22 (b) 86 cm (c) 406 cm
    (d) 100

Unit 2.2 – Square Numbers

Qn 1 (a) n = 4: 13, 36, 49; n = 5: 17, 64, 81
    (b) 3481 (c) 9604 (d) Diagram 8
Qn 2 (a) 30, 30 (b) Figure 9
Qn 3 (a) 36, 45, 81 (b) Diag. 21 (c) 2500
    (d) 6889
Qn 4 (a) 25, 20, 36, 49 (b) Fig. 24
    (c) 8100 (d) 10 404
Qn 5 (a) 4: 8,8 16; 5: 13, 12, 25 (b) 60
    (c) 14 cm (d) 162

Unit 2.3 – Sum of Odd Numbers

Qn 1(a) $1 + 3 + 5 + \ldots + 19 = 10^2 = 100$
    (b) $1 + 3 + 5 + \ldots + 99 = 50^2 = 2500$
    (c) $1 + 3 + 5 + \ldots + 199 = 100^2 = 10\ 000$
Qn 2 (a) Fig. 4: 15, 10, 25; Fig. 5: 15, 21, 36
    (b) Fig. 4: 5 × 5; Fig. 5: 6 × 6 (c) 400
    (d) 1600
Qn 3 (a) 13, 49 (b) 57 (c) 2500
    (d) 10 000
Qn 4(a) 25 (b) 1600 (c) 12
    (d) 24

Unit 2.4 – Sum of Consecutive Numbers

Qn 1 (a) 10 (b) see answer booklet
    (c) 21 (d) 1225
Qn 2 (a) $4 × 4 = 16, 5 × 5 = 25, 16 = 1 + 15,$
    $7 × 7 = 49, \dfrac{7 \times 6}{2} - 21, 29 - 1 + 28$
    (b) 435 (c) 821 (d) 441
Qn 3 (a) A – 840 cm^2, P – 160 cm (b) 820
    (c) A – 16 380 cm^2, P – 720 cm

Unit 2.5 – Sum of Even Numbers

Qn 1 (a) 13, 21 (b) 381 (c) 9901
Qn 2 (a) 21, 31 (b) 931 (c) 8191

Qn 3 (a) $2 + 6 + 10 + 14 + 18 + 22 = 72 = 2 × 6^2$
    (b) 200 (c) $p – 16, q – 62$
    (d) 5202

Unit 2.6 – Multiples of Sum of Consecutive Numbers

Qn 1 (a) 36 (b) 399 (c) 3599
Qn 2 (a) 16, 3 × 10 (b) 3825 (c) 15 150
    (d) 49
Qn 3 (a) Line 4: 16 + 17 + 18 + 19 + 20 = 21 + 22 + 23 + 24
    (b) 101 (c) Line 67
Qn 4 (a) Shaded triangles – 12, 15, 60; Total – 36, 441
    Unshaded triangles – 13, 21, 381
    (b) 120 (c) 2451 (d) 6561
Qn 5 (a) T4: 25, 33; T10: 121,200 (b) 441
    (c) 5000 (d) No
Qn 6 (a) $s – 16, t = 20$ (b) 164

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Chapter 3 Ratio

Unit 3.1 – Part-whole Relationship

Qn 1	480 visitors	Qn 2	$840
Qn 3	120 sweets	Qn 4	800 participants
Qn 5	3150 students	Qn 6	150 cookies

Unit 3.2 – Repeated Identity

Qn 1	49 stamps	Qn 2	$\frac{12}{13}$
Qn 3	84 cm^2	Qn 4	99
Qn 5	$52.50		

Unit 3.3 – External Unchanged

Qn 1	432 passengers	Qn 2	$20.40
Qn 3	42	Qn 4	$14.40
Qn 5	36 members		

Unit 3.4 – Unchanged Total

Qn 1	15 boys	Qn 2	720 students
Qn 3	400 pieces	Qn 4	40 questions
Qn 5	$80		

Unit 3.5 – Constant Difference

Qn 1	$2400	Qn 2	5 years old
Qn 3	$12	Qn 4	180 kg
Qn 5	10 cm	Qn 6	46 years old

Unit 3.6 – Number of Units x Value of Units

Qn 1	96 motorbikes	Qn 2	30
Qn 3	(a) 150 plates	(b) 300 items	
Qn 4	16 packets	Qn 5	64 balls
Qn 6	90 cars		

Unit 3.7 – External Changed (Model)

Qn 1	$39	Qn 2	25 boys; 20 girls
Qn 3	30 chocolate muffins	Qn 4	21 stickers
Qn 5	25 marbles	Qn 6	50 cards

Chapter 4 Circles

Unit 4.1 – Composite Figure (Square – Quadrant)

Qn 1	84 cm^2
Qn 2	A – 86 cm^2, P – 103 cm
Qn 3	A – 193 cm^2, P – 94 cm
Qn 4	A – 247 cm^2, P – 199 cm
Qn 5	A – 220 cm^2, P – 229 cm
Qn 6	A – 343 cm^2, P – 126 cm
Qn 7	1933 cm^2
Qn 8	P – 123 cm, A – 124 cm^2

Unit 4.2 – Composite Figure (Rugby ball = 2 × (Quadrant – Triangle))

Qn 1	112 cm^2	Qn 2	56 cm^2	Qn 3	28 cm^2
Qn 4	73 cm^2	Qn 5	228 cm^2	Qn 6	146 cm^2
Qn 7	314 cm^2	Qn 8	P – 66 cm, A – 56 cm^2		

Unit 4.3 – Further Composite Figures

Qn 1	P – 138 cm, A – 380 cm^2
Qn 2	P – 133 cm, A – 201 cm^2
Qn 3	P – 133 cm, A – 100 cm^2
Qn 4	P – 126 cm, A – 157 cm^2

Unit 4.4 – Cut and Paste

Qn 1	75 cm^2	Qn 2	226 cm^2		
Qn 3	P – 41 cm, A – 64 cm^2				
Qn 4	P – 41 cm, A – 21 cm^2			Qn 5	105 cm^2
Qn 6	162 cm^2	Qn 7	64 cm^2		
Qn 8	119 cm^2	Qn 9	211 cm^2	Qn 10	314 cm^2
Qn 11	165 cm^2				

Unit 4.5 – Overlapping Method

Qn 1	30 cm^2	Qn 2	66 cm^2
Qn 3	73 cm^3	Qn 4	17.1 cm^2
Qn 5	62 cm^2		
Qn 6	A – 225 cm^2, P – 154 cm		
Qn 7	A – 127 cm^2, P – 57 cm		
Qn 8	228 cm^2		

Chapter 5 Average

Unit 5.1 – Averaging Out

Qn 1	80 kg; 82 kg	Qn 2	1.5
Qn 3	3.9		

Unit 5.2 – Two Averages

Qn 1	150 cm	Qn 2	193
Qn 3	34.8 kg		

Unit 5.3 – Average with Unknown Quantity

Qn 1	3 plates	Qn 2	9 boys
Qn 3	5 friends	Qn 4	7 friends
Qn 5	38 students	Qn 6	55 male singers
Qn 7	19 students		
Qn 8	(a) 1	(b) 19	
Qn 9	(a) 0.3 m	(b) 1.7 m	

Unit 5.4 – Average with Repeated Identity

Qn 1	A = 84 marks; B = 72 marks; C = 76 marks		
Qn 2	$1800	Qn 3	$286
Qn 4	B = 200	Qn 5	$3200

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Chapter 6 Simultaneous

Unit 6.1 – Simultaneous (Fraction of Different Quantities)			
Qn 1	96	Qn 2	30
Qn 3	175	Qn 4	4 : 5 : 3
Qn 5	1 : 2 : 3	Qn 6	456 cm^2
Qn 7	100	Qn 8	320

Chapter 7 Percentage

Unit 7.1 – Percentage of Different Bases			
Qn 1	1267	Qn 2	400
Qn 3(a)	1000	(b)	50
Qn 4	42	Qn 5	350
Qn 6	$320	Qn 7	$180
Qn 8	18	Qn 9	$180
Qn 10	$320	Qn 11	$184
Qn 12	160	Qn 13	28
Qn 14	240	Qn 15	40

Chapter 8 Pie Chart

Unit 8.1 – Pie Chart					
Qn 1 (a)	20%	(b)	20		
Qn 2 (a)	13.89%	(b)	180		
Qn 3 (a)	280	(b)	24.44%		
Qn 4 (a)	5.56%	(b)	540		
Qn 5 (a)	120	(b)	720		
(c)	12.5%				
Qn 6 (a)	$1250	(b)	$250		
Qn 7 (a)	35%	(b)	448		
Qn 8 (a)	$\frac{1}{4}$	(b)	108˚		
(c)	240				
Qn 9 (a)	27.78%	(b)	210		
Qn 10 (a)	5.56%	(b) (i)	625	(ii)	1500
Qn 11 (a)	7.78%	(b)	$4000		
Qn 12 (a)	$\frac{1}{9}$	(b)	4200		

Chapter 9 Algebra

Unit 9.1 – Algebra			
Qn 1(a)	8w cm	(b)	75 cm^2
Qn 2 (a)	4b + 8	(b)	45
Qn 3(a)	14 - $\frac{w}{2}$	(b)	10
Qn 4	k + 15		

Qn 5(a)	360 cents – 2w cents		
(b)	80 cents		
Qn 6(a)	$\frac{T-10}{3}$	(b)	$11
Qn 7 (a)	$\frac{x}{4}$	(b)	24 cm^2
Qn 8(a)	$(62 – 0.6k)	(b)	$14
Qn 9 (a)	$w + $4	(b)	$39
Qn 10(a)	36p + 5	(b)	293
Qn 11	(80 + 2m) points		
Qn 12	$($\frac{120k}{6+k}$)		
Qn 13	$ ($\frac{5n}{4}$)		
Qn 14	10 days		
Qn 15	11m$		

Chapter 10 Revision of Key Constructs

Qn 1 (a)	12 : 8 : 9	(b)	1440
Qn 2	360		
Qn 3	$800	Qn 4	50 cm^2
Qn 5 (a)	$4000	(b)	15%
Qn 6 (a)	3	(b)	$950
Qn 7	60	Qn 8	$7
Qn 9	80	Qn 10	10$\frac{7}{9}$
Qn 11	66.67%	Qn 12	10
Qn 13	144	Qn 14	2250
Qn 15(a)	271	(b)	300
(c)	464		
Qn 16	42	Qn 17	7680
Qn 18	650	Qn 19	20 cm
Qn 20	20-cent: 28, 50-cent: 34		
Qn 21	80	Qn 22	21
Qn 23	35		
Qn 24 (a)	20, 16	(b)	121
Qn 25	425	Qn 26	96 cm^2
Qn 27	$440	Qn 28	G – 125, C – 65
Qn 29	9 cm	Qn 30	75˚
Qn 31	880 m		
Qn 32 (a)	$1050	(b)	$420
Qn 33	31	Qn 34	$280
Qn 35	$3000		
Qn 36 (a)	360	(b)	$80
Qn 37(a)	A: B = 6 : 11	(b)	3 litres
Qn 38 (a)	10 : 9 : 5	(b)	$168

Q39	50				
Qn 40(a)	$1980	(b)	$1650		
Qn 41	18°				
Qn 42	260 cm^2	Qn 43	$(1560 + 60x)$		
Qn 44	$(80 + 2\pi)$ cm				
Qn 45(a)	440 cookies	(b)	23		
Qn 46	96	Qn 47	360 cm^2		
Qn 48	288 cm^3	Qn 49	432		
Qn 50	51	Qn 51	190		
Qn 52	240 m^2				

Sample Examination Paper 1 – Booklet A

Qn 1	(4)	Qn 2	(4)
Qn 3	(3)	Qn 4	(2)
Qn 5	(3)	Qn 6	(1)
Qn 7	(3)	Qn 8	(1)
Qn 9	(4)	Qn 10	(2)
Qn 11	(4)	Qn 12	(2)
Qn 13	(3)	Qn 14	(2)
Qn 15	(3)		
Qn 16	62°	Qn 17	$\frac{5}{14}$
Qn 18	48	Qn 19	1000
Qn 20	$\frac{1}{250}$	Qn 21	50
Qn 22	$99	Qn 23	7 km
Qn 24	$72		
Qn 25	45		
Qn 26	9	Qn 27	40
Qn 28	$\frac{15}{8}$	Qn 29	2.5
Qn 30	60		

Sample Examination Paper 1 – Booklet B

Qn 1	126 cm^2	Qn 2	33°
Qn 3	$ $\frac{d}{17}$		
Qn 4	see answer booklet	Qn 5	$80
	Qn 6	$270	
Qn 7	310°	Qn 8	400 cm^2
Qn 9	$3400		
Qn 10(a)	62°	(b)	17°
Qn 11	72	Qn 12	$120
Qn 13	12 h		
Qn 14 (a)	$14.40	(b)	7
Qn 15	314 cm^2		
Qn 16	140		

Qn 17(a)	66	(b)1275	(c)		10 201

Sample Examination Paper 2 – Booklet A

Qn 1	(1)	Qn 2	(2)
Qn 3	(3)	Qn 4	(1)
Qn 5	(4)	Qn 6	(3)
Qn 7	(2)	Qn 8	(3)
Qn 9	(2)	Qn 10	(2)
Qn 11	(1)	Qn 12	(4)
Qn 13	(2)	Qn 14	(3)
Qn 15	(3)		
Qn 16	$1\frac{1}{4}$	Qn 17	1440
Qn 18	144		
Qn 19	1264	Qn 20	$\frac{1}{2}$
Qn 21	2 m	Qn 22	$20\frac{1}{4}$ w
Qn 23	350	Qn 24	126
Qn 25	96	Qn 26	70°
Qn 27	40 cents	Qn 28	11
Qn 29	540	Qn 30	$110

Sample Examination Paper 2 – Booklet B

Qn 1	$80 – w$	Qn 2	$15
Qn 3(a)	100°	(b)	80°
Qn 4	12 cm^3	Qn 5	38
Qn 6	$\frac{11}{15}$	Qn 7	80 cm^2
Qn 8	$120	Qn 9	81 cm^2
Qn 10	4	Qn 11	288 cubes
Qn 12	$3000	Qn 13	$240
Qn 14	237 cm^2	Qn 15	18
Qn 16	30		

Qn 17(a)	110	(b)	2550	(c)	Fig. 24

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P6 Solutions

Note: In all solutions, u represents units

Chapter 1 More Than/Less Than

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

Qn 1

L – Left   R – Remained

$75\% = \frac{3}{4} = \frac{15}{20}$ $60\% = \frac{3}{5} = \frac{12}{20}$ $\frac{3}{4} \times 40 = 30$

Total number of children

[30 (L) 10(R)]

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

Total number of children remained

Boys	5u(R)	10	8
Girls	8u (R)		

From the model, 3 units = 18

1 unit = 18 ÷ 3
     = 6

Total number of girls at first = 20 × 6
                = **120**

Qn 2

G – Gave   L – Left

$\frac{4}{9} = \frac{8}{18}$ $\frac{1}{2} = \frac{9}{18}$ $\frac{4}{9} \times 36 = 16$

G = 16   L = 36 –16 = 20

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

Left

Chocolate	10u	20
Banana	9u	25

1 unit = 5

Total chocolate muffins at first = 18 units + 36
                = (18 × 5) + 36
                = **126**

Qn 3

$60\% = \frac{3}{5}$ 25% of $72

$\frac{3}{5} \times \$120 = \$72$ $\frac{1}{4} \times \$72 = \$18$

$120 – $72 = $48 $72 – $18 = $54

Qn 3 (Cont.)

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

Charles			+$48				
Benedict					x	x	+ $72

Charles			+$48 +$18		$20
Benedict				+ $54	

2☐ = $48 + $18 + $20 − $54 =$32

☐ = $16

Charles at first = 5☐ + $120

= (5 × $16) + $120
= **$200**

Qn 4

$\frac{1}{4} \times 80 = 20$ $60\% = \frac{3}{5}$ $\frac{3}{5} \times 20 = 12$

Dennis					80
Karen					

Dennis			+60	
Karen				+20

In the end

Dennis						+ 60 +12
Karen		+8		92		

4 units + 72 = 92 + 8
4 units = 100 – 72
     = 28
1 unit = 28 ÷ 4
     = 7

Dennis at first = 4 units + 80
         = (4 X 7) + 80
         = **108**

Qn 5

End

Boys		4
Girls		

Qn 5 (Cont.)
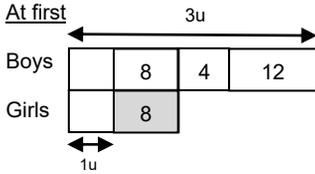
<u>At first</u>

2 units = 8 + 4 + 12
        = 24
1 unit = 24 ÷ 2
      = 12
Total boys at first   = 3u
                 = 3 x 12
                 = **36**

Qn 6

<u>End</u>
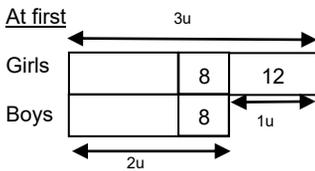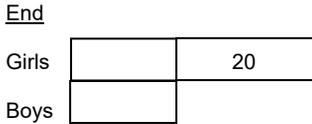
<u>At first</u>

1 unit + 12 = 20
    1 unit = 20 − 12
          = 8
Number of boys at first = 2 units + 8
                     = 2 × 8 + 8
                     = **24**

Qn 7
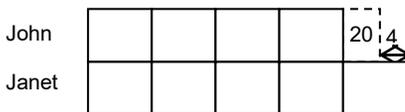
1 unit = 20 + 4
      = 24
Total number of stickers John had at first = 4 units
                                = 4 × 24
                                = **96**

Qn 8
<u>At first</u>
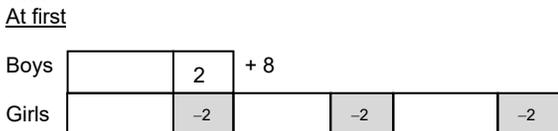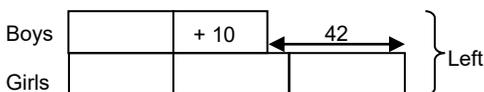
<u>In the end</u>

2 units = 42 + 10
        = 52
1 unit = 52 ÷ 2
        = 26

Qn 8 (Cont.)
No. of boys at first = 1 unit + 2
                    = 26 + 2
                    = **28**

Qn 9
(L) – Left   (R) – Remained

$\frac{2}{5} = \frac{8}{20}$ $25\% = \frac{1}{4} = \frac{5}{20}$ $\frac{2}{5} \times 350 = 140$

<u>At first</u>   140 (L) 210 (R)

<u>Total remained in the end</u>
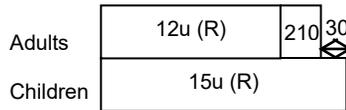
3 units = 210 + 30
         = 240
1 unit   = 240 ÷ 3
         = 80
Number of children in the end = 15u
                          = 15 × 80
                          = **1200**

Qn 10
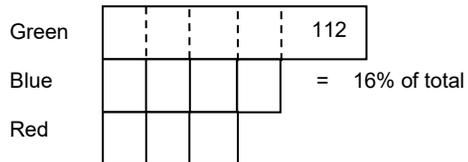
4 ☐ = 16% total
  ☐ = 4% total

Total 11 ☐ = 44% total

100% − 44% = 56%
     56% = 112
       1% = 2

Total in bag = 100%
    100 × 2 = **200**

Qn 11

$\frac{2}{3} \times 180 = 120$

3 ☐ = 15% of total

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Qn 11 (Cont.)

$\square$ = 5% of total

8 $\square$ = 40% of total

100% – 40% = 60%

60% of total → 300
15% of total → 75

Total number of triangles = 75 + 180
= **255**

Qn 12
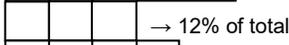
Adults | | | | 120
Boys | | | | → 12% of total
Girls

3 units = 12% of total
1 unit = 4% of total
10 unit = 40% of total

Remaining 60% of total → 120
1% of total → 2

Total number of adults = 12% of total + 120
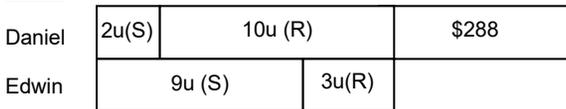= (12 × 2) + 120
= **144**

Qn 13
(S) – Spent   (R) - Remained

$\frac{1}{6} = \frac{2}{12}$ $\frac{3}{4} = \frac{9}{12}$ $\frac{1}{6} \times \$288 = \$48$

__At first__   [$48(S) $240(R)]

| Daniel | 2u(S) | 10u (R) | $288 |
| Edwin | 9u (S) | 3u(R) | |

__In the end__

| Daniel | 10u | $240 |
| Edwin | 3u | $303 |
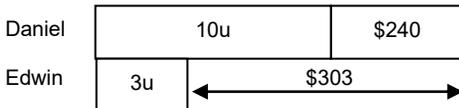
7 units = $303 – $240
= $63
1 unit = $63 ÷ 7
= $9

Daniel had at first = 12 units + $288
= (12 × $9) +288
= **$396**

Qn 14
__At first__

| Alan | 1u | –$140 | –$200 |
| Kenneth | | $140 | + $120 |

3u
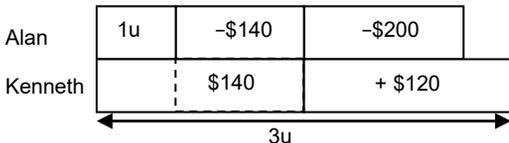
Qn 14 (Cont.)

2u = $140 + $120
= $260
1u = $130

Total at first = 1u + $340 + 1u + $140
= 2u + $480
= (2 × $130) + $480
= **$740**

Qn 15
__End__

$\frac{2}{5}$
Girls | | 120
Boys
$\frac{1}{4}$

__At first__ $\frac{5}{5}$ total

Girls | | | | + 120 + 180   } 820
Boys
$\frac{4}{4}$ total
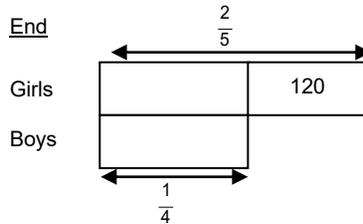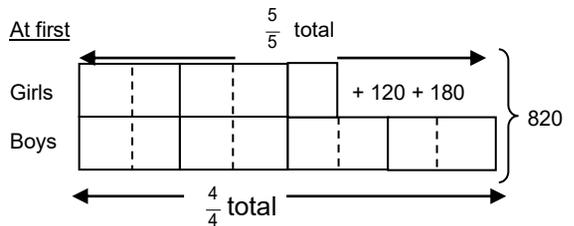
Therefore,
Total = 13 $\square$ + 300 = 820
13 $\square$ = 520
$\square$ = 40

Boys at first = 8 $\square$
= (8 × 40)
= **320**

Qn 16

spent
May | | | $500
Jenny
spent
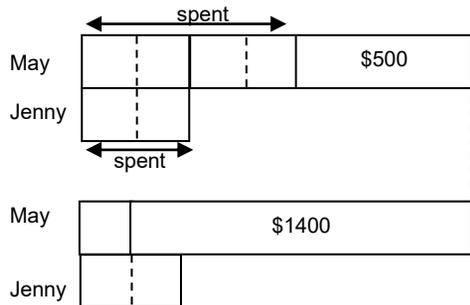
May | | $1400
Jenny

3 $\square$ = $1400 - $500
$\square$ = $300

May = $1400 + $300
= **$1700**

Jenny = **$600**

spent

Benedict | | | | | | | | | | $120

Jeremy

spent

Benedict | $1080

Jeremy

$$8\ \square + \$120 = \$1080$$

$$8\ \square = \$960$$

$$\square = \$120$$

Each at first   Benedict = $120 + $1080
               = **$1200**
          Jeremy = $120 × 3
               = **$360**

Chapter 2 Patterns

Unit 2.1 – Equal Intervals

Qn 1

(a)

Diagram	1	2	3	4	5
No. of dots	6	10	**14**	**18**	**22**

+4   +4   +4   +4

(b) (i) 9th diagram $= 6 + (8 \times 4)$
               $= 6 + 32 = \mathbf{38}$

    (ii) 450th diagram $= 6 + (449 \times 4)$
                  $= 6 + 1796$
                  $= \mathbf{1802}$

Qn 2

(a)

Diagram	1	2	3	4	5
No. of dots	3	5	**7**	**9**	**11**

+2   +2   +2   +2

(b) (i) 20th diagram $= 3 + (19 \times 2)$
                 $= 3 + 38$
                 $= \mathbf{41\ dots}$

    (ii) 200th diagram $= 3 + (199 \times 2)$
                  $= 3 + 398$
                  $= \mathbf{401}$

Qn 3

(a)

T	1	2	3	4		15		**22**
P	4	6	8	**10**		**32**		46

+2   +2   +2

Qn 3 (Cont.)
(b) No. of people around 100 tables $= (100 \times 2) + 2$
                                $= \mathbf{202}$

Qn 4

(a)

Fig.	No. of squares	No. of triangles	Perimeter	No. of sticks
1	1	2	6	8
2	2	4	10	15
3	3	6	14	22
4	4	8	18	**29**
⋮	⋮	⋮	⋮	⋮
8	**8**	**16**	**6 + (7 × 4)** **= 6 + 28** **= 34**	**8 + (7 × 7)** **= 8 + 49** **= 57**

(b) Perimeter for Figure 50 $= 6 + (49 \times 4)$
                          $= \mathbf{202}$

(c) No. of sticks for figure 100 $= 8 + (99 \times 7)$
                             $= \mathbf{701}$

(d) $254 - 6 = 248$
    $248 \div 4 = 62$
    Figure No $= 62 + 1$
              $= 63$
    No. of squares $= \mathbf{63}$

Qn 5

(a)

T-shaped array	Number of coins
1st	5 +3
2nd	5 + (1 × 3) = 8 +3
3rd	5 + (2 × 3) = 11 +3
4th	**5 + (3 × 3) = 14**
5th	**5 + (4 × 3) = 17**
6th	**5 + (5 × 3) = 20**
7th	**5 + (6 × 3) = 23**

(b) No. of coins for 100th array $= 5 + (99 \times 3)$
                                $= \mathbf{302}$

(c) No. of coins for 200th array $= 5 + (199 \times 3)$
                                $= \mathbf{602}$

Qn 6
(a) 2nd structure $= 12 + (1 \times 8)$
                        $= \mathbf{20}$

        3rd structure $= 12 + (2 \times 8)$
                        $= \mathbf{28}$

(b) 10th structure $= 12 + (9 \times 8)$
                        $= \mathbf{84}$

(c) 100th structure $= 12 + (99 \times 8) = 12 + 792$
                                 $= \mathbf{804}$

(d) $252 - 12 = 240$
        $240 \div 8 = 30$

        Structure $= 30 + 1$
                   $= \mathbf{31}$ (31st structure)

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Qn 7

(a) Figure 20 = 7 + (19 × 3)
                 = **64**

(b) Figure 90 = 7 + (89 × 3)
                 = **274**

(c) 1st row = 21 dots
     Figure = 21 − 2
             = 19 (Figure 19th)
     Total dots = 7 + (18 × 3)
                 = **61**

Qn 8

(a) Total seats = (4 × 4) + 2
                  = **18**

(b) Total seats = (20 × 4) + 2
                  = **82**

(c) Total seats = (100 × 4) + 2
                  = **402**

(d) 370 − 2 = 368
     368 ÷ 4 = **92**
     Diagram 92 could seat 370 students.

Qn 9

(a)

Block.	1-T	2-T	3-T	4-T
Perimeter (cm)	10	14	**18**	**22**

+4 +4 +4

(b) Perimeter of a 20-T block = 10 + (19 × 4)
                               = **86**

(c) Perimeter of a 100-T block = 10 + (99 × 4)
                                = **406**

(d) 106 − 10 = 96
     96 ÷ 4   = 24
     24 + 1   = 25-T block
     No. of squares = 25 × 4
                    = **100**

Unit 2.2 – Square Numbers

Qn 1

(a)

Diagram, n	1	2	3	4	5
No. of shaded squares, S	1	5	9	13	17
No. of unshaded squares	0	4	16	**36**	**64**
Total no. of squares, T	1	9	25	**49**	**81**

+4 +4 +4 +4

(b) Total squares in diagram 30 = (30 + 29)²
                                  = **3481**

(c) Total unshaded squares = (49 × 2)²
                             = **9604**

(d) 29 − 1 = 28
     28 ÷ 4 = 7
     7 + 1 = **8**

Diagram 8 has 29 shaded squares

Qn 2

(a)

	No. of squares	Total
Fig. 1	1 = 1	1
Fig. 2	1 + 4 = 5	5
Fig. 3	1 + 4 + 9 = 14	14
Fig. 4	**1 + 4 + 9 + 16 = 30**	**30**

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

   Figure 9 since 9 × 9 = 81.

Qn 3

(a)

Diagram	No. of shaded triangles	No. of unshaded triangles	Total no. of triangles
1	1	15	16
2	4	21	25
3	9	27	36
4	16	33	49
:	:	:	:
6	**36**	15 + (5 × 6) = **45**	9 × 9 = **81**

(b) 135 − 15 = 120
     120 ÷ 6 = 20
     Diagram = 20 + 1 = **21**

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

(d) Total triangles in Diagram 80 = (83 × 83)
                                   = **6889**

Qn 4

(a)

Figure	1	2	3	4	5
No. of white squares	1	4	9	16	**25**
No. of coloured squares	8	12	16	**20**	24
Total no. of squares	9	16	25	**36**	49

(b) 100 ÷ 4 = 25
     Figure no. = 25 − 1
                 = **24**

(c) No. of white squares in Figure 90 = 90 × 90
                                       = **8100**

(d) Total = 102 × 102
           = **10 404**

Qn 5

(a)

Length of side of given big square (cm)	1	2	3	4	5
No. of small black squares	1	2	5	**8**	**13**
No. of small white squares	0	2	4	**8**	**12**
Total no. of small squares	1	4	9	**16**	**25**

(b) Side 11 cm = side has 11 squares
     Total squares = 11 × 11
                    = 121
     Total white squares = (121 − 1) ÷ 2
                         = **60**

Qn 5 (Cont.)

(c)   Length of side = **14 cm**
        Since $14 \times 14 = 196$

(d)   Side 18 cm = side has 18 squares
        Total squares = 18×18
                   = 324
        Total black squares = $324 \div 2$
                             = **162**

Unit 2.3 – Sum of Odd Numbers

Qn 1

(a) 10th line = **$1 + 3 + 5 + \ldots + 19 = 10^2 = 100$**
(b) 50th line = **$1 + 3 + 5 + \ldots + 99 = 50^2 = 2\,500$**

(c) 100th line = **$1 + 3 + 5 \ldots + 199 = 100^2$**
= 10 000

Qn 2

(a)

Figure	1	2	3	4	5
No. of shaded squares	1	6	6	**15**	**15**
No. of unshaded squares	3	3	10	**10**	**21**
Total no. of squares	4	9	16	**25**	**36**

(b)   Figure 4 = **$1 + 3 + 5 + 7 + 9 = 25 = 5 \times 5$**
        Figure 5 = **$1 + 3 + 5 + 7 + 9 + 11 = 36 = 6 \times 6$**

(c)   Figure no. $\times 2 + 1$ = last digit
        Figure no.   = $\dfrac{39-1}{2}$
                    = 19
        The sum   = $(19 + 1)^2$
                    = **400**

(d)   Figure no.   = $\dfrac{79-1}{2}$
                    = 39
        Total sum   = $(39 + 1)^2$
                    = **1600**

Qn 3

(a)   **13 and 49**

(b)   Total tiles in bottom layer = $(29 \times 2) - 1$
                                       = **57**

(c)   Total tiles   = 50×50
                  = **2500**

(d)   Total tiles   = 100×100
                  = **10 000**

Qn 4

(a)   No. of bricks = $1 + 3 + 5 + 7 + 9$
                    = 5^2
                    = 5×5
                    = **25**

(b)   No. of bricks = 40×40
                    = **1600**

(c) $144 = 12 \times 12$
        No. of steps = **12**

(d) $576 = 24 \times 24$
        No. of steps = **24**

Unit 2.4 – Sum Of Consecutive Numbers

Qn 1

(a) $q \rightarrow 1 + 2 + 3 + 4 =$ **10**

(b)

(c)   No. of handshakes = $1 + 2 + 3 + 4 + 5 + 6$
                        = $\dfrac{6 \times 7}{2}$
                        = **21**

(d)   No. of handshakes = $1 + 2 + \ldots + 49$
                        = $\dfrac{49 \times 50}{2}$
                        = **1225**

Qn 2

(a) $4 \times 4 = 16$
        $5 \times 5 = 25$
        $16\ \ = 1 + 15$
        $7 \times 7 = 49$
        $\dfrac{7 \times 6}{2} = 21$
        $29 = 1 + 28$

(b)   Maximum no. of intersections = $\dfrac{30 \times 29}{2}$
                                            = **435**

(c)   Maximum no. of regions = $1 + \dfrac{40 \times 41}{2}$
                                    = **821**

(d) $210 \times 2 = 420$
        $21 \times 20 = 420$
        No. of lines = 21
        No. of line segments   = 21×21
                                  = **441**

Qn 3

(a) Area = $\dfrac{20 \times 21}{2} \times 4$ cm²
          = **840 cm²**
    Perimeter   = 20×2cm $\times 4$
                = **160 cm**

(b) No. of cubes for figure 40 = $\dfrac{40 \times 41}{2}$
                                  = **820**

(c) Area = $\dfrac{90 \times 21}{2} \times 4$ cm²
          = **16 380 cm²**

    Perimeter = 90×2 cm $\times 4$
               = **720 cm**

Unit 2.5 – Sum of Even Numbers

Qn 1

(a)

Figure	1	2	3	4	5
No. of bricks	1	3	7	**13**	**21**

                          +2   +4   +6   +8

(b)   Figure 20 = $(20 \times 19) + 1 =$ **381**

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Qn 1 (Cont.)
(c)   Figure 100 = $(100 \times 99) + 1$
                 = **9901**

Qn 2
(a)

Figure	1	2	3	4	5
No. of circles	3	7	13	**21**	**31**

+4   +6   +8n   +10

(b)   Figure 30 = $(30 \times 31) + 1$
                 = **931**

(c)   Figure 90 = $(90 \times 91) + 1$
                 = **8191**

Qn 3
(a)   5th line = **2 + 6 + 10 + 14 + 18 + 22**
                 = **72**
                 = 2×6^2
(b) $38 - 2 = 36$
       $36 \div 4 = 9$
       Line 9 = 2×10^2
              = 2×100
              = **200**

(c) $p^2 = 512 \div 2$
           = 256
       p = **16**
           = Line 15
       Last digit q = (line no.) $\times 4 + 2$
                    = $(15 \times 4) + 2$
                    = **62**

(d)   50th line sum = 2×51^2
                     = 2×2601
                     = **5202**

Unit 2.6 – Multiples of Sum of Consecutive Numbers

Qn 1
Day 1 = $3 \times 1 = 3$
Day 2 = $5 \times 3 = 3 + 12 = 15$
Day 3 = $7 \times 5 = 3 + 12 + 20 = 35$
Day 4 = $9 \times 7 = 3 + 12 + 20 + (9 + 9 + 10) = 63$

(a) No. of cubes added on Day 5 = $(11 \times 2) + (7 \times 2)$
                              = **22 + 14** (**36 cubes**)

(b) Total blocks on Day 10 = $(10 \times 2 + 1) \times (10 \times 2 + 1 - 2)$
                           = 21×19
                           = **399**
(c) Total blocks on Day 30 = $(30 \times 2 + 1) \times (30 \times 2 + 1 - 2)$
                           = 61×59
                           = **3599**

Qn 2
(a) No. of small triangles = **16**
    No. of sticks   = **30**
                        = **3 × 10**

(b) Figure 5 = $50 \times 50 = 2500$ triangles
    Sticks = $3 \times (1 + 2 + 3 + \dots + 50)$
            = $3 \times \frac{50 \times 51}{2}$
            = **3825**
Qn 5 (Cont.)

Qn 2 (Cont.)
(c) Figure 100 = 100×100 (**10 000 triangles**)
    Sticks   = $3 \times (1 + 2 + 3 + \dots + 100)$
              = $3 \times \frac{100 \times 101}{2}$ (**15 150 sticks**)

(d) $84 \div 3 = 28$
    $28 \times 2 = 56$
    Since $7 \times 8 = 56$
    Figure 7, no. of triangles = 7×7
                              = **49**

Qn 3
(a) **Line 4 = 16 + 17 + 18 + 19 + 20**
            = 21 + 22 + 23 + 24

(b) Line 50 = $50 \times 2 + 1$ (**101 numbers**)
(c) $135 - 1 = 134$
     $134 \div 2$ = **67th line**

Qn 4
(a) No. of shaded triangles = **12, 15 and 60**
     Total no. of triangles = **36, 441**
     No. of unshaded triangles =**13, 21 and 381**

(b) No. of shaded triangles in Diagram 40
     = 40×3
     = **120**
(c) No. of unshaded triangles in diagram 50
     = $1 + (50 \times 49)$
     = **2451**
(d) Total triangles in Diagram 80 = 81×81
                                  = **6561**

Qn 5
(a) Total no. of dots; No of small right angled triangles
     T4   =   **25; 32,**
     T10   = $11 \times 11 =$ **121**; $10 \times 20 =$ **200**

(b) Total dots for figure 20 = $21 \times 21 =$ **441**
(c) Total no. of small right angled triangles in figure 50
    = 50×100
    = **5000**

(d) **No, because $340 \div 2 = 170$ is not a square number.**
    (E.g. 49 is a square number because $7 \times 7 = 49$)

Qn 6
(a) $s =$ **16**, $t =$ **20**
(b)   Number of unshaded rhombuses in Figure 40
       = $(8 + 39 \times 4)$
       = **164**

Chapter 3 Ratio
Unit 3.1 – Part-whole Relationship
Qn 1

$\frac{1}{4} =\frac{4}{16}$

$\frac{3}{4} \times \frac{1}{4} =\frac{3}{16}$

$\frac{3}{4} \times \frac{3}{4} =\frac{9}{16}$

Qn 5 (Cont.)

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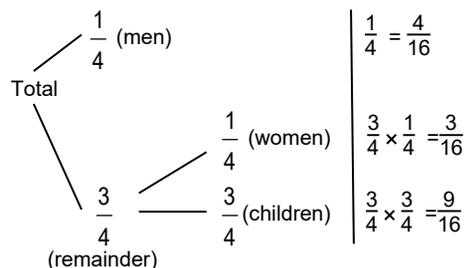
Qn 1 (Cont.)

Difference in the number of children and men

$= \dfrac{9}{16} - \dfrac{4}{16}$

$= \dfrac{5}{16}$

$\dfrac{5}{16}$ of total = 150

$\dfrac{1}{16}$ of total = 150 ÷ 5

$\qquad\qquad = 30$

Total number of visitors = 16 units

$\qquad\qquad\qquad\qquad = 16 \times 30$

$\qquad\qquad\qquad\qquad = \mathbf{480}$

Qn 2

| | wife | bills |

$\qquad\qquad\qquad \dfrac{5}{6}$ of total $\quad \dfrac{1}{6}$ of total
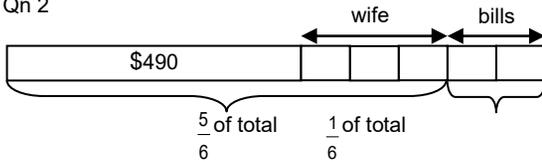
Since $\dfrac{1}{6}$ of total = 2 units, $\dfrac{5}{6}$ of total = 10 units

7 units = $490

1 unit = 490 ÷ 7

$\qquad = \$70$

Total salary = 12 units

$\qquad\qquad = 12 \times \$70$

$\qquad\qquad = \mathbf{\$840}$

Qn 3

Bala   Hock Kee   Krishnan

88

$\dfrac{4}{5}$ of total $\qquad \dfrac{1}{5}$ of total
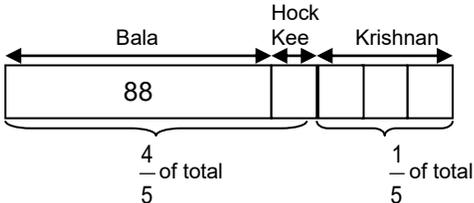
Since $\dfrac{1}{5}$ of total = 3 units, $\dfrac{4}{5}$ of total = 12 units

11 units = 88

1 unit = 88 ÷ 11

$\qquad = 8$

Total number of sweets at first = 15 units

$\qquad\qquad\qquad\qquad\qquad = 15 \times 8$

$\qquad\qquad\qquad\qquad\qquad = \mathbf{120}$

Qn 4

$\dfrac{3}{4}$ (men) $\dfrac{5}{8} \times \dfrac{3}{4} = \dfrac{15}{32}$

$\dfrac{5}{8}$ (male) — $\dfrac{1}{4}$ (boys) $\dfrac{5}{8} \times \dfrac{1}{4} = \dfrac{5}{32}$

Total

$\dfrac{2}{3}$ (women) $\dfrac{3}{8} \times \dfrac{2}{3} = \dfrac{6}{24} = \dfrac{1}{4} = \dfrac{8}{32}$

$\dfrac{3}{8}$ (female) — $\dfrac{1}{3}$ (girls)

$\dfrac{3}{8} \times \dfrac{2}{3} = \dfrac{3}{24} = \dfrac{1}{8} = \dfrac{4}{32}$
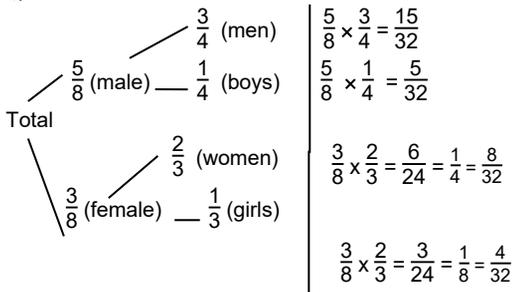
Qn 4 (Cont.)

Difference between boys and girls = $\dfrac{1}{32}$ of total

$\qquad\qquad\qquad\qquad\qquad\qquad = 25$

Total number of participants = 32 units

$\qquad\qquad\qquad\qquad\qquad\quad = 32 \times 25$

$\qquad\qquad\qquad\qquad\qquad\quad = \mathbf{800}$

Qn 5

$\dfrac{2}{5}$ (bus) $\dfrac{2}{5} = \dfrac{14}{35}$

Total

$\dfrac{3}{7}$ (MRT) $\dfrac{3}{5} \times \dfrac{3}{7} = \dfrac{9}{35}$

$\dfrac{3}{5}$ $\dfrac{4}{7}$ (private) $\dfrac{3}{5} \times \dfrac{4}{7} = \dfrac{12}{35}$

(remainder)
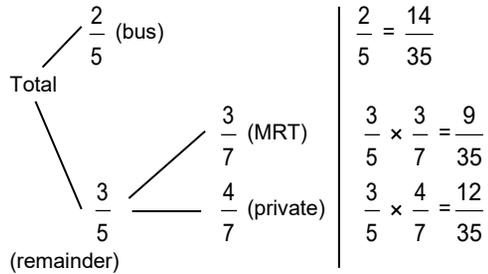
Difference between bus and private transport

$= \dfrac{14}{35} - \dfrac{12}{35}$

$= \dfrac{2}{35}$

$\dfrac{2}{35}$ of total = 180

$\dfrac{1}{35}$ of total = 180 ÷ 2

$\qquad\qquad\quad = 90$

Total number of students = 35 units

$\qquad\qquad\qquad\qquad\quad = 35 \times 90$

$\qquad\qquad\qquad\qquad\quad = \mathbf{3150}$

Qn 6

Christine   Doris

45
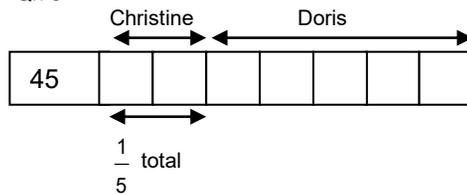
$\dfrac{1}{5}$ total

$\dfrac{1}{5}$ total = 2 ☐   3 ☐ = 45

$\dfrac{4}{5}$ total = 8 ☐   ☐ = 15

Total = 10 ☐

$\qquad = 10 \times 15$

$\qquad = \mathbf{150}$

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Unit 3.2 – Repeated Identity

Qn 1

Swee Hoon	:	Sharon		Sharon	:	Raj
$3^{\times 4}$	:	$1^{\times 4}$		4	:	5
12	:	4				

	Swee Hoon	:	Sharon	:	Raj
	12	:	4	:	5

Total number of stamps = 12u + 4u + 5u
$\qquad\qquad\qquad\qquad$ = 21u

21u = 147
$\;$1u = 147 ÷ 21
$\qquad$ = 7

Difference between Swee Hoon and Raj
= 12u − 5u
= 7u
= 7 × 7
= **49**

Qn 2

Square	:	Rectangle		Unshaded Square	:	Shaded Square
$2^{\times 2}$	:	$5^{\times 2}$		3	:	1
4	:	10				

4 units

Unshaded rectangle = 10 units − 1 unit
$\qquad\qquad\qquad\qquad$ = 9 units

Fraction of unshaded figure $= \dfrac{3 \text{ units} + 9 \text{ units}}{4 \text{ units} + 9 \text{ units}}$

$\qquad\qquad\qquad\qquad\quad = \dfrac{\mathbf{12}}{\mathbf{13}}$

Qn 3

Unshaded Sq	:	Shaded sq
3 units	:	4 units

Shaded rect.	:	Unshaded rect
2 units$^{\times 2}$	:	7 units$^{\times 2}$

Shaded area 4 units $\quad = \quad$ 16 cm²
$\qquad\qquad\quad$ 1 unit $\quad = \quad$ 4 cm²

Area of figure = 3 units + 4 units +14 units
$\qquad\qquad\quad$ = 21 units
$\qquad\qquad\quad$ = 21 × 4
$\qquad\qquad\quad$ = **84 cm²**

Qn 4

Jacintha	:	Isabel
2 units	:	1 unit

Jacintha		Evelyn
1 unit$^{\times 2}$	:	4 units$^{\times 2}$

Jacintha	:	Isabel	:	Evelyn
2 units	:	1 unit	:	8 units

Difference between Evelyn and Isabel
$\qquad$ 7 units $\quad = 63$
$\qquad$ 1 unit $\quad = 9$

Qn 4 (Cont.)
Total $\qquad\qquad\qquad = 11$ units
$\qquad\qquad\qquad\qquad = 11 × 9$
$\qquad\qquad\qquad\qquad = $ **99**

Qn 5

20-cent	:	50-cent		20-cent	:	$1
$5^{\times 3}$	:	$3^{\times 3}$		$3^{\times 5}$	:	$2^{\times 3}$
15	:	9		15	:	10

20-cent	:	50-cent	:	$1
15	:	9	:	10

Total = 15 units + 9 units + 10 units
$\qquad$ = 34 units
34 units = 102
1 unit $\quad = 102 ÷ 34$
$\qquad\quad = 3$
Total value
= (15 units × $0.20) + (9 units × $0.50)
+ (10 units × $1)
= (15 × 3 × $0.20) + (9 × 3 × $.50) + (10 × 3 × $1)
= $9 + $13.50 +$30
= **$52.50**

Unit 3.3 – External Unchanged

Qn 1

At first			End		
Male	:	Female	Male	:	Female
$2^{\times 4}$	:	$7^{\times 4}$	$1^{\times 7}$	:	$4^{\times 7}$
8 units		28 units	7 units		28 units

Difference in the number of men = 8 units − 7 units
$\qquad\qquad\qquad\qquad\qquad\qquad$ = 1 unit

1 unit = 12
Total number of passengers on MRT train at first
= 36 units
= 36 × 12
= **432**

Qn 2

At first			End		
20-cent	:	50-cent	20-cent	:	50-cent
3	:	11	1	:	3
			×3		×3
3 units	11 units		3 units	9 units

Decrease in 50-cent coins = 11 units − 9 units
$\qquad\qquad\qquad\qquad\qquad\quad$ = 2 units

2 units $\quad = 8$
1 unit $\quad = 8 ÷ 2$
$\qquad\quad = 4$
Total amount of money in the end
= $\quad$ (3 units × $0.20) + (9 units × $0.50)
= $\quad$ (3 × 4 × $0.20) + (9 × 4 × $0.50)
= $\quad$ $2.40 + $18
= $\quad$ **$20.40**

Qn 3

At first

Pears	:	Apples
3 units	:	4 units

End

Pears		Apples
1 unit$^{\times 3}$	:	2 units$^{\times 3}$
3 units	:	6 units

Qn 3 (Cont.)
Increase in apples = 2 units
2 units = 12
1 unit = 6
Total = 7 units
7 units = 7 × 6
= **42**

Qn 4

At first			End		
20-cent	:	$1	20-cent	:	$1
4	:	1	$2^{×2}$	:	$1^{×2}$
4 units		1 unit	4 units		2 units

Increase in $1 coins = 2 units − 1 unit
= 1 unit

1 unit = 8

Amount of money at first
= (4 units × $.20) + (1 unit × $1)
= (4 × 8 × $0.20) + (1 × 8 × $1)
= $6.40 + $8
= **$14.40**

Qn 5

At first			End		
Team X	:	Team Y	Team X	:	Team Y
5	:	6	$2^{×2}$	:	$3^{×2}$
5 units		6 units	4 units		6 units

Decrease in Team X = 5 units − 4 units
= 1 unit

1 unit = 6
Total number of members in Team Y = 6 units
= 6 × 6
= **36**

Unit 3.4 – Unchanged Total

Qn 1

At first				End			
Boys	:	Girls	Total	Boys	:	Girls	Total
3	:	5	8 units	$3^{×2}$	:	$1^{×2}$	4 units
3 units		5 units	8 units	6 units		2 units	8 units

Change in number of boys = 6 units − 3 units
= 3 units

3 units = 15
1 unit = 15 ÷ 3
= 5

Number of boys on the bus at first = 3 units
= 3 × 5
= **15**

Qn 2

At first				End			
A	:	B	Total	A	:	B	Total
5	:	7	12 units	1	:	2	3 units
				×4		×4	
5 units		7 units	12 units	4 units		8 units	12 units

Change in School B = 8 units − 7 units
= 1 unit

1 unit = 90

Total number of students in School B in the end
= 8 units
= 8 × 90
= **720**

Page 236

Qn 3

At first			End		
Fixed	:	Unfixed	Total	Fixed	:	Unfixed	Total
$1^{×4}$	:	$4^{×4}$	5 units	$1^{×5}$	:	$3^{×5}$	4 units
4 units	16 units	20 units	5 units	15 units	20 units

Change in the number of pieces fixed
= 5 units − 4 units
= 1 unit
1 unit = 20
Total number of pieces in the puzzle = 20 units
= 20 × 20
= **400**

Qn 4

First hour

Answered	:	Unanswered	Total
$2^{×4}$	:	$3^{×4}$	5 units
8 units		12 units	20 units

After another half an hour

Answered	:	Unanswered	Total
$3^{×5}$	:	$1^{×5}$	4 units
15 units		5 units	20 units

Change in number of questions = 15 units − 8 units
= 7 units

7 units = 14
1 unit = 14 ÷ 7
= 2

Total number of questions = 20 units
= 20 × 2
= **40**

Qn 5

A	1 unit × 4
T + C + D	4 units × 4

16 {	T	3 units × 2
	C + D	5 units × 2

10 {	C	3 units
	D	7 units

A	:	T	:	C	:	D
4 units	:	6 units	:	3 units	:	7 units

Difference between A and C = 3 units
3 units = $12
1 unit = $4

Cost of present = 20 units
= 20 × $4
= **$80**

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Unit 3.5 – Constant Difference

Qn 1

<u>At first</u>

Rakesh	:	Smith	Difference
$3^{\times 2}$	:	$4^{\times 2}$	1 unit
6 units		8 units	2 units

<u>In the end</u>

Rakesh	:	Smith	Difference
1	:	3	2 units
1 unit		3 units	2units

Difference = 6 units − 1 unit
            = 5 units
5 units = $2000
1 unit = $2000 ÷ 5
        = $400

Mr Rakesh's salary = 6 units
                    = 6 × $400
                    = **$2400**

Qn 2

<u>At first</u>

Jeremy	:	Aunt	Difference
1	:	4	3 units
1 unit		4 units	3 units

<u>In the end</u>

Jeremy	:	Aunt	Difference
$2^{\times 3}$	:	$3^{\times 3}$	1 unit
6 units		9 units	3 units

Age difference = 6 units − 1 unit
                = 5 units
5 units = 25
1 unit = 25 ÷ 5
        = 5

Jeremy's age now = 1 × 5
                  = **5**

Qn 3

<u>At first</u>

Joanne	:	Elizabeth	Difference
$1^{\times 3}$	:	$2^{\times 3}$	1 unit
3 units		6 units	3 units

<u>End</u>

Joanne	:	Elizabeth	Difference
2	:	5	3 units
2 units		5 units	3 units

Change in allowance = 3 units − 2 units
                     = 1 unit

1 unit = $4

Joanne's allowance at first = 3 units
                             = 3 × $4
                             = **$12**

Qn 4

<u>At first</u>		<u>End</u>		
Shop X	120 kg	Shop X		2 units
Shop Y	165 kg	Shop Y		5 units
Difference	45 kg	Difference		3 units

Qn 4 (Cont.)
3 units = 45 kg
1 unit = 45 kg ÷ 3
        = 15 kg
Amount of flour in Shop X in the end = 2 units
                                      = 2 × 15
                                      = 30 kg

Amount of flour sold in both Shop X and Shop Y
= (120 kg – 30 kg) × 2
= **180 kg**

Qn 5

<u>At first</u>

Square	1 unit × 5 (5 units)
Rectangle	3 units × 5 (15 units)
Difference	2 units × 5 (10 units)

<u>End</u>

Unshaded Square	2 units × 2 (4 units)
Unshaded Rectangle	7 units × 2 (14 units)
Difference	5 units × 2 (10 units)

Decrease each = 20 cm^2
Area of square = 5 × 20
                = 100 cm^2

Length = **10 cm**

Qn 6

<u>Present</u>

Kim	:	Daughter	Difference
$5^{\times 2}$	:	$2^{\times 2}$	3 units
10 units		4 units	6 units

<u>4 years ago</u>

Kim	:	Daughter	Difference
$3^{\times 3}$	:	$1^{\times 3}$	2 units
9 units		3 units	6 units

Difference in their ages = 10 units − 9 units
                          = 1 unit

1 unit = 4
Present age of Mrs Kim = 10 units
                       = 10 × 4
                       = 40

6 years from now, Mrs Kim will be **46 years old.**

Unit 3.6 – Number of Units x Value of Units

Qn 1

	Number (units)	×	Value (wheels)	=	Total unit (wheels)
Cars	5	×	4	=	20 units
Lorries	2	×	4	=	8 units
Motorbikes	4	×	2	=	8 units
	Total number of wheels =				36 units

36 units = 864
1 unit = 864 ÷ 36
        = 24

Number of motorbikes in the carpark = 4 units
                                     = 4 × 24
                                     = **96**

Qn 2

	Number (units)	×	Value ($)	=	Total unit ($)
Adults	2	×	6	=	12
Boys	3	×	5	=	15
Girls	5	×	4	=	20
	Total sum of money =				47 units

47 units = 705
1 unit = 705 ÷ 47
= 15

Difference between the number of boys and girls
= 5 units − 3 units
= 2 units
= 2 × 15
= **30**

Qn 3

Difference in cost = 1 unit → $3
Cost of 1 plate = 3 units → $9
Cost of 1 cup = 2 units → $6

	No.	×	value	=	Total sales
Plates	3 units	×	$9	=	$27 units
Cups	5 units	×	$6	=	$30 units
Total					$57 units

$57 units = $2850
1 unit = 50

(a) No. of plates sold in 1st month = 3 units
= 3 × 50
= **150**

(b) Items sold = $\frac{4}{7}$ total

$\frac{4}{7}$ total = 8 units
= 8 × 50
= 400

$\frac{3}{7}$ total items left = **300**

Qn 4

	Number (units)	×	Value (g)	=	Total units (g)
Flour	8	×	300	=	2400
Sugar	2	×	200	=	400
Butter	1	×	300	=	300
	Total mass			=	3100 units

3100 units = 24 800
1 unit = 24 800 ÷ 3100
= 8

Number of packets of sugar used = 2 units
= 2 × 8
= **16**

Qn 5

	Number (units)	×	Value (points)	=	Total unit (points)
Red	3	×	2	=	6
Green	1	×	5	=	5
Blue	4	×	3	=	12
	Total points			=	23 units

Qn 5 (Cont.)
23 units = 184
1 unit = 184 ÷ 23
= 8
Total number of balls collected = 8 units
= 8 × 8
= **64**

Qn 6

	Number (units)	×	Value (wheels)	=	Total unit (wheels)
Cars	3	×	4	=	12
Bikes	5	×	2	=	10
Tricycles	2	×	3	=	6
	Total number of wheels			=	28 units

28 units = 840
1 unit = 840 ÷ 28
= 30

Number of cars parked = **90**

Unit 3.7 – External Changed (Model)

Qn 1
Value of 10 pieces of 50-cents coins = $5
Number of 20-cent coins = $5 ÷ $0.20
= 25

	13 units		
20ct	15 units	125	70
50ct	28 units		
	35 parts		
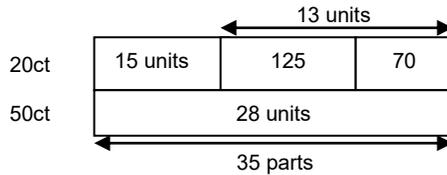
13 units = 125 + 70
= 195
1 unit = 195 ÷ 13
= 15

Sum of money at first
= (3 units × $0.20) + (4 units × $0.50)
= (3 × 15 × $0.20) + (4 × 15 × $0.50)
= $9 + $30
= **$39**

Qn 2

Boys	3 units	15	25
Girls	5 units		
	15 parts		
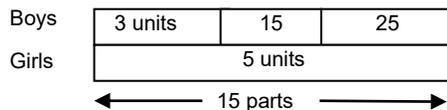
2 units = 40
1 unit = 40 ÷ 2
= 20
Actual
Boys = 1 unit + 5
= 20 + 5
= **25**

Girls = **20**

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Qn 3

Chocolate	Banana		Chocolate	Banana
5 units	2 units		*10 units*	*6 units*
−10	+4	×3	*− 20*	*+12*
3 parts	2 parts		*6 parts*	*6 parts*

X2 { } ×3

6 parts

Chocolate	10 units		
Banana	6 units	12	20
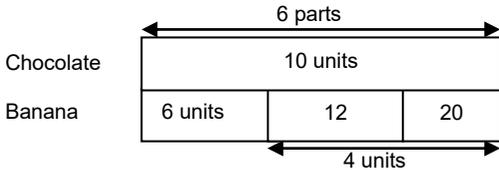
4 units

4 units = 32
1 unit = 32 ÷ 4
      = 8

Number of chocolate muffins in the end
= 5 units − 10
= (5 × 8) − 10
= **30**

Qn 4

X3 { } × 4

Jason	Sister		*Jason*	*Sister*
3 units	4 units		*9 units*	*16 units*
+19	+2		*+ 57*	*+ 8*
4 parts	3 parts		*12 parts*	*12 parts*

Jason	9 units		57
Sister	16 units		8
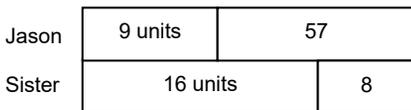
7 units = 57 − 8
       = 49
1 unit = 49 ÷ 7
       = 7

Number of stickers Jason had at first
= 3 units
= 3 × 7
= **21**

Qn 5

×3 { } × 2

Red	Blue		*Red*	*Blue*
3 units	2 units		*9 units*	*4 units*
+5	+20		*+ 15*	*+ 40*
2 parts	3 parts		*6 parts*	*6 parts*

Red	9 units		15
Blue	4 units		40
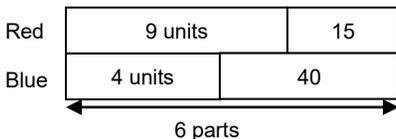
6 parts

5 units = 25
1 unit = 25 ÷ 5
       = 5

Total number of marbles at first
= 5 units
= 5 × 5
= **25**

Qn 6

×7 { } ×6

Daryl		Bernard
2 units	:	3 units
+10		−5
7 × 6 parts	:	7 parts × 6

42 parts

Daryl	14 units	70	30
Bernard	18 units		

4 units = 100
1 unit = 25
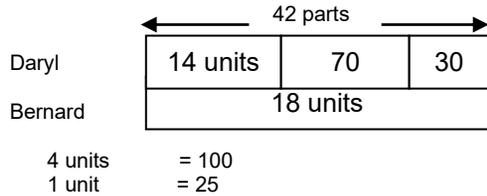
No. of stickers Daryl had at first = 2 units
                                  = 2 × 25
                                  = **50**

Chapter 4 Circles

Unit 4.1 – Composite Figure (Square – Quadrant)

Qn 1

Area of $\frac{1}{2}$ shaded part

= square – quadrant

= (14×14) cm² $- \frac{\pi \times 14 \times 14}{4}$

≈ 42.1 cm²

Shaded part = 42.1 cm² × 2
           ≈ **84 cm²**

Qn 2

Area of $\frac{1}{4}$ shaded part

= square – quadrant

= (10×10) cm² $- \frac{\pi \times 10 \times 10}{4}$ cm²

≈ 21.5 cm²

Shaded part = 21.5 cm² × 4
           ≈ **86 cm²**

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

Alternatively, area = square – circle
                   = $(20 \times 20) - \pi(10 \times 10)$
                   ≈ **86 cm²**

Qn 3

Area of $\frac{1}{4}$ shaded part

= square – quadrant

= (15×15) cm² $- \frac{\pi \times 15 \times 15}{4}$ cm²

≈ 48.3 cm²

Shaded part = 48.3 cm² × 4
           ≈ **193 cm²**

Perimeter = 1 big circle
         = 2π(15 cm)
         ≈ **94 cm**

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Qn 3 (Cont.)
Alternatively, area = square − circle

$$= (30 \times 30) \text{ cm}^2 - \pi(15 \times 15) \text{ cm}^2$$
$$\approx \textbf{193 cm}^2$$

Qn 4

Area of $\frac{1}{8}$ shaded part

= square − quadrant

$$= (12 \times 12) \text{ cm}^2 - \frac{\pi \times 12 \times 12}{4} \text{ cm}^2$$

$$\approx 30.9 \text{ cm}^2$$

Shaded part $= 30.9 \text{ cm}^2 \times 8$
$$\approx \textbf{247 cm}^2$$

Perimeter $= 2$ circles $+ 4(12)$
$$= 2(2\pi)(12) + 48$$
$$\approx \textbf{199 cm}$$

Alternatively, area = (square − circle) × 2
$$= [(24 \times 24) - \pi(12 \times 12)] \times 2$$
$$\approx \textbf{247 cm}^2$$

Qn 5
Area = square − circle
$$= (32 \times 32) \text{ cm}^2 - (\pi \times 16 \times 16) \text{ cm}^2$$
$$\approx \textbf{220 cm}^2$$

Perimeter = circle + square
$$= 2\pi(16 \text{ cm}) + 4(32 \text{ cm})$$
$$\approx \textbf{229 cm}$$

Qn 6
Perimeter $= 1$ big circle
$$= 2 \times \pi \times 20 \text{ cm}$$
$$\approx \textbf{126 cm}$$

Area = square − circle
$$= (40 \times 40) \text{ cm}^2 - \pi(20)^2 \text{ cm}^2$$
$$\approx \textbf{343 cm}^2$$

Qn 7
Area = square + 3 circles
$$= (24 \times 24) \text{ cm}^2 + 3 \times \pi \times 12 \text{cm} \times 12 \text{cm}$$
$$\approx \textbf{1933 cm}^2$$

Qn 8
(a) Outer perimeter = 1 circle + 12 (4 cm)
$$= 2 \times \pi \times 12 \text{ cm} + 48 \text{ cm}$$
$$\approx \textbf{123 cm}$$

(b) Area of shaded part = (squares − circle)
$$= (24 \times 24) - \pi \times 12 \text{cm} \times 12 \text{cm}$$
$$\approx \textbf{124 cm}^2$$

Unit 4.2 – Composite Figure (Rugby ball = 2 × (Quadrant – Triangle))

Qn 1
$\frac{1}{2}$ shaded part

= quadrant − triangle

$$= \frac{\pi r^2}{4} - \left(\frac{1}{2} \times b \times h\right)$$

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Qn 1 (Cont.)
$$= \frac{\pi}{4} \times 14 \text{cm} \times 14 \text{cm} - \frac{1}{2} \times 14 \text{cm} \times 14 \text{cm}$$

$$\approx 55.9 \text{ cm}^2$$

Shaded part (rugby) $= 55.9 \text{ cm}^2 \times 2$
$$\approx \textbf{112 cm}^2$$

Qn 2
Radius = 7 cm
Area = circle − square
= circle − 2 triangles
$$= \pi \times 7 \text{cm} \times 7 \text{cm} - 2\left(\frac{1}{2} \times 14 \text{cm} \times 7 \text{cm}\right)$$
$$\approx \textbf{56 cm}^2$$

Qn 3
$\frac{1}{8}$ shaded part

= quadrant − triangle

$$= \frac{\pi}{4} \times 3.5 \text{cm} \times 3.5 \text{cm} - \frac{1}{2} \times 3.5 \text{cm} \times 3.5 \text{cm}$$

$$\approx 3.5 \text{ cm}^2$$

Shaded part $= 3.5 \text{ cm}^2 \times 8$
$$= \textbf{28 cm}^2$$

Qn 4
Area = circle − square
= circle − 2 big triangles
$$= \pi \times 8 \text{cm} \times 8 \text{cm} - 2 \times \frac{1}{2} \times 16 \times 8 \text{ cm}$$
$$\approx \textbf{73 cm}^2$$

Qn 5
Area = (circle − square) × 2
= (circle − 2 triangles) × 2
$$= \left[\pi \times 10 \times 10 - 2 \times \frac{1}{2} \times 20 \times 10\right] \text{ cm}^2 \times 2$$
$$\approx \textbf{228 cm}^2$$

Qn 6
Area = (circle − square) × 2
= (circle − 2 triangles) × 2
$$= [\pi \times 8 \text{cm} \times 8 \text{cm} - 16 \times 8] \text{ cm}^2 \times 2$$
$$\approx \textbf{146 cm}^2$$

Qn 7
Area $= \frac{1}{4}$ big circle

$$= \frac{1}{4} \times 20 \text{cm} \times 20 \text{cm}$$

$$\approx \textbf{314 cm}^2$$

Qn 8
Perimeter = 1 small circle + 1 big quadrant
$$= 2 \times \pi \times 7 \text{cm} + \frac{2 \times \pi \times 14}{4}$$

$$\approx \textbf{66 cm}$$

Area = quadrant − triangle
$$= \frac{\pi \times 14 \times 14}{4} - \frac{1}{2} \times 14 \text{cm} \times 14 \text{cm}$$

$$\approx \textbf{56 cm}^2$$

Unit 4.3 – Key Construct: Further Composite Figures

Qn 1

Perimeter = 1 big semicircle + 1 small circle

$\qquad$ = π x r + 2 x π x r

$\qquad$ = π x 22cm + 2 x π x 11cm

$\qquad$ ≈ **138 cm**

Area = 1 big semicircle – 1 small circle

$\qquad = \dfrac{\pi \text{ x r x r}}{2} - \pi \text{ x r x r}$

$\qquad = \dfrac{\pi \text{ x 22 x 22}}{2} - \pi \text{ x 11cm x 11cm}$

$\qquad$ ≈ **380 cm²**

Qn 2

Perimeter = 1 big semicircle + 1 small circle +32cm

$\qquad$ = π x r + 2 x π x r + 32cm

$\qquad$ = π x 16cm + 2 x π x 8cm + 32cm

$\qquad$ ≈ **133 cm**

Area = (1 big semicircle – 1 small circle) x 2

$\qquad = (\dfrac{\pi \text{ x r x r}}{2} - \pi \text{ x r x r})$

$\qquad = (\dfrac{\pi \text{ x 16 x 16}}{2} - \pi \text{ x 8cm x 8cm})$

$\qquad$ ≈ **201 cm²**

Qn 3

Perimeter

= (1 big quadrant+ 1 small semi + 8cm) x 4

= 1 big circle + 2 small circles + 32cm

= 2 x π x r + 4 x π x r + 32cm + 32cm

= 2 x π x 8 cm + 4 x π x 4cm + 32cm + 32cm

≈ **133 cm**

Area = (1 big quadrant – 1 small semicircle) x 4

$\qquad$ = 1 big circle – 2 small circles

$\qquad$ = π x r x r – 2 x π x r xr

$\qquad$ = π x 8cm x 8cm – 2 x π x 4cm x 4cm

$\qquad$ ≈ **100 cm²**

Qn 4

Perimeter = (1 big circle+ 2 small circles)

$\qquad$ = 2 x π x r + 2 x π x r

$\qquad$ = 2 x π x 10cm + 4 x π x 5cm

$\qquad$ ≈ **126 cm**

Area = 1 big circle – 2 small circles

$\qquad$ = π x r x r – 2 x π x r x r

$\qquad$ = π x 10cm x 10cm – 2 x π x 5cm x 5cm

$\qquad$ ≈ **157 cm²**

Unit 4.4 – Cut And Paste

Qn 1

There are 2 equal semicircles formed by the 2 equal sides of the isosceles triangle.

Since the small unshaded part overlaps on both semi circles, we could cut and paste the remaining shaded semicircle onto the remaining unshaded semi circle to form a sector.

Area of shaded part= area of sector

$\qquad = \dfrac{60}{360} \times \pi (12)^2$

$\qquad$ ≈ **75 cm²**

Qn 2

Area of shaded part

= 1 big semicircle

$= \dfrac{\pi \text{ x 12 x 12}}{2}$

≈ **226 cm²**

Qn 3

Area of shaded part $\quad$ = 1 square

$\qquad\qquad\qquad\quad$ = (8 × 8) cm²

$\qquad\qquad\qquad\quad$ = **64 cm²**

Perimeter of shaded $\quad$ = Perimeter of semicircle

$\qquad\qquad\qquad\quad$ = π x 8 cm + 16 cm

$\qquad\qquad\qquad\quad$ ≈ **41 cm**

Qn 4

Perimeter of shaded part = 1 circle + 10 cm

$\qquad\qquad\qquad\qquad$ = 2 x π x 5 cm + 10 cm

$\qquad\qquad\qquad\qquad$ ≈ **41 cm**

Area of shaded part

= square – circle

= (10 × 10) cm² – π x 5cm x 5 cm

≈ **21 cm²**

Qn 5

Area of shaded part = area of sector

$= \dfrac{120}{360} \times \pi$ x 10cm x 10cm

≈ **105 cm²**

Qn 6

Area of shaded part= rectangle

$\qquad\qquad\qquad$ = (18 × 9) cm²

$\qquad\qquad\qquad$ = **162 cm²**

Qn 7

Area of shaded part = area of triangle

$\qquad\qquad\qquad\quad = \dfrac{1}{2} \times 16 \times 8$ cm

$\qquad\qquad\qquad\quad$ = **64 cm²**

Qn 8

Area of shaded part

= (square – circle) + triangle

=(16 × 16) cm² – π x 8cm x 8cm + $\dfrac{1}{2}$ x 16cm x 8cm

= 256 cm² + 64 cm² – 64π cm²

≈ **119 cm²**

Qn 9

Square – quadrant

= 12cm x 12cm – $\dfrac{\pi \text{ x 12cm x 12cm}}{4}$

≈ 30.9 cm²

Area of region Z $\quad$ = 30.9 cm² ÷ 2

$\qquad\qquad\qquad$ ≈ 15.5 cm²

Shaded area $\qquad$ = semi-circle – Region Z

$\qquad\qquad\qquad = \dfrac{\pi \text{ x 12 x 12}}{2}$ cm² – 15.5 cm²

$\qquad\qquad\qquad$ ≈ **211 cm²**

Qn 10
Area of shaded part

= large semicircle $- 3\frac{1}{2}$ small circles

$= \dfrac{\pi \text{ x } 30 \text{ x } 30}{2} - \dfrac{7 \text{ x } \pi \text{ x } 10 \text{ x } 10}{2}$

$\approx$ **314 cm²**

Qn 11

$\dfrac{1}{2}$ rugby = quadrant – triangle

$= \dfrac{\pi \text{ x } 8 \text{ x } 8}{4}$ cm² $- \dfrac{1}{2}$ x 8cm x 8cm

$\approx$ 18.3 cm²

Shaded area = big circle – rugby
$= \pi$ x 8cm x 8cm – 2x 18.3 cm²
$\approx$ **165 cm²**

Unit 4.5 Overlapping Method
Qn 1
Area of small semicircle + medium semicircle + Area of triangle
$= \dfrac{\pi \text{ x } 2.5 \text{ x } 2.5}{2} + \dfrac{\pi \text{ x } 6 \text{ x } 6}{2}$ cm² $+ \dfrac{1}{2} \times 5$cm$\times$ 12cm

$\approx$ 96.4 cm²

Shaded area = total area – big semicircle
$= 96.4 - \dfrac{\pi \text{ x } 6.5 \text{ x } 6.5}{2}$

$\approx$ **30 cm²**

Qn 2
Region A = square – quadrant

$= 8$cm x 8cm $- \dfrac{\pi \text{ x } 8 \text{ x } 8}{4}$ cm²

$\approx$ 13.7 cm²

Shaded area $= \dfrac{1}{2}$ x 20cm x 8cm – 13.7 cm²

$\approx$ **66 cm²**

Qn 3
Region A = rectangle – small quadrant

$= (12 \times 5)$ cm² $- \dfrac{\pi \text{ x } 5 \text{ x } 5}{4}$ cm²
$= 60$ cm² – 19.63 cm²
$\approx$ 40.4 cm²

Shaded area = big quadrant – Region A
$= \dfrac{\pi \text{ x } 12 \text{ x } 12}{4}$ cm² – 40.4 cm²

$\approx$ **73 cm²**

Qn 4
Triangle = 48 cm²
$\dfrac{1}{3}$ triangle $= \dfrac{1}{3}$ x 48 cm² = 16 cm²

Area of 1 circle $= \pi \times 6$cm $\times 6$cm
$\approx$ 113.1 cm²

113.1 cm² – 48 cm² = 65.1 cm²
65.1 cm² ÷ 3 = 21.7cm²

Qn 4 (Cont.)
Area of 1 shaded = 21.7 cm² – 16 cm²
= 5.7 cm²

Area of shaded parts = 5.7 cm² $\times$ 3
= **17.1 cm²**

Qn 5
Area of Region A = rectangle – quadrant

$= 8$cm $\times 4$cm $- \dfrac{\pi \text{ x } 4 \text{ x } 4}{4}$ cm²

$\approx$ 19.4 cm²

Shaded region = Big semicircle – (2 × region A)
$= \dfrac{\pi \text{ x } 8 \text{ x } 8}{2} - (2 \times 19.4)$ cm²
$\approx$ **62 cm²**

Qn 6

Area of unshaded part
= 4 squares
= (7.5cm × 7.5cm) × 4
= **225 cm²**

Perimeter of unshaded part
= 2 circles + 4 radius
= 2x2π x7.5 cm + 4x15 cm
$\approx$ **154 cm**

Qn 7
Perimeter of garden
= 1 big semi + 1 small circle
= π x 9cm + 2 x π x 4.5cm
$\approx$ **57 cm**

Area of garden
= 1 big semicircle
$= \dfrac{\pi \text{ x } 9 \text{ x } 9}{2}$

$\approx$ **127 cm²**

Qn 8
Areas X + A = quadrant

$= \dfrac{\pi (20)^2}{4}$ cm²

$\approx$ 314.2 cm²
Areas Y + A = square – quadrant

$= (20 \times 20)$ cm² $- \dfrac{\pi (20)^2}{4}$ cm²

$\approx$ 85.8 cm²

Difference between X and Y = 314.2 cm² – 85.8 cm²
$\approx$ **228 cm²**

Chapter 5 Average
Unit 5.1 – Averaging Out
Qn 1
Total mass (4 brothers) = 75 kg x 4 = 300 kg

Other 2 brothers' mass
= 300 kg – 72 kg – 66 kg
= 162 kg

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Qn 1 (Cont.)

3rd brother	1 unit	2 kg
4th brother	1 unit	
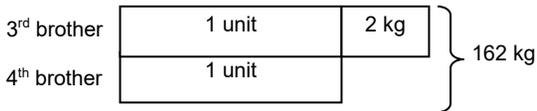
$\}$ 162 kg

$\dfrac{162 \text{ kg} - 2 \text{ kg}}{2}$ = 80 kg

The mass of my other 2 brothers are **80 kg** and **82 kg** respectively.

Qn 2
Average number of children per household

$= \dfrac{(0 \times 50) + (1 \times 20) + (2 \times 50) + (3 \times 40)}{50 + 20 + 50 + 40}$

$= \dfrac{240}{160}$

= **1.5**

Qn 3
Average number sweets received by each child

$= \dfrac{(2 \times 10) + (4 \times 10) + (6 \times 35) + (8 \times 15)}{10 + 40 + 35 + 15}$

$= \dfrac{390}{100}$

= **3.9**

Unit 5.2 – Two Averages

Qn 1
Total height of six students = 125 cm × 6
= 750 cm

Total height of five students = 120 cm × 5
= 600 cm

Height of the sixth student = 750 cm – 600 cm
= **150 cm**

Qn 2
Total of first set = 124 × 2
= 248
Total of next set = 262 × 2
= 524

Total of 4 numbers = 248 + 524
= 772

Average of four numbers $= \dfrac{772}{4}$
= **193**

Qn 3
Total mass of 12 children = 33 kg × 12
= 396 kg

Total mass of 18 children = 36 kg × 18
= 648 kg

Total mass of 30 children = 648 kg + 396 kg
= 1044 kg

Average mass of 30 children = 1044 kg ÷ 30
= **34.8 kg**

Unit 5.3 − Average with Unknown Quantity

Qn 1
$12 – $9 = $3
For each plate to increase from $8 to $9, the increase per plate → $1

Number of plates she bought at first $= \dfrac{3}{1}$
= **3**

Qn 2
75 kg – 48 kg = 27 kg
For each boy to increase from 45 kg to 48 kg,
increase per boy = 3 kg

Number of boys in the group = 27 kg ÷ 3 kg
= **9**

Qn 3
Difference in Gareth's results = 13 + 5
= 18
Difference in average score = 90 – 87
= 3
Total people involved = 18 ÷ 3
= 6
Excluding Gareth himself, he had **5 good friends.**

Qn 4
Difference in Jean's score = 20 – 4
= 16
Difference in average score = 80 – 78
= 2
Number of people involved = 16 ÷ 2
= 8
Excluding herself, Jean had **7 friends**.

Qn 5
Total marks deducted = 96 × 2
= 192

Since 2 students left the class, besides the average of 60 marks lost, the loss will be re-distributed to the rest of the classmates such that each pupil student drop from an average of 60 marks to 58 marks.

192 – (2 × 60) = 192 –120
= 72
72 ÷ 2 = 36

Number of students at first = 36 + 2 (left)
= **38**

Qn 6
Total score = 58.5 × 80
= 4680

Using Guess and Check,

	Male		Female	Total	
40 × 56 =	2240	40 × 64 = 2560		4800	**-40**
45 × 56 =	2520	35 × 64 = 2240		4760	
55 × 56 =	3080	25 × 64 = 1600		4680	**+80**

Number of male singers = **55**

Qn 7

Difference in the individual score $= 18 + 9$
$= 27$
Difference in average score $= 85 - 82$
$= 3$
No. of pupils in the group $= 27 \div 3$
$= \textbf{9}$

Qn 8

Total $= 75 \times 4$
$= 300$
Chinese + Mathematics $= 300 - 62 - 79$
$= 159$
(a) Smallest difference $= 80 - 79$
$= \textbf{1}$
(b) Biggest difference $= 89 - 70$
$= \textbf{19}$

Qn 9

Total distance $= 8.50 \times 4$
$= 34$ m
Ukraine + Germany $= 34$ m $- 8.95$ m $- 7.35$ m
$= 17.7$ m

(a) Smallest difference $= 9$ m $- 8.7$ m
$= \textbf{0.3 m}$
(b) Biggest difference $= 9.7$ m $- 8$ m
$= \textbf{1.7 m}$

Unit 5.4 – Average with Repeated Identity

Qn 1

Total (A + B) $= 78 \times 2$
$= 156$
Total (B + C) $= 74 \times 2$
$= 148$
Total (A + C) $= 80 \times 2$
$= 160$

Total (2A + 2B + 2C) $= 156 + 148 + 160$
$= 464$

A + B + C $\rightarrow 464 \div 2 = 232$

Calvin's score $= 232 - 156$
$= \textbf{76}$

Alan's score $= 232 - 148$
$= \textbf{84}$
Bernard's score $= 232 - 160$
$= \textbf{72}$

Qn 2

Total of John + Henry $= \$2400 \times 2$
$= \$4800$
Total of Henry + Bernard $= \$3000 \times 2$
$= \$6000$

Difference between John and Bernard
$= 2$ units
$= \$(6000 - 4800)$
$= \$1200$
1 unit $= \$600$

John $= 5 \times \$600$
$= \$3000$

Henry's salary $= \$4800 - \$3000$
$= \textbf{\$1800}$

Qn 3

Total of Clara + Joan $= \$80 \times 2$
$= \$160$
Total of Clara + Melissa $= \$115 \times 2$
$= \$230$

Difference between Joan's share and Melissa's share
$= 9$ units $- 4$ units
$= 5$ units

5 units $= \$230 - \$160$
$= \$70$
1 unit $= \$70 \div 5$
$= \$14$

Amount paid by Melissa $= 9$ units
$= 9 \times \$14$
$= \$126$
Cost of present $= \$126 + \$160$
$= \textbf{\$286}$

Qn 4

Total (Benson + Ryan) $= 450 \times 2$
$= 900$
Total (Benson + Joseph) $= 240 \times 2$
$= 480$

Difference between Ryan and Joseph
$= 5$ units $- 2$ units
$= 3$ units

3 units $= 900 - 480$
$= 420$
1 unit $= 420 \div 3$
$= 140$
Ryan $= 5$ units
$= 5 \times 140$
$= 700$
Benson $= 900 - 700$
$= \textbf{200}$

Qn 5

Total (Amos + Bernard) $= \$2800 \times 2$
$= \$5600$
Total (Bernard + Chelsia) $= \$4200 \times 2$
$= \$8400$
Total (Amos + Chelsia) $= \$2600 \times 2$
$= \$5200$

Twice the total of Amos + Bernard + Chelsia
$= \$5200 + \$8400 + \$5600$
$= \$19\,200$

Total amount $= \$19\,200 \div 2$
$= \$9600$

Average of A + B + C $= \$9600 \div 3$
$= \textbf{\$3200}$

Chapter 6 Simultaneous

Unit 6.1 – Simultaneous (Fraction of Different Quantities

Qn 1

$\frac{3}{8}$ of boys $+ \frac{3}{7}$ of girls $= 48$

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Qn 1 (Cont.)

$\frac{1}{8}$ of boys + $\frac{1}{7}$ of girls = 16

(Multiply by 7)

$\frac{7}{8}$ of boys + $\frac{7}{7}$ of girls = 112 (16 × 7)

$\frac{8}{8}$ boys + $\frac{7}{7}$ girls = 124

$\frac{1}{8}$ of boys = 124 − 112 = 12

Boys = 12 × 8
= **96**

Qn 2

$\frac{4}{7}$ of English + $\frac{1}{2}$ of Chinese = 55 $\Big\}$ ×2

$\frac{8}{7}$ of English + $\frac{2}{2}$ of Chinese = 110

English + Chinese = 100

$\frac{1}{7}$ of English = 110 − 100
= 10
English = 7 × 10
= 70
Chinese = 100 − 70
= **30**

Qn 3

$\frac{4}{7}$ of men + $\frac{4}{9}$ of women = 240

$\frac{1}{7}$ of men + $\frac{1}{9}$ of women = 60 $\Big\}$ ×9

$\frac{9}{7}$ of men + $\frac{9}{9}$ of women = 540

But men + women = 490

Extra $\frac{2}{7}$ men = 50

$\frac{1}{7}$ men = 25

Number of men at first = 25 × 7
= **175**

Qn 4

$\frac{1}{4}$ circle + $\frac{1}{3}$ rectangle = $\frac{2}{5}$ square $\Big\}$ ×3

$\frac{3}{4}$ circle + $\frac{3}{3}$ rectangle = $\frac{6}{5}$ square

Circle + rectangle = $\frac{7}{5}$ square

$\frac{1}{4}$ circle = $\frac{1}{5}$ square

Circle : Square
  4 : 5

4u + rectangle = $\frac{7}{5}$ × 5
= 7u
Rectangle = 3u

Circle : Square : Rectangle
  4 : **5** : **3**

Qn 5

$\frac{1}{5}$ of circle + $\frac{1}{3}$ of rectangle = $\frac{3}{5}$ of square $\Big\}$ ×3

$\frac{3}{5}$ of circle + rectangle = $\frac{9}{5}$ of square

Circle + rectangle = 2 squares

$\frac{2}{5}$ of circle = $\frac{1}{5}$ of square

$\frac{2}{5}$ of circle = $\frac{2}{10}$ of square

Circle : Square
  5 : 10

5u + rectangle = 20u
Rectangle = 15u

Circle : Square : Rectangle
  5 : 10 : 15
  1 : **2** : **3**

Qn 6
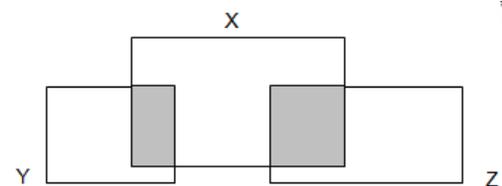
$\frac{1}{4}$ Y + $\frac{1}{5}$ Z = $\frac{1}{6}$ X $\Big\}$ x 4

Y + $\frac{4}{5}$ Z = $\frac{4}{6}$ X

Y + Z = $\frac{3}{4}$ X

$\frac{1}{5}$ Z = $\frac{1}{12}$ X

$\frac{5}{5}$ Z = $\frac{5}{12}$ X

Y = $\frac{3}{4}$ X − $\frac{5}{12}$ X
= $\frac{4}{12}$ X

Z : X : Y
5 : 12 : 4
1u = 24 cm²

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

Qn 7

$\frac{1}{2}$ A + $\frac{1}{2}$ B = 840 − 620
= 220
A + B = 440
C = 840 − 440
= 400
Since 4u = 400
1u = 100
Bernard = **100**

Qn 8

$\frac{1}{2}$ girls − $\frac{1}{4}$ boys = 120 $\Big\}$ ×2

Girls − $\frac{2}{4}$ boys = 240

Girls + Boys = 720

Difference $\frac{4}{4}$ boys + $\frac{2}{4}$ boys = 720 − 240

$\phantom{Difference \frac{4}{4} boys + \frac{2}{4} boys}$ = 480

$\frac{6}{4}$ boys = 480

$\frac{3}{2}$ boys = 480

$\frac{1}{2}$ boys = 160

Boys = 160 × 2
 = **320**

Chapter 7 Percentage

Unit 7.1 – Percentage Of Different Bases

Qn 1

Boys	= 45%
Girls	= 100%
Adults	= 80% × 45%
	= 36%

Difference between adults and boys = 45% − 36%
 = 9%

9% = 63
1% = 7

Total = 45% + 100% + 36%
 = 181%
 = 181 × 7
 = 1267

There were **1267** people at the fun fair altogether.

Qn 2

At first, pears = 40%
 oranges = 60%
Left, oranges = 70% of 60%

 = $\frac{7}{10}$ × 60% = 42%

End, pears increase = 60% of 40%

 = $\frac{6}{10}$ × 40%

 = 24%

Total pears = 24% + 40%
 = 64%

Total in the end = 42% + 64%
 = 106%

6% of fruits = 24
1% of fruits = 4

Total at first = 100%
 = 100 × 4
 = 400

There were **400** fruits in the box at first.

Qn 3

(a)

Adults	= 80%
Children	= 20%

Female = 30% of 80%

 = $\frac{3}{10}$ × 80%

 = 24%

Male = 80% − 24%
 = 56%

Girls = 60% of 20%

 = $\frac{6}{10}$ × 20%

 = 12%

Boys = 20% − 12%
 = 8%

Boys − Girls = 12% − 8%
 = 4%

4% of audience → 40
1% of audience → 10
100% of audience → **1000**

(b) The number of children and men remained the same,
Children + male = 76%
76% of audience → 760

If 80% of remaining people → 760
 1% of remaining people → 9.5
 20% of remaining people → 9.5 × 20
 = 190

Woman at first = 240
Women who left = 240 − 190
 = **50**

Qn 4

At first, pears → 60% (3u) $\Big\}$ ×7 = 21u
 apples → 40% (2u) $}$ ×7 = 14u

End, pears → 30% (3u) $\Big\}$ ×2 = 6u
 apples → 70% (7u) $}$ ×2 = 14u

Since the number of apples remained unchanged, the units for apples were made the same in both scenarios.

Decrease in pears = 21u − 6u = 15u
 15u = 45
 1u = 3
Apples = 14u = 14 × 3 = 42

There are **42 apples** in the basket.

Qn 5

Fixed	=	40% (2u) $\big\}$ × 5	= 10u
Unfixed	=	100% (5u) $\big\}$ × 5	= 25u

Fixed	=	80% (4u) $\big\}$ × 7	= 28u
Unfixed	=	20% (1u) $\big\}$ × 7	= 7u

Transfer	=	18u	= 180 pieces
		1u	= 10 pieces
Total	=	35u	= 35 × 10 = **350** pieces

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Qn 6

Daryl + Chelsia = 75% (3u) ⎫ ×5 = 15u
       John = 25% (1u) ⎭ ×5 = 5u

Chelsia + John = 60% (3u) ⎫ ×4 = 12u
      Daryl = 40% (2u) ⎭ ×4 = 8u

Chelsia : Daryl : John
   7   :   8   :   5

Difference between Daryl and John = 3
3u = $48
1u = $48 ÷ 3
   = $16

Total at first = 20u
             = 20 × $16
             = $320

The amount of money shared was **$320**.

Qn 7

Roy spent $\frac{3}{4}$ of his money → left with $\frac{1}{4}$ of his money

Dennis spent $\frac{2}{5}$ of his money → left with $\frac{3}{5}$ of his money

At the end

Dennis = 2 × Roy's money

$\frac{3}{5}$ D = 2 × $\frac{1}{4}$ R

$\frac{3}{5}$ D = $\frac{1}{2}$ R

$\frac{3}{5}$ D = $\frac{3}{6}$ R

Total   11u = $660
        1u = $60

Dennis at end = 3u
            = 3 × $60
            = **$180**

Qn 8

50% of A → 30% of B

$\frac{1}{2}$ A = $\frac{3}{10}$ B

$\frac{3}{6}$ A = $\frac{3}{10}$ B

A : B = 6 : 10

C is 50% of A + B

C = $\frac{1}{2}$ × 16u
  = 8u

Removed $\frac{1}{4}$ × 8u = 2u (in C)

A : B : C
6 : 10 : 6

   4u = 12
   1u = 3

No. of oranges in A = 6 × 3
                   = **18**

Qn 9

$\frac{3}{5}$ of remainder = $\frac{1}{4}$ of total

Remainder = $\frac{1}{4}$ ÷ $\frac{3}{5}$

        = $\frac{1}{4}$ × $\frac{5}{3}$ = $\frac{5}{12}$ of total

$\frac{7}{12}$ of total = $105

$\frac{1}{12}$ of total = $105 ÷ 7

        = $15
Total   = $15 × 12 = $180

She had **$180** at first.

Qn 10

40% remainder → $20 + $64 = $84
20% remainder → $42
Remainder → $42 × 5 = $210

75% total – $30 → $210
75% total → $240
25% total → $80

Total = $80 × 4 = **$320**

Qn 11

First 2 bags = 75% x $80 x 2
            = $120

3rd bag = 80% x $80
           = $64

Total received = $120 + $64
              = $184

She received **$184** from selling the three bags.

Qn 12

Jenny = 80%
Daryl = 100%

Jenny left = 80% of 80% = 64%

Daryl (end) = 64% × 2 = 128%

Increase (Daryl) = 28%
28% of cards → 56
1% of cards → 2

Jenny at first, 80% of cards → 80 × 2 = **160**

Qn 13

Red	= 20% (1u)	×7	= 7u
Blue + Green	= 100% (5u)	×7	= 35u

Blue	= 75% (3u)	×5	= 15u
Green	= 100% (4u)	×5	= 20u

	No.	×	Value	Total
Red	7u	×	2	14u
Green	20u	×	5	100u
Blue	15u	×	3	45u
	Total			159u

159u = 636
1u = 636 ÷ 159 = 4

Red balls, 7 x 4
= **28**

Qn 14

	Jason	:	Susan	
At first	x5 75%(3u)	:	100%(4u) x4	

Change	×5 +48		+40	×4

End	x5 80% (4p)	:	100% (5p) x4

Jason

15u	240

Susan

16u	160

1u = 240 – 160
   = 80

Jason at first, 3u = 3 x 80
                  = **240**

Qn 15
At first
Amos – 20%
Daniel – 100%

Amos gave 30% x 20% - 6% to Daniel
Daniel gave 25% x 106% = 26.5% back to Amos

End
Amos = 14% + 26.5% = 40.5%
Daniel = 106% – 26.5% = 79.5%

Difference = 79.5% – 40.5% = 39%

39% total = 78
1% total = 78 ÷ 39 = 2

Amos at first = 20 x 2 = **40**

Chapter 8 Pie Chart

Qn 1

(a) $\frac{72}{360} \times 100\% = 20\%$

20% of the students like oranges.

Qn 2 (Cont.)

(b) $\frac{30}{100} \times 360° = 108°$

Pear = 360° – 108° – 72° – 144°
   = 36°

$\frac{36}{360} \times 200 = 20$

20 students like pears.

Qn 2
(a) 4u = 360° – 160°
   = 200°
   1u = 50°

Percentage of cricket = $\frac{50}{360} \times 100\%$
                      = **13.89%**

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

Qn 3
(a) $\frac{140}{360} \times 720 = \textbf{280}$

(b) 5u = 360° – 140°
   = 220°

   1u = 44°
   Spiders, 2u = 88°

% of housewives who dislike spider → $\frac{88}{360} \times 100$
                                    = **24.44%**

Qn 4
(a) 6u = 360° – 240°
   = 120°
   1u = 20°

   % teachers → $\frac{20}{360} \times 100\%$
             = **5.56%**

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

Qn 5
(a) 14u = 360° – 150°
        = 210°
    1u = 15°

    TV sets = 7u = 105°

    Diff = 5° = 10
    1° = 2

    Radios = 4 × 15°
          = 60°

    60° = 60 × 2
       = **120**

(b) Total = 360°

    360° = 360 × 2
        = **720**

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Qn 5 (Cont.)

(c) Irons sold = 3u
   = 3 × 15°
   = 45°

   % of iron sold = $\frac{45}{360}$ × 100%
   = **12.5%**

Qn 6

(a) Total angle sector = 160° + 90°
   = 250°

   Amount spend = $\frac{250}{360}$ × $1800
   = **$1250**

(b) Fare → 120% (6u)
   Miscellaneous → 100% (5u)
   11u = 360° − 90° − 160°
   = 110°
   1u = 10°

   Miscellaneous = 5u
   5u = 50°

   $\frac{50}{360}$ × $1800 = **$250**

Qn 7

(a) % of girls who chose diet coke → $\frac{126}{360}$ × 100% = **35%**

(b) 90% of total → 112
   Total number of girls, 360° = 4 × 112
   = **448**

Qn 8

(a) $\frac{90}{360} = \frac{1}{4}$

(b) 4u = 360° − 90° − 126°
   = 144°
   1u = 36°

   Chinese, 3u = 3 × 36°
   = **108°**

(c) 126° − 90° = 36°
   36° = 24
   3° = 2
   Total, 360° = 2 × 120
   = **240**

Qn 9

(a) Total, 6u = 360° − 240°
   = 120°
   1u = 20
   5u = 100

   % of girls → $\frac{100}{360}$ × 100% = **27.78%**

(b) 1u = 20°
   20° = 30
   2° = 3

Difference between boys and girls = 240° − 100°
   = 140°

(140° ÷ 2) × 3 = **210**

Qn 10

(a) 6u = 360° − 240°
   = 120°
   1u = 20°

% of students who walk to school
→ $\frac{20}{360}$ × 100%
= **5.56%**

(b) 20° of total → 125
   i) Cars, 100° of total → 125 × 5 = **625** students
   ii) Bus, 240° of total → 125 × 12 = **1500** students

Qn 11

(a) 20% of 360° = $\frac{20}{100}$ × 360°
   = 72°
   Others = 360° − 180° − 72° − 80°
   = 28°

% on other expenditure
→ $\frac{28}{360}$ × 100%
= **7.78%**

(b) Amount spent on souvenir = $\frac{1}{2}$ × $8000
   = **$4000**

Qn 12

60 yrs old and above : 40 - 59 yrs old
   1 × 2   :   2 × 2
   2   :   4
40 − 59 yrs old   : 0 − 19 yrs old
   4   :   5

Total = 5u + 4u + 2u
   = 11u
11u = 360° − 140°
   = 220°
1u = 20°

(a) 60 years old and above, 2 units = 40°

   Fraction of people 60 years old and above = $\frac{40}{360} = \frac{1}{9}$

(b) $\frac{140}{360}$ × 10 800 = **4200**

Chapter 9 Algebra

Unit 8.1 Introduction to Algebra

Qn 1

Breadth = w cm
Length = $3w$ cm

(a) Perimeter = $(w + 3w)$ × 2
   = **$8w$ cm**

(b) Area = $3w × w$
   = 3 × 5 × 5
   = **75 cm²**

Qn 2

Annie = b
Mother = 4b
Father = 4b + 5

(a) Father in 3 years time = 4b + 5 + 3 = **4b + 8**

(b) If b = 10, father now = 4 x 10 + 5 = **45**

Qn 3
Gary = 28
Nathaniel = 28 – w

(a) Daniel = (28 – w) ÷ 2 = $\mathbf{14 - \dfrac{w}{2}}$

(b) Daniel = $14 - \dfrac{w}{2}$

  = 14 - 4
  = **10**

Qn 4
Brother now = 12 yrs old
Brother 5 years ago = 12 – 5 = 7 yrs old
John 5 years ago = 7 + k
John in 3 years time = 7 + k + 5 +3
= **k + 15**

Qn 5
(a) 3 apples + 2 oranges = 360 cents
   1 apple + 1 orange = w cents
   2 apples + 2 oranges = 2w cents
   1 apple = **360 cents – 2w cents**

(b) If w = 140
   1 apple = 360 cents – 2 x 140 cents
       = 360 cents – 280 cents
       = **80 cents**

Qn 6

Notebook	1 unit		
Pen	1 unit	$4	
CD	1 unit	$4	$2

Total cost = 3 units + 10 = T

(a) Cost of notebook = 1 unit = $\dfrac{\mathbf{T - 10}}{\mathbf{3}}$

(b) If T = 25, 1 unit = $\dfrac{25 - 10}{3}$ = 5
   Cost of CD = $5 + $6 = **$11**

Qn 7

(a) $\dfrac{x}{4}$ cm

Total perimeter = 12u = x cm

1u = $\dfrac{x}{12}$ cm

Shortest length, 3u = $3 \times \dfrac{x}{12} = \dfrac{\mathbf{x}}{\mathbf{4}}$ **cm**

(b) Since x = 24 cm; Shortest = 6 cm

2nd shortest, 4u = $4 \times \dfrac{24}{12}$

      = 8 cm

Area of triangle = $\dfrac{1}{2} \times 6 \times 8$

        = **24 cm²**

Qn 8

Siti	2 units		
Lilian	2 units	$k	
Janet	1 unit	$\frac{k}{2}$	

Qn 8 (Cont.)
Total = 5 units + $\dfrac{3k}{2}$ = 165

5 units = 165 – 1.5k
1 unit = 31 – 0.3k

(a) Siti = 2 units = **$ (62 – 0.6k)**
(b) If k = 80, Siti = $(62 – 0.6 x 80) = **$14**

Qn 9
6 boxes , short $w
5 boxes, left $4
(a) 1 box = **$w + $4**
(b) If w = $3, 1 box = $7

Amount of money Mrs Lim has = 6 x $7 - $3 = **$39**

Qn 10
(a) Total chairs = 12 x 3p + 5 = **36p + 5**

(b) Total chairs = 36 x 8 + 5 = **293 chairs**

Qn 11
Total score = 78 x m
      = 78m points

Total new score = 80(m + 1)
        = (80m+ 80) points

Next test = 80m + 80 – 78m
      = **(80 + 2m) points**

Qn 12
Total units = 6 units+ k units
(6 + k) units = $120

1 unit = $\dfrac{120}{6+k}$

Amount by Mrs Lee = k units
        = $ $\left(\dfrac{\mathbf{120}}{\mathbf{6+k}}\right)\mathbf{k}$

Qn 13
80% of cost → n

10% of cost → $\dfrac{n}{8}$

100% of cost → $10 \times \dfrac{n}{8}$

        = $\left(\dfrac{\mathbf{5n}}{\mathbf{4}}\right)$

Qn 14
Total work to be done = $w \times 30$
          = 30w

Total days taken with additional workers
= $\dfrac{30w}{2w+w}$
= $\dfrac{30w}{3w}$
= **10 days**

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Qn 15

Cost of pen $= \$\frac{3}{4}m$

5 calculators $= \$5m$

8 pens $= 8\left(\frac{3}{4}m\right)$

Total cost $= \$5m + \$6m$
$\qquad\quad = \mathbf{\$11m}$

Chapter 10 Revision of Key Constructs

Qn 1

Square	:	Round		Square	:	Oval
3	:	2		4	:	3
×4		×4		×3		×3

	Square	:	Round	:	Oval
(a)	**12**	:	**8**	:	**9**

(b) Round : Square + Oval
    30%   70%
  = 3 : 7
  ×3   ×3
  9 : 21

Increase in round cookies = 120

Square cookies $= 12 \times 120 = \mathbf{1440}$

Qn 2

Cost of a child's ticket $= \frac{50}{100} \times \$14$
$\qquad\qquad\qquad\qquad\quad = \$7$

	Number	×	Value ($)	=	Total cost ($)
Adults	60% (3u)	×	14	=	42u
Children	40% (2u)	×	7	=	14u
					56u

56u $= 6720$
1u $= 6720 \div 56$
$\quad = 120$

Tickets for adults, 3u $= 3 \times 120$
$\qquad\qquad\qquad\qquad = \mathbf{360}$

Qn 3

$10 tickets : $5 tickets
  3   :   2
  × 2   × 2
  6   :   4

Number	×	Value ($)	=	Total amount ($)
5U	×	10	=	50u
4U	×	5	=	20u
				70u

70u = $5600
1u = $5600 ÷ 70
$\quad$ = 80

1u = of adult tickets
$\quad$ = 80 × $10
$\quad$ = **$800**

Qn 4

Area of square $= 10 \times 10$
$\qquad\qquad\qquad = 100$ cm²

Area of triangle CDE $= \frac{1}{2} \times 10 \times 10$
$\qquad\qquad\qquad\qquad = 50$ cm²

Difference in square and triangle CDE
= difference in shaded area
= 100 cm² − 50 cm²
= **50 cm²**

Qn 5

80% total = $3200
1% total = $3200 ÷ 80 = $40

(a) Mr Soon = 100 x $40 = **$4000**

(b) Difference = $4000 − $3200 = $800

Increase in difference = $920 − $800 = $120

Percentage increase =

$\frac{\$920 - \$800}{\$800}$ x 100% = **15%**

Qn 6

Difference in income $=$ $250

Difference in savings $=$ $1350 − $600
$\qquad\qquad\qquad\qquad\quad = \$750$

(a) Number of months Clayton take to save $600
$= \frac{750}{250}$
= **3 months**

(b) Alvin's monthly income $= \$\frac{1350}{3} + \$500$
$\qquad\qquad\qquad\qquad\qquad = \mathbf{\$950}$

Qn 7

$\frac{6}{7}$ of remainder $\rightarrow \frac{2}{5}$ total

Remainder $\rightarrow \frac{2}{5} \times \frac{7}{6} = \frac{14}{30}$

$1 - \frac{14}{30} = \frac{16}{30}$ of total = 80 sold

$\frac{1}{30}$ of total $= 80 \div 16$
$\qquad\qquad\qquad = 5$

Total number of roses $= 5 \times 30$
$\qquad\qquad\qquad\qquad = 150$

Total number of roses left $= \frac{2}{5} \times 150$
$\qquad\qquad\qquad\qquad\qquad = \mathbf{60}$

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Qn 8

Total cost

Keychain	$112	$8
Mug	$112	

$232

$$\frac{232-8}{2} = 112$$

3u of key chains cost $120.
1u of key chains cost $40.
1u of mugs cost $112.

Difference in 1u = $112 − $40 = $72
No. of items in 1u = $72 ÷ $4.50 = 16

16 mugs cost $112.

1 mug cost = $$\$\frac{112}{16}$$
          = **$7**

Qn 9

A   = 60% (3u) ⎤   =   15u
B + C = 100% (5u) ⎦ × 5 = 25u

B   = 25% (1u) ⎤   =   8u
A + C = 100% (4u) ⎦ × 8 → 32u

A   :   B   :   C
15 :   8   :   17

Difference between A and B → 2u
2u → 4
1u → 2
Total in box → 40u → 40 × 2 → **80**

Qn 10

In 1 day, Imran can paint $\frac{1}{12}$ house.

Hence in 3 days, he can paint = $\frac{1}{4}$ of the house
(Imran painted alone as John rested on these 3 days).

In 1 day, John can paint $\frac{1}{15}$ house.

Hence, in 5 days, he can paint $\frac{1}{3}$ of the house
(John painted alone as Imran rested on these 5 days.)

Remaining part of the house for both to paint together

$$\to 1 - \frac{1}{4} - \frac{1}{3} = \frac{5}{12} \text{ house}$$

Number of days for both = $$\frac{5}{12} \div \left(\frac{1}{12} + \frac{1}{15} \right)$$

$$= \frac{5}{12} \div \frac{9}{60}$$

$$= \frac{5}{12} \times \frac{60}{9} = \frac{25}{9}$$

$$= 2\frac{7}{9}$$

Qn 10 (Cont.)

Total number of days = $3 + 5 + 2\frac{7}{9}$ = **$10\frac{7}{9}$ days**

Qn 11

      A : B   40% of B → 40% of 5u
     3u : 5u   = 2u
    −2u   −2u
    ────────────
     1u : 3u
% figure unshaded

$$\to \frac{1u + 3u}{1u + 3u + 2u} \to \frac{4}{6} \times 100\% \to \mathbf{66\frac{2}{3}\%} \text{ or } \mathbf{66.67\%}$$

Qn 12

Case 1 : + 10 red beads
Ratio Red : Blue
         2 : 3

Case 2 : +10 red beads + 30 blue beads
          1 : 3 (×2)
          2 : 6

Blue changed by 3 units,
3u = 30 beads
1u = 10 beads

Red beads,
2u = 2 × 10
   = 20

Number of beads = 20 − 10
                = **10**

Qn 13

80% male   →   90% female

$\frac{8}{10}$ male   = $\frac{9}{10}$ female

$\frac{72}{90}$ male   = $\frac{72}{80}$ female

Total   = 90u + 80u
          = 170u

170u = 170 members
1u = 1 member

Total this year, 144u = **144 members**

Qn 14

Performers 30%   ╱ 70% of 70% → $\frac{7}{10}$ × 70% → 49%
                 ╱   (7350)
    male   ╱

Spectators 70% ╲
                ╲ 70% − 49% = 21% female
                  Difference 28% of total → 4200
                            1% of total → 150

Performers + female spectators (remains constant)
→ 51% → 51 × 150 = 7650

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Qn 14 (Cont.)
100% − 40% = 60%
60% of total → 7650
20% of total → 2550
40% of total → 5100 male spectators left

Number of male that must leave = (49 × 150) − 5100
= 7350 − 5100
= **2250**

Qn 15
(a) Total number of rectangles in Figure 90
= 4 + 89(3)
= **271**

(b) 451 − 4 = 447
447 ÷ 3 = 149 → Figure 150
(151 shaded rectangle)

Unshaded rectangles = 451 − 51 = **300**

(c) 697 − 4 = 693
693 ÷ 3 = 231 → Figure 232
(233 shaded rectangle)

Unshaded rectangles = 697 − 233 = **464**

Qn 16
$834 − $66 = $768

$768 ÷ 2 = $384

Pants = $384 + $66
= $450

Shirts = $384

3u of pants cost $450

4u of shirts cost $384

1u of pants cost $150

1u of shirts cost $96

Difference in 1u = $54

No. of items in 1u = $54 ÷ 9
= 6

Total shirt + pants bought = 7 × 6
= **42**

Qn 17

Item	No. of Boxes	×	Item	Total
Blue	Red + 12	×	120	120Red + 1440
Red	Red	×	150	150Red

Comparing the total of items (plates vs cups)

Cups = Plates + 120

150 Red = 120 Red + 1440 + 120

30 Red = 1560

Number of Red boxes = 1560 ÷ 30
= 52

Number of Blue boxes = 52 + 12
= 64

Qn 17 (Cont.)
Total Plates = 64 × 120
= **7680**

Qn 18
$\frac{1}{3}$ Lim = $\frac{3}{4}$ Zhang

$\frac{3}{9}$ Lim = $\frac{3}{4}$ Zhang

$$5× \begin{cases} \text{Lim} : \text{Zhang} \\ 9u : 4u \\ -150 + 50 \\ 6p : 5p \end{cases} ×6$$

Lim	45u		
Zhang	24u	300	750

(45 − 24)u = 21u
= 1050

1u = 50

Total ducks = 13u
= 13 × 50
= **650**

Qn 19
Total shaded area = $\frac{1}{2}$ × 20 × 17 × 4
= 680 cm²

Since AB = BE but AB = BC

Therefore EB = BC = CF = 60 cm ÷ 3
= **20 cm²**

Qn 20
Initial extra = 6 × 50-cent
= $3

After using eight 50-cent coins, 8 × 50-cent = $4

$4 − $3 = $1

Difference in value of 50-cent coins and 20-cents coin

= $7.40 + $1

= $8.40

Difference in value of 1 50-cent coin and 1 20-cent coin

= $0.50 − $0.20

= $0.30

$8.40 ÷ $0.30 = 28

At first, he had **28** 20-cent coins and 28 + 6 = **34** 50-cent coins.

Qn 21

Green	:	Blue
5u	:	3u
×4		×4
20u	:	12u

Green markers sold, 25% of 20u = $\frac{1}{4}$ × 20u = 5u

	Number	×	Value ($)		Total ($)
Green	15u×	4	=	60u	
Blue	12u×	5	=	60u	
					120U

120u = 480
1u = 480 ÷ 120
  = 4

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

Qn 22

Mrs Yeo = 70%
Mdm Lim = 100%
Miss Tang = 80% x 70% = 56%
Increase in Miss Tang's books = 50% x 56% = 28%

Since 4units = 28%
1 unit = 7%

Mdm Lim gave 3 x 7% = 21% to Miss Tang
Mdm Lim (end) = 100% − 21% = 79%

Difference between Miss Tang and Mdm Lim in the end
= 84% − 79% = 5%
5% total = 15 books
1% total = 3 books

Mrs Yeo gave Miss Tang 7% = 7 x 3 = **21 books.**

Qn 23

Terry loses $\frac{4}{9}$, Alex left $\frac{5}{9}$

Terry	:	Alex
2	:	3
×5		×5
10u	:	15u
+8u		−8u

(a) **18 : 7**

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

Since $\frac{5}{9}$ of Terry = 10u

  $\frac{1}{9}$ of Terry = 2u

  $\frac{4}{9}$ of Terry = 8u

Finally T : A   = 1 : 4 = 5 : 20

Transfer   = 5u   = 35
          1u   = 7

Terry in the end = 5u = **35**

Qn 24

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

(b) Shaded   8 + 8 (4) = 40
    Plain   9 × 9   = 81
    Total   = 40 + 81
         = **121**

Qn 25

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

        = $12500

Amount refunded = $12 500 − $9500

        = $3000

No. of parcels damaged = $3000 ÷ ($25 +$15)

        = 75

No. of parcels delivered successfully = 500 − 75

                = **425**

Qn 26

Area of unshaded part = $\frac{1}{2}$ × 7 × (12 + 7)

        = $66\frac{1}{2}$ cm²

Shaded = quadrant + square − unshaded

    = $\frac{\pi(12)^2}{4}$ + (7 × 7) − 66.5

    = **96 cm²**

Qn 27

	Spent
Anna	40%
Isabel	−$30
Kenneth	80% Anna

Total amount spent   = $640 − $370
            = $270
120% of Anna + $30 → $270
120% of Anna   → $240
1% of Anna   → $2
100% of Anna   → $200

Isabel + Kenneth at first   = $640 − $200
              = **$440**

Qn 28

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

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

Difference, 2u = 50
      1u = 25
Gavin, 5u = 5 × 25
      = 125
Charles =190 − 125
      = **65**

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Qn 29
Square X   = 1u × 3
           = 3u
Rectangle Y = 3u × 3   } Difference 6u
           = 9u
Unshaded X = 1u × 2
           = 2u   } Difference 6u
Unshaded Y = 4u × 2
           = 8u

Decrease each, 1u = 27 cm²
Area (Square X), 3u= 3 × 27 cm²
                 = 81 cm²

Length of square = **9 cm**

Qn 30
$\angle AFG$ = 115°
$\angle DFE$ = 180° − 50° − 50°
       = 80°

$\angle AFD$ = 360° − 115°− 75° − 80°
       = 90°

$\angle BFC = \dfrac{90}{3}$
       = 30°

$\angle FBC = \dfrac{180-30}{2}$
       = **75°**

Qn 31
1 unit = 18cm²
Area of triangle ABC
= 4 x 18cm²
= 72cm²

Since triangle ABC is isosceles,
Twice of Triangle ABC = square
= 72cm² x 2
= 144cm²

Side AB = side BC = $\sqrt{144\text{cm}^2}$
= **12cm**

Qn 32

Alfred | $840
Benedict
        spent

Alfred | | $210
Benedict
        spent
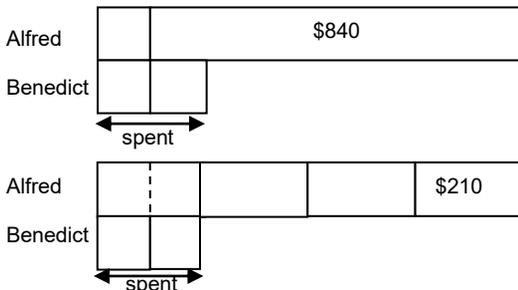
(a) Amount Alfred received = $210 + $840
                            = **$1050**

(b) 3u = $840 − $210
        = $630
     1u = $210
     Benedict = $210 × 2
              = **$420**

Qn 33

Aaron | −16 | −16 | −16
Lucy | 16 + 12

Aaron
Lucy   +16 +12   2
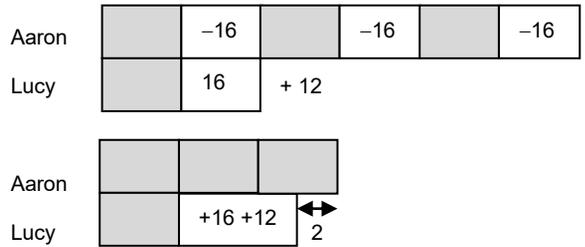
   2u = 16 + 12 + 2
      = 30
   1u = 15

Lucy at first = 15 + 16
             = **31**

Qn 34
A   = 1u × 4 } A : B : C : J
B + C + J = 4u × 4   4 : 5 : 6 : 5
B   = 1u × 5
A + C + J = 3u × 5

C   = 3u × 2
A + B + J = 7u × 2

Difference 1u = $14

Cost of present = 20u
                 = 20 × $14
                 = **$280**

Qn 35
A   =   4u   A : B : C : D
B + C + D= 11u   4 : 5 : 2 : 4
B   =   5u
C + D   =   6u
C   =   1u ×2   Difference 2u = $400
D   =   2u ×2   1u = $200

Total sum   = 15u
            = 15 × $200
            = **$3000**

Qn 36

	Number	×	Value ($)	=	Total ($)
On time	18u	×	6	=	108u
Late	2u	×	4	=	8u
					116u

116u = 2320
1u   = 20

(a) Number of parcels delivered on time,
     18u = 20 × 18
         = **360**

(b) Amount did not collect = 2 × 20 × $(6 − 4)
                             = **$80**

Qn 37
Work backwards
A : B = 12: 5(40%)

Since 40% of B = 5 units,
20% of B = 2.5 units
and 60% of B = 7.5u

A = 12u – 7.5u = 4.5u (75%)
B = 5u + 7.5u = 12.5u

Since 75% of A = 4.5u, then 25% of A = 1.5u
A at first = 4.5u + 1.5u = 6u
B at first = 12.5u – 1.5u = 11u

(a)   A : B = **6 : 11**

(b)   5 units = 2.5 litres
1 unit = 2.5 litres ÷ 5 = 0.5 litres
A at first = 6 x 0.5 litres
= **3 litres**

Qn 38

$\frac{3}{5}$ of Joel's = $\frac{2}{3}$ of Matthew's

$\frac{6}{10}$ of Joel's = $\frac{6}{9}$ of Matthew's

Joel = 10u   Difference
Matt = 9u   5u = $35
Ben   = 5u   1u = $7

(a) J : M : B = **10 : 9 : 5**

(b) Total savings, 24u = 24 × $7
= **$168**

Qn 39
End
M : C = ($\frac{3}{4}$) 3 : 1 ($\frac{2}{5}$) = 6 : 2

Since $\frac{3}{4}$ of muffins = 6 units,

$\frac{1}{4}$ of muffins = 2 units (given away)

Muffins at first = 6u + 2u = 8u

Since $\frac{2}{5}$ of cupcakes = 2u,

$\frac{3}{5}$ of cupcakes = 3u (given away)

Cupcakes at first = 2u + 3u = 5u

Total at first = 8u + 5u = 13u
13u = 325
1u = 325 ÷ 13 = 25

Muffins given away = 2 x 25 = **50**

Qn 40

(a)   90% of original price = $1782
1% of original price = $1782 ÷ 90
= $19.80

100% of original price = $19.80 x 100
= **$1980**

(b)   120% of cost price = $1980
1% of cost price = $1980 ÷ 120
= $16.50

100% of cost price = $16.50 x 100
= **$1650**

Qn 41
Since ΔXYZ is isosceles,

∠MYN = 66º
∠MNY = 81º

(a)   ∠p = 180º - 66 º - 81º
= **33º**
(b)   ∠q = 180 º - 81 º - 81 º
= **18°**

Qn 42
A : B   B : C
$2^{\times 2}$: $3^{\times 2}$ $2^{\times 3}$: $3^{\times 3}$
4 : 6   6 : 9

Summary
A : B : C
4 : 6 : 9

Since all triangles have the same height,
area ratio = base ratio

area of triangle D = 9u + 4u – 6u
= 7u
7u = 70 cm²
1u = 10 cm²

Area of rectangle = (9u + 4u) × 2
= 26u
= 26 × 10
= **260 cm²**

Qn 43
Perimeter   = (16 × 2) + (x + 10) + (x + 10)
= (52 + 2x) m

Cost = 30(52 + 2x)
= **$(1560 + 60$x$)**

Qn 44
Perimeter of circle   = 2π(10 cm)
= 20π cm
Perimeter of figure
=   20π +(40 – 20) × 2 + 40
=   **(80 + 20π)**

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Qn 45

$$1 - \frac{1}{4} - \frac{2}{5} = \frac{20}{20} - \frac{5}{20} - \frac{8}{20}$$

$$= \frac{7}{20}$$

$\frac{7}{20}$ total = 154 cookies

$\frac{1}{20}$ total = 154 ÷ 7 = 22 cookies

(a) Total cookies baked = 22 x 20 = **440**

(b) Total cookies left = 22 x 8 = 176 cookies

Assume all packed into small boxes
4 x 30 = 120 cookies

Big difference = 176 – 120 = 56 cookies
Small difference = 12 – 4 = 8 cookies

No. of big boxes = 56 ÷ 8 = 7 big boxes
No. of small boxes = 30 – 7 = **23 small boxes**

Qn 46
Total cost

Watch	$1980	$2820
Clock	$1980	

$6780

$$\frac{\$6780 - \$2820}{2} = \$1980$$

3u of clocks cost $1980   5u of watches cost $4800
1u of clocks cost $660   1u of watches cost $960

Difference in 1u = $300
$$1u = \frac{\$300}{\$25} \text{ (12 items)}$$

Total number of watches and clocks,
8u = 8 × 12 items
  = **96 items**

Qn 47
Area of shaded part

$$= (12 \times 12 \times 3) \text{ cm}^2 - (\frac{1}{2} \times 12^2) \text{ cm}^2$$

$= 432 \text{ cm}^2 - 72 \text{ cm}^2$
= **360 cm²**

Qn 48
When both have the same height,

Ratio of volume = ratio of base area

Base Area (A) : Base Area (B)
  (12 × 5) : (10 × 4)
    3   :   2

Volume of water in Tank A = 12 × 5 × 12
                          = 720 cm³

Qn 48 (Cont.)

720 cm³ is to be shared between Tank A and Tank B in the ratio 3 : 2 respectively.
5u = 720 cm³
1u = 720 cm³ ÷ 5
   = 144 cm³

Volume of water transferred to tank B,
2u = **288 cm³**

Qn 49

	-48		+240 (left)
Calvin	2U (gave)	10U (left)	288
Elizabeth	9u (gave)	3u (left)	

Left behind

Calvin	10u	240
Elizabeth	3u	324

$$\frac{1}{6} = \frac{2}{12}$$

$$\frac{3}{4} = \frac{9}{12}$$

$$\frac{1}{6} \times 288 = 48$$
7u = 84
1u = 12

Total sweets Calvin had at first = 12u + 288
                                 = 12 × 12 + 288
                                 = **432**

Qn 50
Total 5 numbers = 60 × 5
               = 300
Total 6 numbers = 65 × 6
               = 390
Total 7 numbers = 63 × 7
               = 441

7th number = 441 – 390
            = **51**

Qn 51
B : C
5 : 4

$\frac{1}{2}$ of A + $\frac{1}{2}$ of B = 640 – 420
                = 220

A + B = 440
C   = 640 – 440 = 200

Since 4u = 200
   1u = 50
B + C, 9u = 9 × 50
       = 450

Number of sweets Annie had at first
               = 640 – 450
= **190**

Qn 52
Area of original rectangle
= 38m x 30m
= 1140m^2

Area of rectangle after removing shaded part
= 30m x 30m
= 900m^2

Shaded part
= 1140m^2 – 900m^2
= **240m²**

Sample Examination Paper 1 – Booklet A

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

6. (1) 7. (3) 8. (1) 9. (4) 10. (2)

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

16. 62° 17. $\frac{5}{14}$ 18. 48 19. 1000

20. $\frac{1}{250}$ 21. 50 22. 20 days

23. $99 24. $72

25. 45

26. $\frac{8}{12}$ = $\frac{2}{3}$ = $\frac{6}{9}$ Ans: **9**

27. $\frac{3}{5}$ N = 48, $\frac{1}{5}$ N = 16

   Number = 16 × 5
          = 80

   $\frac{1}{2}$ of number = 40 Ans : **40**

28. $\frac{2}{5}$ of red = $\frac{3}{4}$ of blue

   $\frac{6}{15}$ of red = $\frac{6}{8}$ of blue

   red = 15u

   blue = 8u Ans: $\frac{15}{8}$

29. Average = $\frac{9+(38\times2)+(23\times3)+(24\times4)}{100}$

            = **2.5**

30.
Daryl = 75% = 3 units x 4 = 12 units

Calvin = 100% = 4 units x 4 = 16 units

Daryl = 80% = 4 units x 3 = 12 units

John = 100% = 5 units x 3 = 15 units

Since Daryl is repeated, make the units of Daryl the same

Total = 12 units + 16 units + 15 units

     = 43 units

43 units = 215

1 unit = 215 ÷ 43 = 5

Daryl = 12 x 5 = **60**

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Sample Examination Paper 1 – Booklet B

1. Area of shaded part = $\frac{1}{2}$ × 14 cm × 18 cm
                        = **126 cm²**

2. $\angle$ UQT = 142° + 71° – 180°
            = **33°**

3. 85% of original → $d
   ÷ 17   ÷ 17
   5% of original → $$\frac{d}{17}$$

   100% of original → $$\frac{d}{17}$$ × 20 = $$\frac{20d}{17}$$
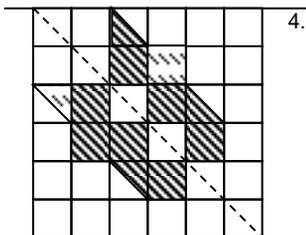
4.

5. Difference = $120
   End, Imran = (50%) 1u
        Jason = (100%) 2u

   Difference, 1u = $120
   Amount each spent = $200 – $120
                      = **$80**

6.

Janet			$60	+$90
Tony	1U	–$90		

(3u spans the whole width)
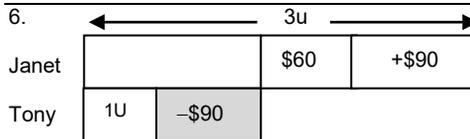
2u = $90 + $60 + $90
   = $240

1u = $120

Janet at first, 3u – $90 = (3 × 120) – 90
                        = **$270**

7. $\angle c + \angle d$ = 180° – 25°
            = 155° (sum of angles in a triangles)

   $\angle a + \angle b$ = 180° – 25°
            = 155° (2 interior $\angle$ = 1 exterior $\angle$)

   $\angle a + \angle b + \angle c + \angle d$ = 155° × 2 = **310°**

8. Area of shaded part = $\frac{1}{2}$ × 20 cm × 20 cm × 2
                        = **400 cm²**

9. Total (A + B) = $5200 × 2
                 = $10 400
    Total (B + C) = $3800 × 2
                 = $7600
    Difference, 2u = $10 400 − $7600
                 = $2800
    1u = $1400
      Benson = $7600 − (3 × 1400)
                = **$3400**

---

10 ∠*FBE* = 90°

(a) ∠*DFB* = 90° + 28°
             = **118°** (2 interior ∠ = 1 exterior ∠)

     ∠*DFC* = 180° − 118° = **62°**

(b) ∠*BDF* = 45° − 28° = **17°**

11.
   Before
   Pears   = 1u ⎫
   Oranges = 2u ⎬×3 = 3u
                        = 6u

   After
   Pears   = 3u
   Oranges = 5u
   Difference in oranges = 1u
   1u   = 8
   Total number of fruits, 9u = 9 × 8
                             = **72**

---

12. $\frac{1}{4}$ of total + $10

Total

   $\frac{3}{4}$ of total − $10 ——— $\frac{2}{5}$ of remainder + $15

                        $\frac{3}{5}$ of remainder − $15
                                  $33

$\frac{3}{5}$ of remainder = $33 + $15
            = $48
$\frac{1}{5}$ of remainder = $48 ÷ 3
            = $16

Remainder   = $16 × 5
            = $80
$\frac{3}{4}$ of total − $10 = $80
$\frac{3}{4}$ of total   = $90

$\frac{1}{4}$ of total   = $90 ÷ 3
            = $30
Total amount of money at first = $30 × 4
                             = **$120**

---

13. In 1 h, Mr Tan would paint $\frac{1}{6}$ of the house.

In 1 h, Mr Tan + Krishnan would paint $\frac{1}{4}$ of the house.

Krishnan would paint $\frac{1}{4} - \frac{1}{6} = \frac{1}{12}$ of the house in 1 h.

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

14.
(a) Cost of ticket = 80% x $18
             = $\frac{80}{100}$ x $18
             = **$14.40**

(b) Additional ticket cost = 75% x $18
             = $\frac{75}{100}$ x $18
             = $13.50
$95.40 − $14.40 = $81
$81 ÷ $13.50 = 6

Total tickets Celine bought = 6 + 1 = **7 tickets**

15.
At first

Left

$\frac{2}{5} = \frac{8}{20}$

$\frac{3}{4} = \frac{15}{20}$

7u = 64 − 36
  = 28
1u = 4

Chocolate pies at first = 20u + 60
                = 20 × 4 + 60
                = **140**

---

16. Area = big semicircle − $3\frac{1}{2}$ small circles

    = $\frac{\pi(30)^2}{2} - \frac{7}{2}\pi(10)^2$
    = **314 cm²**

---

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

(b) Number of unshaded triangles in Figure 50
        = 1 + 2 + 3 + …+ 50 = $\frac{50(51)}{2}$ = **1275**

(c) Total number of triangles in Figure 100
        = 101 × 101
        = **10 201**

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Sample Examination Paper 2 – Booklet A

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

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

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

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

21. 2 m 22. $20\frac{1}{4}$ w 23. 350 24. 126

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

$\frac{1}{2}$ of total = 48

Total at first = 48 × 2
= **96**
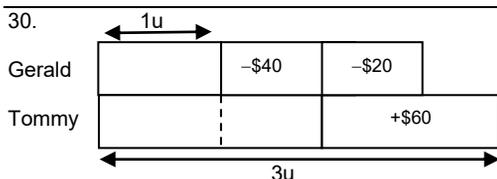
26. $\angle y = 180° – 90° – 20°$
= **70°**

27. 2 apples + 3 oranges = \$2.10
1 apple + 1 orange = \$0.85
×2   ×2   ×2   Compare

2 apples + 2 oranges = \$1.70   1 orange = **40 cent**
Ans: **40 cents or \$0.40**

28. \$26 – 3(\$7) = \$5
3 + 3 + 3 + 2 = **11**

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

30.

	1u		
Gerald		–\$40	–\$20
Tommy			+\$60

3u

2u = \$60 + \$40 = \$100
1u = \$50

Gerald = 1u + \$60
= \$50 + \$60
= **\$110**

Sample Examination Paper 2 – Booklet B

1. Total sweets = 40 × 4 + w = 160 + w
2.
Total needed for each student to receive 6 sweets
= 40 × 6
= 240

Extra sweets needed = 240 – 160 – w
= **80 – w**

2. 1st watch = $\frac{70}{100}$ × \$150

= \$105
Loss = \$45

2nd watch = $\frac{120}{100}$ × \$150

= \$180
Profit = \$30
Overall loss = **\$15**

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3. $\angle BCD = 130°$
(a) $\angle BCE = 130° – 30°$
= **100°**

(b) $\angle BCE = \angle CED$
$\angle AEC = 180° – 100°$
= **80°**

4. Volume of solid = 12 × 1 cm³
= **12 cm³**

5.

	Number	×	Value (legs)	=	Total Legs
Chickens	2u	×	2	=	4u
Horses	1u	×	4	=	4u
					8u

8u = 152
1u = 152 ÷ 8
= 19

Chickens, 2u = 19 × 2
= **38**

6.

Square			Rectangle		
Unshaded	:	shaded	Shaded	:	Unshaded
2	:	1	4	:	3
8	:	4			

Fraction of figure unshaded = $\frac{8+3}{8+3+4} = \frac{11}{15}$

7. Since all 3 triangles share the same height, area ratio
will be equal to base ratio
14 : 6 : 14 = 7 : 3 : 7

7u = 56 cm²
1u = 8 cm²

Total unshaded, 10u = **80 cm²**

8.

	cups		
\$84			

$\frac{4}{5}$ of total $\frac{1}{5}$ of total
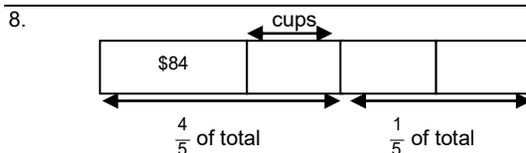
$\frac{1}{5}$ T = 2u

$\frac{5}{5}$ T = 10u

10u – 3u = 7u

7u – 84
1u = 84 ÷ 7
= 12
10u = 10 x 12
= 120
Mrs Krishnan have **\$120** at first

9. Volume = 5u × 3u × 3u
= 1215 cm³
1u × 1u × 1u = 1215 ÷ 45 = 27 cm³
1u = 3 cm

Area of base = 3 unit × 3 unit
= (3 × 3) × (3 × 3)
= 9 × 9
= **81 cm²**

10.

John	=	1u	×2	=	2u
Sister	=	4u		=	8u
Difference	=	3u	×2		6u

In 14 yrs time,

John	=	3u	×3	=	9u
Sister	=	5u		=	15u
Difference	=	2u			6u

Increase each = 7u = 14 years
1u = 2 years

John is now = 2 × 2 years
= **4 years old**

11.

Volume of 1 cube = 1cm x 1cm x 1cm
= 1cm³

14cm – 2cm = 12cm
8cm – 2cm = 6cm
5cm – 1 cm = 4cm (open)

Internal volume = 12cm x 6cm x 4cm
= 288cm³

No. of cubes not touching the surface
= 288cm³ ÷ 1cm³
= **288 cubes**

12.

100% 〈 40% wife
60% himself (remainder)

Increase

130% 〈 wife $\frac{40}{100}$ × 130% = 52%
himself 130% – 52% = 78%

Increase (wife), 12% of total → $360
1% of total → $30

Income before, 100% of total
→ 100 × $30 = **$3000**

13.

Total 〈 30% of total + $40 jewellery box
70% of total – $40

50% remainder + $10 CD
50%remainder – $10 left } $54

50% remainder → $54 + $10 = $64
Remainder → $64 × 2 = $128

70% of total – $40 → $128
70% of total → $168

10% of total → $24
100% of total → $24 × 10 = **$240**

---

14. (a) P = 1 small circle + 1 big semicircle + 24 cm
= 2π(6) + π(12) + 24
= **99 cm**

(b) Area = square – small circle – big semicircle

$$= (24 \times 24) - \pi(6)^2 - \frac{\pi(12)^2}{2}$$

= **237 cm²**

15.

	Elias	:	Roy	
×5 {	(30%) 3u	:	10U (100%)	} ×4
×5	+50		+25	×4
	(80%) 4p	:	5p (100%)	

Elias	15u	250
Roy	40u	100

25u = 150
1u = 150 ÷ 25
= 6

Elias at first, 3u = 3 × 6
= **18**

16.
At first

In the end

1u = 30 – 16 – 8
= 6

Number of boys at first = 6 × 3 + 12
= 18 + 12
= **30**

---

17 (a) Total unshaded in Figure 10= 10 × 11
= **110**

(b) Total unshaded in Figure 50= 50 × 51
= **2550**

(c) (Figure No.) × (Figure No. + 1) = 600
24 × 25 = 600

Therefore **Figure 24**.