The +hinkingMath Handy Guide
Volume 2

Misconception due to misinterpretation or an inability to understand context often occurs and gives rise to errors when solving mathematical word problems, short-answer and even multiple-choice questions.

This can be frustrating when you thought that your child has fully grasped all mathematical concepts and worked tirelessly through all materials to reinforce understanding and yet he could not get the questions right. Why is this so? And what can you do about it?

This +hinkingMath Handy Guide, developed by the onSponge team, addresses the 12 most common misconceptions about word problems. Presented in an easy-to-understand format, it explains how each misconception arises and how students can avoid it. This guide aims at reinforcing the areas of improvement — with a study of the reasons and practice questions, it will help eliminate errors due to misconceptions and bring your child closer to that A/A*.

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MISCONCEPTIONS CLARIFIED

Volume 2

Your Last Sprint To

Learning Resource By

onSponge™

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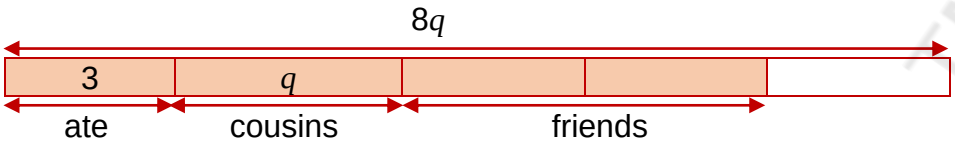
Solutions to Misconceptions Clarified Volume 2

1.



Remaining chocolates $= 8q - q - 3$

$= 7q - 3$

Chocolates left $= \frac{7q-3}{3}$

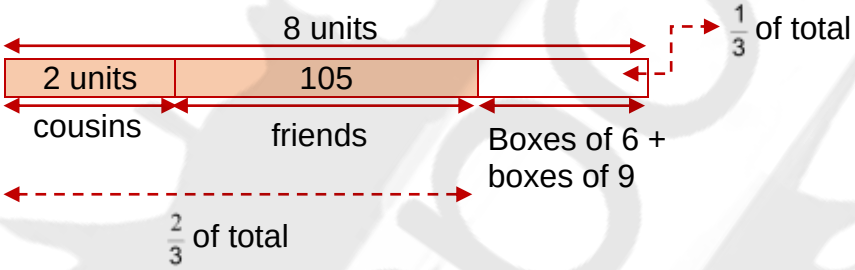
2. Cost of dress $= \$2a$

Money left $= \$15a - \$a - \$2a - \$40$

$= \$(12a - 40)$

Each friend $= \$\frac{12a-40}{4}$ or $\$(3a-10)$

3.



(a) $\frac{2}{3}$ Total $= 2$ units $+ 105$

$\frac{1}{3}$ Total $= 1$ unit $+ 52.5$

$\frac{3}{3}$ Total $= 3$ units $+ 157.5$

8 units $= 3$ units $+ 157.5$

5 units $= 157.5$

1 unit $= 157.5 \div 5$

$= 31.5$

Remaining shells packed in boxes of 6 and boxes of 9

$= 31.5 + 52.5$

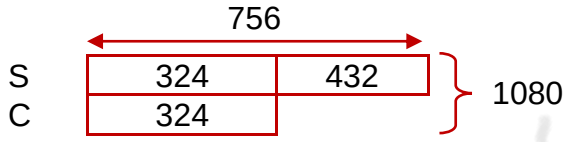
$= \mathbf{84}$

(b) Using Quantity x Value Method

Items	Quantity	x	Value (shells)	Total value (shells)
Box of 6	1 part	×	6	6 parts
Box of 9	1 part + 1	×	9	9 parts + 9
Total	2 parts + 1			15 parts + 9

15 parts + 9 = 84
15 parts = 84 – 9
= 75
1 part = 75 ÷ 15
= 5
Painted shells in boxes of 6 = 6 × 5
= **30**

4. Using model to represent the total number of C and S.



(a) 1080 – 432 = 648
648 ÷ 2 = 324
S made = 324 + 432
= **756**

Items	Quantity	x	Value (food)	Total value (food)
(S) Paper bags	4 units	×	1 part	4up (756)
(C) Boxes	1 unit	×	1 part + 5	1up + 5u (324)
Total				

(b) 4up = 756
1up = 756 ÷ 4
= 189

5 units = 324 – 189
= 135
1 unit = 135 ÷ 5
= 27
No. of curry puffs in each box = 324 ÷ 27
= **12**

5. (a) Take note that the price of the 2nd comic book must be must either be the same or lower in price from the 1st comic book.

	Original price	Discount	Discounted price
1st	40	$\frac{20}{100} \times 40 = 8$	40 – 8 = 32
2nd	25	$\frac{30}{100} \times 25 = 7.50$	25 – 7.5 = **17.50**

(b)

	Discounted price	Discount	Original price
1st	80.5 units	20%	80% → 80.5 units 100% → 100.625 units
2nd	70 units	30%	70% → 70 units 100% → 100 units
Total	150.5 units ($86)		

150.5 units = $86
1 unit = $86 ÷ 150.5
= $\$\frac{4}{7}$

100.625 units = 100.625 × $\$\frac{4}{7}$
= **$57.50**

6.

	No. of candles	Cost of each	Total cost
Striped	$\frac{30}{100} \times 40 = 12$	$4	12 × $4 = $48
Plain	40 – 12 = 28	$3	28 × $3 = $84
Total	40		$48 + $84 = $132

Total paid after discount = $\frac{80}{100} \times \$132$
= **$105.60**

7.

Original price	Discount	Discounted price	Final discounted price
100 units	35%	$\frac{65}{100} \times 100 = 65$	$\frac{93}{100} \times 65 = 60.45$

Change = 100 units – 60.45 units
= 39.55 units

Percentage discount = $\frac{39.55}{100} \times 100\%$
= **39.55%**

8.

Months	Original price	Discount	Discounted price
January	100 units	15%	$\frac{85}{100}\times 100 = 85$
February	100 units	40%	$\frac{60}{100}\times 100 = 60$

(a) Difference = 85 units – 60 units
= 25 units

25 units = \$175

1 unit = \$175 ÷ 25
= 7

Cost of mattress in Feb = 60 × \$7
= \$420

(b) Cost of mattress with GST = $\frac{107}{100}\times$\$420
= **\$449.40**

9. 25% → 50

75% → 3 × 50 = 150

Foreign notes received = 150 – 88
= **62**

10. Overall increased in the total number of people
= 380 – 130
= 250

At first			In the end		
B	:	A+G	B	:	A+G
$9^{\times 2}$	:	$16^{\times 2}$	$6^{\times 3}$	:	$19^{\times 3}$
18	:	32	18	:	57

57u – 32u = 25u

25 units = 250
1 unit = 250 ÷ 25
= 10
18 units = 18 × 10
= **180** (a)

A + G (end) = 57 × 10
= 570

570 – 260 = 310

310 ÷ 2 = 155 (A in the end)

G (end) = 155 + 260

= 415

G (at first) = 415 – 380

= 35

A (at first) = 155 + 130

= 285

Ratio (at first) = 35 : 285

= **7 : 57**

11. Multiples of 9 : 9, 18, 27, 36, 45 …

+2 : 11, 20, 29, 38, 47 …

Multiples of 5 : 5, 10, 15, 20, 25, 30, 35, 40 …

+3 : 8, 13, 18, 23, 28, 33, 38, 43 …

Distance from first black stick to last black stick within groups of 38 cm

= 38 cm – 3 cm

= 35 cm

No. of gaps = 35 cm ÷ 5 cm

= 7

No. of sticks = 7 + 1

= **8**

12. First common multiple of 0.6 m and 0.5 m is 3 m.

Blue ribbon : no. of groups of 0.6 m = 3 ÷ 0.6

= 5

No. of big buttons = 5 × 8

= 40

Yellow ribbon : no. of groups of 0.5 m = 3 ÷ 0.5

= 6

No. of small buttons = 6 × 5

= 30

For every group of 3 m, there are 10 more big than small buttons.

No. of groups of 3 m = 120 ÷ 10

= 12

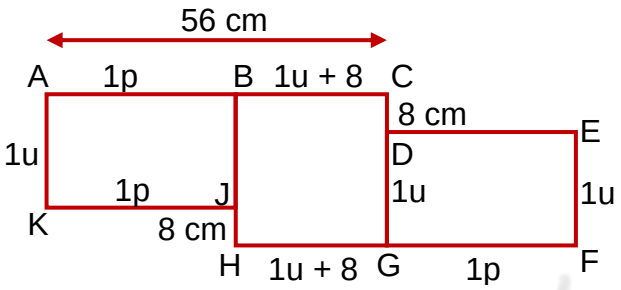
Total no. of buttons in every 3 m of ribbon = 40 + 30

= 70

Total no. of buttons Jothi used in all = 70 × 12

= **840**

13.



1p + 1u + 8 = 56

1p + 1u = 56 – 8

= 48

Perimeter of rectangle = perimeter of square

2p + 2u = 1u + 8 + 1u + 8 + 1u + 8 + 1u + 8

2p + 2u = 4u + 32

1p + 1u = 2u + 16

2u + 16 = 48

2u = 48 – 16

= 32

1u = 32 ÷ 2

= 16

1p = 48 – 16

= 32

Area of each rectangle = 32 cm × 16 cm

= 512 cm^2

Length of each square = 16 cm + 8 cm

= 24 cm

Area of square = 24 cm × 24 cm

= 576 cm^2

Total area of figure = 512 cm^2 + 512 cm^2 + 576 cm^2

= **1600 cm^2**

14.

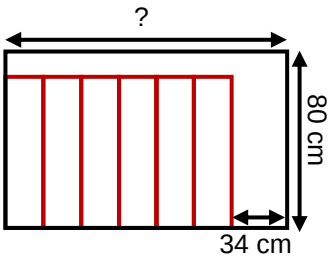


Figure 1: Arrangement A

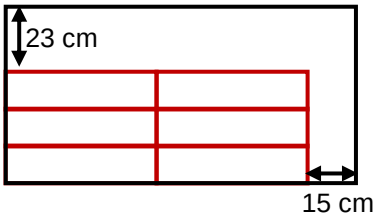


Figure 2: Arrangement B

Width of 3 containers = 80 cm – 23 cm

= 57 cm

Width of 1 container = 57 cm ÷ 3

= 19 cm

Width of 6 containers = 6 × 19 cm

= 114 cm

Length of box = 114 cm + 34 cm

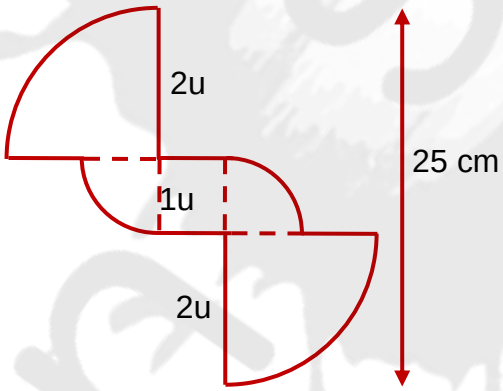
= **148 cm** (a)

Using Arrangement B, a box can fit a total 8 containers.

No. of boxes needed = 275 ÷ 8

≈ **35** (b)

15.



5 units = 25 cm

1 unit = 25 cm ÷ 5

= 5 cm

Circumference of 2 big quadrants $= 2 \times \frac{1}{4} \times 3.14 \times 2 \times 10$ cm

$= 31.4$ cm

Circumference of 2 small quadrants $= 2 \times \frac{1}{4} \times 3.14 \times 2 \times 5$ cm

$= 15.7$ cm

Perimeter of figure $= 15.7$ cm $+ 31.4$ cm $+ 2 \times 10$ cm $+ 4 \times 5$ cm

$=$ **87.1 cm**

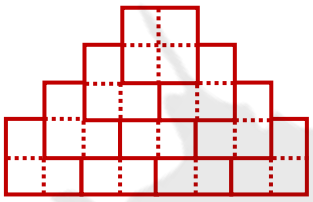
16. Total perimeter = Circumference of 2 semicircles + Circumference of quadrant

$= 2 \times \frac{1}{2} \times 3.14 \times 10$ cm $+ \frac{1}{4} \times 3.14 \times 2 \times 10$ cm

$= 47.1$ cm

17. Length of each square card $= \sqrt{256 \text{ cm}^2}$

$=$ **16 cm** (a)



Perimeter of card $= 26 \times 8$ cm

$=$ **208 cm** (b)

Each card is divided into 4 parts, with each part with an area of

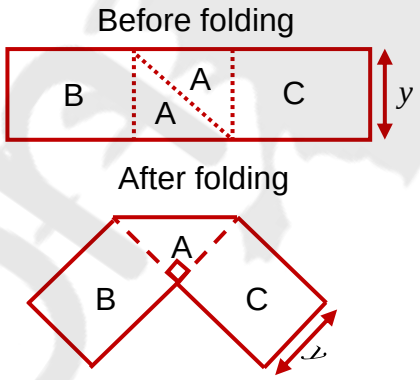
$= 8$ cm $\times 8$ cm

$= 64$ cm^2

Area of card covered in purple $= 28 \times 64$ cm^2

$=$ **1792 cm^2** (c)

18.



1 unit = 32 cm^2

8 units = 8 × 32 cm^2

= **256 cm^2** (a)

Area of 2A = 32 cm^2 + 32 cm^2

= 64 cm^2

Length of y = $\sqrt{64\ cm^2}$

= **8 cm** (b)

19. Half- filled, height occupied by cubes = 6 cm ÷ 2

= 3 cm

No. of cubes along the length = 12 cm ÷ 1 cm

= 12

No. of cubes along the width = 3 cm ÷ 1 cm

= 3

No. of cubes along the height = 3 cm ÷ 1 cm

= 3

Total no. of cubes in the box = 12 × 3 × 3

= **108**

20. Volume of water in the tank = $\frac{3}{5}$ × 25 cm × 15 cm × 10 cm

= 2250 cm^3

Volume of each ice cube = 2 cm × 2 cm × 2 cm

= 8 cm^3

No. of ice cubes made = 2250 cm^3 ÷ 8 cm^3

≈ **281**

21.

Statement	True	False	Not possible to tell
Area of Figure 1 is equal to area of Figure 2.	✓		
Perimeter of Figure 1 is equal to perimeter of Figure 2.		✓	

For the first statement, since the number of rectangles in both figures are the same, and these rectangles are identical, the area of the figures are equal.

For statement 2,

The length of each identical rectangle is 3 times its breadth.

Perimeter of Figure 1 is made up of 6 lengths and 2 breadths which is the same as 20 breadths.

Perimeter of Figure 2 is made up of 4 lengths and 6 breadths which is the same as 18 breadths.

Hence, the perimeter of Figure 1 is more than the perimeter of Figure 2.

22. No. of cubes in Figure A = 16

No. of cubes that make up Figure B = 3 × 3 × 3

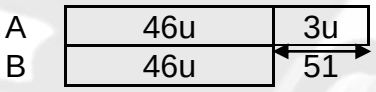
= 27

No. of cubes needed = 27 – 16

= **11**

23.

Team	No of pupils	×	Average score	Total score
A	1u	×	49	49u
B	1u	×	46	46u



3 units = 51

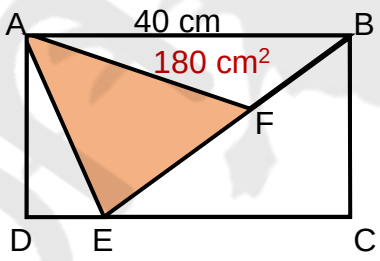
1 unit = 51 ÷ 3

= 17

46 units = 46 × 17

= **782**

24.



AB = CD = 40 cm

AD = BC = $\frac{124 - 40 - 40}{2}$

= 22

Area of triangle ABE = $\frac{1}{2}$ Area of rectangle ABCD

= $\frac{1}{2}$ × 40 cm × 22 cm

= 440 cm^2

Area of triangle AEF = 440 cm^2 – 180 cm^2

= **260 cm^2**

25. Since ABDE and CDFG are straight lines,

∠CBD = 79° (vertically opposite angles)

∠EFD = 115° (vertically opposite angles)

∠CDB = ∠EDF (vertically opposite angles)

Difference between ∠BCD and ∠DEF = 115° − 79°

= **36°**

26. Painted base = 40 cm × 10 cm

= 400 cm^2

Painted left and right faces = 2 × 10 cm × 20 cm

= 400 cm^2

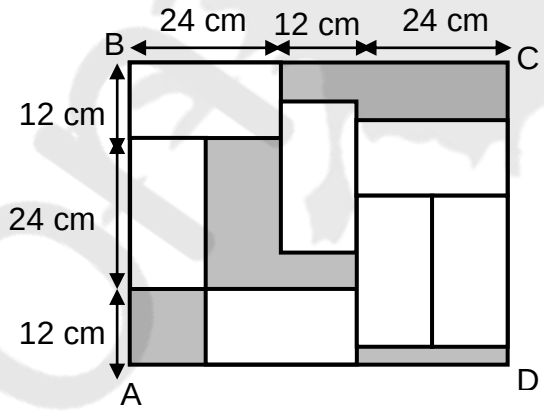
Painted front and back faces = 2 × 40 cm × 20 cm

= 1600 cm^2

Total painted area = 400 cm^2 + 400 cm^2 + 1600 cm^2

= **2400 cm^2**

27.



Area of each identical rectangle = 24 cm × 12 cm

= 288 cm^2

Area of ABCD = 60 cm × 48 cm

= 2880 cm^2

Shaded area = 2880 cm^2 – 7 × 288 cm^2

= **864 cm^2**

28. Length of 1 revolution (big wheel) = $\frac{22}{7}$ × 84 cm

= 264 cm

Length of 1 revolution (small wheel) = $\frac{22}{7}$ × 35 cm

= 110 cm

Total of 1 revolution each = 264 cm + 110 cm

= 374 cm

No. of revolutions = 2750 ÷ 374

≈ **7**

29. Draw a table to show the shaded and unshaded squares for each figure.

Figure	No. of shaded squares	No. of unshaded squares	Total no. of squares
1	0	1	1
2	2	1	3
3	2	4	6
4	6	4	10

Total no. of squares in Figure 126 = $\frac{126 \times 127}{2}$

= **8001** (a)

For every even row, difference is half of the row no.

Difference in Figure 126 = 126 ÷ 2

= **63** (b)

30. Area of 1 face = 75 cm^2 ÷ 3

= 25 cm^2

Length of each cube = $\sqrt{25\ cm^2}$

= 5 cm

Volume of figure = 10 × (5 cm × 5 cm × 5 cm)

= **1250 cm^3**

31.

Statement	True	False	Not possible to tell
There are more adults than children.		✓	
There are more boys than girls.	✓		

A	:	B+G	:	Total
2	:	3	:	5

G	:	A+B	:	Total
1	:	4	:	5

Summary

A	:	G	:	B
2	:	1	:	2

For the first statement, since the number of adults is 2 units and the number of children is 3 units, there are more children than adults.

For the second statement, the number of boys is 2 units and the number of girls is 1 unit. Hence, there are more bots than girls.