5th Grade: Unit 1 Study Guide

Name: Key Date: _____

1. **Use the image to answer the following question.**

   A: What is the volume of the package below? 128 cubes

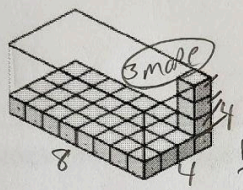
   B. Part B: How many more cubes are needed to fill the packing box? 93 more cubes

(A) V = l × w × h
l = 4
w = 8
h = 4
(4 × 8) × 4
32 × 4

32 × 4
32
32
32
32
128

or

32 × 4
30 + 2
4 | 120 | 8 = 128



B. Holds → 128
Cubes IN Box Already 35
93 more Needed

Base = Bottom
8 × 4 = 32 + 3 more = 35

2. **You are designing a toy box that needs to be able to hold 60 cubic meters of toys. What might the dimensions be? Choose all that apply.** Volume

   ~~A.~~ 6 m × 10 m = $60 m^2$ → squared
   B. 2 m × 3 m × 10 m = $60 m^3$ or cubic m
   ~~C.~~ 6 m × 6 m × 6 m × 6 m = NO - Not cubic
   ~~D.~~ 20 m × 20 m × 20 m = too big NO
   E. $15 m^2 \times 4 m = 60 m^3$

   15 × 4
   10 + 5
   4 | 40 | 20 = 60

   Volume = 60 cubic meters

B, E

3. **How many 1-inch cubes are needed to fill a box that is 14 inches long, 2 inches wide, and 8 inches high? Explain your answer.**

L = 14 in
w = 2 in
h = 8 in

$V = \frac{14 \times 2 \times 8}{28 \times 8}$

14 × 2
14
+ 14
28

28 × 8
20 + 8
8 | 160 | 64
160
+ 64
224

1 - 8
2 - 16
3 - 24
4 - 32
5 - 40
6 - 48
7 - 56
8 - 64

224 inch cubes are needed to fill the box.

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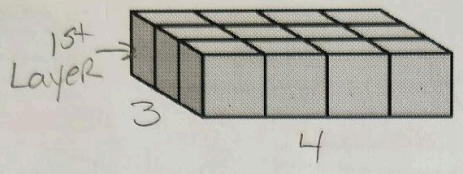
4. Ruben is designing a blockhouse. The bottom floor of the blockhouse is shown.

Base

Base = l x w



Base = 4 x 3

B = 12 in²

If Ruben wants the blockhouse to have a volume of 60 cubic inches, how many layers, exactly like the first layer, will he need to add to get to the needed volume? Show your work.

V = 60 cu. in

h = 5 in

60 cu. in. ÷ 12 in² = h

5

How many need to be Added

5 layers − 1 layer = 4 more Layers

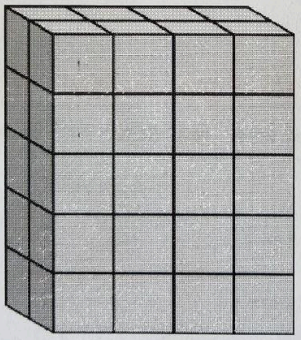
5 – 12 – 60
4 – 12 – 48
3 – 12 – 36
2 – 12 – 24
1 – 12 – 12

5. A Toy Company packs cubic blocks into packages. Each package is shaped like the figure shown.

l = 4 cubes

w = 2 cubes

h = 5 cubes



Solve the Expression

(4 x 2) x 5

8 x 5

40

Part A: Write an expression to determine the volume of the package.

Base h

8 x 5 OR 4 x 2 x 5

l x w x h

Part B: Find the total volume of the package. 40 cubic units OR 40 cubes

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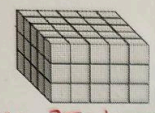
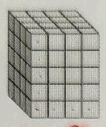
6. Which rectangular prism has the greatest volume? Show the volume of each to justify.

A.



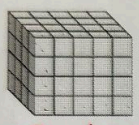
V = 75 cubic units

C.



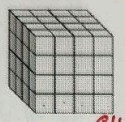
V = 80 cubic units

B.



V = 80 cubic units

D.



V = 64 cubic units

A. l = 5, w = 5, h = 3 — (5 × 5) × 3 = 25 × 3 = 75 (25 + 25 + 25 = 75)

B. l = 5, w = 4, h = 4 — (5 × 4) × 4 = 20 × 4 = 80 (20 + 20 + 20 + 20 = 80)

C. l = 4, w = 4, h = 5 — 4 × 4 × 5 = 16 × 5 = 80 (10 + 6: 5 × 50 | 30)

D. 4 × 4 × 4, l = 4, w = 4, h = 4 — 16 × 4 = 64 (10 + 6: 4 × 40 | 24)

7. Saud's school box is 20 inches long, 5 inches wide, and 2 inches high. What is the volume of the school box?

l = 20 in
w = 5 in
h = 2 in

$20 \times 5 \times 2$

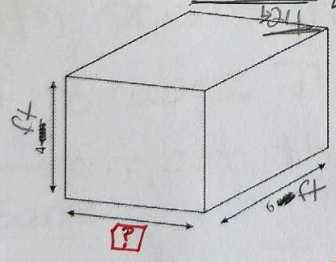
$5 \times 2 = 10$

$20 \times 10 = 200$

The school box has a volume of 200 cubic inches.

8. A toy chest has a volume of 120 cubic feet. How wide is the toy chest?

$V = 120\ ft^3$
$l = 6\ ft$
$h = 4\ ft$



$6 \times 4 \times ? = 120\ ft^3$

24

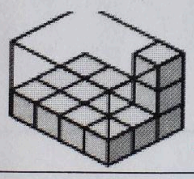
$120 \div 24 = w$

check: 24×5 — $20 + 4$; $5 \times 100 \mid 20 = 120$

24 − 1 ft; + 24 − 2 ft; 48; + 24 − 3 ft; 72; + 24 − 4 ft; 96; + 24 = 5 ft; 120

The toy chest is 5 feet wide.

9. Givinchi partially fills a rectangular prism with unit cubes, as shown. What is the volume of the rectangular prism?



l = 3
w = 4
h = 3

$3 \times 4 \times 3$

12×3

36

12 + 12 + 12 = 36

The volume is 36 cubic units.

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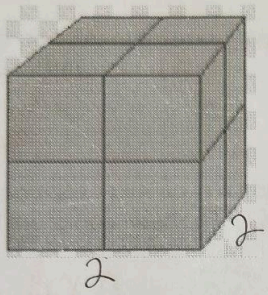
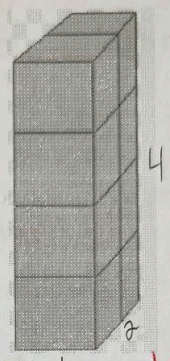
10. Analiah and Aeesha each build a figure using centimeter cubes.



2x2x2
4x2
8

Aeesha's Box

V=8 cubic units



1x2x4
2x4
8

V=8 cubic units

Anaila's Box

Anaila says her figure has greater volume than Aeesha's figure because it is taller. Is Is Analia correct? Explain your thinking. ← written Response

No, Analia is not correct. Both prisms have the same volume of 8 cubes. The dimensions are different, but the total volume is the same.

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11. James is planning a ping-pong ball party for his family and friends. He wanted to have 6 sets of paddles available for the party. The paddles will be shipped to James's house for the party and must be in boxes.

Wants 6 sets of paddles

Each set of paddles requires a base area of 96 square inches when placed flat and a height of 3 inches.

one set = $96in^2 \times 3in$

$B = 96in^2$

$h = 3in$

Part A

If a set of paddles is placed in a box with the given paddles dimensions, what is the volume of the space needed?

Find the Volume of 1 set

$V = B \times h$

B h

96×3

Area Model

90 + 6

3	270	18

270 + 18 = 288

Repeated Addition

96 + 96 + 96 = 288 (3 times)

9 18 27

$V = 288in^3$ of one set

Part B

If the paddles were set on top of the other, what is the volume of a box that would hold all 6 sets of paddles?

288×6

$1set = 288in^3$

wants 6 sets

Area Model

200 + 80 + 8

6	1200	480	48

1200 + 480 + 48 = 1728

For All 6 sets

The box would have A volume of $1,728in^3$

6's

1 - 6
2 - 12
3 - 18
4 - 24
5 - 30
6 - 36
7 - 42
8 - 48