

# Rectangular Prisms

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 24

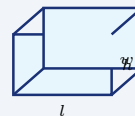
## Quick Review and Helpful Hints

A rectangular prism (a box) has length  $l$ , width  $w$ , and height  $h$ . Its *volume* is  $V = l \times w \times h$ , and its *surface area* is  $SA = 2(lw + lh + wh)$ . Use cubic units for volume and square units for surface area.

► **Example:** Find the volume of a box with  $l = 5$ ,  $w = 3$ , and  $h = 4$ .

**Work:** Multiply all three dimensions:  $V = l \times w \times h = 5 \times 3 \times 4$ .

★ **Answer:** 60 cubic units

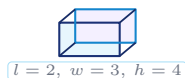


$$V = l \times w \times h.$$

### Practice Problems

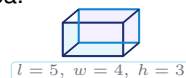
Use each prism illustration to find the volume or surface area.

1. Find the volume.



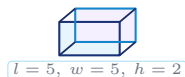
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8. Find the surface area.



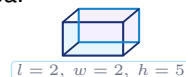
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2. Find the volume.



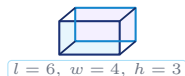
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9. Find the surface area.



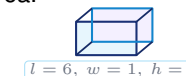
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3. Find the volume.



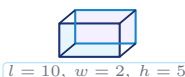
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10. Find the surface area.



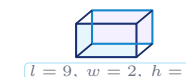
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4. Find the volume.



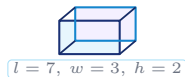
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11. Find the volume.



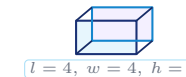
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5. Find the volume.



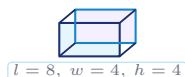
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12. Find the volume.



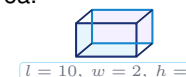
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6. Find the volume.



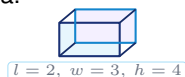
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13. Find the surface area.



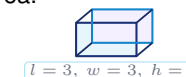
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7. Find the surface area.



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14. Find the surface area.



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◆ Word Problems

15. A shipping box is 12 in long, 6 in wide, and 4 in tall. Find its volume.



$$l = 12, w = 6, h = 4$$

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16. An aquarium is 20 cm long, 10 cm wide, and 15 cm tall. How much water (volume) can it hold?



$$l = 20, w = 10, h = 15$$

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17. A box is 5 ft by 4 ft by 2 ft. Find the total surface area to know how much cardboard is needed.



$$l = 5, w = 4, h = 2$$

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18. A storage container measures 8 m by 3 m by 3 m. Find its volume.



$$l = 8, w = 3, h = 3$$

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19. A cereal box has a volume of 480 cubic inches. It is 12 in long and 5 in wide. Find its height.



$$l = 12, w = 5, h = ?$$

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20. An open-top planter is 6 ft long, 3 ft wide, and 2 ft tall. Find the outside area of the bottom and four sides.



$$l = 6, w = 3, h = 2$$

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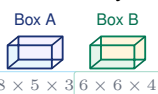
21. A gift box is 9 in long, 4 in wide, and 3 in tall. Ribbon goes once around length and height, and once around width and height. How many inches of ribbon are needed?



$$l = 9, w = 4, h = 3$$

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22. Box A is 8 in by 5 in by 3 in. Box B is 6 in by 6 in by 4 in. How many more cubic inches does Box B hold than Box A?



$$8 \times 5 \times 3 \quad 6 \times 6 \times 4$$

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23. A display block is 4 ft long, 3 ft wide, and 2 ft tall. Paint costs 0.50 per square foot. Find the total cost to paint all outside faces.



$$l = 4, w = 3, h = 2$$

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24. A rectangular prism has surface area 94 square cm. Its length is 5 cm and its width is 4 cm. Find its height.



$$l = 5, w = 4, h = ?$$

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## Answer Keys

- |        |        |                          |                        |
|--------|--------|--------------------------|------------------------|
| 1. 24  | 7. 52  | 13. 64                   | 19. 8 in               |
| 2. 50  | 8. 94  | 14. 54                   | 20. 54 ft <sup>2</sup> |
| 3. 72  | 9. 48  | 15. 288 in <sup>3</sup>  | 21. 38 in              |
| 4. 100 | 10. 54 | 16. 3000 cm <sup>3</sup> | 22. 24 in <sup>3</sup> |
| 5. 42  | 11. 36 | 17. 76 ft <sup>2</sup>   | 23. 26 dollars         |
| 6. 128 | 12. 64 | 18. 72 m <sup>3</sup>    | 24. 3 cm               |

### Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The prism shows  $l = 2$ ,  $w = 3$ , and  $h = 4$ . Volume is  $lwh = 2 \times 3 \times 4 = 24$ . So the final answer is 24.
2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Use the three labeled dimensions:  $5 \times 5 \times 2 = 50$ . So the final answer is 50.
3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Volume =  $6 \times 4 \times 3 = 72$ . So the final answer is 72.
4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Volume =  $10 \times 2 \times 5 = 100$ . So the final answer is 100.
5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Volume =  $7 \times 3 \times 2 = 42$ . So the final answer is 42.
6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Volume =  $8 \times 4 \times 4 = 128$ . So the final answer is 128.
7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Surface area is  $2(lw + lh + wh)$ . With 2, 3, 4:  $2(6 + 8 + 12) = 52$ . So the final answer is 52.
8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Surface area =  $2(5 \cdot 4 + 5 \cdot 3 + 4 \cdot 3) = 2(47) = 94$ . So the final answer is 94.
9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Surface area =  $2(2 \cdot 2 + 2 \cdot 5 + 2 \cdot 5) = 2(24) = 48$ . So the final answer is 48.
10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Surface area =  $2(6 \cdot 1 + 6 \cdot 3 + 1 \cdot 3) = 2(27) = 54$ . So the final answer is 54.
11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The labeled dimensions give volume =  $9 \times 2 \times 2 = 36$ . So the final answer is 36.
12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Volume =  $4 \times 4 \times 4 = 64$ ; this prism is also a cube. So the final answer is 64.
13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Surface area =  $2(10 \cdot 2 + 10 \cdot 1 + 2 \cdot 1) = 2(32) = 64$ . So the final answer is 64.
14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Surface area =  $2(3 \cdot 3 + 3 \cdot 3 + 3 \cdot 3) = 2(27) = 54$ . So the final answer is 54.
15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The shipping box volume is  $12 \times 6 \times 4 = 288$  cubic inches. So the final answer is 288 in<sup>3</sup>.
16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The aquarium volume is  $20 \times 10 \times 15 = 3000$  cubic cm. So the final answer is 3000 cm<sup>3</sup>.
17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Cardboard covers the surface:  $2(5 \cdot 4 + 5 \cdot 2 + 4 \cdot 2) = 2(38) = 76$  square feet. So the final answer is 76 ft<sup>2</sup>.
18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The storage container volume is  $8 \times 3 \times 3 = 72$  cubic meters. So the final answer is 72 m<sup>3</sup>.
19. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Use the volume formula backward:  $480 = 12 \cdot 5 \cdot h$ , so  $h = 480 \div 60 = 8$  inches. So the final answer is 8 in.
20. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is An open-top planter has no top face:  $6 \cdot 3 + 2(6 \cdot 2) + 2(3 \cdot 2) = 54$  square feet. So the final answer is 54 ft<sup>2</sup>.
21. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Ribbon around length-height and width-height loops gives  $2(9 + 3) + 2(4 + 3) = 38$  inches. So the final answer is 38 in.
22. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Box A holds  $8 \cdot 5 \cdot 3 = 120$  cubic inches and Box B holds  $6 \cdot 6 \cdot 4 = 144$ , so the difference is 24 cubic inches. So the final answer is 24 in<sup>3</sup>.
23. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Paint all outside faces:  $SA = 2(4 \cdot 3 + 4 \cdot 2 + 3 \cdot 2) = 52$ . At 0.50 dollars per square foot, the cost is 26 dollars. So the final answer is 26 dollars.
24. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is From  $94 = 2(5 \cdot 4 + 5h + 4h)$ , get  $47 = 20 + 9h$ , so  $h = 3$  cm. So the final answer is 3 cm.



