

Rectangular Prisms

Name: _____ Date: _____ Score: _____ / 24

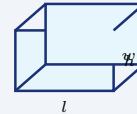
Quick Review and Helpful Hints

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

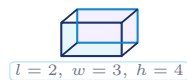


$$V = l \times w \times h.$$

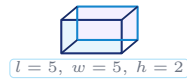
Practice Problems

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

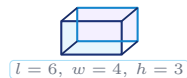
1. Find the volume.



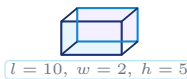
2. Find the volume.



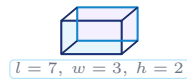
3. Find the volume.



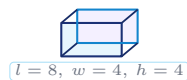
4. Find the volume.



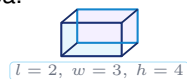
5. Find the volume.



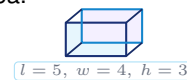
6. Find the volume.



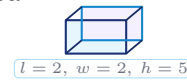
7. Find the surface area.



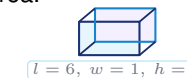
8. Find the surface area.



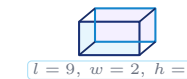
9. Find the surface area.



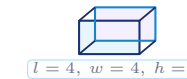
10. Find the surface area.



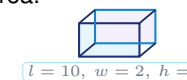
11. Find the volume.



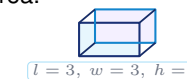
12. Find the volume.



13. Find the surface area.



14. Find the surface area.





◆ Word Problems

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



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

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



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

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



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

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



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

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



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

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.



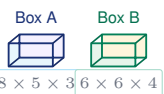
$$l = 6, w = 3, h = 2$$

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?



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

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?



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

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.



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

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



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



Answer Keys

- | | | | |
|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 1. 24 | 7. 52 | 13. 64 | 19. 8 in |
| 2. 50 | 8. 94 | 14. 54 | 20. 54 ft² |
| 3. 72 | 9. 48 | 15. 288 in³ | 21. 38 in |
| 4. 100 | 10. 54 | 16. 3000 cm³ | 22. 24 in³ |
| 5. 42 | 11. 36 | 17. 76 ft² | 23. 26 dollars |
| 6. 128 | 12. 64 | 18. 72 m³ | 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 in³.
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 cm³.
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 ft².
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 m³.
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 ft².
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 in³.
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.



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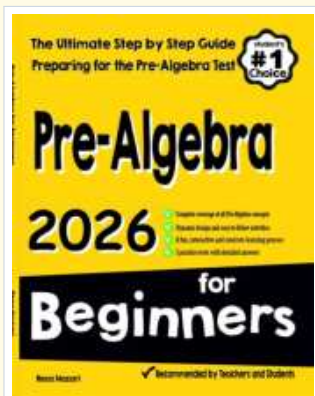
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