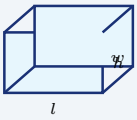
Rectangular Prisms

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

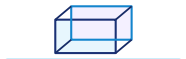


$V = l \times w \times h.$

Practice Problems

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

1. Find the volume.



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

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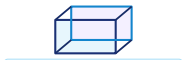
2. Find the volume.



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

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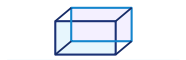
3. Find the volume.



$l = 6,\ w = 4,\ h = 3$

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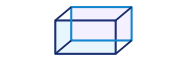
4. Find the volume.



$l = 10,\ w = 2,\ h = 5$

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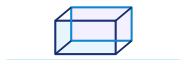
5. Find the volume.



$l = 7,\ w = 3,\ h = 2$

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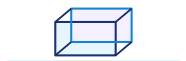
6. Find the volume.



$l = 8,\ w = 4,\ h = 4$

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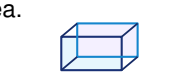
7. Find the surface area.



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

_____

8. Find the surface area.

$l = 5,\ w = 4,\ h = 3$

_____

9. Find the surface area.

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

_____

10. Find the surface area.

$l = 6,\ w = 1,\ h = 3$

_____

11. Find the volume.

$l = 9,\ w = 2,\ h = 2$

_____

12. Find the volume.

$l = 4,\ w = 4,\ h = 4$

_____

13. Find the surface area.

$l = 10,\ w = 2,\ h = 1$

_____

14. Find the surface area.

$l = 3,\ w = 3,\ h = 3$

_____

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?

Box A Box B

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

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 ft^2
3. 72	**9.** 48	**15.** 288 in^3	**21.** 38 in
4. 100	**10.** 54	**16.** 3000 cm^3	**22.** 24 in^3
5. 42	**11.** 36	**17.** 76 ft^2	**23.** 26 dollars
6. 128	**12.** 64	**18.** 72 m^3	**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^3.

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^3.

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^2.

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^3.

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^2.

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^3.

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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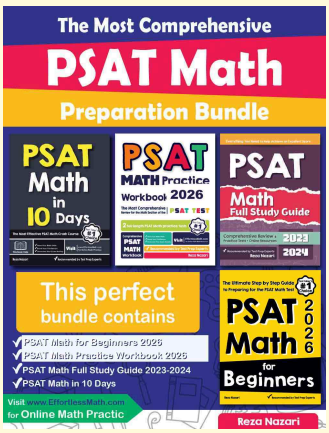

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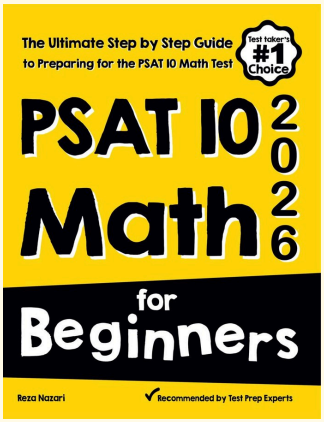

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