7. Volume Practice Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. Identify the following 3-D object.

![Diagram of a rectangular pyramid]

a. cylinder  
b. rectangular pyramid  
c. right triangular prism  
d. right rectangular prism

2. Identify the following 3-D object.

![Diagram of a right rectangular prism]

a. cylinder  
b. right rectangular prism  
c. right triangular prism  
d. triangular pyramid

3. A rectangular garage has a volume of 480 m$^3$, a length of 12 m and a width of 8 m. What is the height of the garage?

a. 4 m  
b. 5 m  
c. 6 m  
d. 7 m

4. Which set of dimensions belongs to a right rectangular prism with a volume of 440 cm$^3$?

a. 6 cm . 12 cm . .5 cm  
b. 7 cm . 9 cm . 6 cm  
c. 8 cm . 5 cm . 11 cm  
d. 12 cm . 2 cm . 5 cm

5. All right prisms have side views that are

a. different shapes  
b. rectangular  
c. square  
d. triangular
6. Find the volume of this right triangular prism.

![Triangular Prism Diagram]

\[
\text{Volume} = \frac{1}{2} \times \text{base} \times \text{height} \times \text{length} = \frac{1}{2} \times 3 \, \text{cm} \times 8 \, \text{cm} \times 5 \, \text{cm} = 60 \, \text{cm}^3
\]

a. 60 cm\(^3\)  b. 90 cm\(^3\)  c. 120 cm\(^3\)  d. 150 cm\(^3\)

7. A triangular prism has a base area of 7.3 cm\(^2\) and a volume of 71.54 cm\(^3\). The height of the prism must be

a. 3.65 cm  b. 7.3 cm  c. 9.8 cm  d. 19.6 cm

8. A juice container shaped like a cylinder has a base area of 100 cm\(^2\) and can hold 1500 cm\(^3\) of juice. The height of the juice container is

a. 1.5 cm  b. 10 cm  c. 15 cm  d. 150 cm

9. A standard die is a cube with sides measuring 15 mm. What is the volume of the die?

![Dice Diagram]

\[
\text{Volume} = \text{side}^3 = (15 \, \text{mm})^3 = 3375 \, \text{mm}^3
\]

a. 30 mm\(^3\)  b. 45 mm\(^3\)  c. 225 mm\(^3\)  d. 3375 mm\(^3\)

10. A soup can has a radius of 4.3 cm and a height of 11.6 cm. What is the volume of the soup can to the nearest tenth of a cubic centimetre?

\[
\text{Volume} = \pi r^2 h = \pi (4.3 \, \text{cm})^2 (11.6 \, \text{cm}) \approx 1816.8 \, \text{cm}^3
\]

a. 49.9 cm\(^3\)  b. 168.4 cm\(^3\)  c. 673.5 cm\(^3\)  d. 1816.8 cm\(^3\)

11. A storage box for skis measures 0.45 m high, 0.45 m wide, and 1.7 m long. What is the volume of the case to the nearest hundredth of a cubic metre?

\[
\text{Volume} = \text{length} \times \text{width} \times \text{height} = (0.45 \, \text{m}) \times (0.45 \, \text{m}) \times (1.7 \, \text{m}) = 0.34 \, \text{m}^3
\]

a. 0.34 m\(^3\)  b. 0.69 m\(^3\)  c. 3.44 m\(^3\)  d. 6.88 m\(^3\)

12. A backyard sandbox shaped like a right rectangular prism is 0.45 m high, 2 m wide, and 2.6 m long. If the sand in the box is 0.25 m deep, what volume of sand is in the box?

\[
\text{Volume} = \text{length} \times \text{width} \times \text{height} = (2 \, \text{m}) \times (2.6 \, \text{m}) \times (0.25 \, \text{m}) = 1.3 \, \text{m}^3
\]

a. 1.3 m\(^3\)  b. 2.34 m\(^3\)  c. 11.3 m\(^3\)  d. 23.41 m\(^3\)

13. A recycling box holds 151 875 cm\(^3\) of material and has a square base with sides measuring 45 cm. What is the height of the recycling box?

\[
\text{Volume} = \text{base area} \times \text{height} = (45 \, \text{cm})^2 \times \text{height} = 2025 \, \text{cm}^2 \times \text{height} = 151875 \, \text{cm}^3
\]

\[
\text{Height} = \frac{151875 \, \text{cm}^3}{2025 \, \text{cm}^2} = 75 \, \text{cm}
\]

a. 33.8 cm  b. 75 cm  c. 1687.5 cm  d. 3375 cm

14. A recycling bin is shaped like a right rectangular prism and holds 300 000 cm\(^3\) of returnable containers. If the base of the bin is 40 cm wide and 60 cm long, what is the height of the recycling bin in metres?

\[
\text{Volume} = \text{base area} \times \text{height} = (40 \, \text{cm}) \times (60 \, \text{cm}) \times \text{height} = 2400 \, \text{cm}^2 \times \text{height} = 300000 \, \text{cm}^3
\]

\[
\text{Height} = \frac{300000 \, \text{cm}^3}{2400 \, \text{cm}^2} = 125 \, \text{cm}
\]

a. 0.90 m  b. 1.25 m  c. 1.50 m  d. 3.00 m
15. A mug of hot chocolate measures 8.6 cm in diameter and has a height of 11.2 cm. The top 0.4 cm of the mug is filled with froth; the rest is hot chocolate. Rounding to the nearest cubic centimetre, how much hot chocolate is in the mug?
   a. 146 cm³  b. 292 cm³  c. 627 cm³  d. 2508 cm³

Completion

Write your answer in the space provided.

16. The formula for determining the volume of a right rectangular prism is ____________________________.

17. Cubic units are used when calculating the ____________________________ of right prisms and cylinders.

18. A right rectangular prism is made of 1-cm cubes and measures 5 cubes by 4 cubes by 4 cubes. The volume of the rectangular prism must be ____________________________.

19. Mark has a rectangular cooler that is 32 cm long and 21 cm wide. The cooler has a volume of 9072 cm³. The depth of this cooler must be ____________________________.

20. The height of a right prism or right cylinder must be ____________________________ to its base.

Short Answer

21. Mary pours 1000 cm³ of juice into a pitcher shaped like a right triangular prism. If the depth of the juice is 20 cm, what is the area of the triangular base of the pitcher?

22. A right rectangular prism has a volume of 117.81 cm³, a height of 16.5 cm, and a width of 2 cm. Find the length of the prism.

23. A right rectangular prism measures 6.2 cm × 4.7 cm × 2.3 cm. Find the volume of the prism and express your answer to two decimal places.

24. A right triangular prism has a volume of 594.5 cm³. Its base measures 12.5 cm long by 8.2 cm high. Determine the length of the prism.

25. The volume of a cylinder is 867.5 cm³ and the area of the circular base is 69.4 cm². What is the diameter of the cylinder, to the closest millimetre?

26. A cylinder has a diameter of 5.8 cm and is 8.4 cm high. Calculate the volume of the cylinder and express your answer to one decimal place.
Problem

Write your answer in the space provided.

27. A telescope has a diameter of 17 cm and has 72 cm between the two lenses. What is the volume of the space between the lenses? Express your answer to the nearest cubic centimetre.

28. Anita cuts a piece of birthday cake as shown below. What is the volume of the piece of cake?

29. What is the volume of concrete required to make the large culvert shown below? Round your answer to the nearest hundredth of a cubic metre.

30. A hockey puck has a diameter of 7.6 cm and a height of 3.4 cm. What is the volume of a cylindrical package containing six pucks? Express your answer to the nearest cubic centimetre.
31. Sharon built this playhouse. What volume of air will the playhouse hold? Round your answer to the nearest tenth of a cubic metre.

![Playhouse Diagram]

32. A sandbox shaped like a right triangular prism has a base of 2.6 m and a height of 1.7 m. If the sand in the box is 0.3 m deep, how many full cubic metres of sand do you need to buy? Explain your answer.

33. A fire hydrant is composed of three cylinders, as shown below. All measurements show the inside diameters and lengths. Approximately what volume of water is in the pipes when they are full? Show your answer to the nearest hundredth of a cubic metre.

![Fire Hydrant Diagram]
7. Area Practice Test
Answer Section

MULTIPLE CHOICE

1. C  
2. B  
3. B  
4. C  
5. B  
6. A  
7. C  
8. C  
9. D  
10. C  
11. A  
12. A  
13. B  
14. B  
15. C

COMPLETION

16. Volume = length × width × height
   \( V = l \times w \times h \)
   Volume = area of base × height

17. volume

18. 80 cm³

19. 13.5 cm

20. perpendicular

SHORT ANSWER

21. Volume = area of the triangular base × height of prism

   \[ 1000 = A \times 20 \]
   \[ A = 1000 \div 20 \]
   \[ A = 50 \]

   The area of the triangular base is 50 cm².
22. \[ V = l \times w \times h \]
\[ 117.81 = l \times 16.5 \times 2 \]
\[ l = 117.81 \div 33 \]
\[ l = 3.57 \]
The length of the prism is 3.57 cm.

23. \[ V = l \times w \times h \]
\[ V = 6.2 \times 4.7 \times 2.3 \]
\[ V = 67.02 \]
The volume of the rectangular prism is 67.02 cm³.

24. Area of a triangle = \( b \times h + 2 \)
\[ A = 12.5 \times 8.2 + 2 \]
\[ A = 51.25 \]
The area of the triangular base is 51.25 cm².

Volume of rectangular prism = (area of base) \times length
\[ 594.5 = 51.25 \times l \]
\[ 11.6 = l \]
The length of the prism is 11.6 cm.

25. Area of circular base = \( \pi \times r^2 \)
\[ 69.4 = 3.14 \times r^2 \]
\[ \sqrt{22.10191} = r \]
\[ 4.7012668 = r \]
The radius of the base is 4.7 cm. The diameter is 9.4 cm or 94 mm.

26. \[ V = (\pi \times r^2) \times h \]
\[ V = (3.14 \times 2.9 \times 2.9) \times 8.4 \]
\[ V = 221.82216 \]
The volume of the cylinder is 221.8 m³.

**PROBLEM**

27. \[ V = (\pi \times r^2) \times h \]
\[ V = (3.14 \times 8.5 \times 8.5) \times 72 \]
\[ V = 16334.28 \]
The volume of space between the lenses is 16334 cm³.
28. \( V = (\text{base} \times \text{height} \div 2) \times \text{height of prism} \)
   \[ V = (10.18,2) \times 6 \]
   \[ V = 540 \]
   The volume of the piece of cake is 540 cm³.

29. Determine the volume of the outside cylinder
   \[ V = (\pi \times r^2) \times h \]
   \[ V = (3.14 \times 0.5 \times 0.5) \times 4 \]
   \[ V = 3.14 \]
   The volume of the outside is 3.14 m³. 
   Determine the volume of the hollow space inside.
   \[ V = (\pi \times r^2) \times h \]
   \[ V = (3.14 \times 0.4 \times 0.4) \times 4 \]
   \[ V = 2.0096 \]
   The volume of the hollow space inside the tube is 2.0096 m³.
   Volume of concrete required = volume of the outside cylinder − volume of the hollow space 
   \[ V = 3.14 - 2.0096 \]
   \[ V = 1.13040 \]
   The volume of concrete required is 1.13 m³.

30. Volume of one puck
   \[ V = (\pi \times r^2) \times h \]
   \[ V = (3.14 \times 3.8 \times 3.8) \times 3.4 \]
   \[ V = 154.16144 \]
   Volume of six pucks
   \[ 6 \times 154.16144 = 924.96864 \]
   The volume of the six pucks is 925 cm³.
31. 180 cm = 1.8 m

Volume of the right triangular prism

\[ V = (\text{base} \times \text{height} + 2) \times \text{height of prism} \]
\[ V = (2.5 \times 1.8 + 2) \times 3 \]
\[ V = 6.75 \]

Volume of the right rectangular prism

\[ V = l \times w \times h \]
\[ V = 3 \times 2.5 \times 1.4 \]
\[ V = 10.5 \]

Total volume = 6.75 + 10.5
\[ = 17.25 \]

The total volume of air held by the playhouse is 17.3 m³.

32. \[ V = (\text{base} \times \text{height} + 2) \times \text{height of prism} \]
\[ V = (2.6 \times 1.7 + 2) \times 0.3 \]
\[ V = 0.663 \]

In order to buy enough sand to fill the box, I need 1 cubic metre of sand.

33. Volume of main cylinder

\[ V = (\pi r^2) \times h \]
\[ V = (3.14 \times 7.5 \times 7.5) \times 90 \]
\[ V = 15 \, 896.25 \]

Volume of one side cylinder

\[ V = (\pi r^2) \times h \]
\[ V = (3.14 \times 5 \times 5) \times 7 \]
\[ V = 549.5 \]

Total volume of the pipes = volume of main cylinder + volume of two side cylinders
\[ 15 \, 896.25 + (2 \times 549.5) = 16 \, 995.25 \]

1 m³ = 1 000 000 cm³
16 995.25 cm³ = 0.1699525 m³

There is approximately 0.17 m³ of water in the hydrant when the pipes were full.