DraftKids
Learn through sports

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Game Ball Volume

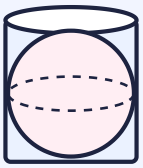
How much air is inside a basketball? How much space does a hockey puck take up? Use the volume formulas for cylinders, cones and spheres to measure the gear in the Owls' equipment room.

Name _____

Date _____

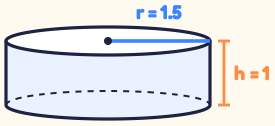
VOLUME TOOLKIT

$r = d \div 2$	$V = \pi r^2 h$	$V = \frac{1}{3}\pi r^2 h$	$V = \frac{4}{3}\pi r^3$	$\pi \approx 3.14$
radius is half the diameter	cylinder (puck, can)	cone (cup, marker)	sphere (any ball)	use this for every problem

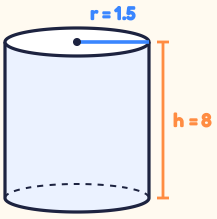


BALL IN A BOX

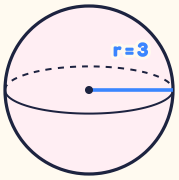
THE EQUIPMENT ROOM · MEASURED IN INCHES



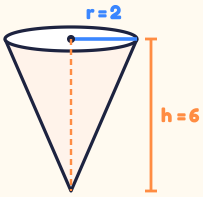
Hockey puck
cylinder · regulation size



Ball can
cylinder



Training ball
sphere



Cone cup
cone

Volume is how much space a 3-D object fills, measured in **cubic inches (in³)**.

Round answers to the nearest tenth unless a problem says otherwise. Calculators are OK.

ROOKIE

1 A regulation hockey puck is a cylinder **3 in** across and **1 in** thick. Find its volume.

WORK SPACE

_____ in³

ROOKIE

2 The Northside Owls keep 3 practice balls in a can **3 in** wide and **8 in** tall. Find the can's volume.

WORK SPACE

_____ in³

STARTER

3 A youth training ball has a radius of **3 in**. Find its volume.

WORK SPACE

_____ in³

STARTER

4 A snack-stand cone cup has radius **2 in** and height **6 in**. How much does it hold?

WORK SPACE

_____ in³

PRO

5 An official NBA ball has a circumference of **29.5 in**. Find its diameter to the nearest tenth.

WORK SPACE

_____ in

PRO

6 Use a radius of **4.7 in** to find the volume of the NBA ball, to the nearest whole cubic inch.

WORK SPACE

_____ in³

ALL-STAR

7 A giant fan-zone ball has **double** the radius of the ball in #3. How many times more air does it hold?

WORK SPACE

_____ times

CHALLENGE ★

8 Challenge: The ball from #3 fits snugly in a cylinder box (radius 3 in, height 6 in). How much empty space is left?

WORK SPACE

_____ in³

A Stock the Sideline

Find each volume in cubic inches (nearest tenth). All measurements are in inches.

ITEM	SHAPE	SIZE (IN)	VOLUME (IN³)
Water cooler	Cylinder	r = 6, h = 15	
Paper cone cup	Cone	r = 1.5, h = 4	
Kickball	Sphere	r = 4	
Traffic cone	Cone	r = 5, h = 18	

1. How many **full** paper cone cups can the water cooler fill?

_____ **cups**

2. One gallon is **231 in³**. About how many gallons does the cooler hold? (nearest tenth)

_____ **gal**

B Work Backward

You know the volume. Undo the formula to find the missing measurement.

1. A cylinder trophy base holds **314 in³** and has radius **5 in**. How tall is it?

WORK SPACE

h = _____ in

2. A cone marker holds **37.68 in³** and has radius **3 in**. How tall is it?

WORK SPACE

h = _____ in

3. A ball holds **904.32 in³**. What is its radius? (Hint: find r³ first.)

WORK SPACE

r = _____ in

C Scale It Up

Volume grows much faster than length. Think about what happens to r × r × r.

1. If a ball's radius doubles, its volume is multiplied by _____

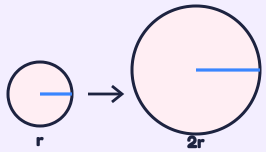
2. If every measurement of a cylinder triples, its volume is multiplied by _____

3. A stack of **20** hockey pucks makes one tall cylinder. What is its volume?

_____ **in³**

4. A rim is **18 in** across. About how many times wider is it than the NBA ball from #5? (nearest tenth)

_____ **times**



TWICE AS WIDE ≠ TWICE THE AIR

BONUS · NOT SCORED

Pick a ball from any sport. Measure (or look up) its size, then estimate its volume. Show your work.

Answer Key (for teachers & parents)

Answers for **Game Ball Volume**, with the work shown, using $\pi \approx 3.14$. Print pages 1 and 2 for students and keep this page for checking. Accept small rounding differences (for example from using the π key). The puck size, NBA ball circumference, 18-inch rim and 231 in³ per gallon are real; teams and players are made up.

Page 1 Problems

1. Answer: **7.1 in³**
   r = 1.5; 3.14 × 1.5² × 1 = 7.065
2. Answer: **56.5 in³**
   r = 1.5; 3.14 × 2.25 × 8 = 56.52
3. Answer: **113.0 in³**
   $^4/_3$ × 3.14 × 27 = 113.04
4. Answer: **25.1 in³**
   ⅓ × 3.14 × 4 × 6 = 25.12
5. Answer: **9.4 in**
   d = C ÷ π = 29.5 ÷ 3.14 ≈ 9.39
6. Answer: **435 in³**
   4.7³ = 103.823; $^4/_3$ × 3.14 × 103.823 ≈ 434.7
7. Answer: **8 times**
   2 × 2 × 2 = 8 (113.04 to 904.32 in³)
8. Answer: **56.5 in³**
   Box 3.14 × 9 × 6 = 169.56; 169.56 − 113.04 = 56.52, exactly ⅓ of the box

C · Scale It Up

1. Answer: **8**
2. Answer: **27**
   3 × 3 × 3 = 27
3. Answer: **141.3 in³**
   20 × 7.065 = 141.3 (or 3.14 × 1.5² × 20)
4. Answer: **About 1.9 times**
   18 ÷ 9.4 ≈ 1.91, almost two balls side by side

Quick score

Page 1 problems	_____ / 8
A · Sideline (4 boxes + 2)	_____ / 6
B · Work Backward	_____ / 3
C · Scale It Up	_____ / 4
Total	_____ **/ 21**

Skills practiced

Volume of cylinders · Volume of cones · Volume of spheres · Radius & diameter · Circumference · Solving for a dimension · Scale factors · Unit conversion

Teaching tip: Before #7, have students guess how many small balls fit in the big one. Most say 2. Show that doubling the radius doubles it three ways (r × r × r), so it holds 8 times the air.

A · Stock the Sideline

0. **Table:** Answer: **1695.6, 9.4, 267.9, 471.0**
   3.14·36·15; ⅓·3.14·2.25·4; $^4/_3$·3.14·64 = 267.95 (accept 268.0); ⅓·3.14·25·18
1. Answer: **180 cups**
   1,695.6 ÷ 9.42 = 180
2. Answer: **7.3 gallons**
   1,695.6 ÷ 231 ≈ 7.34

B · Work Backward

1. Answer: **h = 4 in**
   314 ÷ (3.14 × 25) = 314 ÷ 78.5 = 4
2. Answer: **h = 4 in**
   37.68 × 3 = 113.04; 113.04 ÷ (3.14 × 9) = 4
3. Answer: **r = 6 in**
   904.32 × 3 ÷ 4 ÷ 3.14 = 216 = 6 × 6 × 6

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