Helping With Math

Solving Volume of Cylinders, Cones, and Spheres

GRADE 8

Volume is the measure of the space being occupied by an object. The volume of cylinders, cones, and spheres can be identified by using different formulas for each which you can learn from this worksheet.

TAKE NOTE!

Volume of Cylinder	Volume of Cone	Volume of Sphere
$= \pi r^2 h$	$= \frac{1}{3} \pi r^2 h$	$= \frac{4}{3} \pi r^3$

*Dimension of Volume should always be in cube (^{3}).

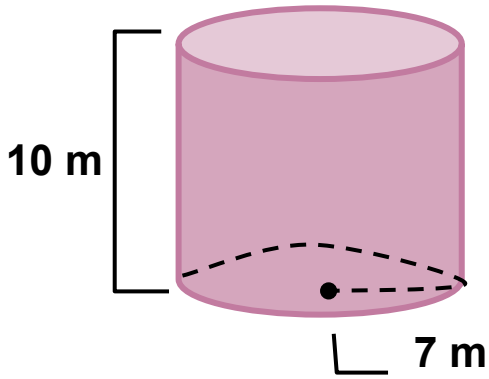
STEPS AND PROCESS

VOLUME OF CYLINDER

Formula: $V = \pi r^2 h$

Using the formula, you can identify the amount of space that can fit inside a cylinder.

Π = Pi **R^2 = Radius** **H = Height**	**Π = 3.14** **R^2 = 7 m** **H = 10 m**



Step 1: Substitute the given Radius and Height, and Pi Value (3.14) to the formula.

Example:
$\Pi r^2 h = (3.14)(7m)^2(10m)$

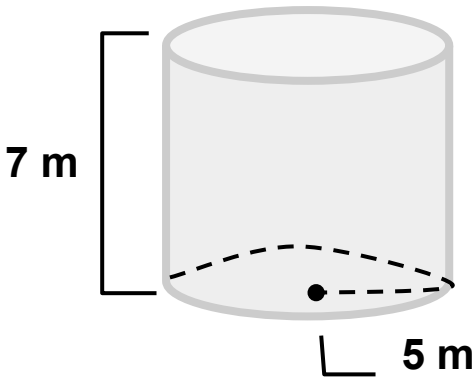
Step 2: Square the length of the given Radius.

Example:
$= (3.14)(49m^2)(10m)$

Step 3: Multiply all of the given together to get the final answer.

Example:
$= (3.14)(490m^3)$

$V = 1{,}538.6\ m^3$



Π = 3.14
R^2 = 5 m
H = 7 m

$V = (3.14)(5m)^2(7m)$

$= (3.14)(25m^2)(7m)$

$= (3.14)(175m^3)$

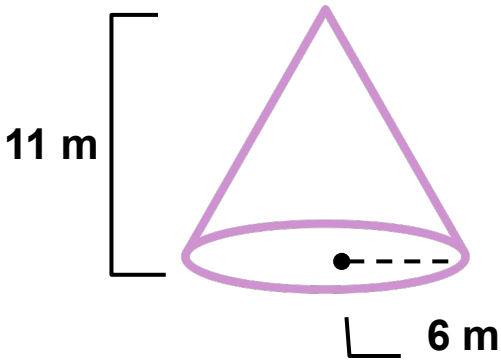
$V = 549.5\ m^3$

STEPS AND PROCESS

VOLUME OF CONE

Formula: $V = {}^{1}/_{3}\pi r^2 h$

A cylinder can be filled up by 3 cones, reason for having ⅓ in the formula.



Π = Pi **R^2 = Radius** **H = Height**	**Π = 3.14** **R^2 = 6 m** **H = 8 m**

Step 1: Substitute the formula given Radius and Height, and Pi Value (3.14) to the formula.

Example:

$${}^{1}/_{3}\Pi r^2 h = (3.14)(6m)^2(11m)$$

Step 2: Square the given Radius.

Example:

$$= {}^{1}/_{3}(3.14)(36m^2)(11m)$$

Step 3: Multiply Pi, Squared Radius and Height.

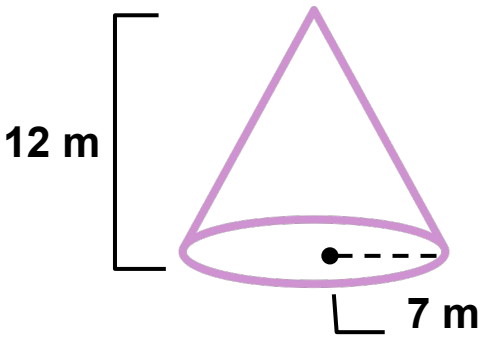
Example:

$$= {}^{1}/_{3}(1{,}243.44m^3)$$

Step 4: Multiply the answer to ⅓.

Example:

$$V = 414.48\ m^3$$



Π = 3.14
R^2 = 7 m
H = 12 m

$$V = {}^{1}/_{3}(3.14)(7m)^2(12m)$$

$$= {}^{1}/_{3}(3.14)(49m^2)(12m)$$

$$= {}^{1}/_{3}(1{,}846.32m^3)$$

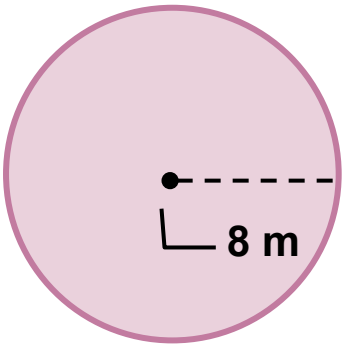
$$V = 615.44\ m^3$$

STEPS AND PROCESS

VOLUME OF SPHERE

Formula: $V = {}^{4}/_{3}\,\pi r^3$

Sphere is three-dimensional. To solve the volume of the sphere is to find it's capacity.



Π = Pi **R^3 = Radius**	**Π = 3.14** **R^3 = 8 m**

Step 1: Substitute the given to the formula.

Example:

$${}^{4}/_{3}\pi r^3 = {}^{4}/_{3}(3.14)(8m)^3$$

Step 2: Perform the operation given by the formula.

Example:

$$= {}^{4}/_{3}(3.14)(512m^3)$$

Step 3: Simplify your answer.

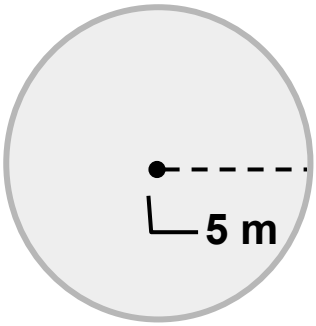
Example:

$$= {}^{4}/_{3}(1{,}607.68m^3)$$

Step 4: Don't forget to write the desired label.

Example:

$$V = 2{,}143.57\ m^3$$

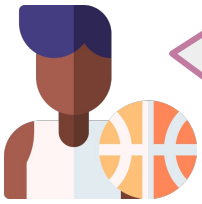


Π = 3.14
R^3 = 5 m

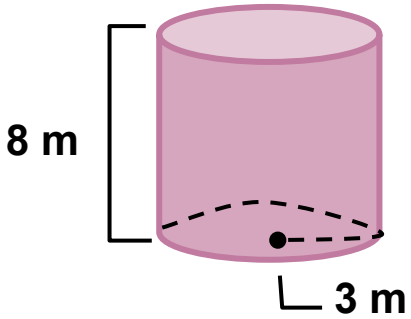
$$V = {}^{4}/_{3}(3.14)(5m)^3$$
$$= {}^{4}/_{3}(3.14)(125m^3)$$
$$= {}^{4}/_{3}(392.5m^3)$$
$$V = 523.33\ m^3$$

LET'S PRACTICE!

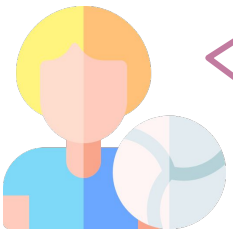
$V = \pi r^2 h$



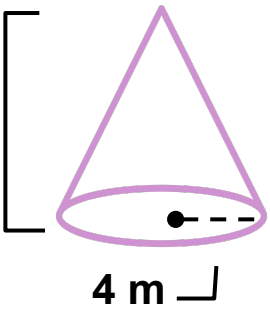
Find the volume! Show your solutions.



$V = {}^{1}/_{3}\pi r^2 h$

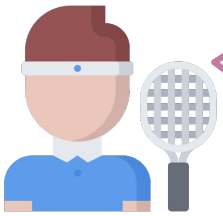


What is the volume? Write down the solutions.



Do not forget the value of the Pi, 3.14.

$V = {}^{4}/_{3}\pi r^3$



Show me the volume of the sphere.

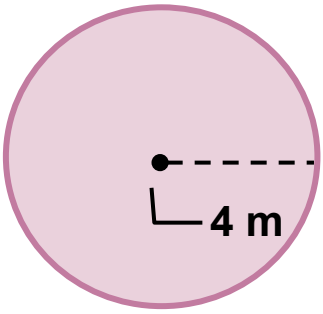


TABLE OF ACTIVITIES

BASKETBALL GAMES

You went to the basketball court to watch the game. Choose the letter of the correct answer to enter the court. Write down your solutions on the spaces provided.

By the basketball court, ice cream cones with 10 in height and 5 in radius are being sold. Find the cone's volume.

a. 160.67 in^3
b. 261.67 in^3
c. 360.67 in^3

1.

A three-point shot was made by Bryan using a 15 cm radius ball. Find the ball's volume.

a. 10,130 cm^3
b. 12,130 cm^3
c. 14,130 cm^3

4.

The players' favorite drink has a height of 11 cm and a radius of 6 cm. Find its volume.

a. 1,423.44 cm^3
b. 1,342.44 cm^3
c. 1,243.44 cm^3

2.

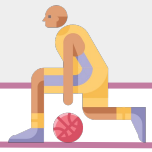
To have energy, Adrian eats an ice cream. The cone has 30 cm height and 7 cm radius. What is its volume?

a. 1,438.6 cm^3
b. 1,538.6 cm^3
c. 1,638.6 cm^3

5.

Roland uses a pail as a substitute ring for practice. It has 9 in radius and 20 in height. Find the volume.

a. 5,086.8 in^3
b. 4,086.8 in^3
c. 3,086.8 in^3



3.

Lots of basketballs are rolling on the court. Each has a radius of 17 cm. What is the volume of the ball?

a. 20,100.59 cm^3
b. 20,569.09 cm^3
c. 20,500.59 cm^3

6.

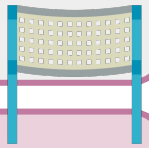
VOLLEYBALL TIME

It's time for the volleyball game! Choose the correct answer from the box below to answer each questions. Write down the solutions on the spaces provided

20,569.09 cm^3	**12,576.67 cm^3**	**1,695.6 cm^3**
3,663.33 cm^3	**38,772.72 cm^3**	**200.96 cm^3**

Find the volume of the volleyball used for practice with a 21 cm radius.

Cindy drank a soda with 15 cm height and 6 cm radius. Find the volume of the can.



Training cones for practice has 35 cm height and 10 cm radius each. Find out the volume of a training cone.

Liz practices her spike using a balloon with 17 cm radius? Find the volume.

The marker used by the coach has 12 cm height and 4 cm radius. Find the volume.

READY FOR INTRAMURALS

Preparations for the intramurals are on going. Help the players by identifying the volume of each balls to be used. Draw a line to match the corresponding volume.

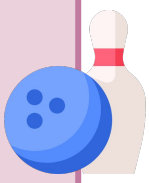
A basketball has a a radius of 13 cm. Find its volume.

A volleyball has a radius of 11 cm. Find its volume.

A soccer ball has a radius of 9 cm. Find its volume.

A baseball has a radius of 5 cm. Find its volume.

A bowling ball has a radius of 8 cm. Find its volume.



3,052.08 cm^3

523.33 cm^3

9,198.11 cm^3

2,143.57 cm^3

5,572.45 cm^3

THE BASEBALL FAN

Giveaways are being handed to baseball fans. Get one by identifying what word was coined by Archimedes who also discovered Volume. Solve the problems below and write the corresponding letters.

"I have found it!"

_ _ _ _ _ _

R
1,949.94 cm^3

E
267.95 cm^3

A
4747.68 cm^3

E
480.42 cm^3

U
1,177.5 cm^3

K
1,436.03 cm^3

1. A baseball has 4 cm radius What is its volume?

2. The ball buckets has 15 cm height and 5 cm radius. What is its volume?

3. Audiences used party hats during the game with 23 cm height and 9 cm radius. Find the volume.

4. Each player-signed water bottles has 17 cm height and 3 cm radius. Find the volume.

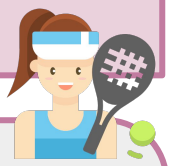
5. The baseball shaped coin bank has a radius of 7 cm. Find the volume.

6. The baseball bat has 42 cm height and 6 cm radius. Find the volume.

AT THE TENNIS COURT

The tennis court is open for all. Find the volume of the given cylinders, cones, and spheres found in the word problems below. Show your solutions.

Vicky is playing tennis with her friends. The tennis ball has 2 cm radius. To score the game, they are using a pencil with 17 cm height and 3 cm radius. Whoever loses the game must buy the others soda with 13 cm height and 4 cm radius.



1.

2.

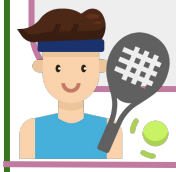
3.

The children are eating ice cream and holding a balloon while watching the tennis game. The cone has 13 cm height and 3 cm radius and the balloon has 8 cm radius. After the game, they offered water bottles to the players with 20 cm height and 4 cm radius.

4.

5.

6.



CHEER FOR YOUR TEAM

Cheer for your school's team for the billiards competition! From the paragraph below, fill out the table for the cylinder, cone and sphere. Show your solutions.

The school's billiards team has a tournament. The billiard balls that were used has a radius of 7 cm. Each billiard sticks provided to them has a height of 45 cm and a radius of 3 cm. With the members ready for the game, the scorer now is also getting ready with his pen and paper. The pen has a height of 13 cm and and a radius of 1 cm. Find the volume of the balls, sticks, and pen.

SHAPE	HEIGHT	RADIUS	VOLUME
CYLINDER	1.	2.	3.
CONE	4.	5.	6.
SPHERE	7.	8.	9.

DURING THE GAME

During the badminton game, you've noticed the following statements below. Find the volume of the shapes provided below. Show your solutions.

If a shuttlecock has a radius of 3 cm and a height of 6 cm, what is the volume of a shuttlecock?	
If the case of a shuttlecock has a height of 24 cm and a radius of 6 cm, what is its volume?	
If a can of energy drink for the badminton players has a height of 34 cm and a radius of 5 cm, find the volume of the can.	
The net at the court has rollers. If each one has 3 cm radius, what is the volume of one roller?	
If a player's drinking bottle has 27 cm height and a radius of 7 cm, what is its volume?	

SOCCER PRACTICE

The soccer team is having a practice. To help them, make the statements correct by writing down the correct volumes. Show your solutions.

The soccer ball with a radius of 13 cm has a volume of 30,102 $cm^{3.}$

The coach is using a megaphone with 23,157 cm^3 volume. Its height and radius is at 31 cm and 7 cm.

A can used for practice has 13,100 cm^3 volume. It has 23 cm height and 6 cm radius.

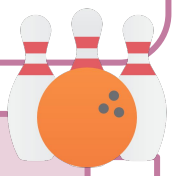
Ash won the gold medal with a volume of 15, 765.32 cm^3. Its radius is 7 cm.

Coach bought training cones with 35,792.12 cm^3 volume with a height of 26 cm and radius of 5 cm.

LEARN THE SPORT

You want to learn bowling. But first, draw and put measurements on the bowling ball. Find the volume and show your solution on the space provided.

You are at a bowling stadium. You want to play bowling but the balls are too big for you. The ball suited for your age should have a radius of 9 cm. Identify the volume of this ball.



DRAWING

SOLUTION & ANSWER

LET'S WATCH THE GAME

The much awaited baseball game is happening in the arena. To enter the arena, you have to answer the following questions briefly.

Understanding the formula of each, how can this be useful in your day-to-day life?

In your own words, explain why $^1/_3$ is included in the formula to find the volume of a cone.

ANSWER GUIDE

Activity 1

1. **B**

$= {}^{1}/_{3}(3.14)(5in)^2(10in)$

$= {}^{1}/_{3}(3.14)(25in^2)(10in)$

$= {}^{1}/_{3}\ (785in^3)$

$=261.67\ in^3$

2. **C**

$=(3.14)(6cm)^2(11cm)$

$=(3.14)(36cm^2)(11cm)$

$=1{,}243.44\ cm^3$

3. **A**

$=(3.14)(9in)^2(20in)$

$=(3.14)(81in^2)(20in)$

$= 5{,}086.8\ in^3$

4. **C**

$= {}^{4}/_{3}(3.14)(15cm)^3$

$= {}^{4}/_{3}(3.14)(3{,}375cm^3)$

$= {}^{4}/_{3}(10{,}597.5cm^3)$

$=14{,}130\ cm^3$

5. **B**

$= {}^{1}/_{3}(3.14)(7cm)^2(30cm)$

$= {}^{1}/_{3}(3.14)(49cm^2)(30cm)$

$= {}^{1}/_{3}\ (4{,}615.8cm^3)$

$=1{,}538.6\ cm^3$

6. **B**

$= {}^{4}/_{3}(3.14)(17cm)^3$

$= {}^{4}/_{3}(3.14)(4{,}913cm^3)$

$= {}^{4}/_{3}(15{,}426.82cm^3)$

$=20{,}569.09\ cm^3$

Activity 2

1.

$= {}^{4}/_{3}(3.14)(21cm)^3$

$= {}^{4}/_{3}(3.14)(9{,}261cm^3)$

$= {}^{4}/_{3}(29{,}079.54cm^3)$

$=38.772.72\ cm^3$

2.

$=(3.14)(6cm)^2(15cm)$

$=(3.14)(36cm^2)(15cm)$

$=1{,}695.6\ cm^3$

3.

$= {}^{1}/_{3}(3.14)(10cm)^2(35cm)$

$= {}^{1}/_{3}(3.14)(100cm^2)(35cm)$

$= {}^{1}/_{3}\ (10{,}990cm^3)$

$=3{,}663.33\ cm^3$

ANSWER GUIDE

Activity 2

4.

$= {}^{4}/_{3}(3.14)(17cm)^3$

$= {}^{4}/_{3}(3.14)(4{,}913cm^3)$

$= {}^{4}/_{3}(15{,}426.82cm^3)$

$=20{,}569.09\ cm^3$

5.

$= {}^{1}/_{3}(3.14)(4cm)^2(12cm)$

$= {}^{1}/_{3}(3.14)(16cm^2)(12cm)$

$= {}^{1}/_{3}\ (602.88cm^3)$

$=200.96\ cm^3$

Activity 3

1.

$= {}^{4}/_{3}(3.14)(13cm)^3$

$= {}^{4}/_{3}(3.14)(2{,}197cm^3)$

$= {}^{4}/_{3}(6{,}898.58cm^3)$

$=9{,}198.11\ cm^3$

2.

$= {}^{4}/_{3}(3.14)(11cm)^3$

$= {}^{4}/_{3}(3.14)(1{,}331cm^3)$

$= {}^{4}/_{3}(4{,}179.34cm^3)$

$=5{,}572.45\ cm^3$

3.

$= {}^{4}/_{3}(3.14)(9cm)^3$

$= {}^{4}/_{3}(3.14)(729cm^3)$

$= {}^{4}/_{3}(2{,}289.06cm^3)$

$=3{,}052.08\ cm^3$

4.

$= {}^{4}/_{3}(3.14)(5cm)^3$

$= {}^{4}/_{3}(3.14)(125cm^3)$

$= {}^{4}/_{3}(392.5cm^3)$

$=523.33\ cm^3$

5.

$= {}^{4}/_{3}(3.14)(8cm)^3$

$= {}^{4}/_{3}(3.14)(512cm^3)$

$= {}^{4}/_{3}(1{,}607.68cm^3)$

$=2{,}143.57\ cm^3$

ANSWER GUIDE

Activity 4

1. **E**

$= {}^{4}/_{3}(3.14)(4cm)^3$

$= {}^{4}/_{3}(3.14)(64cm^3)$

$= {}^{4}/_{3}(200.96cm^3)$

$=267.95\ cm^3$

2. **U**

$=(3.14)(5cm)^2(15cm)$

$=(3.14)(25cm^2)(15cm)$

$=1{,}177.5\ cm^3$

3. **R**

$= {}^{1}/_{3}(3.14)(9cm)^2(23cm)$

$= {}^{1}/_{3}(3.14)(81cm^2)(23cm)$

$= {}^{1}/_{3}\ (5{,}849.82cm^3)$

$=1{,}949.94\ cm^3$

4. **E**

$=(3.14)(3cm)^2(17cm)$

$=(3.14)(9cm^2)(17cm)$

$=480.42\ cm^3$

5. **K**

$= {}^{4}/_{3}(3.14)(7cm)^3$

$= {}^{4}/_{3}(3.14)(343cm^3)$

$= {}^{4}/_{3}(1{,}077.02cm^3)$

$=1{,}436.03\ cm^3$

6. **A**

$=(3.14)(6cm)^2(42cm)$

$=(3.14)(36cm^2)(42cm)$

$=4{,}747.68\ cm^3$

Activity 5

1.

$= {}^{4}/_{3}(3.14)(2cm)^3$

$= {}^{4}/_{3}(3.14)(8cm^3)$

$= {}^{4}/_{3}(25.12cm^3)$

$=33.49\ cm^3$

2.

$= {}^{1}/_{3}(3.14)(3cm)^2(17cm)$

$= {}^{1}/_{3}(3.14)(9cm^2)(17cm)$

$= {}^{1}/_{3}\ (480.42cm^3)$

$=160.14\ cm^3$

3.

$=(3.14)(4cm)^2(13cm)$

$=(3.14)(16cm^2)(13cm)$

$=653.12\ cm^3$

ANSWER GUIDE

Activity 5

4.

$= {}^{1}/_{3}(3.14)(3cm)^2(13cm)$

$= {}^{1}/_{3}(3.14)(9cm^2)(13cm)$

$= {}^{1}/_{3}(367.38cm^3)$

$=122.46\ cm^3$

5.

$= {}^{4}/_{3}(3.14)(8cm)^3$

$= {}^{4}/_{3}(3.14)(512cm^3)$

$= {}^{4}/_{3}(1{,}607.68cm^3)$

$=2{,}143.57cm^3$

6.

$=(3.14)(4cm)^2(20cm)$

$=(3.14)(16cm^2)(20cm)$

$=1{,}004.8\ cm^3$

Activity 6

1. 45 cm

2. 3 cm

3.

$=(3.14)(3cm)^2(45cm)$

$=(3.14)(9cm^2)(45cm)$

$=1{,}271.7\ cm^3$

4. 13 cm

5. 1 cm

6.

$= {}^{1}/_{3}(3.14)(1cm)^2(13cm)$

$= {}^{1}/_{3}(3.14)(1cm^2)(13cm)$

$= {}^{1}/_{3}(40.82cm^3)$

$=13.61\ cm^3$

7. N/A

8. 7 cm

9.

$= {}^{4}/_{3}(3.14)(7cm)^3$

$= {}^{4}/_{3}(3.14)(512cm^3)$

$= {}^{4}/_{3}(1{,}077.02cm^3)$

$=1{,}436.03\ cm^3$

ANSWER GUIDE

Activity 7

1.

$= {}^{1}/_{3}(3.14)(3cm)^2(6cm)$

$= {}^{1}/_{3}(3.14)(9cm^2)(6cm)$

$= {}^{1}/_{3}\ (169.56cm^3)$

$=56.52\ cm^3$

2.

$=(3.14)(6cm)^2(24cm)$

$=(3.14)(36cm^2)(24cm)$

$=2{,}712.96\ cm^3$

3.

$=(3.14)(5cm)^2(34cm)$

$=(3.14)(25cm^2)(34cm)$

$=2{,}669\ cm^3$

4.

$= {}^{4}/_{3}(3.14)(3cm)^3$

$= {}^{4}/_{3}(3.14)(27cm^3)$

$= {}^{4}/_{3}(84.78cm^3)$

$=113.04\ cm^3$

5.

$=(3.14)(7cm)^2(27cm)$

$=(3.14)(49cm^2)(27cm)$

$=4{,}154.22\ cm^3$

Activity 8

1.

$= {}^{4}/_{3}(3.14)(13cm)^3$

$= {}^{4}/_{3}(3.14)(2{,}197cm^3)$

$= {}^{4}/_{3}(6{,}898.58cm^3)$

$=9{,}198.11\ cm^3$

2.

$= {}^{1}/_{3}(3.14)(7cm)^2(31cm)$

$= {}^{1}/_{3}(3.14)(49cm^2)(31cm)$

$= {}^{1}/_{3}\ (4{,}769.66cm^3)$

$=1{,}589.89\ cm^3$

3.

$=(3.14)(6cm)^2(23cm)$

$=(3.14)(36cm^2)(23cm)$

$=2{,}559.92\ cm^3$

ANSWER GUIDE

Activity 8

4.

$= {}^{4}/_{3}(3.14)(7cm)^3$

$= {}^{4}/_{3}(3.14)(343cm^3)$

$= {}^{4}/_{3}(1{,}077.02cm^3)$

$=1{,}436.03\ cm^3$

5.

$= {}^{1}/_{3}(3.14)(5cm)^2(26cm)$

$= {}^{1}/_{3}(3.14)(25cm^2)(26cm)$

$= {}^{1}/_{3}\ (2{,}041.6cm^3)$

$=680.33\ cm^3$

Activity 9

1.

$= {}^{4}/_{3}(3.14)(9cm)^3$

$= {}^{4}/_{3}(3.14)(729cm^3)$

$= {}^{4}/_{3}(2{,}289.06cm^3)$

$=3{,}052.8\ cm^3$

*Drawing may vary.

Activity 10

1. Answers may vary.
2. A cylinder can be filled up by 3 cones, reason for having ⅓ in the formula.

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