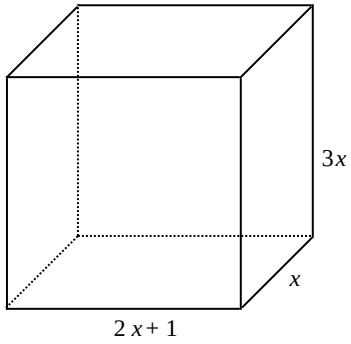
Review

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

____ 1. Find the volume of a right rectangular prism with length 13 cm, width 9 cm, and height 5 cm. Round to the nearest tenth, if necessary.
a. 585 cm^3
b. 292.5 cm^3
c. 195 cm^2
d. 1,755 cm^3

____ 2. Find the volume of a cylinder with a base area of 64π in^2 and height equal to the radius. Give your answer both in terms of π and rounded to the nearest tenth.
a. $64\pi^2$ $in^3 \approx 631.7$ in^3
b. $1,024\pi$ $in^3 \approx 3,217$ in^3
c. 512π $in^3 \approx 1,608.5$ in^3
d. $4,096\pi$ $in^3 \approx 12,868$ in^3

____ 3. Find the volume of the three-dimensional figure in terms of *x*.



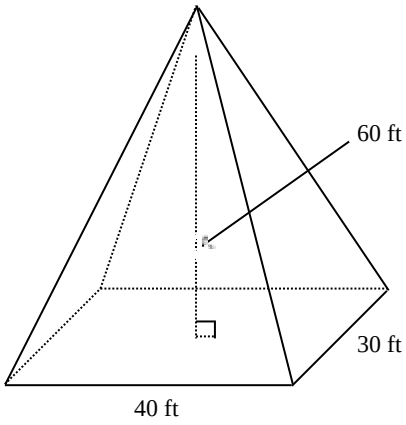
a. $6x^3 + 3x^2$
b. $6x^2 + 3x$
c. $22x^2 + 8x$
d. $6x^3 + 3x^2 + 3x$

____ 4. Find the volume of a rectangular pyramid with length 14 cm, width 8 cm, and height 5 cm. Round to the nearest tenth, if necessary.
a. 280 cm^3
b. 560 cm^3
c. 186.7 cm^3
d. 62.2 cm^3

____ 5. The base area of a model square pyramid is 1,000 sq ft. The height of the pyramid is 100 ft. Find the volume of the pyramid in cubic feet. Round to the nearest cubic foot.
a. 100,000 ft^3
b. 33,333 ft^3
c. 100,000,000 ft^3
d. 1,054 ft^3

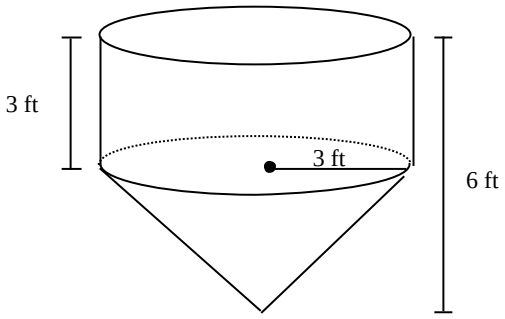
____ 6. Find the volume of a cone with a base circumference of 21π in. and a height 5 in. less than twice the radius. Give your answer both in terms of π and rounded to the nearest tenth.
a. 955.5π $in^3 \approx 3,001.8$ in^3
b. $1,764\pi$ $in^3 \approx 5,541.8$ in^3
c. 29.2π $in^3 \approx 91.6$ in^3
d. 588π $in^3 \approx 1,847.3$ in^3

____ 7. The length, width, and height of the rectangular pyramid are multiplied by $\frac{1}{3}$. Describe the effect on the volume.



a. The volume is multiplied by $\frac{1}{3}$.
b. The volume is multiplied by $\frac{1}{9}$.
c. The volume is multiplied by $\frac{1}{27}$.
d. The volume is multiplied by $\frac{1}{81}$.

____ 8. Find the volume of the composite figure. Round to the nearest hundredth.



a. 28.26 ft^3
b. 84.78 ft^3
c. 113.04 ft^3
d. 197.82 ft^3

____ 9. Find the diameter of a sphere with volume 288π cm^3.
a. 19 cm
b. 12 cm
c. 8.3 cm
d. 6 cm

____ 10. Find the volume of a sphere with diameter 12 m. Give your answer in terms of π.
a. 144π m^3
b. $2,304\pi$ m^3
c. 288π m^3
d. 16π m^3

____ 11. Find the surface area of a sphere with volume 288π m^3. Give your answer in terms of π.
a. 144 m^2
b. 6π m^2
c. 144π m^2
d. 864 m^2

Numeric Response

1. Find the height in centimeters of a square pyramid with a volume of $576\ \text{cm}^3$ and a base edge length equal to the height.

Matching

Match each vocabulary term with its definition.

a. cube
b. cylinder
c. cone
d. sphere
e. prism
f. pyramid
g. hemisphere

____ 1. a polyhedron formed by a polygonal base and triangular lateral faces that meet at a common vertex

____ 2. a prism with six square faces

____ 3. a polyhedron formed by two parallel congruent polygonal bases connected by lateral faces that are parallelograms

____ 4. a three-dimensional figure with two parallel congruent circular bases and a curved lateral surface that connects the bases

____ 5. a three-dimensional figure with a circular base and a curved lateral surface that connects the base to a point called the vertex

Match each vocabulary term with its definition.

a. cross section
b. edge
c. area
d. volume
e. vertex
f. perimeter
g. face

____ 6. the number of nonoverlapping unit cubes of a given size that will exactly fill the interior of a three-dimensional figure

____ 7. the intersection of a three-dimensional figure and a plane

____ 8. a segment that is the intersection of two faces of the figure

____ 9. a flat surface of the polyhedron

____ 10. the point that is the intersection of three or more faces of the figure

Review
Answer Section

MULTIPLE CHOICE

1. ANS: A

$V = lwh$ Volume of a right rectangular prism

$V = (13)(9)(5) = 585 \text{ cm}^3$ Substitute 13 for *l*, 9 for *w*, and 5 for *h*.

	Feedback
A	Correct!
B	The prism has a rectangular base.
C	The volume of a right rectangular prism is equal to the product of its length, width, and height, and is expressed in cubic units.
D	The volume of a right rectangular prism is equal to the product of its length, width, and height.

PTS: 1 DIF: Basic REF: 1c67a592-4683-11df-9c7d-001185f0d2ea
OBJ: 11-2.1 Finding Volumes of Prisms TOP: 11-2 Volume of Prisms and Cylinders
KEY: prism | volume DOK: DOK 2

2. ANS: C

Step 1 Use the base area to find the radius.

$\pi r^2 = 64\pi$ Substitute 64π for the base area.

$r = 8$ Solve for *r*.

Step 2 Use the radius and height to find the volume. The height is equal to the radius, so $h = 8$.

$V = \pi r^2 h$ Volume of a cylinder

$V = 64\pi(8) = 512\pi \text{ in}^3 \approx 1,608.5 \text{ in}^3$ Substitute 8 for *r* and *h*.

	Feedback
A	The volume of a cylinder is equal to pi times the radius squared times the height.
B	The base area is equal to pi times the radius squared.
C	Correct!
D	Use the base area to find the radius. Then use the radius and height (equal to the radius) to find the volume.

PTS: 1 DIF: Average REF: 1c6a2efe-4683-11df-9c7d-001185f0d2ea
OBJ: 11-2.3 Finding Volumes of Cylinders NAT: NT.CCSS.MTH.10.9-12.G.GMD.3
STA: MACC.912.G-GMD.1.3 TOP: 11-2 Volume of Prisms and Cylinders
KEY: volume | cylinder DOK: DOK 2

3. ANS: A

$V = lwh$ Volume of a right rectangular prism

$= (2x + 1)(x)(3x)$ Substitute $(2x + 1)$ for *l*, *x* for *w*, and 3*x* for *h*.

$= 6x^3 + 3x^2$ Simplify.

	Feedback
A	Correct!
B	To find the volume of the figure, multiply length times width times height.
C	This is the surface area of the figure. Find the volume.
D	To find the volume of the figure, multiply length times width times height.

PTS: 1 DIF: Advanced REF: 1c6ef3b6-4683-11df-9c7d-001185f0d2ea
TOP: 11-2 Volume of Prisms and Cylinders KEY: volume | prism
DOK: DOK 3

4. ANS: C

$V = \frac{1}{3}Bh = \frac{1}{3}(14 \cdot 8)(5) = 186.7 \text{ cm}^3$

	Feedback
A	The volume of a rectangular pyramid is equal to the product of one third of its base area times its height.
B	The volume of a rectangular pyramid is equal to the product of one third of its base area times its height.
C	Correct!
D	The volume of a rectangular pyramid is equal to the product of one third of its base area times its height.

PTS: 1 DIF: Basic REF: 1c712f02-4683-11df-9c7d-001185f0d2ea
OBJ: 11-3.1 Finding Volumes of Pyramids NAT: NT.CCSS.MTH.10.9-12.G.GMD.3
STA: MACC.912.G-GMD.1.3 TOP: 11-3 Volume of Pyramids and Cones
KEY: volume | pyramid DOK: DOK 2

5. ANS: B

$V = \frac{1}{3}Bh$ Use the formula for volume of a regular pyramid.

$= \frac{1}{3}(1,000)(100) \approx 33,333.33 \text{ ft}^2$ Substitute 1,000 for *B* and 100 for *h*.

	Feedback
A	The volume is one-third the area of the base times the height.
B	Correct!
C	The volume is one-third the area of the base times the height.
D	The volume is one-third the area of the base times the height.

PTS: 1 DIF: Average REF: 1c73915e-4683-11df-9c7d-001185f0d2ea
OBJ: 11-3.2 Application NAT: NT.CCSS.MTH.10.9-12.G.GMD.3
STA: MACC.912.G-GMD.1.3 TOP: 11-3 Volume of Pyramids and Cones
KEY: volume | pyramid DOK: DOK 2

6. ANS: D

Step 1 Use the circumference to find the radius.

$2\pi r = C$

$2\pi r = 21\pi$ Substitute 21π for *C*.

$r = 10.5$ in. Divide both sides by 2π.

Step 2 Use the radius to find the height.

$2(10.5) - 5 = 16$ in. The height is 5 in. less than twice the radius.

Step 3 Use the radius and height to find the volume.

$V = \frac{1}{3}\pi r^2 h$ Volume of a cone

$= \frac{1}{3}\pi(10.5)^2(16)$ Substitute 10.5 for *r* and 16 for *h*.

$= 588\pi \text{ in}^3 \approx 1{,}847.3 \text{ in}^3$ Simplify.

	Feedback
A	The height is less than twice the radius.
B	The volume of a cone is equal to a third of the product of pi times the radius squared times the height.
C	The circumference is equal to 2 times pi times the radius.
D	Correct!

PTS: 1 DIF: Average REF: 1c73b86e-4683-11df-9c7d-001185f0d2ea
OBJ: 11-3.3 Finding Volumes of Cones NAT: NT.CCSS.MTH.10.9-12.G.GMD.3
STA: MACC.912.G-GMD.1.3 TOP: 11-3 Volume of Pyramids and Cones
KEY: volume | cone DOK: DOK 2

7. ANS: C

Original dimensions:

$V = \frac{1}{3}Bh = \frac{1}{3}(30 \times 40)(60) = \frac{72{,}000}{3} = 24{,}000 \text{ ft}^3$

Length, width, and height multiplied by $\frac{1}{3}$:

$V = \frac{1}{3}Bh = \frac{1}{3}\left(\frac{30}{3} \times \frac{40}{3}\right)\left(\frac{60}{3}\right) = \frac{72{,}000}{81} = \frac{1}{27} \times \frac{72{,}000}{3} = 888\frac{8}{9} \text{ ft}^3$

If the length, width, and height are multiplied by $\frac{1}{3}$, the volume is multiplied by $\frac{1}{27}$.

	Feedback
A	Find the volumes of the original pyramid and the smaller pyramid and compare them.
B	Find the volumes of the original pyramid and the smaller pyramid and compare them.
C	Correct!
D	Find the volumes of the original pyramid and the smaller pyramid and compare them.

PTS: 1 DIF: Average REF: 1c75f3ba-4683-11df-9c7d-001185f0d2ea
OBJ: 11-3.4 Exploring Effects of Changing Dimensions NAT: NT.CCSS.MTH.10.9-12.G.GMD.3
STA: MACC.912.G-GMD.1.3 TOP: 11-3 Volume of Pyramids and Cones
KEY: change dimensions | volume | pyramid DOK: DOK 2

8. ANS: C

The volume of the cylinder is $V = \pi r^2 h = \pi(3)^2(3) = 27\pi \text{ ft}^3$.

The volume of the cone is $V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(3)^2(3) = 9\pi \text{ ft}^3$.

The volume of the water tank is the sum of the volumes.

V = (cylinder volume) + (cone volume)

$= 27\pi \text{ ft}^3 + 9\pi \text{ ft}^3 = 36\pi \text{ ft}^3 \approx 36 \times 3.14 = 113.04 \text{ ft}^3$.

	Feedback
A	Add the volume of the cone to the volume of the cylinder.
B	Add the volume of the cone to the volume of the cylinder.
C	Correct!
D	The height of the cylinder is 3 ft, not 6 ft.

PTS: 1 DIF: Average REF: 1c785616-4683-11df-9c7d-001185f0d2ea
OBJ: 11-3.5 Finding Volumes of Composite Three-Dimensional Figures
NAT: NT.CCSS.MTH.10.9-12.G.GMD.3 STA: MACC.912.G-GMD.1.3
TOP: 11-3 Volume of Pyramids and Cones
KEY: composite figure | cone | cylinder | volume DOK: DOK 2

9. ANS: B

$V = \frac{4}{3}\pi r^3$	Volume of a sphere
$288\pi = \frac{4}{3}\pi r^3$	Substitute 288π for V.
$216 = r^3$	Divide both sides by $\frac{4}{3}\pi$.
$r = 6$	Take the cube root of both sides.
$d = 12$ cm	$d = 2r$

	Feedback
A	The volume of a sphere is equal to 4/3 times pi, times the radius raised to the third power.
B	Correct!
C	The volume of a sphere is equal to 4/3 times pi, times the radius raised to the third power.
D	Find the diameter of the sphere, not the radius.

PTS: 1 DIF: Average REF: 1c787d26-4683-11df-9c7d-001185f0d2ea
OBJ: 11-4.1 Finding Volumes of Spheres NAT: NT.CCSS.MTH.10.9-12.G.GMD.3
STA: MACC.912.G-GMD.1.3 TOP: 11-4 Spheres
KEY: volume | sphere DOK: DOK 2

10. ANS: C

$V = \frac{4}{3}\pi r^3$	Volume of a sphere
$V = \frac{4}{3}\pi 6^3$	Substitute 6 for r.
$V = 288\pi$	Simplify.

	Feedback
A	The volume of a sphere is equal to 4/3 times pi, times the radius raised to the third power.
B	The volume of a sphere is equal to 4/3 times pi, times the radius raised to the third power.
C	Correct!
D	The volume of a sphere is equal to 4/3 times pi, times the radius raised to the third power.

PTS: 1 DIF: Basic REF: 1c7ab872-4683-11df-9c7d-001185f0d2ea

OBJ: 11-4.1 Finding Volumes of Spheres NAT: NT.CCSS.MTH.10.9-12.G.GMD.3
STA: MACC.912.G-GMD.1.3 TOP: 11-4 Spheres
KEY: volume | sphere DOK: DOK 2

11. ANS: C

$V = \frac{4}{3}\pi r^3$	Volume of a sphere
$288 = \frac{4}{3}\pi r^3$	Substitute 288 for *V*.
$r = 6$	Solve for *r*.
$S = 4\pi r^2$	Surface area of a sphere
$S = 4\pi(6)^2 = 144\pi$ m^2	Substitute 6 for *r*.

	Feedback
A	Surface area has pi in its formula.
B	Substitute the radius to solve for surface area.
C	Correct!
D	Solve for radius first.

PTS: 1 DIF: Basic REF: 1c7d41de-4683-11df-9c7d-001185f0d2ea
OBJ: 11-4.3 Finding Surface Area of Spheres NAT: NT.CCSS.MTH.10.9-12.G.GMD.3
STA: MACC.912.G-GMD.1.3 TOP: 11-4 Spheres
KEY: surface area | sphere DOK: DOK 2

NUMERIC RESPONSE

1. ANS: 12

PTS: 1 DIF: Advanced REF: 1c89069a-4683-11df-9c7d-001185f0d2ea
NAT: NT.CCSS.MTH.10.9-12.G.GMD.3 STA: MACC.912.G-GMD.1.3
TOP: 11-3 Volume of Pyramids and Cones KEY: volume | pyramid
DOK: DOK 2

MATCHING

1. ANS: F PTS: 1 DIF: Basic
REF: 1c892daa-4683-11df-9c7d-001185f0d2ea TOP: 11-1 Solid Geometry
DOK: DOK 1
2. ANS: A PTS: 1 DIF: Basic
REF: 1c8b68f6-4683-11df-9c7d-001185f0d2ea TOP: 11-1 Solid Geometry
DOK: DOK 1
3. ANS: E PTS: 1 DIF: Basic
REF: 1c92900a-4683-11df-9c7d-001185f0d2ea TOP: 11-1 Solid Geometry
DOK: DOK 1
4. ANS: B PTS: 1 DIF: Basic
REF: 1c8df262-4683-11df-9c7d-001185f0d2ea TOP: 11-1 Solid Geometry
DOK: DOK 1
5. ANS: C PTS: 1 DIF: Basic
REF: 1c902dae-4683-11df-9c7d-001185f0d2ea TOP: 11-1 Solid Geometry

DOK: DOK 1

6. ANS: D PTS: 1 DIF: Basic
REF: 1c92b71a-4683-11df-9c7d-001185f0d2ea
TOP: 11-2 Volume of Prisms and Cylinders DOK: DOK 1
7. ANS: A PTS: 1 DIF: Basic
REF: 1c94f266-4683-11df-9c7d-001185f0d2ea TOP: 11-1 Solid Geometry
DOK: DOK 1
8. ANS: B PTS: 1 DIF: Basic
REF: 1c9c197a-4683-11df-9c7d-001185f0d2ea TOP: 11-1 Solid Geometry
DOK: DOK 1
9. ANS: G PTS: 1 DIF: Basic
REF: 1c977bd2-4683-11df-9c7d-001185f0d2ea TOP: 11-1 Solid Geometry
DOK: DOK 1
10. ANS: E PTS: 1 DIF: Basic
REF: 1c9c408a-4683-11df-9c7d-001185f0d2ea TOP: 11-1 Solid Geometry
DOK: DOK 1