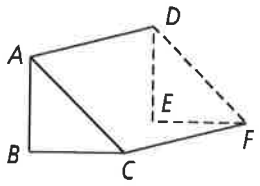
Name _____ Class _____ Date _____

Extra Practice

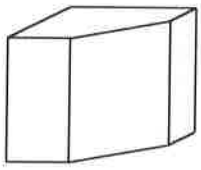
Chapter 11

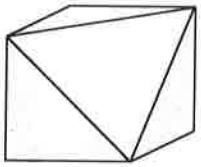
Lesson 11-1

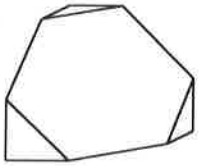
1. Look at the polyhedron at the right.
   a. How many vertices are there? List them. **6; *A, B, C, D, E, F***
   b. How many edges are there? List them. **9; $\overline{AB}$, $\overline{AC}$, $\overline{AD}$, $\overline{BC}$, $\overline{BE}$, $\overline{CF}$, $\overline{DE}$, $\overline{DF}$, $\overline{EF}$**
   c. How many faces are there? List them. **5; $\triangle ABC$, $\triangle DEF$, $\square ABED$, $\square ACFD$, $\square BCFE$**



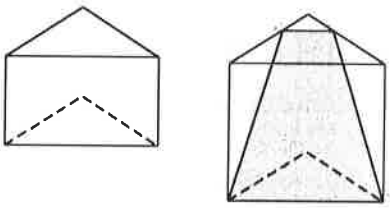
The diagrams in Exercises 2–4 each show a cube after part of it has been cut away. Identify the shape of the cross section formed by the cut. Also, verify Euler's Formula, $F + V = E + 2$, for the polyhedron that remains.

2. 
rectangle; 7 + 10 = 15 + 2

3. 
equilateral △; 7 + 7 = 12 + 2

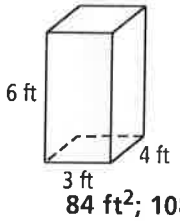
4. 
hexagon; 7 + 10 = 15 + 2

5. The bases of the prism shown at the right are equilateral triangles. Make a sketch that shows how you can have a plane intersect the prism to give a cross section that is an isosceles trapezoid.

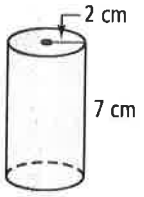


Lessons 11-2 and 11-3

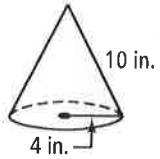
Find the (a) lateral area and (b) surface area of each figure. Leave your answers in terms of π or in simplest radical form.

6. 

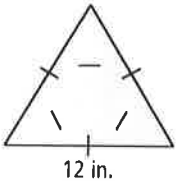
84 ft²; 108 ft²

7. 

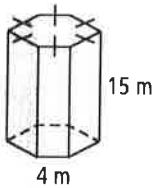
28π cm²; 36π cm²

8. 

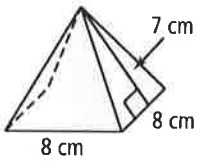
40π in.²; 56π in.²

9. 

108√3 in.²; 144√3 in.²

10. 

360 m²; (360 + 48√3) m²

11. 

112 cm²; 176 cm²

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Extra Practice (continued)

Chapter 11

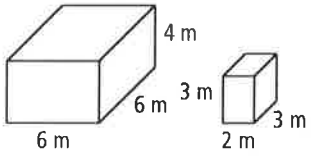
Lesson 11-7

Copy and complete the table for three similar solids.

	Similarity Ratio	Ratio of Surface Areas	Ratio of Volumes
40.	2 : 3	4 : 9	8 : 27
41.	5 : 8	25 : 64	125 : 512
42.	3 : 4	9 : 16	27 : 64

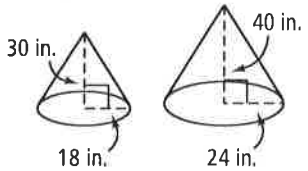
Are the two figures similar? If so, give the similarity ratio.

43.



yes; 2 : 1

44.



yes; 3 : 4

The surface areas of two similar figures are given. The volume of the larger figure is given. Find the volume of the smaller figure.

45. S.A. $= 160\ \text{ft}^2$
S.A. $= 250\ \text{ft}^2$
$V = 600\ \text{ft}^3$ **307.2 ft³**

46. S.A. $= 121\ \text{cm}^2$
S.A. $= 196\ \text{cm}^2$
$V = 343\ \text{cm}^3$ **$\approx$ 166.4 cm³**

47. S.A. $= 4\ \text{yd}^2$
S.A. $= 4.5\ \text{yd}^2$
$V = 8\ \text{yd}^3$ **$\approx$ 6.7 yd³**

48. How do the surface area and volume of a cylinder change if the radius and height are multiplied by $\frac{5}{4}$? **S.A. is multiplied by $\frac{25}{16}$. Volume is multiplied by $\frac{125}{64}$.**

49. For two similar solids, how are the ratios of their volumes and surface areas related? $\left(\frac{V_1}{V_2}\right)^2 = \left(\frac{A_1}{A_2}\right)^3$

Chapter 11 Find the Errors!

1. The vertices and edges are correct. The faces are incorrect because the bases are pentagons, not separate quadrilaterals and triangles.

   There are 7 faces:
   quadrilaterals *ABGF*, *BCHG*, *DCHI*, *EDIJ*, and *AFJE*, and pentagons *ABCDE* and *FGHIJ*.

2. The perimeter of the base is the perimeter of the triangle, not the rectangle. The height of the prism is 14 feet.

   The triangle is a right triangle, so the length of the hypotenuse is $\sqrt{5^2 + 12^2} = 13$ ft.

   $p = 5 + 12 + 13 = 30$

   L.A. $= ph = 30 \cdot 14 = 420$

   $B = \frac{1}{2}bh = \frac{1}{2}(5)(12) = 30$

   S.A. $=$ L.A. $+ 2B$
   $= 420 + 2(30) = 480$

   The surface area is 480 ft^2.

3. The diameter was used instead of the radius.

   S.A. $=$ L.A. $+ 2B$
   $= 2\pi rh + 2\pi r^2$
   $= 2\pi(5)(4) + 2\pi(5)^2$
   $= 40\pi + 50\pi$
   $= 90\pi$

   The surface area is 90π in.^{2}.

4. The term 8^2 should be simplified as 64, not 16.

   S.A. $=$ L.A. $+ B$
   $= \frac{1}{2}pl + s^2$
   $= \frac{1}{2}(32)(10) + 8^2$
   $= 160 + 64$
   $= 224$

   The surface area is 224 m^2.

5. A paper cup does not have a top, so only the lateral area is needed.

   L.A. $= \pi rl$
   $= \pi(1.5)\left(\sqrt{3^2 + 1.5^2}\right)$
   ≈ 15.8

   You will need about 15.8 square inches of paper.

1. The long leg of a 30-60-90° triangle is $\sqrt{3}$ times the length of the short leg, not twice the length of the short leg.

$$V = Bh$$
$$= \frac{1}{2}(20\sqrt{3})(20)(30)$$
$$\approx 10{,}392$$

The volume is about 10,392 cm^3.

2. The area of the base is πr^2, not $2\pi r$.

$$V = Bh$$
$$= \pi r^2 h$$
$$= \pi(4^2)(6)$$
$$= 96\pi$$

The volume is 96π ft^3.

3. The height should be used, not the slant height.

$$V = \frac{1}{3}Bh$$
$$= \frac{1}{3}(10^2)(12)$$
$$= 400$$

The volume is 400 cm^3.

4. The formula was written incorrectly.

$$V = \frac{1}{3}Bh$$
$$= \frac{1}{3}\pi r^2 h$$
$$= \frac{1}{3}\pi(5)^2 12$$
$$= 100\pi$$

The volume is 100π m^3.

5. The height of the trapezoidal face is $19 - 4$, or 15 in., not 19 in.

Trapezoidal Prism: $V = \frac{1}{2}(15)(3 + 5)(15) = 900$

Rectangular Prism: $V = 4(15)(5) = 300$

Total: $V = 900 + 300 = 1200$

The volume of the desk is 1200 $in.^3$.

1. The radius is $\frac{C}{2\pi}$, not $\frac{C}{\pi}$.

Find the radius: $r = \frac{C}{2\pi}$
$= \frac{28}{2\pi}$
≈ 4.5

Find the surface area: S.A. $= 4\pi r^2$
$= 4\pi(4.5)^2$
≈ 254.5

The surface area is about 254.5 in.^{2}.

2. The formula used is missing π.

$V = \frac{4}{3}\pi r^3$
$= \frac{4}{3}\pi(9)^3$
$= 972\pi$

The volume is 972π cm^3.

3. The ratios of the volumes is $a^3 : b^3$, but the scale factor is $a : b$.

$\frac{a^3}{b^3} = \frac{8}{27}$
$\frac{a}{b} = \frac{2}{3}$

The scale factor is 2 : 3.

4. The proportion is set up incorrectly.

$\frac{8}{27} = \frac{x}{4}$
$27x = 32$
$x \approx 1.2$

It will hold about 1.2 pounds.

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Problem 3

What is the area of the shaded segment shown? Round your answer to the nearest whole number, about 14 in.^{2}

page 134

Problem 1

[illegible] chosen at ra[illegible] the probability that P is on $\overline{GH}$? $\frac{5}{11}$

Problem 2

A river ferry runs every 40 minutes. If a passenger arrives at the ferry station at a random time, what is the probability that he will have to wait at least 25 minutes for the ferry? $\frac{3}{8}$

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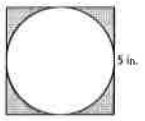
10-8 **Additional Problems** (continued)
Geometric Probability

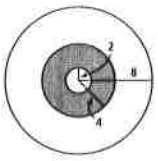
Problem 3

A circle is inscribed in a square. A point N in the square is chosen at random. What is the probability that N lies in the shaded region? about 21.5%



Problem 4

Suppose a dart lands randomly on the target at the right. What is the probability that the dart will land in the shaded region? 18.75%



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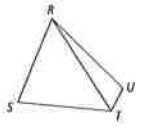
11-1 **Additional Problems**
Space Figures and Cross Sections

Problem 1

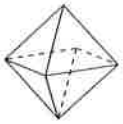
How many vertices, edges, and faces are in the polyhedron below? List them.



There are four vertices: R, S, T, and U. There are six edges: $\overline{RS}$, $\overline{RT}$, $\overline{RU}$, $\overline{ST}$, $\overline{TU}$, and $\overline{US}$. There are four faces: $\triangle RST$, $\triangle RTU$, $\triangle RUS$, and $\triangle STU$.

Problem 2

How many edges does the polyhedron below have? Use Euler's Formula. 12



Problem 3

How can you verify Euler's Formula for a net of a cube?

Draw a net for the cube. There are 6 regions ($F = 6$), 14 vertices ($V = 14$), and 19 segments ($E = 19$). So, $F + V = E + 1$, or $6 + 14 = 19 + 1$.

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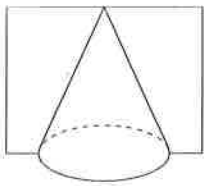
Problem 4

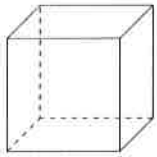
the solid below?



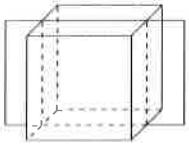
The cross section is a triangle.

Problem 5

Draw a cross section formed by a vertical plane intersecting the right and left faces of the cube. What shape is the cross section?



The cross section is a square.



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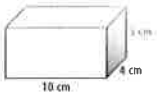
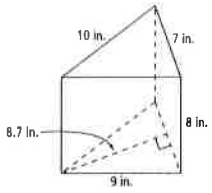
Problem 1



Problem 2

What is the surface area of the prism below? **268.9 in.²**



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11-2 **Additional Problems** (continued)
Surface Areas of Prisms and Cylinders

Problem 3

The radius of the base of a cylinder is 6 cm and its height is 15 cm. What is the surface area of the cylinder in terms of π? **D**

A. 176π cm^2

B. 188π cm^2

C. 234π cm^2

D. 252π cm^2

Problem 4

A soup can is 4.5 in. high and has a diameter of 3 in. How much paper is needed to make a label that will completely cover the sides of the can without overlap? **about 42.4 in.²**

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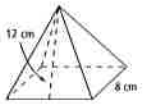
11-3 **Additional Problems**
Surface Areas of Pyramids Cones

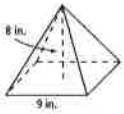
Problem 1

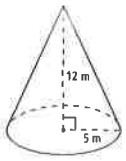
What is the surface area of the square pyramid with base edges of 8 cm and a slant height of 12 cm? **256 cm²**

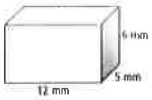


Problem 2

What is the lateral area of a pyramid with a height of 8 in. and a square base that measures 9 in. on each side? Round to the nearest tenth. **about 165.2 in.²**

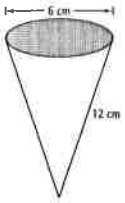






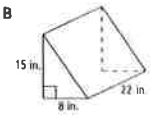
Problem 4

What is the lateral area of the ice cream cone shown below? Round to the nearest square centimeter. **about 113 cm²**



Problem 2

What is the volume of the triangular prism? **B**



A. 1472 in.^{3}

B. 1320 in.^{3}

C. 1184 in.^{3}

D. 960 in.^{3}

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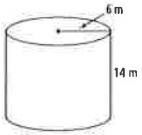
11-4 Additional Problems (continued)
Volumes of Prisms and Cylinders

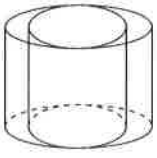
Problem 3

Find the volume of the cylinder in terms of π. **504π m²**



Problem 4

A lab technician made a 14 cm diameter hole through the middle of a cylinder that has a diameter of 20 cm and a height of 18 cm. What is the approximate volume of the finished cylinder? **about 2,884 cm³**



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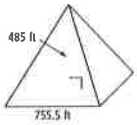
11-5 Additional Problems
Volumes of Pyramids and Cones

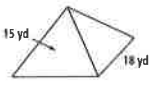
Problem 1

The Great Pyramid of Giza is the largest of the original Seven Wonders of the World. The pyramid originally had the dimensions shown below. What was the approximate volume of the Great Pyramid? **about 92,276,140 ft³**



Problem 2

What is the volume in cubic yards of a square pyramid with base edges 18 yd and slant height 15 yd? **1296 yd³**



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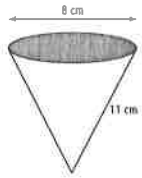
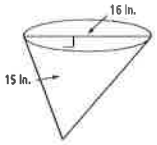
Problem 3

About how many cubic centimeters of water does the paper drinking cup hold? about 172 cm^3



Problem 4

What is the volume of the oblique cone below? Give your answer in terms of π and also rounded to the nearest cubic inch. **320π in.^{3} or about 1005 in.^{3}**



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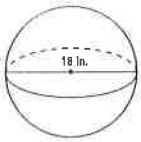

Problem 2

What is the surface area of a ball with a circumference of about 25 in.? Round to the nearest ten square inches. **about 200 in.^{2}**

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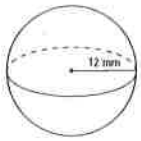
11-6 **Additional Problems** (continued)
Surface Areas and Volumes of Spheres

Problem 3

What is the volume of the sphere in terms of π? **2304π mm^3**



Problem 4

The volume of a sphere is 2200 yd^3. What is the surface area of the sphere? **about 818 yd^2**

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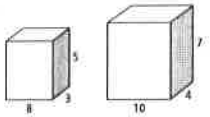
11-7 **Additional Problems**
Areas and Volumes of Similar Solids

Problem 1

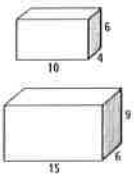
Are the two rectangular prisms similar? If so, what is the scale factor?

a.



no

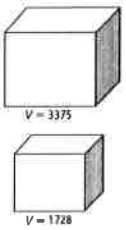
b.



yes, 2 : 3

Problem 2

What is the scale factor of the similar rectangular prisms shown below? **5 : 4**



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Problem 3

The volumes of two similar solids are 40 in.³ and ... If the surface area of the smaller solid is 48 in.², what is ... surface area of the larger solid? **108 in.²**

Problem 4

An office supplies store sells paper clips in small and large boxes. A small box holds about 220 paper clips. The large box is formed by doubling the dimensions of the small box. About how many paper clips should fit in the large box?
about 1760 paper clips

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Problem 1

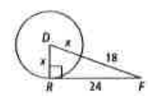
A. 28
B. 56
C. 76
D. 152

Problem 2

Jasmine is riding in an airplane at an altitude of about 6.5 mi above the Earth. How far on the Earth can she see if the Earth's radius is about 4000 mi? Round to the nearest mile. **228 mi**

Problem 3

What is the value of x? **7**



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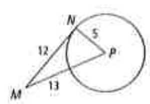
12-1 Additional Problems (continued)
Tangent Lines

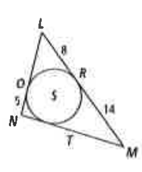
Problem 4

Is $\overline{MN}$ tangent to $\odot P$ at N? Explain.
Yes. Triangle *MNP* is a right triangle by the Converse of the Pythagorean Theorem. So, $\overline{MN}$ is tangent to $\odot P$ at *N* by Theorem 12-2.



Problem 5

$\odot S$ is inscribed in $\triangle LMN$. What is the perimeter of $\triangle LMN$? **54**



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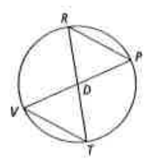
12-2 Additional Problems
Chords and Arcs

Problem 1

In the diagram, $\overline{VT} \cong \overline{RP}$. What can you conclude?

$\overset{\frown}{VT} \cong \overset{\frown}{RP}$, $\angle VDT \cong \angle RDP$



Problem 2

What is the value of a in the circle? **6**