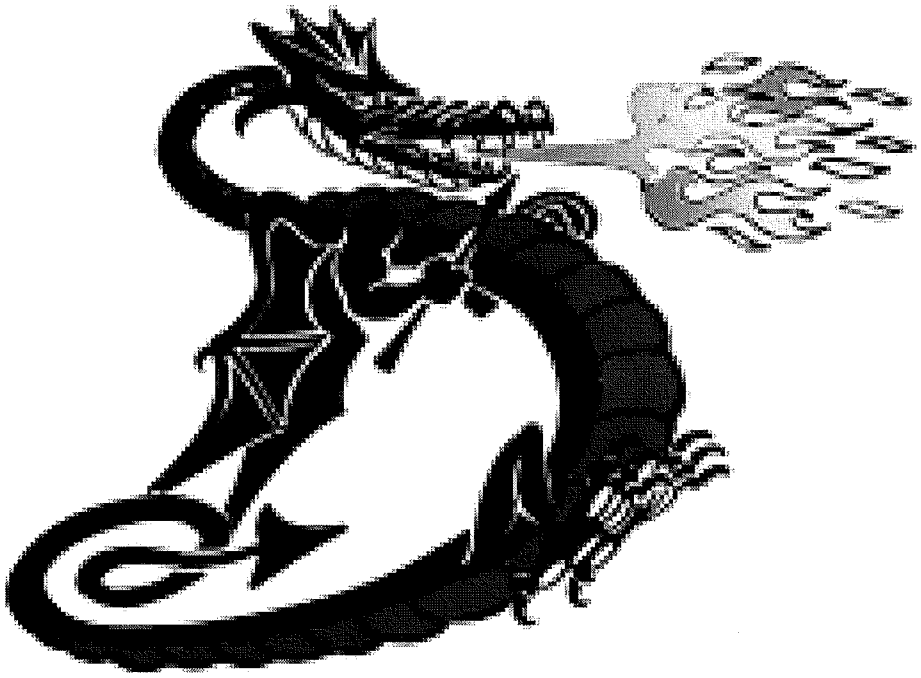
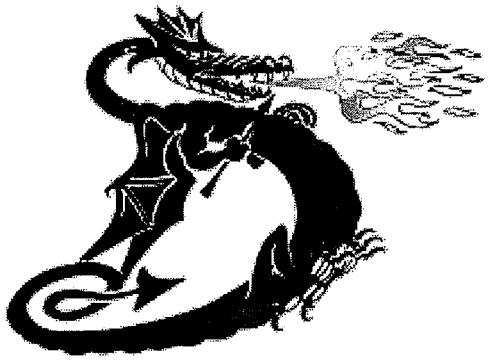
DUNSMUIR MIDDLE SCHOOL

Math 8 - Project Based Learning

Geodesic Dome 2013-2014



STUDENT NAME:



DMS Math 8 – Miss Harvey's

GEODESIC DOME PROJECT

2013-2014

Project: Build a Geodesic Dome

Rules:

- can be any material
- needs to fit in the classroom (or a picture and signed authentication
- can work w/ up to 1 partner
    i. project needs to be twice as involved/detailed/work

Due: February 27, 2014

	Exemplary 4	**Proficient 3**	**Developing 2**	**Beginning 1**
Design Creativity	Design is *Masterful*; flexible, and efficient; able to use knowledge and skill and adjust understandings well in novel, or difficult design idea	Design is *Skillfull*; Competent in using knowledge & skill; demonstrates adapting understandings to your own design ideas	Design is *Competent*; Basic design with a bit of a personal twist (gumdrops); Able to perform well with knowledge and skill in a few key situations; flexibility, adaptability, or range to new situations may be limited	Someone else's design; internet printout; Can perform only with coaching or relies on highly scripted, singular "plug-in" skills, procedures or approaches
Form & Function	Final product stands independently & is extremely sturdy; goes well beyond basic design elements	Final product generally stands independently & is sturdy	Final product basically stands & is somewhat sturdy; may contain a few errors	Final product almost stands & is not quite sturdy; some significant errors are present
Math Calculations	Demonstrates knowledge & skills at 85% correct?	Demonstrates knowledge & skills at 75% correct	Demonstrates knowledge & skills at 65% correct	Demonstrates knowledge & skills at 50% correct
Math Workbook	An uncommon and revealing workbook, going beyond what is obvious or what was discussed in class; makes refined connections; well supported by mathematical work; unique thinking displayed	a workbook that reflects some in-depth and personalized ideas; the student is making the work his/her own, going beyond what is directly stated in the class—there are some supported ideas here, but it is missing some mathematical work	A complete workbook but with limited ideas; rarely extends beyond basic ideas of what was learned; workbook is general and contains basic mathematical work	A sketchy or brief workbook; more copying from the text than analytical or creative; contains short disconnected sections of mathematical work

Geodesic Dome Project

Table of Contents

Student Name _____ Mark /5

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	7.6 Area of a Rectangle and a Square	☐
	7.7 Area of a Parallelogram	☐
	7.8 Area of a Triangle	☐
	7.9 Area of a Circle	☐
	8.1 Three-Dimensional Solids	☐
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Project	Design Creativity	☐
	Form & Function	☐
	Math Calculation – Surface Area	☐
	Workbook	☐

Skill Builder

1. *Add.*

NO CALCULATOR

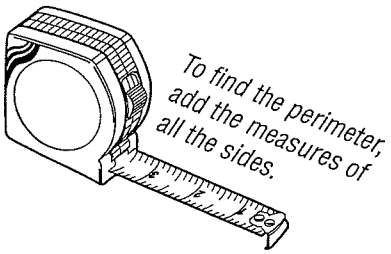
a)	b)	c)	d)	e)
3.6	6.4	14.3	1.9	7.4
4.5	5.8	16.9	1.8	6.4
8.9	10.7	12.0	2.7	1.0
			3.8	10.7
				4.6

2. *Match each question with the correct answer.*

NO CALCULATOR

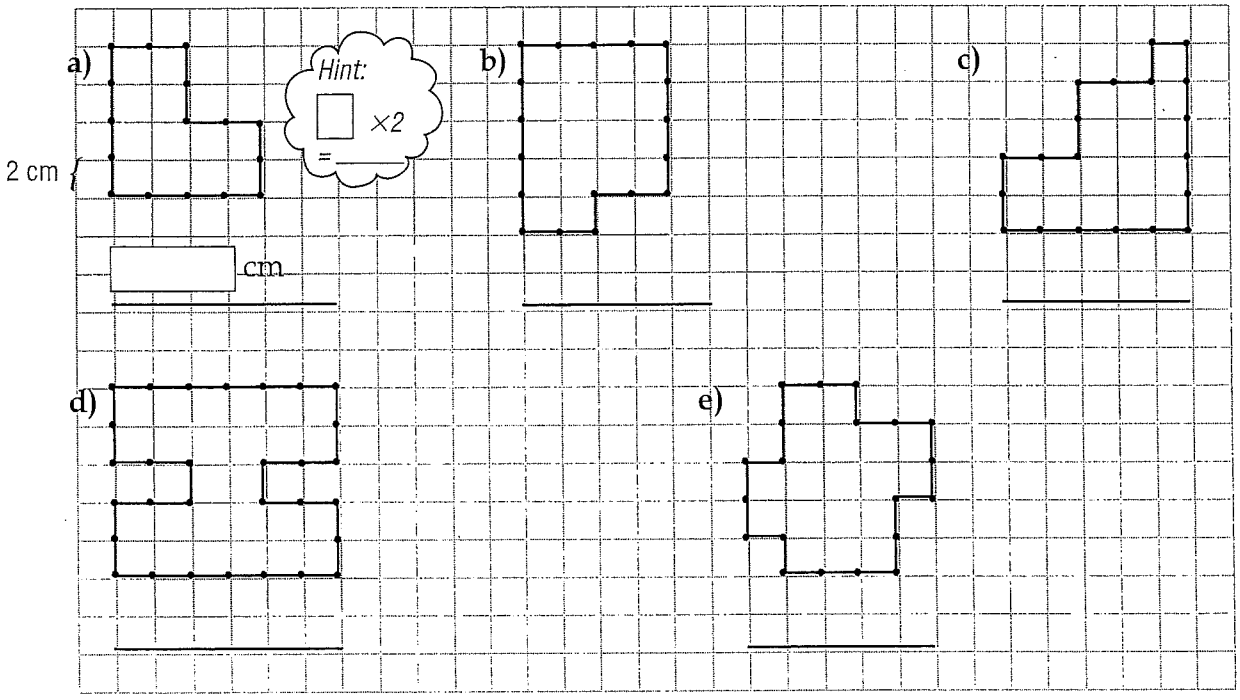
a) $6 \times 3 \times 10$	27
b) $7 \times 2 \times 10$	80
c) $3 \times 3 \times 3$	25
d) $5 \times 4 \times 4$	180
e) $2 \times 2 \times 6$	90
f) $10 \times 9 \times 1$	48
g) $4 \times 2 \times 2$	140
h) $5 \times 5 \times 1$	16
i) $2 \times 4 \times 6$	1000
j) $10 \times 10 \times 10$	24

7.3 Perimeter



Practice

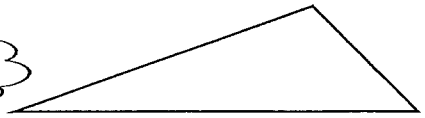
1. *Find the* ***perimeter*** *of each figure.*
   The ***distance between two points*** *on the grid is 2 cm.*



2. ***Estimate*** *the perimeter of each figure.* ***Measure*** *each side of the figure.* ***Calculate*** *the perimeter of each figure.*

a)

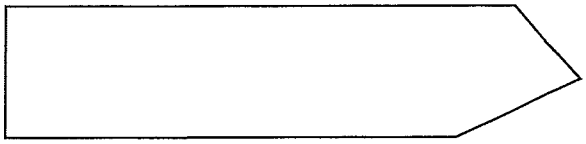
First, estimate the length of each side.



Est. _____ + _____ + _____ = _____

Measure: _____ + _____ + _____ = _____

b)

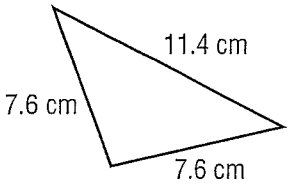


Est. _____

Measure: _____

3. ***Estimate****, then* ***calculate*** *the perimeter of each figure.*

a)

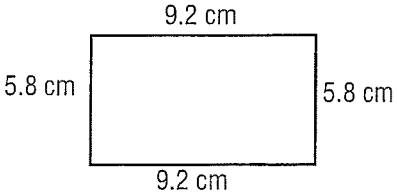


Est.
10
8
8
[ ]

P = 7.6 + 11.4 + 7.6

P = _____ cm

b)

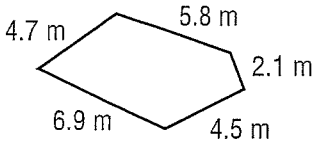


Est.

P = 9.2 + [ ] + [ ] + [ ]

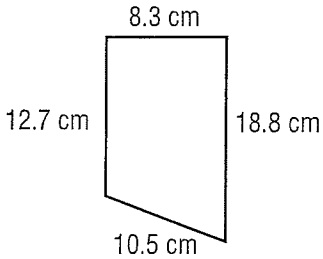
P = _____

c)



Est.

d)



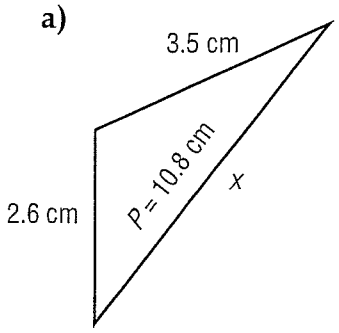
Est.

Remember to include units.

Problems and Applications

4. *Calculate each missing length.*

a)



P = [ ] + [ ] + [ ]

Substitute. **10.8 = 2.6 + 3.5 + x**

Add like terms. **10.8 = + x**

Add -6.1. **−6.1 = − 6.1**

[ ] = x

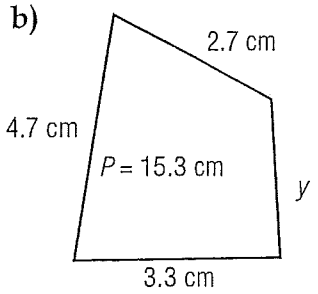
OR

x = [ ]

The missing side is [ ] cm.

Find the missing side.

b)



Substitute

Add like terms

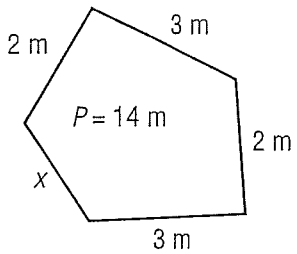
Add ☐

$P = \square + \square + \square + \square$

$15.3 = \square + \square + \square + \square$

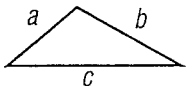
Sentence: _____

c)



Sentence: _____

5. *Complete the table.*



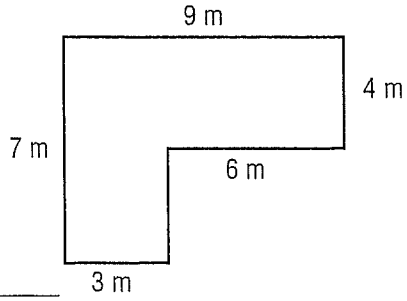
$P = a + b + c$

	a	b	c	P
a)	1.5	1.3	1.2	
b)	2.1	1.6	2.5	
c)	4		5	14
d)		4	5	13

Rough Work:

6. A wallpaper border will be put around the top of the walls of a hallway.

a) What length of border will be needed?



Sentence: _____

b) The border is sold in 6 m rolls. How many rolls will be needed?

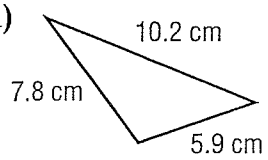
Hint: *Divide by 6.*

Sentence: _____

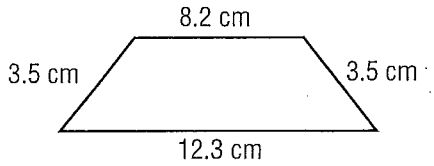
Skill Builder

1. *Calculate each perimeter.*

a)



b)



P = sum of all sides

P = _____ + _____ + _____

P = _____

2. *Subtract.*

NO CALCULATOR

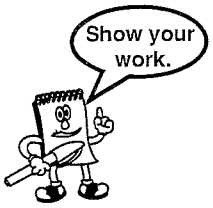
a) 165 − 99 = _____	b) 342 − 99 = _____	c) 602 − 99 = _____	d) 111 − 99 = _____	e) 276 − 99 = _____
f) 545 − 99 = _____	g) 215 − 99 = _____	h) 485 − 99 = _____	i) 198 − 99 = _____	j) 100 − 99 = _____

7.4 Perimeters of Polygons

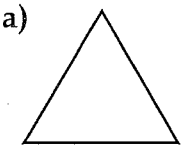
Perimeter = number of sides × length of side

Practice

1. *Find the perimeter of each* ***regular polygon.***



a)



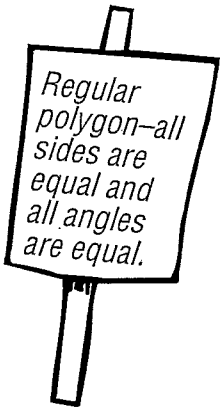
s = 4.5 cm

P = number of sides × length of a side

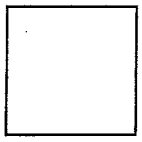
$P = 3 \times 4.5$

P = _____ cm

4.5
× 3
_____
_____



b)



s = 2.3 cm

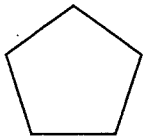
$P = 4 \times s$

$P = 4 \times$ ☐

P = _____ cm

2.3
× 4
_____
_____

c)



s = 1.8 cm

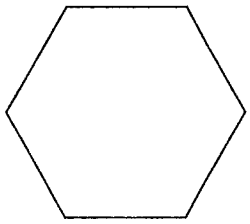
P = ☐ × s

P = ☐ × ◯

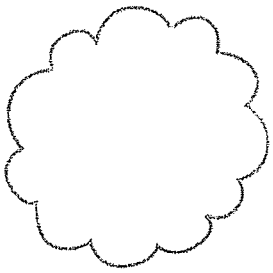
P = _____ cm

Find the ***perimeter*** *of each regular polygon.*

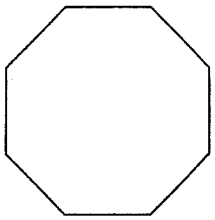
d)



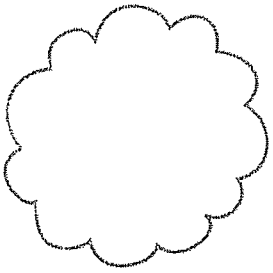
$s = 5.4$ cm



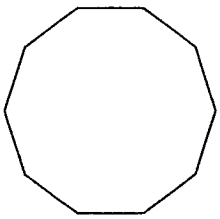
e)



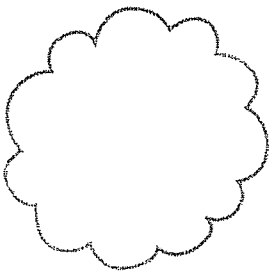
$s = 7.6$ cm



f)

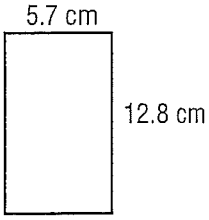


$s = 3.9$ cm



2. *Calculate the* ***perimeter*** *of each rectangle.*

a)



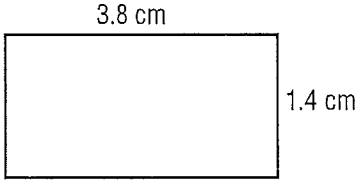
Formula $P = 2 \times l + 2 \times w$

Substitute $= 2 \times 5.7 + 2 \times 12.8$

Multiply $=$ _____ + _____

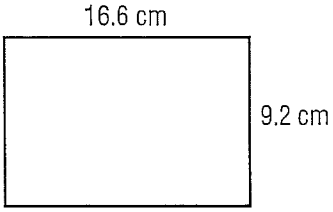
Add $=$ _____ cm

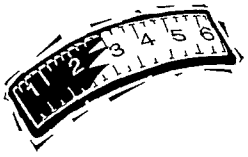
b)



$P = 2 \times l + 2 \times w$

c)





Problems and Applications

3. To warm up before a practice, the soccer coach has the team members run around the field 2 times. The length of the field is 100 m and the width is 73 m. How far does each team member run?

Diagram:

Sentence: _____

4. *Find the perimeter of each* ***regular polygon.***

Draw the figure first.

a) square, each side is 8.3 m

Diagram

$P = 4 \times s$

$= 4 \times \square$

$=$ _____

b) triangle, each side is 7.4 cm

Diagram

_____

_____

_____

c) hexagon, each side is 9.4 cm

Diagram

Hint:
Hexagon
• 6 sides
Octagon
• 8 sides

_____

_____

_____

d) octagon, each side is 5.2 cm

Diagram

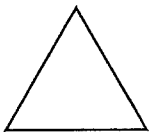
_____

_____

_____

5. *Find the* ***length*** *of the side of each regular polygon.*

a) triangle, perimeter is 21 cm



$P = 3 \times s$ Formula

$21 = 3 \times s$ Substitute

$\frac{21}{3} = \frac{3}{3} \times s$

$=$ _____

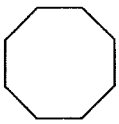
Divide both sides by the same number.

b) square, perimeter is 24 m

Skill Builder

1. *Calculate the perimeter of each regular polygon.*

a) octagon, sides 4.1 cm

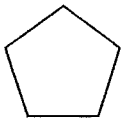


$P = 8s$ Formula

$P = 8 \times$ _____ Substitute

$P =$ _____ cm Multiply

b) pentagon, sides 4 cm



c) square, sides 3.9 cm

d) triangle, sides 7.7 cm

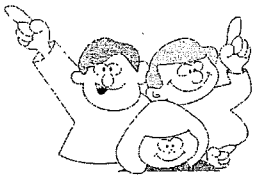
2. *Calculate.* 4×4

a) $4^2 =$ _____ b) $7^2 =$ _____ c) $2^2 =$ _____ d) $6^2 =$ _____

e) $9^2 =$ _____ f) $10^2 =$ _____ g) $1^2 =$ _____ h) $3^2 =$ _____

NO CALCULATOR

LEARNING TOGETHER Investigating Geometric Constants



Work together with your classmates, using your *MATHPOWER*™ student text, pages 214 and 215.

MATHPOWER™ **Pages 214 to 215**

Skill Builder

1. Multiply. *Round each answer to the nearest hundredth (2 decimal places).*

NO CALCULATOR

Round answer to 2 decimal places.

a) 6.87 × 4.5 = _____ ↓ _____

b) 3.14 × 7.4 = _____ ↓ _____

c) 4.08 × 2.9 = _____ ↓ _____

d) 14.21 × 9.6 = _____ ↓ _____

2. Add.

NO CALCULATOR

a) 5000 + 4500 = _____

b) 600 + 700 = _____

c) 8000 + 430 = _____

d) 7000 + 2100 = _____

e) 400 + 3000 = _____

f) 1000 + 2200 = _____

g) 900 + 4000 = _____

h) 6000 + 2000 = _____

7.5 Circumference of a Circle

$\doteq 3.14$

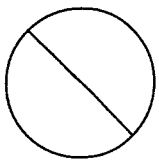
Diameter is double the radius.

Round each answer to the nearest hundredth (2 *decimal places*), if necessary.

Practice

1. *Measure each radius or diameter and* ***calculate*** *the circumference of each circle.*

a)



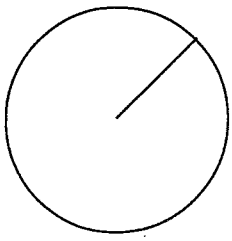
d = _____

C = $\times d$

= 3.14 × ☐

= _____ cm

b)



r = _____

d = 2 × _____

= _____

Formula

Substitute

Multiply

_____

_____

_____

2. ***Estimate****, then* ***calculate*** *the circumference of each circle.*

a) d = 8.35 cm

Formula

Substitute

Multiply

C = × _____

= 3.14 × ☐

= _____ cm

Est.

$C = 3 \times 8$

= _____ cm

b) d = 15 cm

C = _____ × _____

= _____ × _____

= _____

Est.

c) d = 19.2 cm

Est.

d) d = 5.6 m

Est.

e) r = 23 cm

The diameter is twice the radius. $d = 2 \times r$

d = 2 × _____

= _____

C = $\times d$

= _____ × _____

= _____

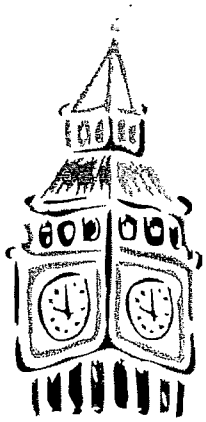
Est.

f) r = 5.3 cm

Est.

Problems and Applications

3. The diameter of the clock face of Big Ben in London, England, is 7.1 m. What is the circumference of the clock face?



Formula

Substitute

Multiply

Sentence: _____

4. How much longer is the circumference of a quarter than the circumference of a dime?

Quarter

$d = 23.9$ mm

_____

_____

_____

Formula

Substitute

Multiply

_____

_____

_____

Dime

$d = 18$ mm

Subtract the circumferences.

Sentence: _____

5. *Calculate the* ***perimeter*** *of each figure.*

a)

$d = 8$ cm

$C = \quad \times d$

$= \_\_\_\_ \times \_\_\_\_$

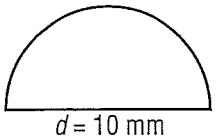
$= \boxed{}$

$\frac{1}{2}$ of the circumference $= \frac{C}{2}$

$= \frac{\boxed{}}{2}$

$= \_\_\_\_$

b)



$d = 10$ mm

To find the perimeter of ⌓:

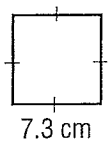
Add: → $d + \frac{1}{2}$ of C

$= \boxed{} + \_\_\_\_$

$= \_\_\_\_$

Skill Builder

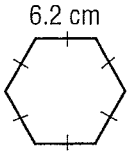
1. *Calculate the perimeter of each figure.*

a) 

P = ☐ x s *Formula*

= _____ x _____ *Substitute*

= _____ *Multiply*

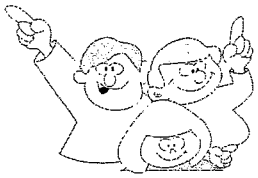
b) 

2. *Calculate the perimeter of each circle.*

a) diameter of 2.5 cm *C = × d*

b) radius of 4 cm *d = 2 × r*

LEARNING TOGETHER Area

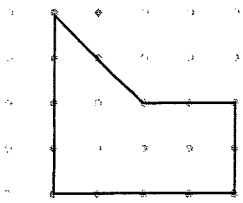


Work together with your classmates, using your *MATHPOWER*™ student text, pages 218 and 219.

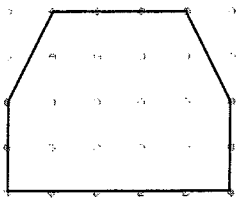
MATHPOWER™ **Pages 218 to 219**

Skill Builder

1. *What is the area of each figure in square units?*

a) 

_____ square units

b) 

_____

2. ***Match*** *each question in Column A with the correct answer in Column B. Connect with lines.*

Column A	Column B
0.3 × 0.5	0.18
0.8 × 0.6	0.3
0.1 × 8	0.15
0.2 × 0.9	0.12
0.7 × 0.6	0.08
0.2 × 0.3	0.48
0.6 × 0.5	0.8
0.2 × 0.4	0.42
0.7 × 0.3	0.06
0.4 × 0.3	0.21

Rough Work:

0.3
× 0.5

7.6 Area of a Rectangle and Square

Practice

$A = l \times w$

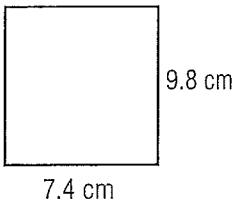
1. *Estimate, then calculate the area of each rectangle.*

a)

Est.
$A = 20 \times 10$
$A =$ _____ cm^2

$A = l \times w$ — Formula
$= 18.5 \times$ ☐ — Substitute
$=$ _____ cm^2 — Multiply

b)



Est.

$A =$ _____ $\times$ _____
$=$ _____ $\times$ _____
$=$ _____ cm^2

c)

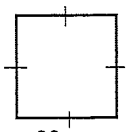
Est.

d)

Est.

2. *Estimate, then calculate the area of each square.*

a)



"s" means length of side.

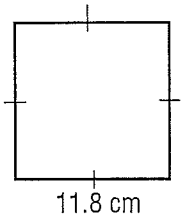
Est.
$A = 20 \times 20$
$A =$ _____ cm^2

$A = s \times s$
$=$ _____ $\times$ _____
$=$ _____ cm^2

OR

$A = s^2$ — Formula
$= 22^2$ — Substitute
$=$ _____ — Multiply

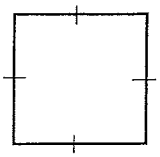
b)



Est.

Calculate the area of each square.

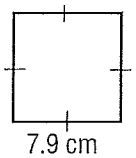
c)



4.4 cm

Est.

d)

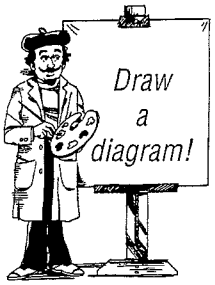


7.9 cm

Est.

Problems and Applications

3. The Imperial Palace in Beijing, China, is 960 m long and 750 m wide. What is the area of the palace?



Formula

Substitute

Multiply

Sentence: _____

4. The perimeter of a square play area is 36 m.

a) What is the length of each side?

b) What is the area?

$A = s^2$

Hint: $P = 4s$

$36 = 4s$

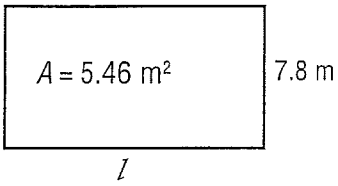
$\frac{36}{\square} = \frac{4s}{\square}$

Divide both sides by 4.

$s = \square$

Sentence: _____ _____

5. The area of a rectangular pathway is 5.46 m². The width is 7.8 m. How long is the pathway?



$A =$ _____ Formula

_____ = _____ × _____ Substitute

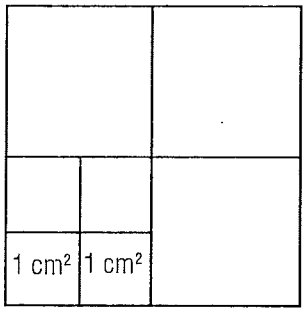
Divide both sides by 7.8

Sentence: _____

Logic Zapper

The area of each of the smallest squares is 1 cm^2.

a) Calculate the area of each of the other squares.



b) The area of the largest square is _____ .

Skill Builder

1. *Calculate the area of each rectangle.*

a) length is 2 cm
width is 8 cm

$A = l \times w$

Formula

Substitute

Multiply

b) length is 8 cm
width is 7 cm

c) length is 25.6 cm
width is 8.4 cm

d) length is 3.8 cm
width is 2.5 cm

Remember:
1. $3^4 \times 3^2 = 3^{4+2}$
$= 3^6$
2. $3^9 \div 3^2 = 3^{9-2}$
$= 3^7$
3. $(3^4)^2 = 3^{4\times 2}$
$= 3^8$

2. *Simplify. Leave your answer in exponential form.*

a) $3^2 \times 3^3 = 3^{\square}$

b) $4^6 \div 4^2 =$

c) $2^4 \times 2^3 =$

d) $(6^3)^2 =$

e) $9^6 \times 9 =$

f) $4^6 \div 4 =$

g) $5^3 \times 5^5 =$

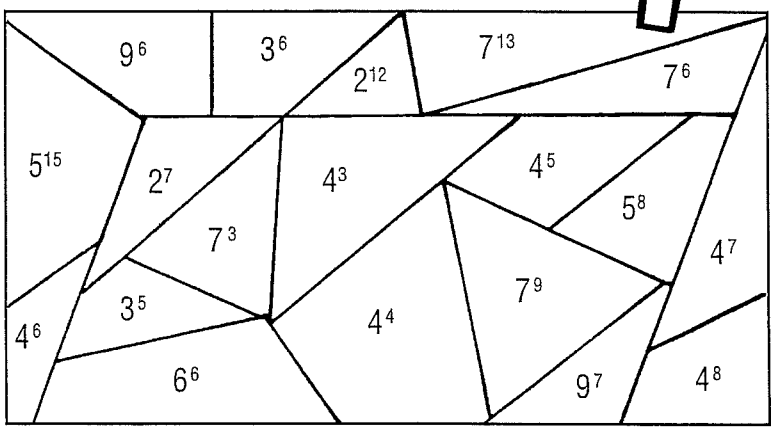
h) $7^8 \div 7^5 =$

i) $(7^3)^3 =$

j) $4^5 \div 4^2 =$

In the diagram at the right, colour in the spaces that have the above answers. What shape appears?

_____



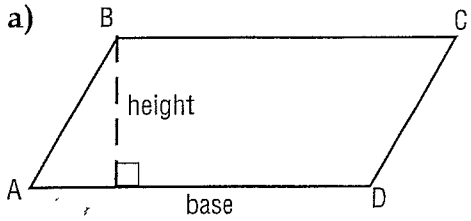
7.7 Area of a Parallelogram

Practice

$A = b \times h$

1. *Measure the base and the height of each parallelogram. Then,* ***calculate*** *the area.*

a)



$b =$ _____

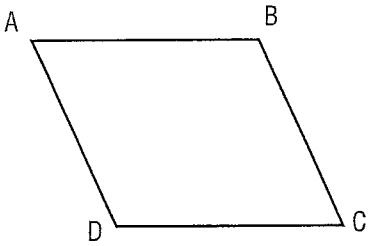
$h =$ _____

$A = b \times h$ — Formula

$=$ _____ $\times$ _____ — Substitute

$=$ _____ — Multiply

b)

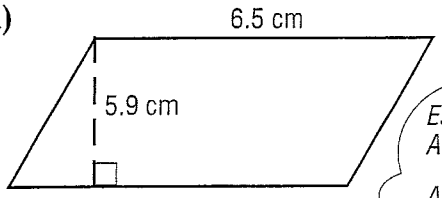


$b =$ _____

$h =$ _____

2. *Estimate, then* ***calculate*** *the area of each parallelogram.*

a)



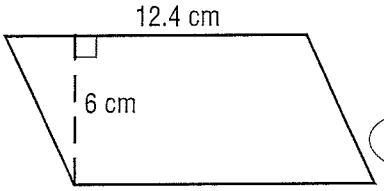
Est.
$A = 6 \times 6$
$A =$ _____ cm^2

$A = b \times h$ — Formula

$= 6.5 \times 5.9$ — Substitute

$=$ _____ — Multiply

b)



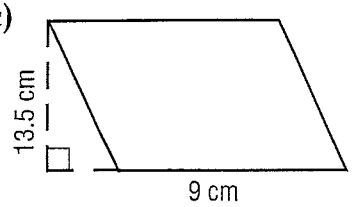
Est.

$A =$ _____ $\times$ _____

$= 12.4 \times$ _____

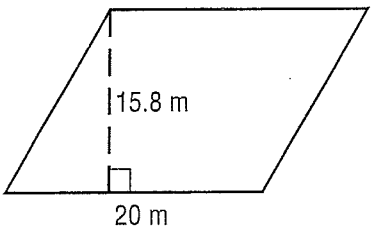
$=$ _____

c)



Est.

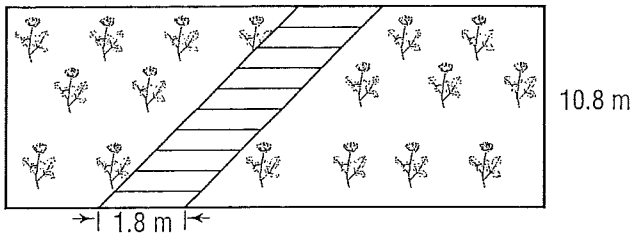
d)



Est.

Problems and Applications

3. The path cuts through a rose garden. What is the area of the path?



Formula

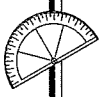
Substitute

Multiply

Sentence: _____

Skill Builder

1. *Draw each of the following.*

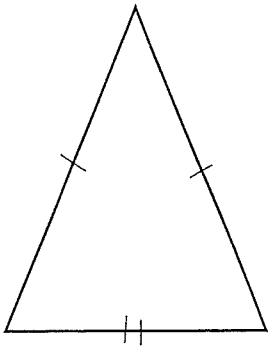


a) a right angle
equal to 90°

b) an acute angle
less than 90°

c) a reflex angle
more than 180° but less than 360°

2. Draw the **line of symmetry**.



Draw a line that cuts the figure exactly in half.

3. *Continue each pattern for 2 more numbers.*

a) 1, 2, 3, _____, _____.

b) 4, 7, 10, _____, _____.

c) 4, 8, 16, _____, _____.

d) 1, 3, 9, _____, _____.

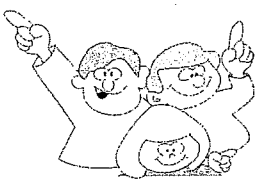
e) 48, 24, 12, _____, _____.

f) 100, 200, 400, _____, _____.

g) 33, 30, 27, _____, _____.

h) 10 000, 1000, 100, _____, _____.

LEARNING TOGETHER Seven-Point Geometry



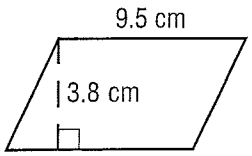
Work together with your classmates, using your *MATHPOWER*™ student text, pages 224 and 225.

MATHPOWER™
Pages 224 to 225

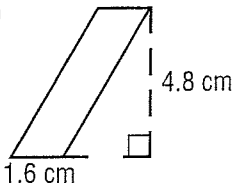
Skill Builder

1. *Calculate the area of each parallelogram.*

a)



b)



$A = b \times h$

Formula

Substitute

Multiply

2. *Calculate.*

Hint: $\sqrt{81} = \sqrt{9 \times 9}$
$= 9$

NO CALCULATOR

a) $\sqrt{49}$ = _____ b) $\sqrt{16}$ = _____ c) $\sqrt{100}$ = _____ d) $\sqrt{25}$ = _____

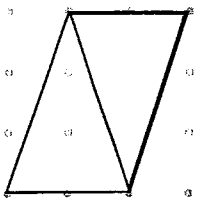
e) $\sqrt{64}$ = _____ f) $\sqrt{900}$ = _____ g) $\sqrt{9}$ = _____ h) $\sqrt{400}$ = _____

7.8 Area of a Triangle

Practice

1. *Find the area of each* ***parallelogram*** *and of each shaded* ***triangle****.*

a)



Area of parallelogram $= b \times h$

$=$ _____ $\times$ _____

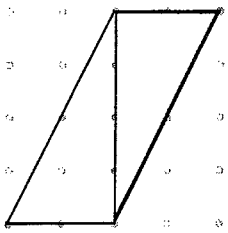
$=$ _____ units^2

Area of triangle $= \frac{1}{2} \times$ area of parallelogram

$= \frac{1}{2} \times$ _____

$=$ _____

b)



Area of parallelogram = _____

= _____ $\times$ _____

= _____

Area of triangle $= \frac{1}{2} \times$ area of parallelogram

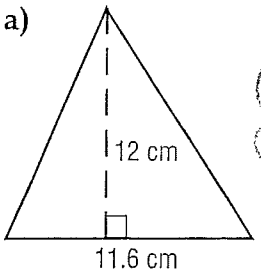
$= \frac{1}{2} \times$ _____

$=$ _____

2. *Estimate, then* ***calculate*** *the area of each triangle.*

Remember:
$A = \frac{1}{2} \times b \times h$
or $A = \frac{b \times h}{2}$

a)



Est.
$A = \frac{1}{2} \times 10 \times 10$
$A =$ _____ cm^2

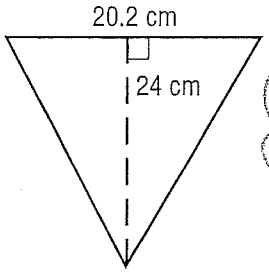
Formula $A = \frac{b \times h}{2}$

Substitute $= \frac{11.6 \times \square}{2}$

Calculate $=$ _____ cm^2

Press C 11.6 × 12 ÷ 2

b)



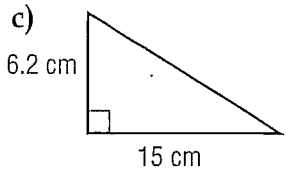
Est.
$A = \frac{1}{2} \times 25 \times 20$
$A =$ _____

Formula

Substitute

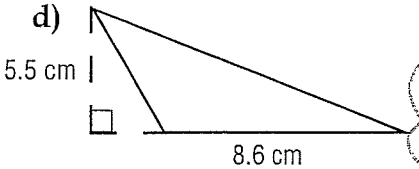
Calculate

c)



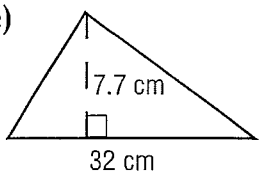
Est.

d)



Est.

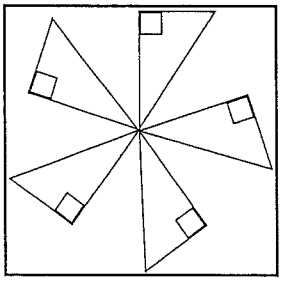
e)



Est.

Problems and Applications

3. This section of a patchwork quilt has 5 triangles on it. The **base** of each triangle is 5.3 cm and the height is 3.6 cm.



a) What area of fabric is needed for 1 triangle?

b) What area of fabric is needed for 5 triangles?

Sentence: _____ _____

Skill Builder

1. *Calculate the **area** of each **parallelogram**.*

a) $h = 4.5$ cm, $b = 3.8$ cm

$A = b \times h$ Formula

$= \_\_\_\_ \times \_\_\_\_$ Substitute

$= \_\_\_\_$ cm^2 Multiply

b) $h = 7$ cm, $b = 6$ cm

2. *Calculate the **circumference** of each **circle**.*

a) $d = 3$ cm

$C = \quad \times d$ Formula

$= 3.14 \times \_\_\_\_$ Substitute

$= \_\_\_\_\_$ Multiply

b) $r = 6$ m

So, $d = 2 \times 6$

$= \_\_\_\_\_$

3. *Tell whether each number is prime* (P) *or composite* (C).

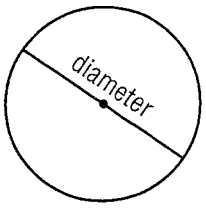
a) 5 _____ b) 17 _____ c) 40 _____

d) 16 _____ e) 45 _____ f) 25 _____

g) 2 _____ h) 11 _____ i) 51 _____

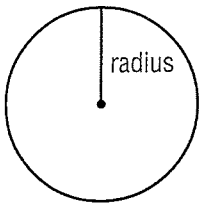
Remember: *A prime number is one that is divisible only by itself and 1; e.g., 3 is prime.*

7.9 Area of a Circle



Remember: *The radius is half the diameter.*

$r = \frac{d}{2}$



$A = \quad r^2$

$\doteq 3.14$

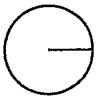
Practice

Round each answer to the nearest hundredth *(2 decimal places).*

1. *Using a straight edge, measure the radius or diameter of each circle. Then, calculate each area.*

$\doteq 3.14$

a)



$r = \_\_\_\_$ Measure

$A = r^2$ Formula

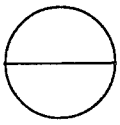
$= 3.14 \times \_\_\_\_^2$ Substitute

$= 3.14 \times \_\_\_\_ \times \_\_\_\_$ Square

$= 3.14 \times \_\_\_\_\_$ Multiply

$= \_\_\_\_\_$

b)



Measure $d = \_\_\_\_$

$r = \frac{d}{2}$

$r = \_\_\_\_$

2. *Estimate, then calculate the area of each circle.*

a) radius is 4.8 cm

Est. $A = 3 \times 5^2$
$= 3 \times 25$
$=$ _____ cm^2

Formula $A = \quad \times r^2$

Substitute $= 3.14 \times 4.8^2$

Square $= 3.14 \times 4.8 \times \square$

Multiply $=$ _____

Press $\boxed{C}$ 4.8 $\boxed{x^2}$
or
Press $\boxed{C}$ 4.8 $\boxed{\times}$ 4.8

b) radius is 12 cm

Est. $A = 3 \times 10^2$
$= 3 \times$ _____
$=$ _____ cm^2

$A = \quad \times$ _____

$= 3.14 \times$ _____^{2}

$= 3.14 \times 12 \times \square$

$=$ _____

c) radius is 3.6 m

Est.

d) radius is 21 cm

Est.

e) diameter is 16 cm

$r = \frac{d}{2}$

$r = \frac{16}{2}$

$=$ _____

Est. $A = 3 \times 10^2$
$= 3 \times$ _____
$=$ _____ cm^2

Formula $A = \quad \times r^2$

Substitute $=$ _____ $\times$ _____^{2}

Square $=$ _____ $\times \square$

Multiply $=$ _____

f) diameter is 1.2 m

Est.

Problems and Applications

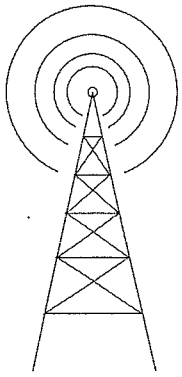
3. A radio station sends out sound waves approximately 80 km in all directions from the station. What is the area of the transmission circle covered by the sound waves?

Diagram: **Hint:** $r = 80$ km

Formula

Substitute

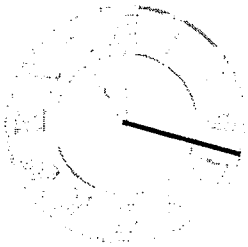
Calculate



Sentence: _____

4. The world's largest clock face is on a floral clock in Toi, Japan. The clock face has a **radius** of 15.5 m. Calculate the area.

Diagram:



Formula

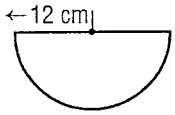
Substitute

Solve

Sentence: _____

5. *Calculate the **area** of each shaded region.*

a)



First: Find the **area** of the whole circle.

$A = \quad \times r^2$

$= \_\_\_\_ \times \_\_\_\_$

$= \_\_\_\_\_$

Second: To find the area of half of a circle, divide the area of the whole circle by 2.

Area of  $= \frac{A}{2}$

$= \frac{\square}{2}$

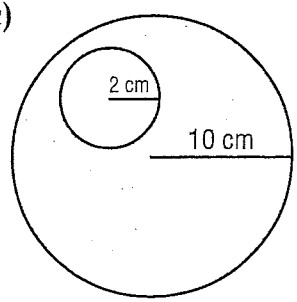
$= \_\_\_\_\_$

b)

First: Find the **area** of the whole circle.

Second: Divide the area by 4.

c)



First: Find the area of the large circle.

Second: Find the area of the small circle.

Third: Subtract.

Shaded area = Area of large circle − Area of small circle

$= \_\_\_\_\_ - \_\_\_\_\_$

$= \_\_\_\_\_$

Logic Zapper

What is the mystery number? To find the answer, use the following clues.

a) It is less than 50, but greater than 30.

b) It can be divided by 5.

c) It can be divided by 7.

The number is _____ .

Skill Builder

1. **First:** Draw and label a diagram of each figure.

   Second: Calculate the area of each figure.

Formulas: $A = l \times w$	$A = b \times h$	$A = s^2$	$A = \frac{1}{2} \times b \times h$	$A = \quad \times r^2$

a) rectangle with $l = 8$ cm, $w = 2$ cm

Diagram

Formula

Substitute

Calculate

b) a square with $s = 6$ cm

c) parallelogram with $b = 2.1$ cm, $h = 4.6$ cm

d) triangle with $b = 9$ cm, $h = 7$ cm

e) circle with $r = 5$ cm

2. *Find the missing factor.*

a) $7 \times \square = 63$

b) $4 \times \square = 16$

c) $\square \times 6 = 30$

d) $10 \times \square = 40$

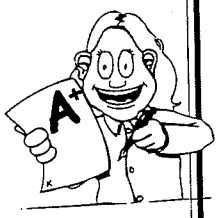
e) $\square \times 10 = 90$

f) $\square \times 8 = 48$

g) $\square \times 11 = 66$

h) $\square \times 9 = 54$

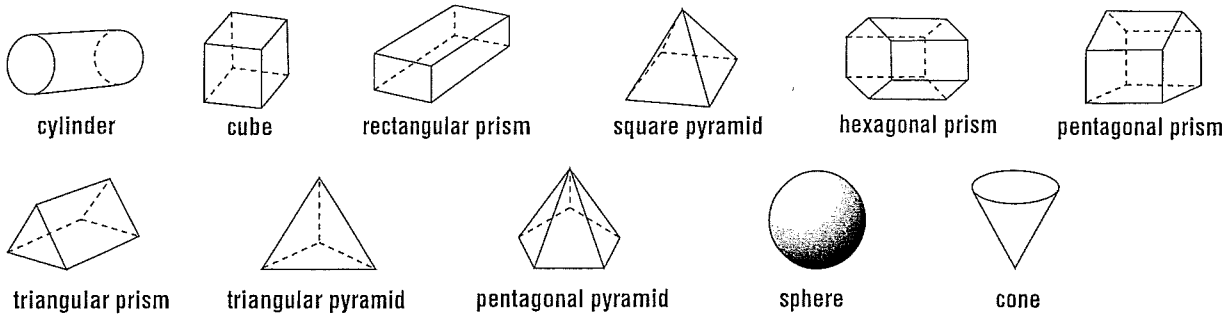
i) $\square \times 6 = 18$



8.1 Three-Dimensional Solids

Practice

1. *Use the solids shown below to answer* a – g.



a) List all the solids with **more** than **4** flat faces.

_____, _____, _____,

_____, _____,

_____, _____

b) List all the solids with **at least 1** square face.

_____ and _____

c) List all the solids with **no** flat faces. _____

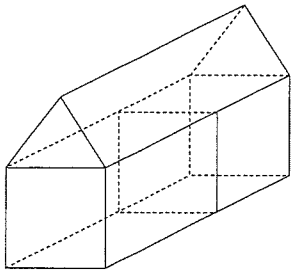
d) List all the solids with **only** triangular faces. _____

e) List all the solids with **at least one** triangular face.

_____, _____,

_____ and _____

f) The model was built using 3 solids. Name the solids.



Two _____

and one _____

g) Draw a model of a structure built from at least 2 geometric solids.
Name the solids you used.

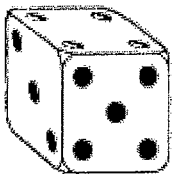
_____

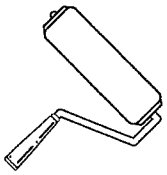
_____

_____

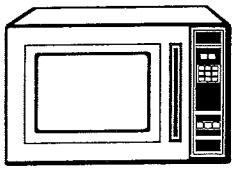
Problems and Applications

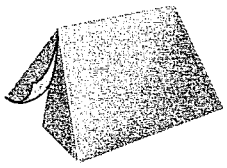
2. *Name the* ***geometric shape*** *suggested by each object.*

a. 

b. 

c. 

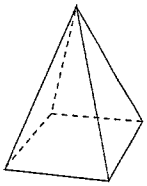
d. 

e. 

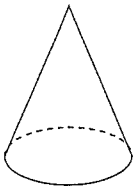
3. Describe how a **prism** is named. See diagrams on p. 351, #1.

4. Describe how a **pyramid** is named. See diagrams on p. 351, #1.

5. **a)** How are a pyramid and a cone alike?



pyramid

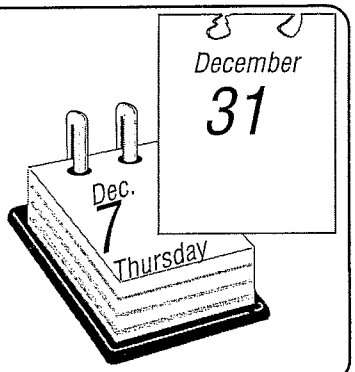


cone

b) How are a pyramid and a cone different?

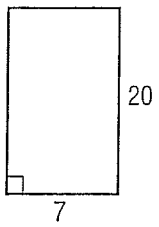
Logic Zapper

If December 7 falls on a Thursday, on which day of the week will December 31 fall?

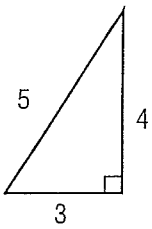


Skill Builder

1. *Calculate the area.*

a) 

$A = l \times w$

b) 

$A = \frac{1}{2} \times b \times h$

2. *Write each fraction as a decimal.*

a) $\frac{4}{5} = \frac{\square}{10}$

$= 0.\square$

b) $\frac{7}{10} =$ _____

c) $\frac{3}{4} = \frac{\square}{100}$

$=$ _____

d) $\frac{1}{5}$

e) $\frac{9}{10}$

f) $\frac{1}{2}$

g) $\frac{1}{100}$

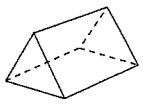
h) $\frac{3}{50}$

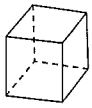
i) $\frac{12}{100}$

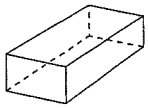
8.2 Surface Areas of Polyhedra

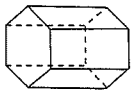
Practice

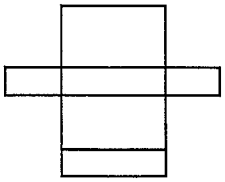
1. *Match each net with its polygon.*

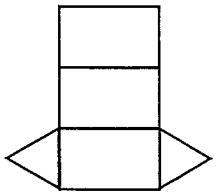

triangular prism

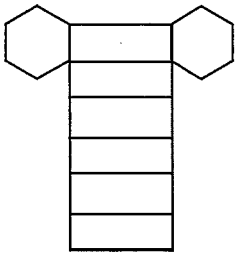

cube

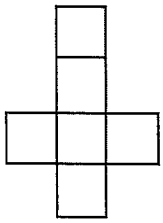

rectangular prism


hexagonal prism



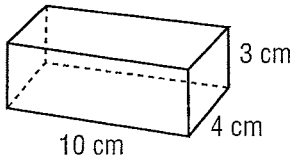




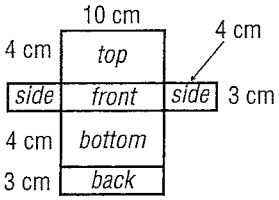


2. *Draw the net. Then, calculate the* ***surface area*** *of each polyhedron.*

a)

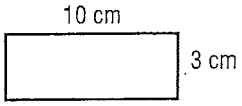


Drawing:

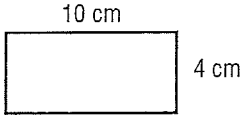


Calculate:

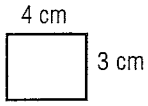
Use $A = l \times w$



Front and back



Top and bottom



Sides

Front: A = _____ × _____ **Top:** A = _____ × _____ **Side:** A = _____ × _____

= _____ cm^2 = _____ cm^2 = _____ cm^2

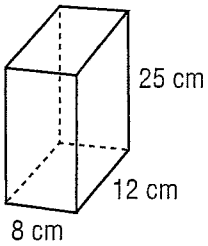
Front and back: 2 × _____ cm^2 = _____

Top and bottom: 2 × _____ cm^2 = _____

Two sides: 2 × _____ cm^2 = _____

Total Surface Area = _____

b)

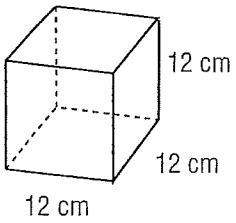


Drawing:

Calculate:

Draw the net. Then, calculate the ***surface area*** *of each polyhedron.*

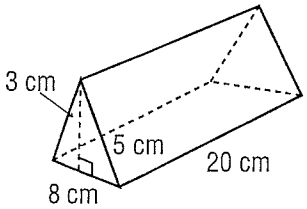
c)



Drawing:

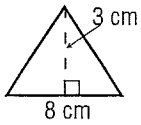
Calculate:

d)

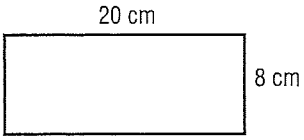


Drawing:

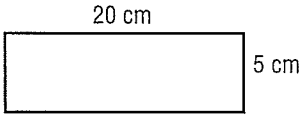
Calculate:



Two ends



Bottom



Two sides

End: $A = \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 3 \times 8$

$= \frac{\square}{2}$

$=$ _____ cm^2

Bottom: $A =$ _____ $\times$ _____

$=$ _____ cm^2

Side: $A =$ _____ $\times$ _____

$=$ _____ cm^2

Two ends: $2 \times$ _____ $cm^2 =$ _____

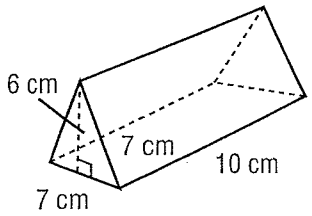
Bottom: $1 \times$ _____ $cm^2 =$ _____

Two sides: $2 \times$ _____ $cm^2 =$ _____

Total Surface Area = _____

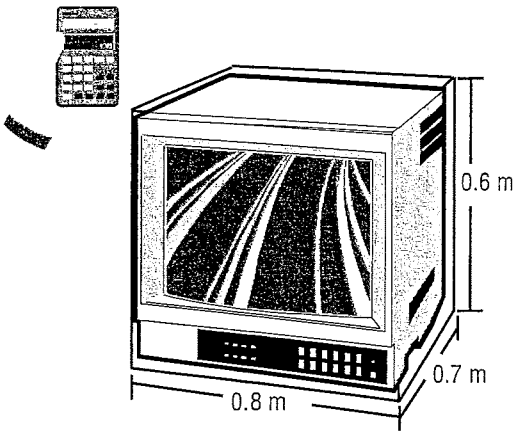
Draw the net. Then, calculate the ***surface area*** *of each polyhedron.*

e)



Problems and Applications

3. a) The Chan's television is delivered in a cardboard box. Calculate the least amount of cardboard needed to make the box.



Top and Bottom:

Front and back:

Two sides:

Front and back:

Top and Bottom:

Two sides: _____

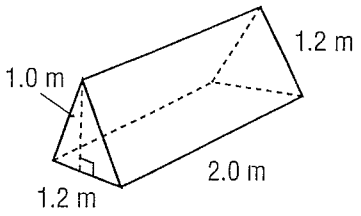
Total Surface Area = _____

Sentence: _____

b) What assumptions have you made? _____

_____

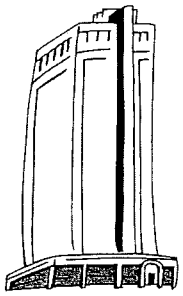
4. This small tent has an attached ground sheet. What is the least amount of material that would be needed to make this tent?



Sentence: _____

5. A highrise office tower is 165 m tall, 85 m long, and 22 m wide. What is the **total surface area** of the **sides** and **roof** of the tower?

Do not include the floor.



Sentence: _____

Logic Zapper

Make each of the following sentences true. Use the numbers 2, 3, and 6 only once in each problem.

1. ◯ − ◯ + ◯ = 7
2. ◯ × ◯ − ◯ = 0
3. ◯ × ◯ + ◯ = 20
4. ◯ ÷ ◯ + ◯ = 4

Skill Builder

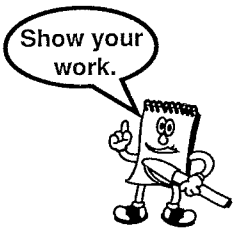
1. *Find the* ***area*** *of each rectangle.*

$A = l \times w$

a) $l = 11$ cm, $w = 10$ cm

b) $l = 3$ m, $w = 1.9$ m

Show your work!



2. *Calculate.*

a) 50% *of* 50

"of" means multiply

$= 0.5 \times 50$

$=$ _____

b) 10% *of* 70

c) 20% *of* 70

d) 60% *of* 300

e) 100% *of* 76

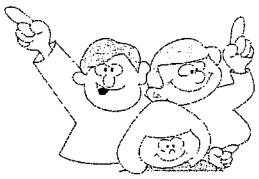
f) 30% *of* 60

3. *There is* ***one mistake*** *in the box below.* ***Shade it.***

x	3	5	7	9
4	12	20	28	36
6	18	30	49	54
8	24	40	56	72
2	6	10	14	18

What should the number be? _____

LEARNING TOGETHER Estimating and Measuring Volume



Work together with your classmates, using your *MATHPOWER*™ student text, pages 250 and 251.

MATHPOWER™ **Pages 250 to 251**

Skill Builder

1. *Calculate the* ***area.***

a) a square with side 5 cm

b) a rectangle with length 8 m and width 4 m

Formulas:
$A = l \times w$
$A = \frac{1}{2} \times b \times h$

Continues on next page. ➡

Calculate the ***area.***

c) a triangle with base 6 cm and height 3 cm

d) a rectangle with length 9 m and width 1 m

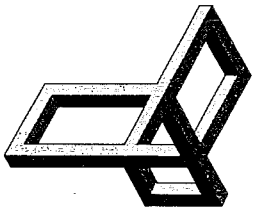
Formulas:
$A = l \times w$
$A = \frac{1}{2} \times b \times h$

2. *Complete each table.*

Decimal	Percent
a) 0.3	
b) 0.45	45%
c) 0.04	
d) 0.5	
e) 0.01	

Decimal	Percent
f) 3.61	361%
g) 1.25	
h) 1	
i) 1.01	
j) 2	

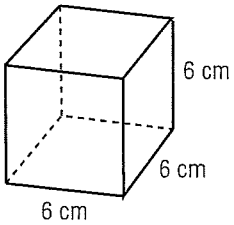
8.3 Volumes of Prisms



Practice

1. *Calculate the* ***volume*** *of each prism.*

a)

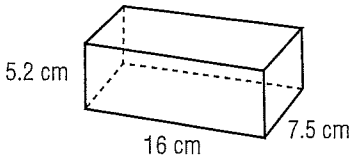


V = area of base × height
$= l \times w \times h$

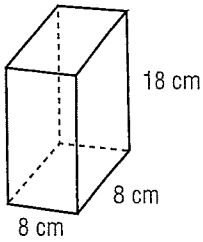
= _____ × _____ × _____

= [ ] cm^3

b)

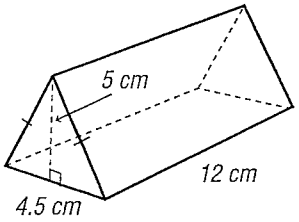


c)



Calculate the ***volume*** *of each prism.*

d)



V = **area of base** × **height**

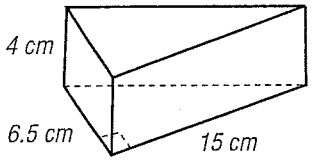
$V = \frac{b \times h}{2} \times \text{height}$

$= \frac{1}{2} \times 5 \times 4.5 \times 12$

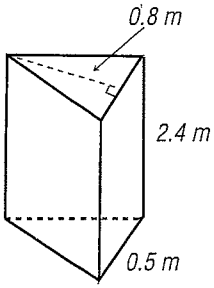
Press [C] 5 [×] 4.5 [×] 12 [÷] 2 [=]

$V =$ [ ] cm^3

e)



f)

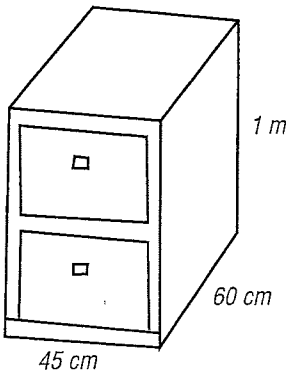


Problems and Applications

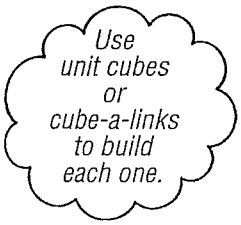
2. Calculate the volume of the filing cabinet, in **cubic metres**.

60 cm = 0.6 m

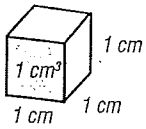
45 cm = _____ m



3. a) How many **rectangular prisms** can you make with **12 unit cubes** in each one?



Draw each prism.



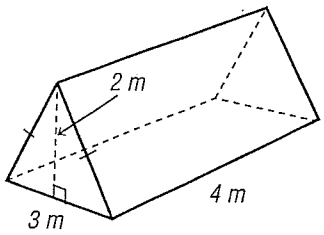
_____

b) What is the volume of each prism? _____

4. A tent is 4 m long, 3 m wide, and 2 m high.

a) What is the volume of the tent?

Volume = Area of base × height



_____

b) How many campers could sleep in this tent?

_____

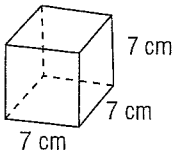
Explain how you would arrange them to sleep.

_____

_____

Skill Builder

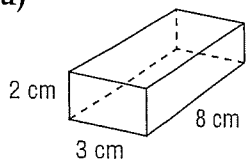
1. **Draw** the net and **calculate** the **surface area** of the cube.



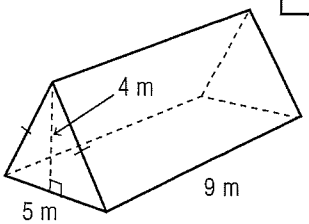
2. *Calculate the* ***volume*** *of each prism.*

Volume = Area of base × height

a)

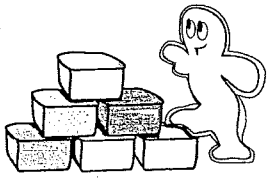


b)



8.4 Surface Area and Volume of a Cylinder

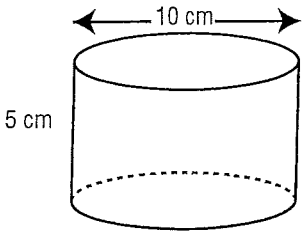
Practice



Round all answers to 1 decimal place.

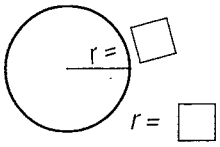
1. *Calculate the* ***surface area*** *of each cylinder.*

a)



The length of the rectangle equals the circumference of the circle.

$C = \quad \times d$
$= 3.14 \times 10$
$= \_\_\_\_\_$



Hint:
$r = \frac{d}{2}$
$r = \frac{\square}{2}$
$r = \_\_\_\_\_$

One end:

$A = \quad \times r^2$
$= 3.14 \times 5 \times 5$
$= \_\_\_\_\_$

One side:

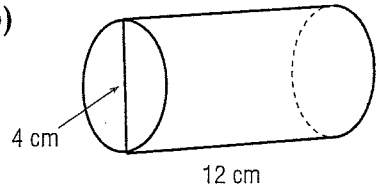
$A = l \times w$
$= \_\_\_\_\_ \times 5$
$= \_\_\_\_\_$

Two ends: $2 \times \_\_\_\_\_ \text{ cm}^2 = \_\_\_\_\_$

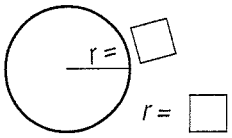
One side: $1 \times \_\_\_\_\_ \text{ cm}^2 = \_\_\_\_\_$

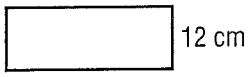
Total Surface Area $= \_\_\_\_\_$

b)



$C = \quad \times d$
$= \_\_\_\_\_ \times \_\_\_\_\_$
$= \_\_\_\_\_$





Hint:
$r = \frac{d}{2}$
$r = \frac{\square}{2}$
$r =$

One end:

$A = \quad \times r^2$
$= \_\_\_\_\_ \times \_\_\_\_\_ \times \_\_\_\_\_$
$= \_\_\_\_\_ \text{ cm}^2$

One side:

$A = l \times w$
$= \_\_\_\_\_ \times \_\_\_\_\_$
$= \_\_\_\_\_ \text{ cm}^2$

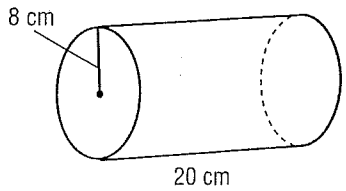
Two ends: $2 \times \_\_\_\_\_ \text{ cm}^2 = \_\_\_\_\_$

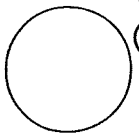
One side: $1 \times \_\_\_\_\_ \text{ cm}^2 = \_\_\_\_\_$

Total Surface Area $= \_\_\_\_\_$

Calculate the ***surface area*** *of each cylinder.*

c)





$d = 2 \times r$

$= 2 \times$ _____

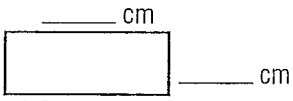
$=$ _____

Ends:

$C = \quad \times d$

$=$ _____ $\times$ _____

$=$ _____



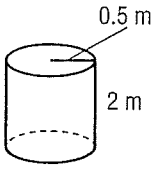
Side:

Two ends: $2 \times$ _____ $cm^2 =$ _____

One side: $1 \times$ _____ $cm^2 =$ _____

Total Surface Area $=$ _____

d)



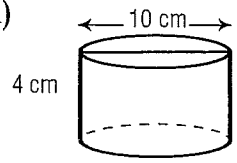
$d = 2 \times r$

$= 2 \times$ _____

$=$ _____

2. *Find the* ***volume*** *of each cylinder.*

a)



$r = \frac{d}{2}$

$=$ _____

$=$ _____

$V =$ Area of base $\times$ height

$V = \quad \times r^2 \times h$

$V = \quad \times r^2 \times h$

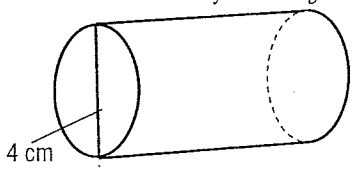
$=$ _____ $\times 5^2 \times 4$ Substitute

$=$ _____ $\times 5 \times 5 \times 4$

Volume $=$ _____ cm^3

*Find the **volume** of each cylinder.*

b)



$r =$

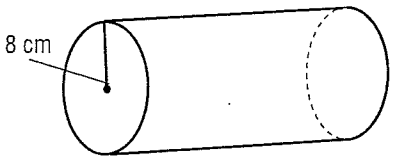
V = Area of base × height
V = × r^2 × h

$V = \quad \times r^2 \times h$

$= \_\_\_\_ \times \_\_\_\_ \times \_\_\_\_$ ← *Substitute*

$= \_\_\_\_\_$

c)



$V = \quad \times r^2 \times h$

← *Substitute*

Problems and Applications

3. a) The glue stick container has a radius of 1.5 cm and a height of 10.5 cm. What is the **volume** of the container?

$V = \quad \times r^2 \times h$

Sentence: _____

b) The glue inside the glue stick container has a radius of 1.3 cm and a height of 9 cm. What is the **volume of the glue**?

← *Formula*

← *Substitute*

← *Calculate*

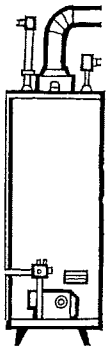
_____

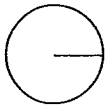
c) What is the **difference** between the volume of the container and the volume of the glue?

_____

4. The Durams have a water heater with a radius of 30 cm and a height of 120 cm.

a) What is the **surface area** of the water heater?





Two ends

$d = 2 \times r$

$=$

One side

$C = \quad \times d$

One end: $A = \quad \times r^2$

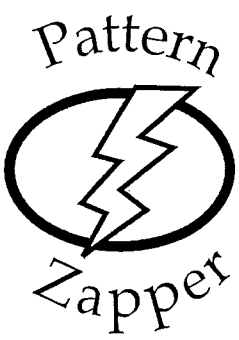
Side: $A = l \times w$

Sentence: _____

b) What is the **volume** of the water heater?

$V = \quad \times r^2 \times h$

Substitute



1. Describe the following pattern in words.

$99 \times 2 = 198$

$99 \times 3 = 297$

$99 \times 4 = 396$

$99 \times 5 = 495$

$99 \times 6 =$ _____

$99 \times 7 =$ _____

_____

_____

_____

_____

_____

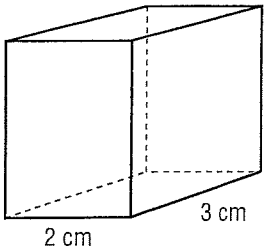
_____

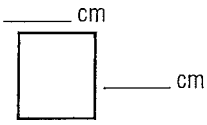
2. Complete the last 2 lines without using a calculator.

Skill Builder

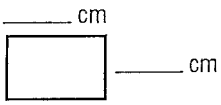
1. *Find the* ***surface area*** *of the rectangular prism.*

Use $A = l \times w$.

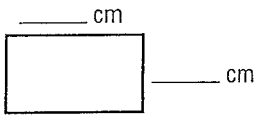




Two sides



Top and bottom



Front and back

One side:

$A = l \times w$

$= \square \times \square$

$=$ _____ cm^2

Top:

$A = l \times w$

$= \square \times \square$

$=$ _____

Front:

$A =$ _____

$=$ _____

$=$ _____

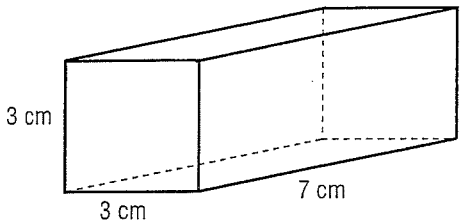
Two sides: $2 \times$ _____ $=$ _____

Top and bottom: $2 \times$ _____ $=$ _____

Front and back: $2 \times$ _____ $=$ _____

Total Surface Area $=$ _____

2. *Find the* ***volume*** *of the rectangular prism.*



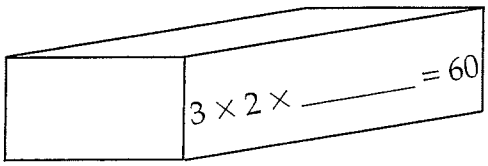
Volume = Area of base × height

$V = l \times w \times h$

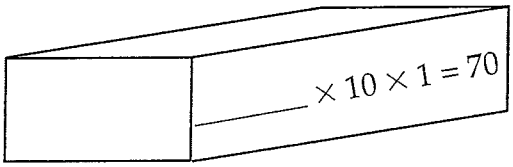
Substitute

3. *Find the* ***missing factor.***

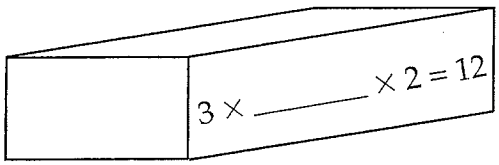
a)



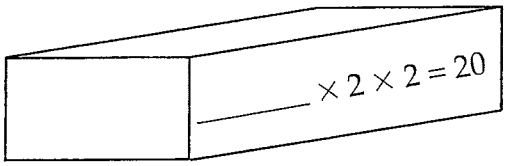
b)



c)



d)



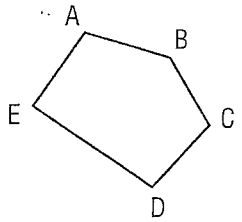
9.5 Polygons

Practice

1. *Name each shape and find the sum of the interior angles in each of the following.*

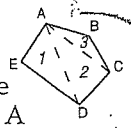
Polygon	Sides
Triangle (△)	3
Quadrilateral (□)	4
Pentagon (⬠)	5
Hexagon (⬡)	6
Heptagon (⬡)	7
Octagon	8
Nonagon	9
Decagon	10
Dodecagon	12

a)



Name: _____

First:
From point A draw line segments joining point A to all the points.

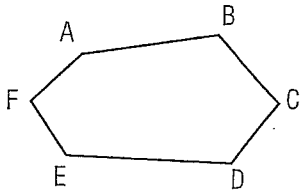


Second: Multiply.
180° × number of Δ s
= sum of interior angles.

180° × ☐ = _____

Sentence: *The sum of the interior angles is* ☐°.

b)



Name: _____

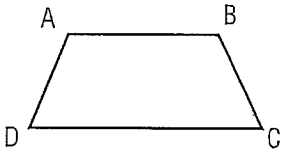
First:
Draw all line segments from point A.

Second:
180° × number of Δ s
= sum of interior angles.

180° × ☐ = _____

Sentence: _____

c)



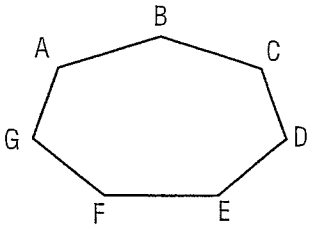
Name: _____

First:

Second:

Sentence: _____

d)



Name: _____

Sentence: _____

2. *Use the formula to find the* ***sum of the interior angles*** *of each of the following.*

Sum of interior angles of a polygon: $S = 180° \times (n - 2)$

number of sides

a) Quadrilateral

A quadrilateral has $\boxed{4}$ sides.

$S = 180 \times (n - 2)$

$= 180 \times (\boxed{4} - 2)$

$= 180 \times$ _____

$= \boxed{\quad}°$

Formula

Substitute

Do brackets

Multiply

b) Pentagon

Pentagon has $\boxed{\quad}$ sides.

$S = 180 \times (n - 2)$

$= 180 \times (\boxed{\quad} - 2)$

$= 180 \times$ _____

$= \boxed{\quad}°$

c) Hexagon

Formula

Substitute

Do brackets

Multiply

d) Heptagon

e) Octagon

Formula

Substitute

Do brackets

Multiply

f) Nonagon

g) Decagon

Formula

Substitute

Do brackets

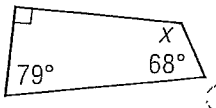
Multiply

Complete the chart.

Polygon	Sum of the Interior Angles
Triangle	
Quadrilateral	
Pentagon	
Hexagon	720°
Heptagon	
Octagon	
Nonagon	
Decagon	

3. *Find the measure of the unknown angle in each polygon.*

a)



See chart below.

$\angle x =$ *Total number of degrees in the polygon.* − *Total of given angles.*

$= \square° - (79° + 68° + 90°)$

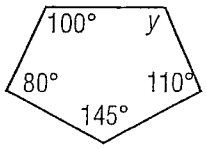
$= \square° - \square°$

$= \_\_\_\_\_°$

Do brackets

Subtract

b)



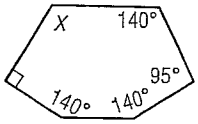
$\angle y =$ Total number of degrees in the polygon. − Total of given angles.

$= \square - (\_\_\_\_ + \_\_\_\_ + \_\_\_\_)$

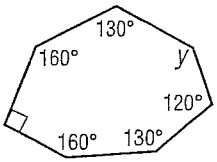
$= \square - \square$

$= \_\_\_\_\_$

c)



d)



Polygon	Sum of the Interior Angles
Triangle	180°
Quadrilateral	360°
Pentagon	540°
Hexagon	720°
Heptagon	900°
Octagon	1080°
Nonagon	1260°
Decagon	1440°

4. *Find the measure of each angle in the following.*

Regular Polygon → *all the sides are the same length and all the angles have the same measure.*

a) regular triangle

$$\text{measure of each angle} = \frac{\text{Sum of interior angles}}{\text{Number of sides}}$$

$$= \frac{180°}{\square}$$ Substitute

$$= \_\_\_\_\_$$ Divide

Each angle is $\square$.

b) regular pentagon

$$\text{measure of each angle} = \frac{\text{Sum of interior angles}}{\text{Number of sides}}$$

$$= \frac{\square}{\square}$$

$$= \_\_\_\_\_$$

c) regular hexagon

d) regular decagon

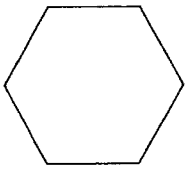
Problems and Applications

5. What is the common name for a regular quadrilateral? _____

Hint: All 4 sides are equal.

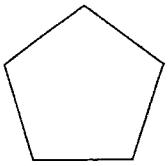
6. *How many lines of symmetry are there in*

   a) a regular hexagon?



_____

   b) a regular pentagon?



_____

Skill Builder

1. *Write each ratio 3 ways.*

> Example:
> *$3 spent to $10 saved* → 3 to 10, 3:10 or $\frac{3}{10}$

a) $1 spent to $4 saved

_____ , _____ or _____

b) $5 spent to $7 saved

_____

c) $6 spent to $5 saved

_____

2. *Evaluate for* $t = -3$.

BEDMAS

a) $-5t$

$= -5 \times \boxed{-3}$ *Substitute*

$=$ _____ *Calculate*

b) $-t + 3$

c) $4t$

d) $6t + 2$

$=$ *Substitute*

$=$ *Multiply*

$=$ *Calculate*

e) $-2t - 5$

f) $-t + 3$

$= -1(\quad) + 3$

$=$ _____ $+ 3$

$=$ _____

g) $2t^2$

Substitute

Exponents

Multiply

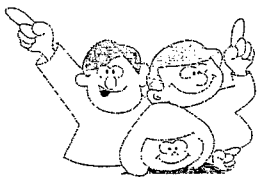
h) $t^2 + 4$

Substitute

Exponents

Add

LEARNING TOGETHER The Golden Ratio



Work together with your classmates, using your *MATHPOWER*™ student text, pages 286 and 287.

MATHPOWER™ **Pages 286 to 287**