

Measurement

- 9.1 Circumference
- 9.2 Time Zones
- 9.3 Measuring Instruments
- 9.4 The Language of Geometry
- 9.5 Angles
- 9.6 Classifying Angles
- 9.7 Intersecting and Perpendicular Lines
- 9.8 Angles and Parallel Lines
- 9.9 Classifying Triangles
- 9.10 The Sum of the Interior Angles in a Triangle

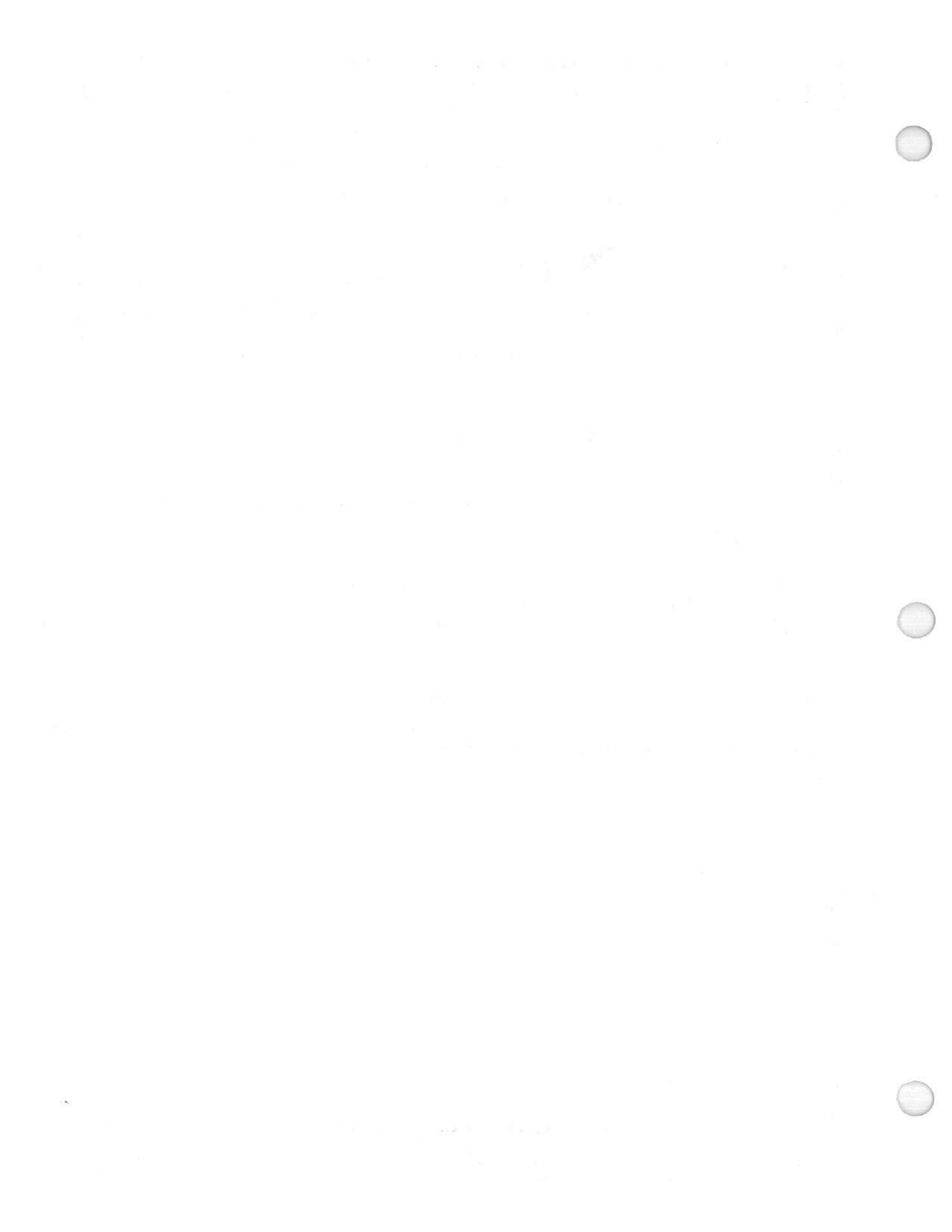
Review

Chapter Check

Problem Solving: Using the Strategies

Answers CHAPTER 9 Measurement





Skill Builder

State the first five multiples of each number.

Example: Multiples of 6 \longrightarrow 6, 12, 18, 24, 30, ...

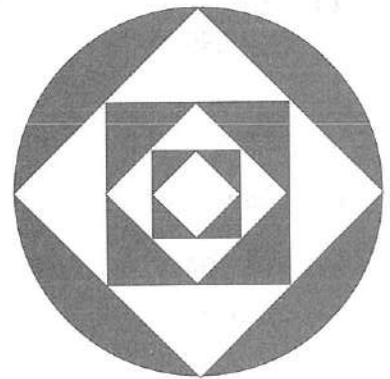
1. 3 \rightarrow _____

2. 4 \rightarrow _____

3. 10 \rightarrow _____

4. 2 \rightarrow _____

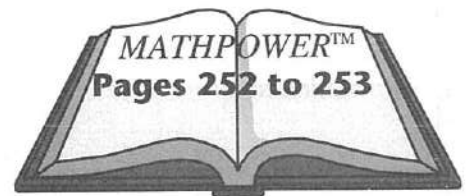
5. 5 \rightarrow _____



GETTING STARTED



Work together with your classmates, using your *MATHPOWER*TM student text, pages 252 and 253.



Mental Math

Look for shortcuts.

1. Add.



NO CALCULATOR

a) $\begin{array}{r} \$1.99 \\ + 4.99 \\ \hline \end{array}$

b) $\begin{array}{r} \$3.99 \\ + 2.99 \\ \hline \end{array}$

c) $\begin{array}{r} \$2.99 \\ + 3.99 \\ \hline \end{array}$

d) $\begin{array}{r} \$4.99 \\ + 3.99 \\ \hline \end{array}$

e) $\begin{array}{r} \$10.99 \\ + 5.99 \\ \hline \end{array}$

f) $\begin{array}{r} \$12.99 \\ + 10.99 \\ \hline \end{array}$

g) $\begin{array}{r} \$3.49 \\ + 5.49 \\ \hline \end{array}$

h) $\begin{array}{r} \$6.49 \\ + 8.49 \\ \hline \end{array}$

Continues on next page. \longrightarrow

2. Calculate.

$$\begin{array}{r} \text{a) } \$4.95 \\ + 3.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b) } \$6.95 \\ + 9.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c) } \$10.95 \\ + 5.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d) } \$25.95 \\ + 15.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e) } \$19.95 \\ + 9.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f) } \$4.95 \\ + 16.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g) } \$30.95 \\ + 50.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h) } \$39.95 \\ + 19.95 \\ \hline \end{array}$$

3. Calculate.

$$\begin{array}{r} \text{a) } \$2.99 \\ + 1.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b) } \$3.99 \\ + 4.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c) } \$10.99 \\ + 3.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d) } \$19.99 \\ + 6.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e) } \$8.99 \\ + 8.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f) } \$11.99 \\ + 5.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g) } \$25.98 \\ + 3.95 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h) } \$32.98 \\ + 5.95 \\ \hline \end{array}$$

4. Calculate.

$$\begin{array}{r} \text{a) } \$2.99 \\ + 1.75 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b) } \$3.99 \\ + 2.75 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c) } \$4.99 \\ + 3.50 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d) } \$1.99 \\ + 4.25 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e) } \$6.99 \\ + 6.50 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f) } \$2.50 \\ + 3.99 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g) } \$5.75 \\ + 4.99 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h) } \$7.50 \\ + 2.99 \\ \hline \end{array}$$

5. Calculate.

a) 3 at \$2.99

$$\begin{array}{r} \$2.99 \\ \times \quad 3 \\ \hline \\ \hline \end{array}$$

b) 4 at \$4.99

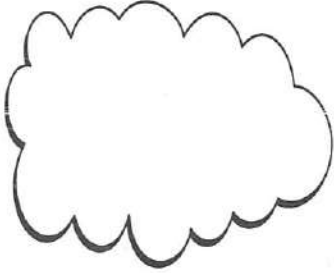
$$\begin{array}{r} \\ \\ \\ \hline \\ \hline \end{array}$$

c) 6 at \$3.99

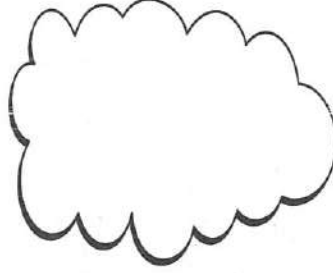
$$\begin{array}{r} \\ \\ \\ \hline \\ \hline \end{array}$$

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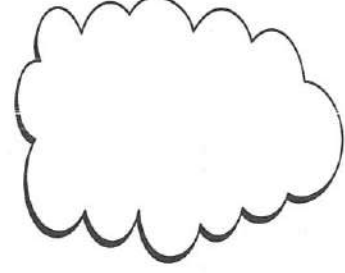
d) 5 at \$9.99



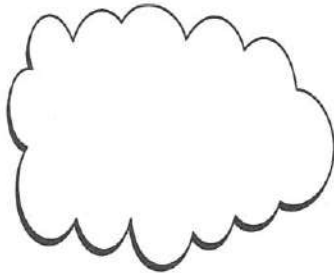
e) 4 at \$3.98



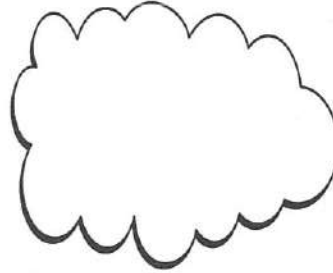
f) 2 at \$7.98



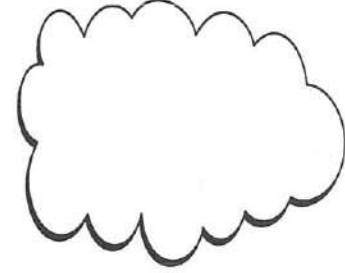
g) 3 at \$4.95



h) 2 at \$19.95



i) 3 at \$1.98



Skill Builder

1. Complete the table.



	Question	Product (Answer)	Round to 2 Decimal Places (Nearest Hundredth)
a)	7.9×8.62		
b)	1.7×14.99		
c)	11.3×8.71		
d)	6.66×4.35		

2. Multiply.

a) $10 \times 3 =$ _____

b) $5 \times 3 =$ _____

c) $20 \times 3 =$ _____

d) $12 \times 3 =$ _____

e) $30 \times 3 =$ _____

f) $120 \times 3 =$ _____

g) $40 \times 3 =$ _____

h) $25 \times 3 =$ _____



NO CALCULATOR



9.1 Circumference

$$C = \pi \times d \leftarrow \text{diameter}$$


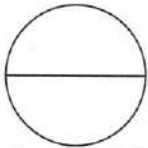

$$d = 2 \times r \leftarrow \text{radius}$$

$$C = 2 \times \pi \times r$$

$\pi = 3.14$

Practice

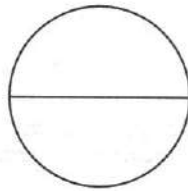
1. Measure each diameter. Calculate the circumference to 1 decimal place (the nearest tenth).

a)   


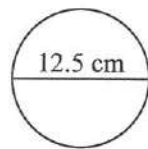
$$C = \pi \times d$$

$$= 3.14 \times \boxed{}$$

$$= \underline{}$$

b) 

2. Estimate the circumference of each circle.

a)  

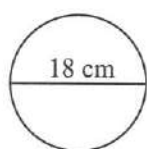
NO CALCULATOR

$$C = \pi \times d$$


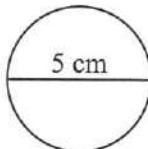
$$= 3 \times \boxed{}$$

$$= \underline{}$$

Round each number.

b) 

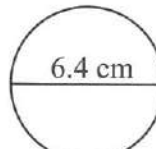
3. Calculate the circumference of each circle.

a)  

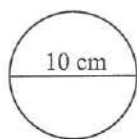
$$C = \pi \times d$$

$$= 3.14 \times \boxed{}$$

$$= \underline{}$$

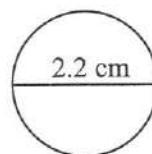
b) 

c)



Find the circumference.

d)



Problems and Applications

4. The medals at the Olympic Games are 6 cm in diameter. Find the circumference of a medal.

$$C = \pi \times d$$

← **Formula**

$$= \underline{\hspace{2cm}}$$

← **Substitute**

$$= \underline{\hspace{2cm}}$$

← **Solve**

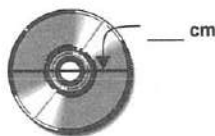


Show your work!



The circumference of an Olympic medal is _____.

5. A compact disc is 12 cm in diameter. What is the circumference of the CD?



6. The diameter of a circle is twice its **radius**.

Complete the table.

	Radius (r)	Diameter (d) $d = 2 \times r$	Circumference (C) $C = \pi \times d$
a)	6 cm	$2 \times 6 = 12$ cm	$C = 3.14 \times 12$ $C = \underline{\hspace{2cm}}$
b)	5 cm		
c)	4 cm		
d)	10 cm		

Skill Builder

1. Complete the table.

Radius (r)	Diameter (d) $d = 2 \times r$	Circumference $C = \pi \times d$ (Substitute)
a) 3 cm	$2 \times 3 = \underline{\quad}$ cm	$3.14 \times 6 = \underline{\quad}$
b) 10 km		
c) 100 m		
d) 2 km		

2. What time is it?

a) 3 h after 07:30 _____

b) 2 h after 04:00 _____

c) 1 h before 10:45 _____

d) 5 h before 12:00 _____

e) 3 h before 09:00 _____

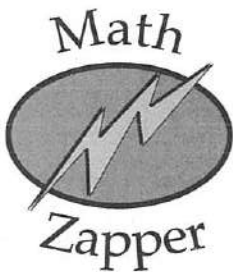
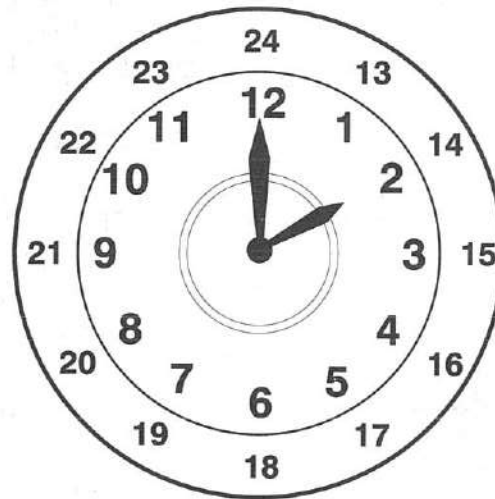
f) 8 h before 16:00 _____

g) 6 h before 05:00 _____

i) 3 h after 22:00 _____

h) 4 h after 01:00 _____

j) 2 h 30 min after 06:00 _____

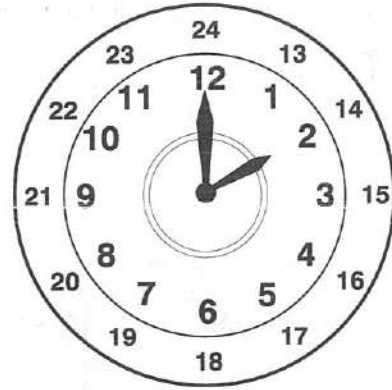


If it is 3 h 30 min after 07:30, what time is it?



9.2 Time Zones

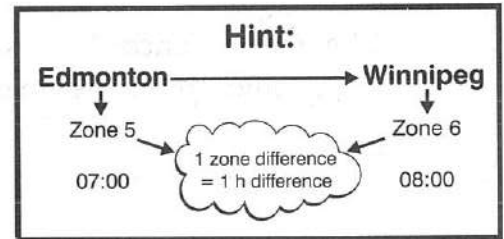
Practice



- What time is it?
 - 2 h before 15:00 _____
 - 2 h 30 min after 12:00 _____
 - 5 h 30 min before 19:00 _____
 - 6 h after 19:00 _____

Use the time zones map on pages 388 and 389 of your MATHPOWER™ student text, for questions 2 to 6.

- It is 07:00 in Edmonton. What time is it in
 - Winnipeg? _____
 - Halifax? _____
 - Toronto? _____
 - Vancouver? _____
 - London? _____
 - Hong Kong? _____



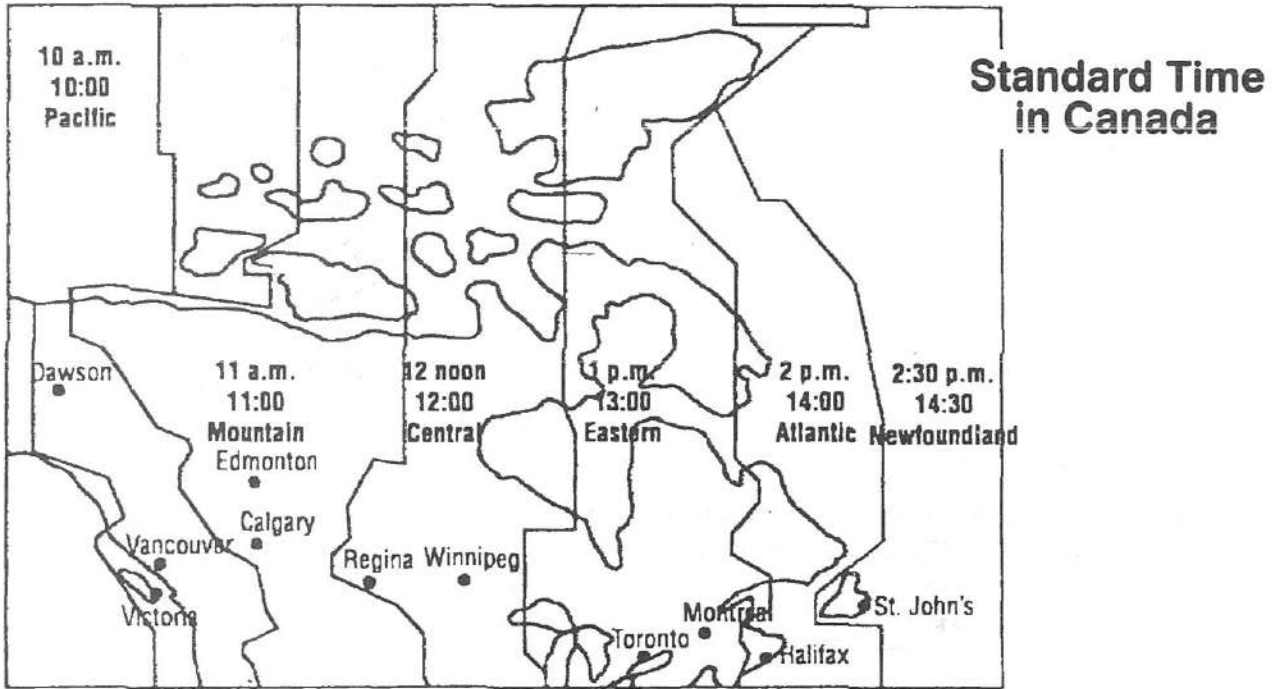
- It is 08:30 in Paris, France. What time is it in
 - Winnipeg? _____
 - Moscow? _____
 - Sydney, Australia? _____

Problems and Applications

- Paulo lives in Winnipeg. At 11:30, he phoned his brother in Madrid, Spain. What time was it in Spain when Paulo phoned his brother?

- When the first human set foot on the moon, it was about 02:56 on July 21, 1969, in London, England.
 - What time was it in Sydney, Australia?
 - What time and date was it in Edmonton?

6.



a) The time in Vancouver is known as Pacific Standard Time. What are the names of the other time zones in Canada?

b) The time in Toronto is known as _____ Standard Time.

What other Canadian city is in the same time zone? _____

c) What is the difference, in hours, between

(i) Mountain Standard Time and Eastern Standard Time? _____

(ii) Pacific Standard Time and Atlantic Standard Time? _____

d) When Pacific Standard Time is 08:00, what is the Atlantic Standard Time?

Skill Builder

1. Solve each proportion.

a) $\frac{7}{10} \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{50}$

b) $\frac{75}{100} \div \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{4}$

c) $\frac{12}{25} = \frac{\boxed{}}{100}$

d) $\frac{8}{10} = \frac{\boxed{}}{5}$

e) $\frac{4}{5} = \frac{\boxed{}}{30}$

f) $\frac{12}{36} = \frac{\boxed{}}{6}$

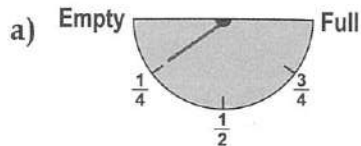
2. Complete the table.

	Fraction	Decimal
a)	$\frac{1}{2} = \frac{\boxed{}}{10}$	
b)	$\frac{17}{100}$	0.17
c)	$\frac{99}{100}$	
d)	$\frac{3}{10}$	
e)	$\frac{1}{4} = \frac{\boxed{}}{100}$	
f)	$\frac{1}{10}$	
g)	$\frac{3}{4} = \frac{\boxed{}}{100}$	
h)	$\frac{2}{5} = \frac{\boxed{}}{10}$	
i)	$\frac{85}{100}$	

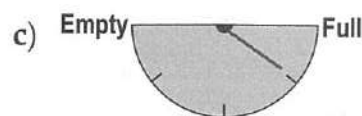
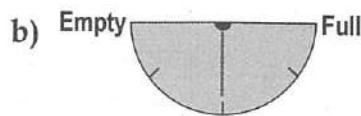
9.3 Measuring Instruments

Practice

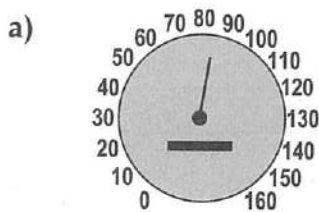
1. Each diagram shows a fuel gauge of a car. Estimate the reading of each fuel gauge.



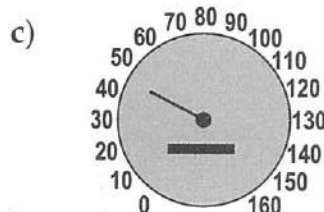
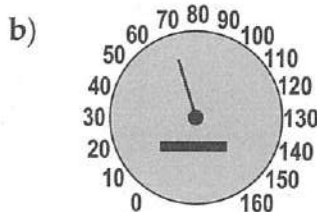
$\frac{1}{4}$ full or $\frac{3}{4}$ empty



2. Each diagram shows the speedometer of a car. Estimate the car's speed in kilometres per hour.



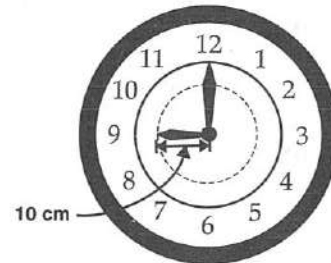
85 km/h



Problems and Applications

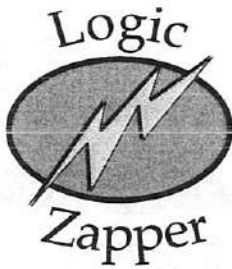
3. The hour hand of a clock is 10 cm long. How far does the tip of the hour hand travel in one complete turn?

$$C = 2 \times \pi \times r$$



4. Name 4 measuring instruments. State what each measures and which unit of measurement is used.

Name of Instrument	Used to Measure	Unit of Measurement
clock	time	minutes, hours



Can you guess the word? We use it every day in mathematics.

- a) There are three vowels (not including I or O).
- b) The second letter is Q.
- c) The last letter is between K and M.
- d) The last two letters form a man's name.

Skill Builder

1. Place the numbers 4 to 9 in the top six squares.

Try to make 4 different answers.

<p>a)</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>4</td><td>5</td><td>6</td></tr> <tr><td>+</td><td>7</td><td>8</td><td>9</td></tr> <tr><td colspan="4">-----</td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>	4	5	6	+	7	8	9	-----								<p>b)</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>5</td><td>8</td><td>9</td></tr> <tr><td>+</td><td> </td><td> </td><td> </td></tr> <tr><td colspan="4">-----</td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>	5	8	9	+				-----								<p>c)</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td>+</td><td> </td><td> </td><td> </td></tr> <tr><td colspan="4">-----</td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>				+				-----								<p>d)</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td>+</td><td> </td><td> </td><td> </td></tr> <tr><td colspan="4">-----</td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>				+				-----							
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2. Calculate.



<p>a)</p> <table style="margin-left: 20px;"> <tr><td>180</td></tr> <tr><td>+ 20</td></tr> <tr><td>-----</td></tr> <tr><td> </td></tr> </table>	180	+ 20	-----		<p>b)</p> <table style="margin-left: 20px;"> <tr><td>150</td></tr> <tr><td>+ 60</td></tr> <tr><td>-----</td></tr> <tr><td> </td></tr> </table>	150	+ 60	-----		<p>c)</p> <table style="margin-left: 20px;"> <tr><td>175</td></tr> <tr><td>- 50</td></tr> <tr><td>-----</td></tr> <tr><td> </td></tr> </table>	175	- 50	-----		<p>d)</p> <table style="margin-left: 20px;"> <tr><td>360</td></tr> <tr><td>+ 60</td></tr> <tr><td>-----</td></tr> <tr><td> </td></tr> </table>	360	+ 60	-----	
180																			
+ 20																			

150																			
+ 60																			

175																			
- 50																			

360																			
+ 60																			

<p>e)</p> <table style="margin-left: 20px;"> <tr><td>200</td></tr> <tr><td>- 25</td></tr> <tr><td>-----</td></tr> <tr><td> </td></tr> </table>	200	- 25	-----		<p>f)</p> <table style="margin-left: 20px;"> <tr><td>25</td></tr> <tr><td>× 2</td></tr> <tr><td>-----</td></tr> <tr><td> </td></tr> </table>	25	× 2	-----		<p>g)</p> <table style="margin-left: 20px;"> <tr><td>25</td></tr> <tr><td>× 5</td></tr> <tr><td>-----</td></tr> <tr><td> </td></tr> </table>	25	× 5	-----		<p>h)</p> <table style="margin-left: 20px;"> <tr><td>125</td></tr> <tr><td>× 2</td></tr> <tr><td>-----</td></tr> <tr><td> </td></tr> </table>	125	× 2	-----	
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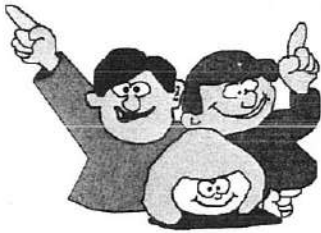
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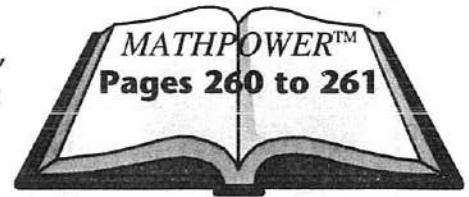
3. Name these geometric shapes.

<p>a)</p> <p>_____</p>	<p>b)</p> <p>_____</p>	<p>c)</p> <p>_____</p>	<p>d)</p> <p>_____</p>
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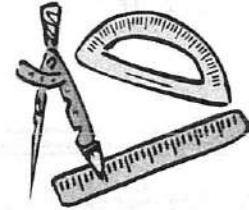
LEARNING TOGETHER Geometry Around Us



Work together with your classmates, using your *MATHPOWER*™ student text, pages 260 and 261.



9.4 The Language of Geometry

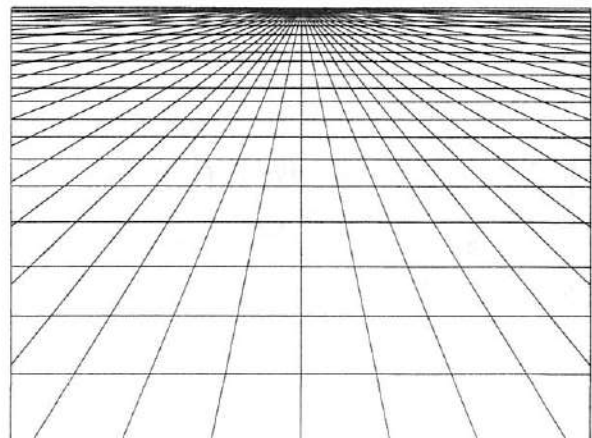


Geometric Terms (Name)	Symbol	Figure
Point A	A	• A
Line AB	\overleftrightarrow{AB}	
Ray AB	\overrightarrow{AB}	
Line segment AB	\overline{AB} or AB	
Angle ABC	$\angle ABC$	



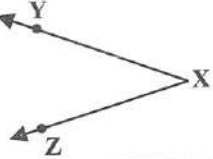

Practice

1. Match the following names and symbols.

- | | |
|-----------------|---------------------------|
| Point B | \overleftrightarrow{AB} |
| Ray EA | \overline{AB} |
| Line segment AB | $\angle PQR$ |
| Line AB | B |
| Angle PQR | \overrightarrow{EA} |

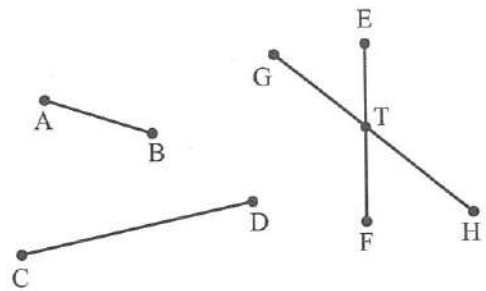


2. Write the name and symbol for each figure.

Figure	Name	Symbol
a) 	Line segment LM	\overline{LM}
b) 		
c) 		
d) 		

Problems and Applications

3. Estimate, then measure each line segment.



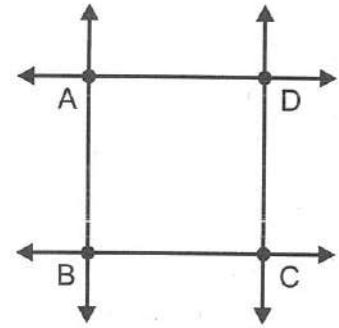
Complete the chart.

	Line Segment	Estimate	Measure	Difference
a)	\overline{AB}	10 mm	15 mm	$15 - 10 = 5$ mm
b)	\overline{CD}			
c)	\overline{GH}			
d)	\overline{EF}			
e)	\overline{GT}			
f)	\overline{TH}			
g)	\overline{ET}			
h)	\overline{TF}			



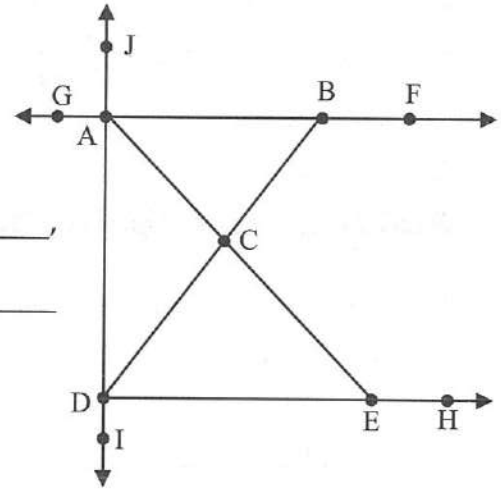
4. From the diagram, give the symbols of the following.

- a) 4 points _____
- b) 4 line segments _____
- c) 4 lines _____
- d) 4 rays _____
- e) 4 angles _____



5. Use the figure to give the symbols of the following.

- a) 6 points _____
- b) 8 line segments _____
- c) 2 lines _____
- d) 4 rays _____
- e) 3 angles _____

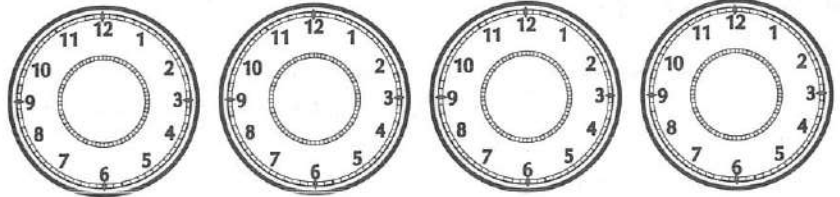


6. Complete the following chart.

Join the points.

2 Points	3 Points	4 Points	5 Points	6 Points
1 line	3 lines	_____ lines	_____ lines	_____ lines

Describe the pattern. _____



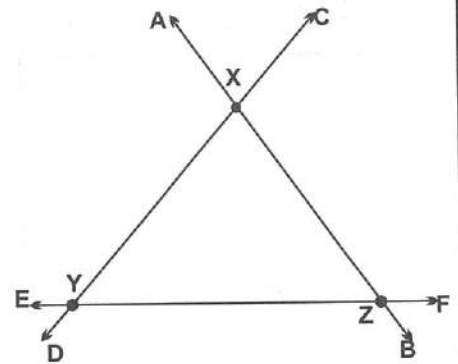
How many times a day does the hour hand and minute hand lie in a straight line? _____



Skill Builder

1. Use the diagram to name

- a) 3 points _____ / _____ / _____
- b) 3 lines _____ / _____ / _____
- c) 3 line segments _____ / _____ / _____
- d) 3 angles _____ / _____ / _____
- e) 3 rays _____ / _____ / _____



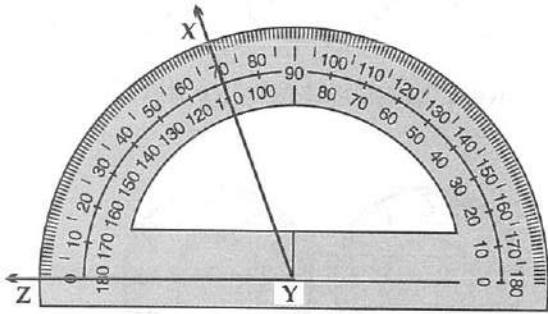
2. Calculate.



- a) $8^2 = 8 \times 8 =$ _____
- b) $3^2 =$ _____
- d) $3^3 =$ _____
- f) $2^2 =$ _____
- h) $2^2 + 2^2$
= _____ + _____
= _____
- c) $10^3 = 10 \times 10 \times 10 =$ _____
- e) $2^3 =$ _____
- g) $5^2 =$ _____
- i) $2^3 + 3^3$
= _____ + _____
= _____
- j) $3^2 + 3^2$
= _____ + _____
= _____

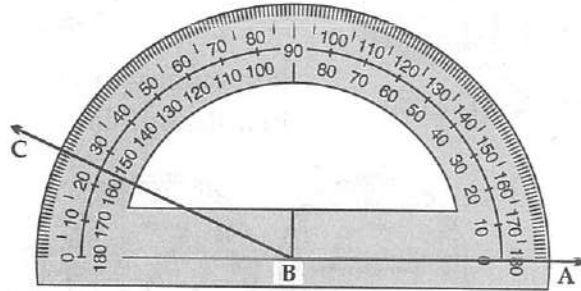
9.5 Angles

Angles are measured with a protractor.



The outer scale is read from left to right.

$$\angle XYZ = 70^\circ$$

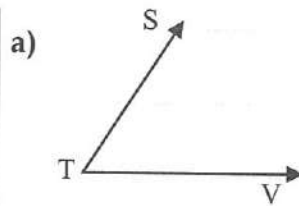
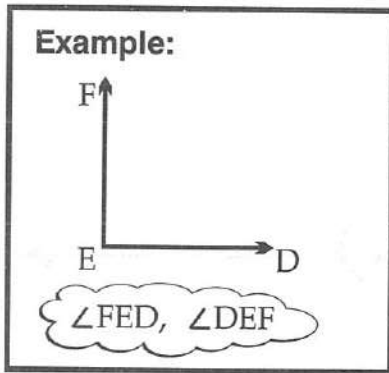


The inner scale is read from right to left.

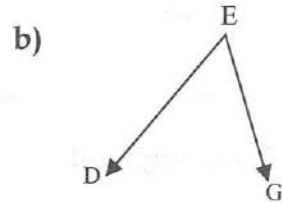
$$\angle ABC = 155^\circ$$

Practice

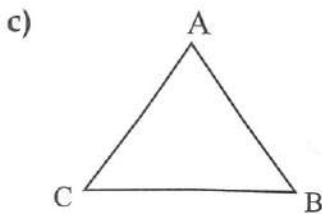
1. Name each angle in two ways.



_____ / _____



_____ / _____



_____ / _____

_____ / _____

_____ / _____

2. State the measure of each angle.

a) $\angle DAE =$ _____

b) $\angle DAG =$ _____

c) $\angle DAH =$ _____

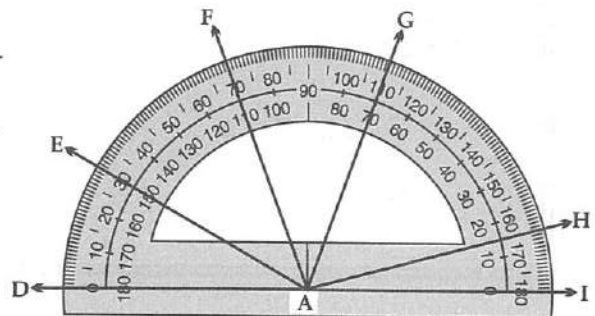
d) $\angle DAF =$ _____

e) $\angle IAE =$ _____

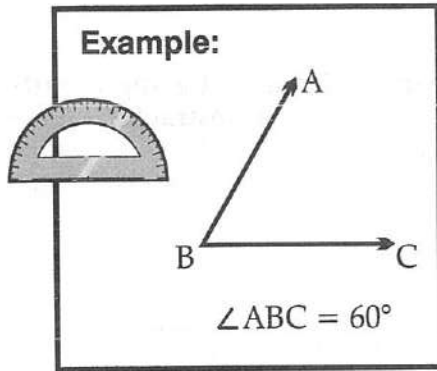
f) $\angle IAG =$ _____

g) $\angle IAH =$ _____

h) $\angle IAF =$ _____



3. Draw angles with the following measures. Label and name each angle.



a) 45°

b) 100°

c) 10°

d) 165°

e) 70°

f) 130°

g) 90°

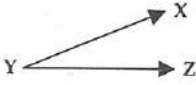

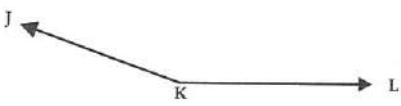
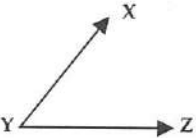
h) 32°



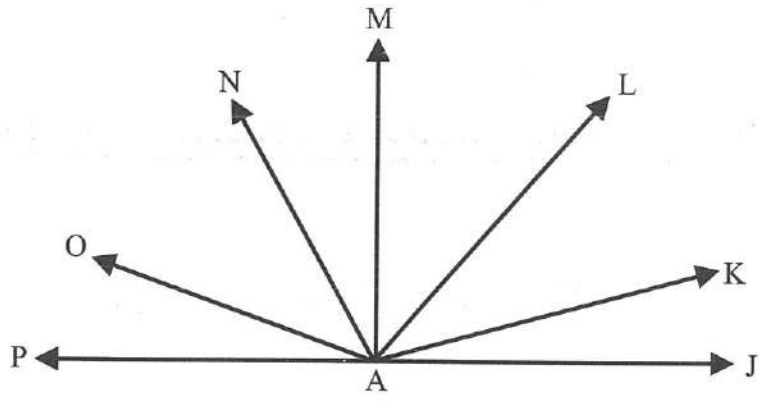
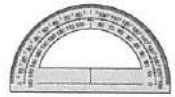
Problems and Applications

4. Complete the chart.

GUESS

Angle	Estimate the measure of each angle.	Measure the angle with a protractor.
<p>a)</p> 		
<p>b)</p> 		
<p>c)</p> 		

5. Measure the following angles with a protractor.



Angle	Measure (°)
$\angle PAO$	
$\angle NAP$	
$\angle KAO$	
$\angle JAM$	
$\angle JAK$	

Angle	Measure (°)
$\angle MAP$	
$\angle JAL$	
$\angle KAM$	
$\angle PAN$	
$\angle JAN$	

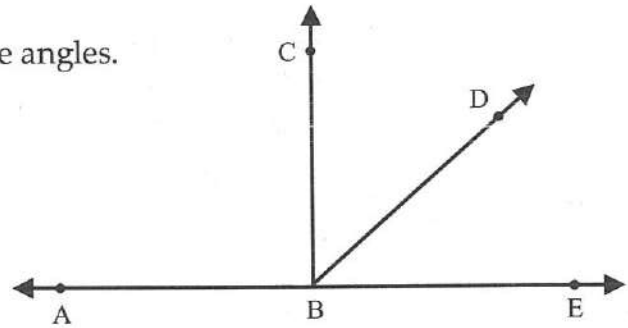
Skill Builder

1. a) Use your protractor to measure these angles.

$$\angle ABC = \underline{\hspace{2cm}}$$

$$\angle CBD = \underline{\hspace{2cm}}$$

$$\angle DBE = \underline{\hspace{2cm}}$$



Add

- b) What is the sum of these three measures? $\underline{\hspace{2cm}}$

2. Subtract.

$$\begin{array}{r} \text{a) } 180 \\ - 50 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b) } 180 \\ - 25 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c) } 180 \\ - 45 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d) } 180 \\ - 90 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e) } 360 \\ - 80 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f) } 360 \\ - 75 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g) } 360 \\ - 150 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h) } 360 \\ - 210 \\ \hline \end{array}$$

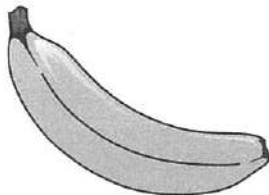


NO CALCULATOR



Draw each picture as it would look reflected in a mirror.

1.

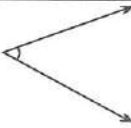

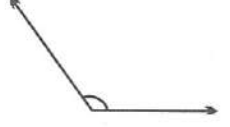
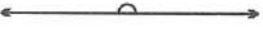



2.



9.6 Classifying Angles

Angles are named according to their size.

Angle Name	Angle Size	Illustration
Acute	less than 90°	
Right	90°	
Obtuse	between 90° and 180°	
Straight	180°	
Reflex	between 180° and 360°	

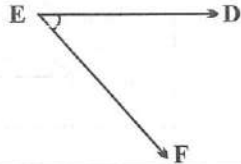
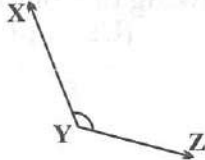
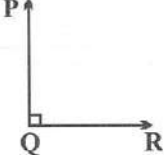
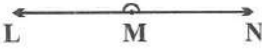
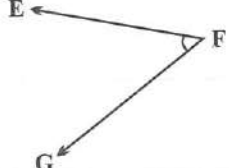
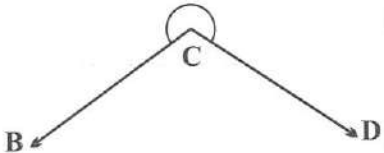
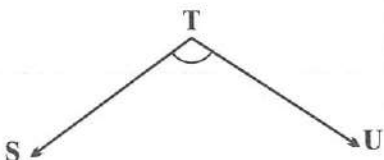
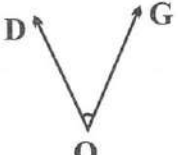
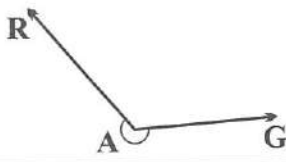
Practice

1. Classify each angle as acute, right, obtuse, straight, or reflex.

	Angle	Angle Classification
a)	53°	acute
b)	7°	
c)	90°	
d)	325°	
e)	180°	
f)	79°	
g)	167°	
h)	37°	

	Angle	Angle Classification
i)	13°	
j)	299°	
k)	115°	
l)	151°	
m)	72°	
n)	190°	
o)	315°	
p)	179°	

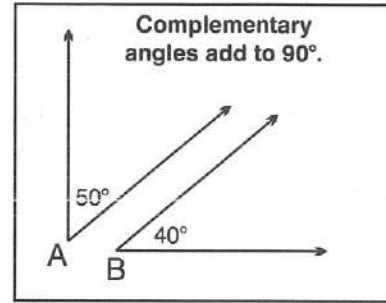
2. Classify each angle as acute, right, obtuse, straight, or reflex.

	Angle	Angle Classification
a)		
b)		
c)		
d)		
e)		
f)		
g)		
h)		
i)		



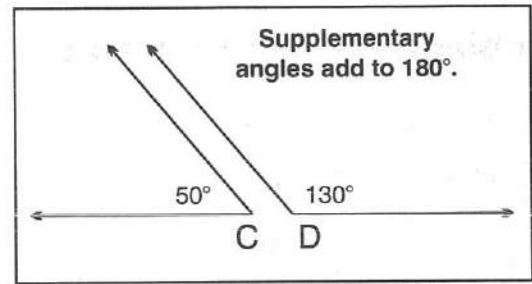
Problems and Applications

3. For each of the following angles, draw the complementary angle and state its measure ($^{\circ}$).



	Given Angle	Complementary Angle ($^{\circ}$)	Drawing of Complementary Angle (Use a protractor.)
a)	20°	$90 - 20 = \boxed{}^{\circ}$	
b)	60°		
c)	45°		
d)	80°		
e)	72°		
f)	54°		
g)	13°		

4. For each of the following angles, draw the supplementary angle and state its measure.



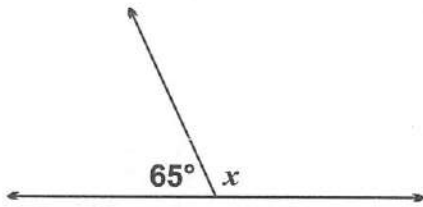
	Given Angle	Supplementary Angle (°)	Drawing of Supplementary Angle
a)	70°	180 - 70 = <input type="text"/> °	
b)	50°		
c)	130°		
d)	35°		
e)	144°		
f)	68°		
g)	104°		



5. Find the missing measures.



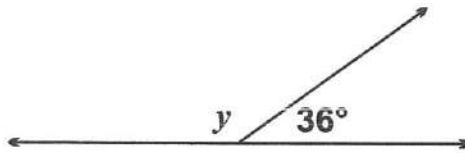
a)



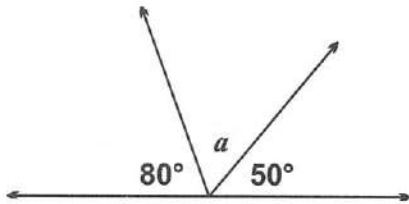
$$\angle x = 180^\circ - 65^\circ$$

$$\angle x = \underline{\hspace{2cm}}$$

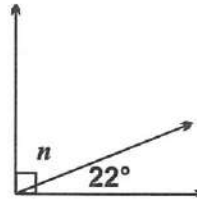
b)



c)



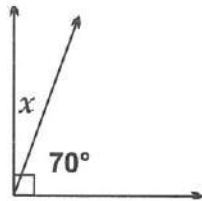
d)



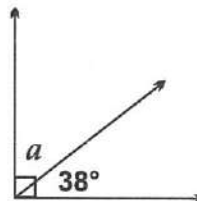
$$\angle n = 90^\circ - 22^\circ$$

$$\angle n = \underline{\hspace{2cm}}$$

e)



f)



6. Use the diagram to name the following.

a) two pairs of **complementary** angles

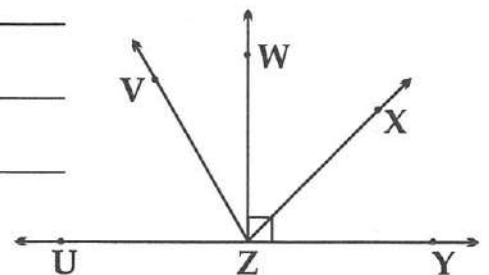
$\angle WZX$ and _____

_____ and _____

b) two pairs of **supplementary** angles

$\angle UZV$ and _____

_____ and _____



7. Draw a 75° angle.

a) What is its **complementary** angle?

$90^\circ - 75^\circ = \underline{\hspace{3cm}}$

Draw it.

b) What is its **supplementary** angle?

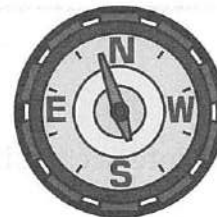
$\underline{\hspace{3cm}}$

Draw it.

Drawings

8. If you turn 90° clockwise (\curvearrowleft),
from north (N), which way will you face?

$\underline{\hspace{3cm}}$

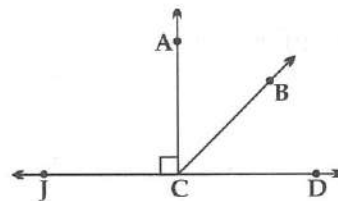


9. If you face north and turn 180° , which way will you face? $\underline{\hspace{3cm}}$

10. If you face northwest (NW) and turn 180° , which way will you face? $\underline{\hspace{3cm}}$

Skill Builder

1. Name the following.



a) an obtuse angle $\underline{\hspace{2cm}}$

b) a right angle $\underline{\hspace{2cm}}$

c) an acute angle $\underline{\hspace{2cm}}$

d) a straight angle $\underline{\hspace{2cm}}$

2. Add.



a)
$$\begin{array}{r} 26 \\ + 40 \\ \hline \end{array}$$

$\underline{\hspace{2cm}}$

b)
$$\begin{array}{r} 13 \\ + 17 \\ \hline \end{array}$$

$\underline{\hspace{2cm}}$

c)
$$\begin{array}{r} 8 \\ 10 \\ + 9 \\ \hline \end{array}$$

$\underline{\hspace{2cm}}$

d)
$$\begin{array}{r} 54 \\ + 16 \\ \hline \end{array}$$

$\underline{\hspace{2cm}}$

e)
$$\begin{array}{r} 21 \\ + 19 \\ \hline \end{array}$$

$\underline{\hspace{2cm}}$

f)
$$\begin{array}{r} 10 \\ 5 \\ + 75 \\ \hline \end{array}$$

$\underline{\hspace{2cm}}$

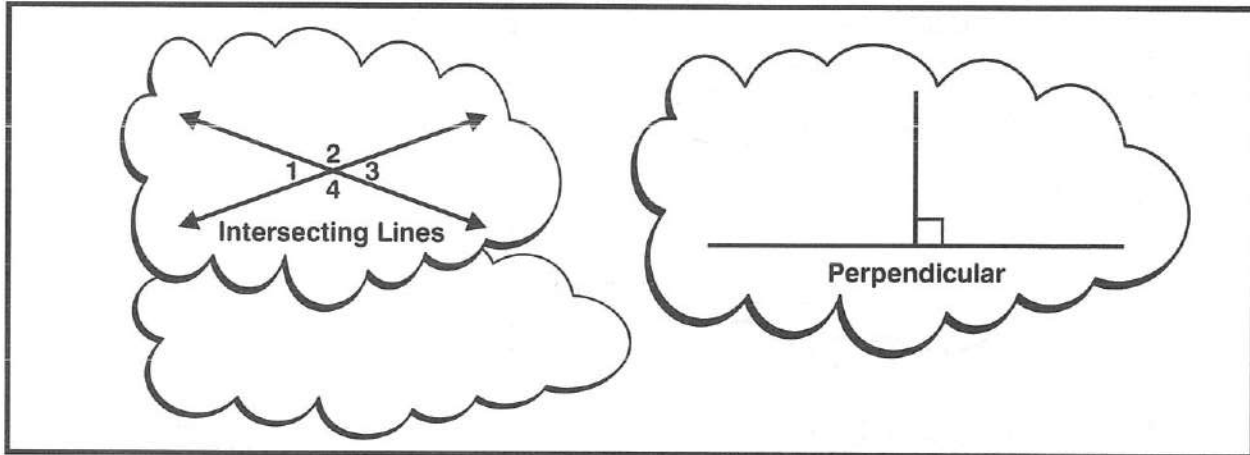
g)
$$\begin{array}{r} 23 \\ + 37 \\ \hline \end{array}$$

$\underline{\hspace{2cm}}$

h)
$$\begin{array}{r} 11 \\ 9 \\ + 54 \\ \hline \end{array}$$

$\underline{\hspace{2cm}}$

9.7 Intersecting and Perpendicular Lines



Practice

1. a) Name 3 pairs of intersecting lines.

(i) \overleftrightarrow{AB} and _____

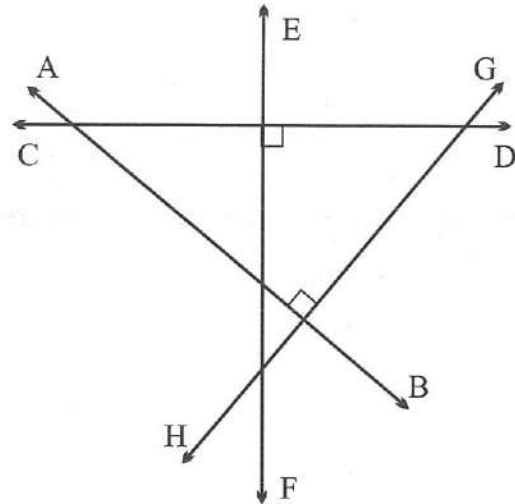
(ii) _____ and _____

(iii) _____ and _____

b) Name 2 pairs of perpendicular lines.

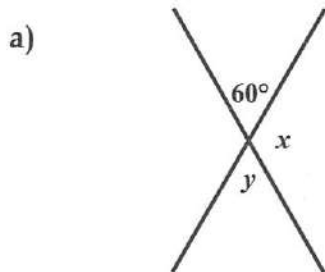
(i) $\overleftrightarrow{AB} \perp$ _____

(ii) _____



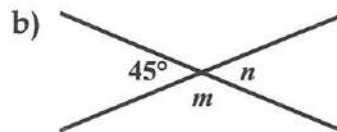
Problems and Applications

2. Find the missing measures.



$$\angle x = 180^\circ - 60^\circ = \underline{\hspace{2cm}}$$

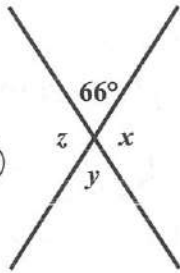
$$\angle y = \underline{\hspace{2cm}}$$



$$\angle n = \underline{\hspace{2cm}}$$

$$\angle m = \underline{\hspace{2cm}}$$

c)



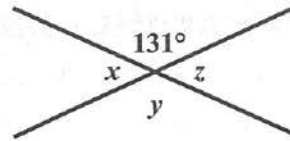
Opposite
△'s are equal.

$\angle x =$ _____

$\angle y =$ _____

$\angle z =$ _____

d)



$\angle x =$ _____

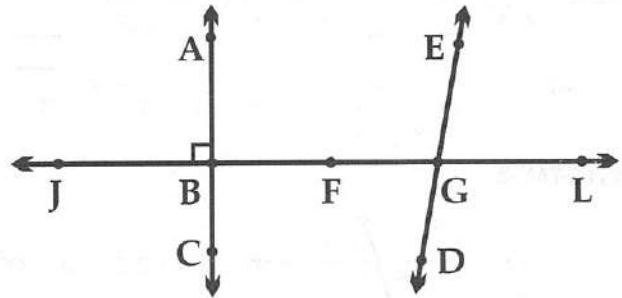
$\angle y =$ _____

$\angle z =$ _____

Skill Builder

1. Name the following:

- a) a right angle _____
- b) an obtuse angle _____
- c) an acute angle _____
- d) a straight angle _____
- e) supplementary angles _____ and _____
- f) opposite angles _____ and _____
- g) a reflex angle _____



2. Subtract.

a) $\begin{array}{r} 180 \\ - 110 \\ \hline \end{array}$

b) $\begin{array}{r} 180 \\ - 65 \\ \hline \end{array}$

c) $\begin{array}{r} 180 \\ - 66 \\ \hline \end{array}$

d) $\begin{array}{r} 90 \\ - 35 \\ \hline \end{array}$

e) $\begin{array}{r} 90 \\ - 46 \\ \hline \end{array}$

f) $\begin{array}{r} 90 \\ - 72 \\ \hline \end{array}$

g) $\begin{array}{r} 180 \\ - 85 \\ \hline \end{array}$

h) $\begin{array}{r} 180 \\ - 25 \\ \hline \end{array}$

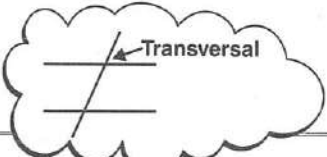
i) $\begin{array}{r} 90 \\ - 75 \\ \hline \end{array}$

j) $\begin{array}{r} 90 \\ - 50 \\ \hline \end{array}$



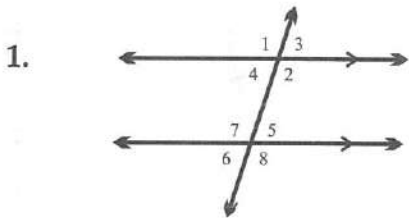
9.8 Angles and Parallel Lines

→ or →
→ or →
means parallel.



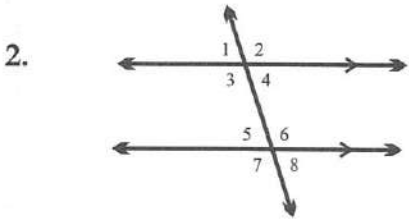
Alternate Angles	Corresponding Angles	Co-interior Angles	Co-exterior Angles
Alternate angles are equal. $\angle 4 = \angle 6$ $\angle 3 = \underline{\hspace{2cm}}$	Corresponding angles are equal. $\angle 3 = \angle 7$ $\angle 2 = \underline{\hspace{2cm}}$ $\angle 4 = \underline{\hspace{2cm}}$ $\angle 1 = \underline{\hspace{2cm}}$	Co-interior angles are supplementary. $\angle 4 + \angle 5 = 180^\circ$ $\angle 3 + \underline{\hspace{2cm}} = 180^\circ$	Co-exterior angles are supplementary. $\angle 2 + \angle 7 = 180^\circ$ $\angle 1 + \underline{\hspace{2cm}} = 180^\circ$

Practice



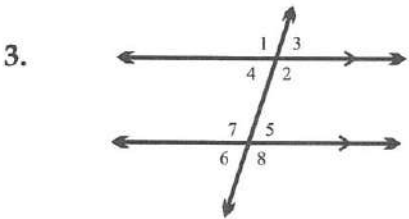
List 5 pairs of supplementary angles.

$\angle 1$ and $\angle 3$, _____, _____,
_____, _____, _____



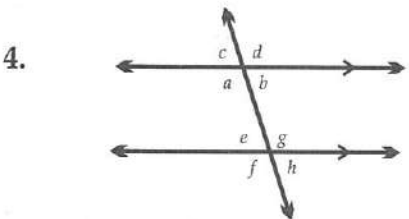
List 3 pairs of opposite angles.

$\angle 5$ and $\angle 8$, _____,
_____, _____



List 2 pairs of alternate angles. (\sphericalangle or Σ)

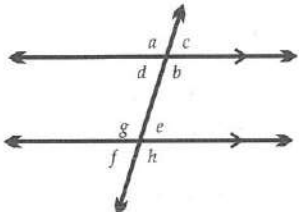
_____ and _____
_____ and _____



List 3 pairs of corresponding angles. (F , ∇ , \perp , or \sphericalangle)

$\angle b$ and $\angle h$, _____,
_____, _____

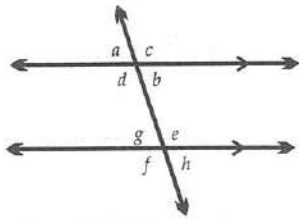
5.



List 2 pairs of co-interior angles.

_____ and _____, _____ and _____

6.

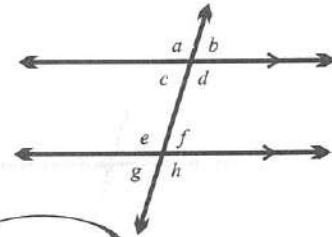


List 1 pair of co-exterior angles.

_____ $\angle c$ and $\angle h$ _____, _____

7. Use the diagram and state how the angles are related.

- a) $\angle d$ and $\angle f$ _____
- b) $\angle c$ and $\angle f$ _____
- c) $\angle e$ and $\angle f$ _____
- d) $\angle d$ and $\angle h$ _____
- e) $\angle b$ and $\angle c$ _____



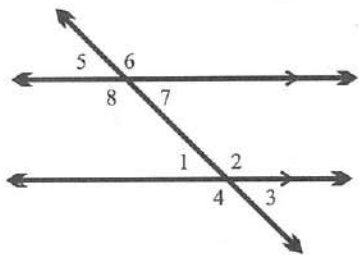
CLUES
 opposite angles
 supplementary angles
 co-interior angles
 alternate angles
 corresponding angles
 co-exterior angles

Problems and Applications

8. Find the measure of each angle in the diagrams. (Use a protractor when necessary.)



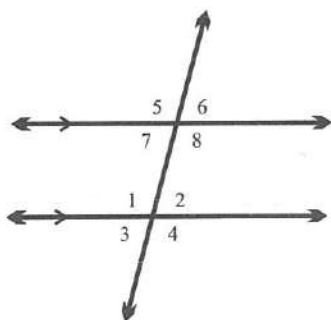
a)



- $\angle 1 =$ _____ $\angle 5 =$ _____
- $\angle 2 =$ _____ $\angle 6 =$ _____
- $\angle 3 =$ _____ $\angle 7 =$ _____
- $\angle 4 =$ _____ $\angle 8 =$ _____

What do you notice?

b)



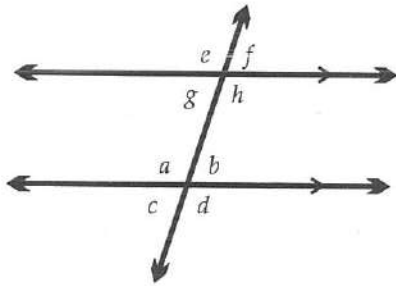
- $\angle 1 =$ _____ $\angle 5 =$ _____
- $\angle 2 =$ _____ $\angle 6 =$ _____
- $\angle 3 =$ _____ $\angle 7 =$ _____
- $\angle 4 =$ _____ $\angle 8 =$ _____



9. Use the diagram and give a reason for how the following angles are related.

Reasons

a)



$\angle e$ and $\angle h$ _____

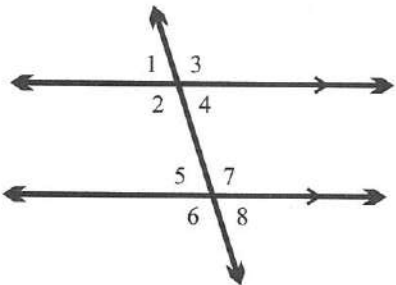
$\angle a$ and $\angle d$ opposite angles

$\angle a$ and $\angle b$ _____

$\angle e$ and $\angle f$ _____

$\angle c$ and $\angle d$ _____

b)



$\angle 4$ and $\angle 5$ _____

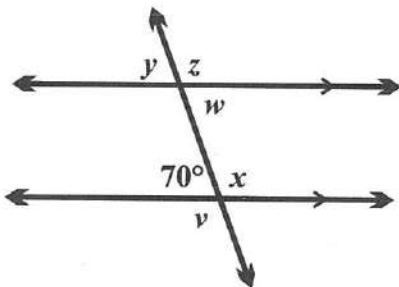
$\angle 1$ and $\angle 4$ _____

$\angle 2$ and $\angle 4$ _____

$\angle 7$ and $\angle 8$ _____

10. Determine the measures of angles v , w , x , y , and z .

a)



$\angle x = 180^\circ - 70^\circ =$ _____

$\angle v =$ _____

$\angle z =$ _____

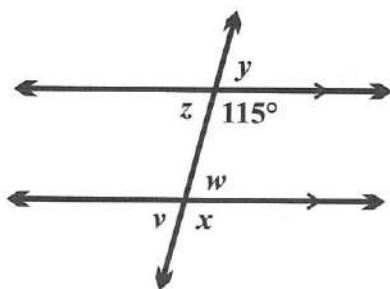
$\angle w =$ _____

$\angle y =$ _____

Rough Work:

180
- 70

b)



$\angle y =$ _____

$\angle z =$ _____

$\angle w =$ _____

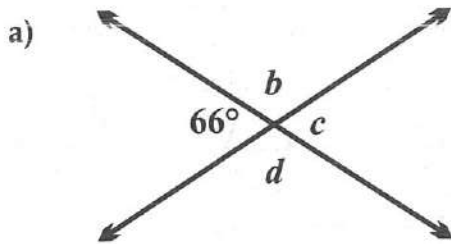
$\angle v =$ _____

$\angle x =$ _____

Rough Work:

Skill Builder

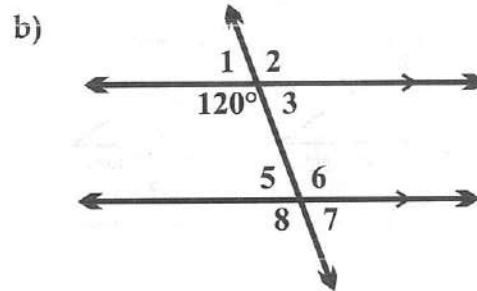
1. What are the measures of the angles?



$\angle c =$ _____

$\angle b = 180^\circ - 66^\circ =$ _____

$\angle d =$ _____



$\angle 2 =$ _____

$\angle 1 =$ _____

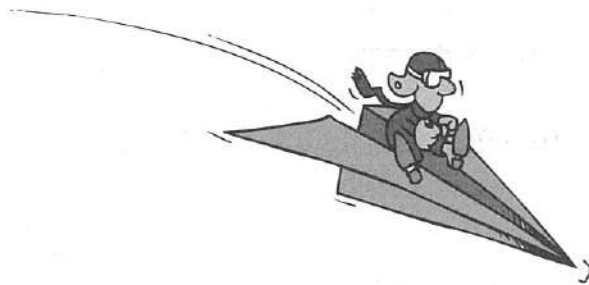
$\angle 3 =$ _____

$\angle 5 =$ _____

$\angle 6 =$ _____

$\angle 7 =$ _____

$\angle 8 =$ _____



2. Match the following angles.

a) 45°

b) 210°

c) 120° and 60°

d) 90°

e) 40° and 50°

f) 110°

_____ supplementary angles

_____ acute angle

_____ obtuse angle

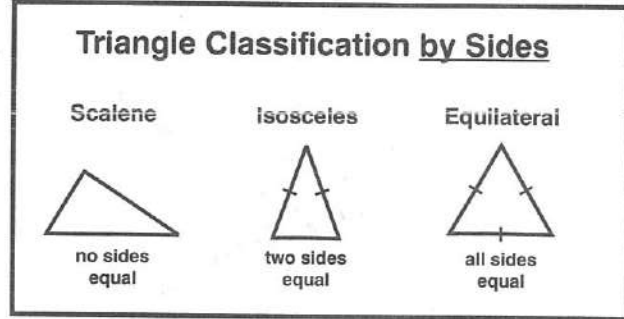
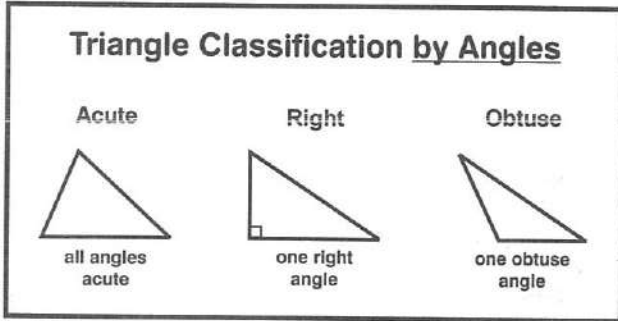
_____ complementary angles

_____ reflex angle

_____ right angle

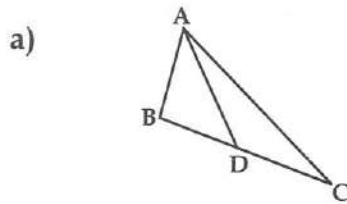


9.9 Classifying Triangles

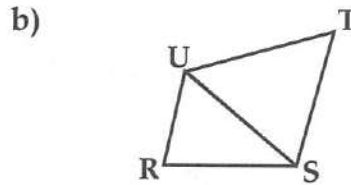


Practice

1. Name all the triangles in each diagram.

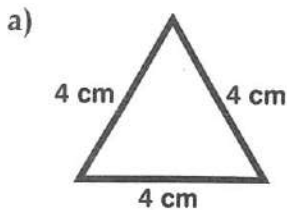


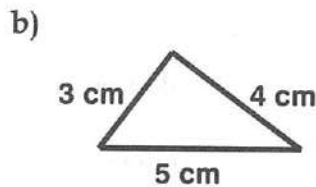
$\triangle ABD$, _____, _____

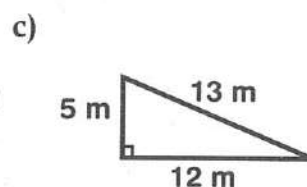


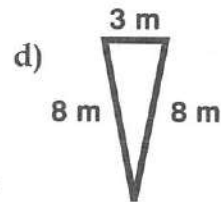
\triangle _____ and \triangle _____

2. Classify each triangle as equilateral, isosceles, or scalene.

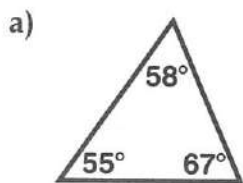


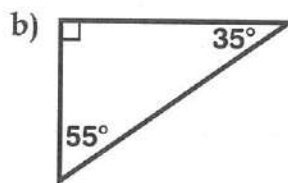


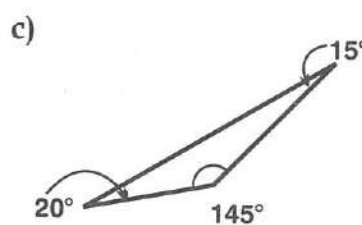


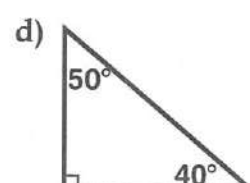


3. Classify each triangle as acute, right, or obtuse.

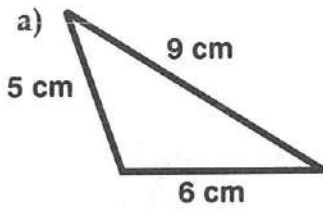
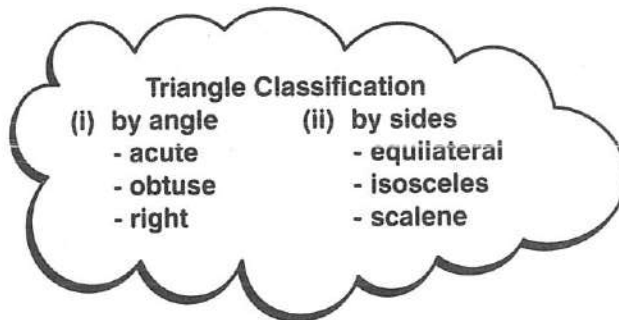


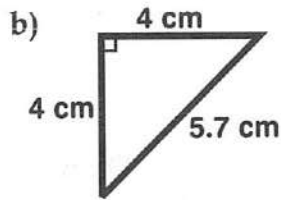


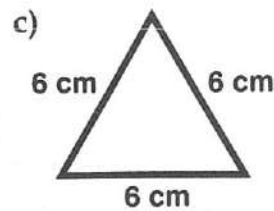


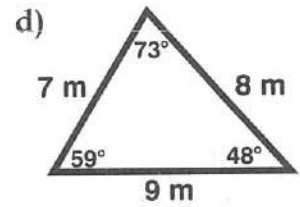


4. Classify each triangle in two ways.





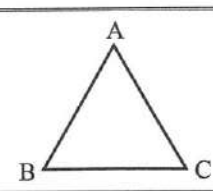
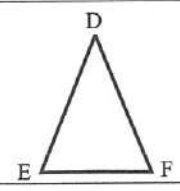
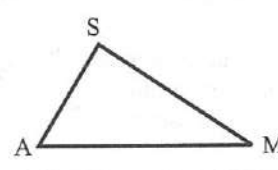
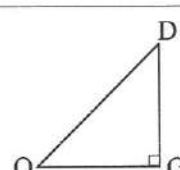




Problems and Applications

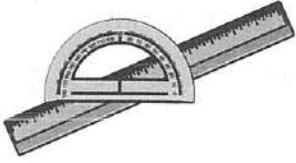
5. Complete the chart.

GUESS

	Triangle	Estimate the length of each side.	Measure each side.	Classify the triangle.
a)		AB = _____ AC = _____ BC = _____	AB = _____ AC = _____ BC = _____	
b)		DE = _____ DF = _____ EF = _____	DE = _____ DF = _____ EF = _____	
c)		_____ _____ _____	_____ _____ _____	
d)		_____ _____ _____	_____ _____ _____	



6. Draw triangle ABC, using a ruler and protractor, so that $\angle A = 90^\circ$, $AB = 4$ cm, and $AC = 5$ cm.

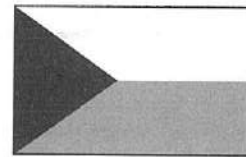


Classify the triangle.

Note:
2 ways

7. Look up flags of different provinces and countries. Draw one that includes triangles. Can you classify the triangles?

Do on a blank sheet.



Skill Builder

1. Draw these triangles. Use a ruler and protractor.

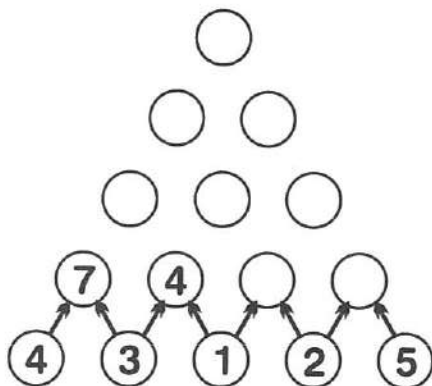
a) right

b) obtuse

c) scalene

d) isosceles

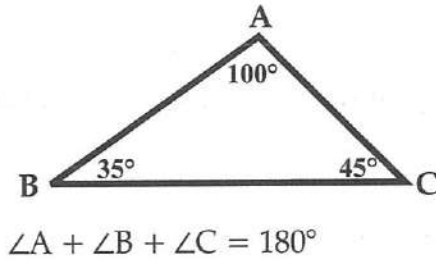
2. Complete this addition pyramid.



Add 2 numbers on the bottom row to get the number above them.

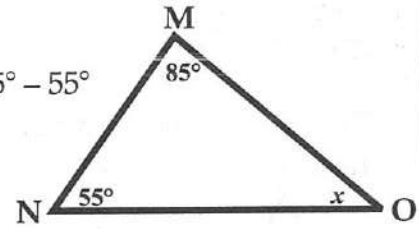
9.10 The Sum of the Interior Angles in a Triangle

The sum of the interior angles of any triangle is 180° .



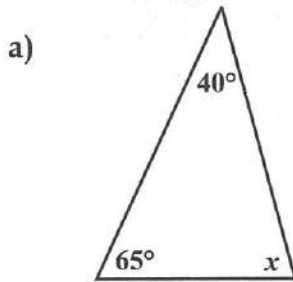
To find the measure of an angle of a triangle:

$$\begin{aligned}\angle x &= 180^\circ - 85^\circ - 55^\circ \\ \angle x &= 40^\circ\end{aligned}$$



Practice

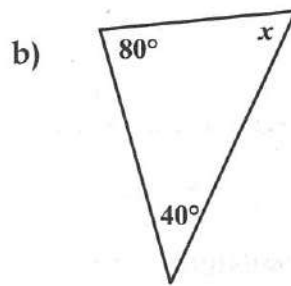
1. Find the measure of $\angle x$.

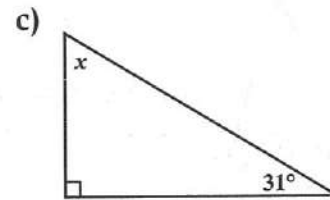


$$\angle x = 180^\circ - 65^\circ - 40^\circ$$

$$\angle x = \underline{\hspace{2cm}}$$

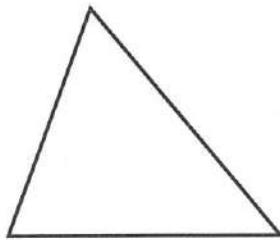
$$\angle x = \underline{\hspace{2cm}}$$



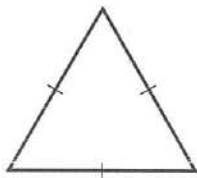


Problems and Applications

2. The measures of two angles in a triangle are 60° and 70° . Find the measure of the third angle.

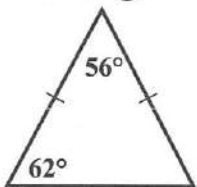


3. What are the measures of the angles in an equilateral triangle?

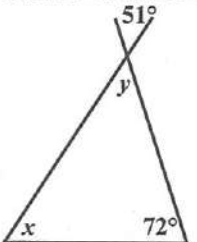


Hint: All the angles are equal.

4. The measure of two angles in a triangle are 56° and 62° . Find the measure of the third angle.



5. Find $\angle x$ and $\angle y$.



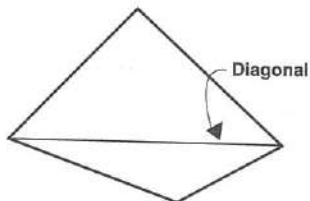
$\angle y =$ _____

Hint: Opposite angles are equal.

$\angle x = 180^\circ - 72^\circ -$

$\angle x =$ _____

6. You can draw one diagonal in a quadrilateral (a four-sided figure).

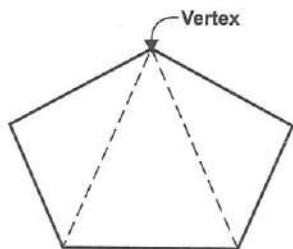


a) How many triangles are formed? _____

b) What is the sum of the angles in each triangle? _____

c) What is the sum of the angles of a quadrilateral? _____

7. a) How many diagonals can you draw from **one vertex** in a pentagon (a five-sided figure)?

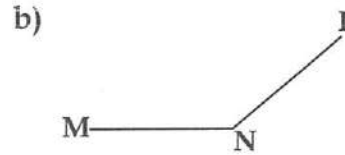
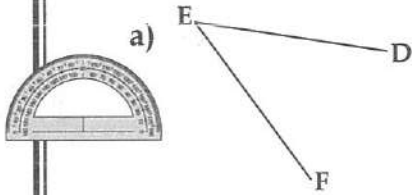


b) How many triangles are formed? _____

c) What is the sum of the angles of a pentagon? _____

Skill Builder

1. Use a protractor to measure each angle.



2. Find half of each number.

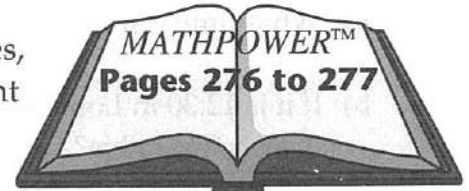
- a) $\frac{1}{2}$ of 10 = _____ b) $\frac{1}{2}$ of 12 = _____ c) $\frac{1}{2}$ of 50 = _____ d) $\frac{1}{2}$ of 8 = _____
 e) $\frac{1}{2}$ of 70 = _____ f) $\frac{1}{2}$ of 100 = _____ g) $\frac{1}{2}$ of 9 = _____ h) $\frac{1}{2}$ of 25 = _____

LEARNING TOGETHER



Constructing an Angle Bisector Constructing the Right Bisector of a Line Segment

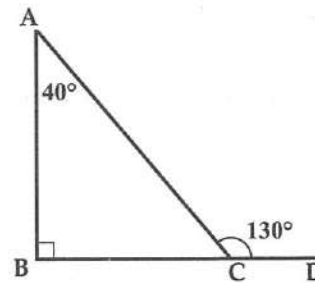
Work together with your classmates, using your *MATHPOWER*™ student text, pages 276 and 277.



Skill Builder

1. What is the measure of each angle?

- a) $\angle BAC =$ _____ b) $\angle ACD =$ _____
 c) $\angle ABC =$ _____ d) $\angle ACB =$ _____



2. Write true or false for each statement.

Use your glossary.

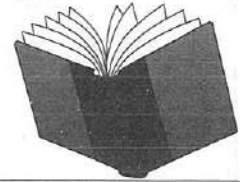
- _____ a) All squares are rectangles. _____ b) All rectangles are squares.
 _____ c) All triangles have parallel sides. _____ d) A circle has no vertices.

3. Calculate.

- a) $2 \times 5 \times 3 =$ _____ b) $5 \times 2 \times 7 =$ _____ c) $2 \times 3 \times 10 =$ _____
 d) $2 \times 4 \times 3 =$ _____ e) $2 \times 4 \times 10 =$ _____ f) $5^2 =$ _____
 g) $3^3 =$ _____ h) $1^4 =$ _____ i) $2 \times 5 \times 10 =$ _____
 j) $10^2 =$ _____ k) $10 \times 20 =$ _____ l) $6 \times 2 \times 10 =$ _____



Review



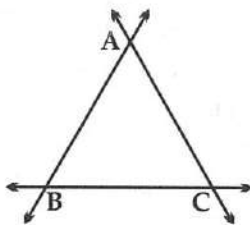
1. Complete the chart.

	Circle	Diameter ($d = 2 \times r$)	Estimate Circumference ($C = \pi \times d$)	Calculate Circumference ($C = \pi \times d$)
a)		$d = 2 \times 6.5$ $d = \boxed{}$	$C \doteq 3 \times \underline{\hspace{2cm}}$ $C \doteq \underline{\hspace{2cm}} \text{ cm}$	$C = 3.14 \times \underline{\hspace{2cm}}$ $C = \underline{\hspace{2cm}}$
b)				

2. Use the time zones map on pages 388 and 389 of your **MATHPOWER™** student text.

- What time is it in Red Deer, Alberta, when it is 17:00 in Toronto, Ontario? _____
- If it is 12:30 in London, England, what time is it in Vancouver, British Columbia? _____
- A plane left Edmonton, Alberta, at 08:00. It takes about 1 h to fly to Vancouver. What time was it in Vancouver when they arrived? _____

3. Use the diagram to **name** the figures.

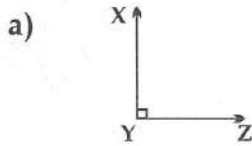


- 3 lines \overleftrightarrow{AB} , _____, and _____
- 3 line segments _____, _____, and _____
- 3 rays _____, _____, and _____
- 3 angles _____, _____, and _____

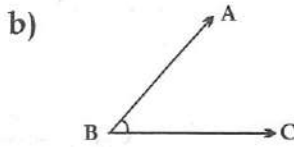
4. Complete the chart.

See page 446.	Name	Diagram	Definition (meaning in words)
a)	Line		A line goes on forever. There are no endpoints.
b)	Line segment		
c)	Ray		

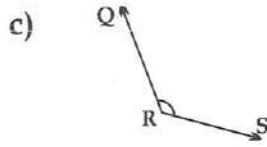
5. Match the following.



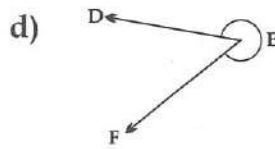
_____ acute angle



_____ straight angle



_____ right angle

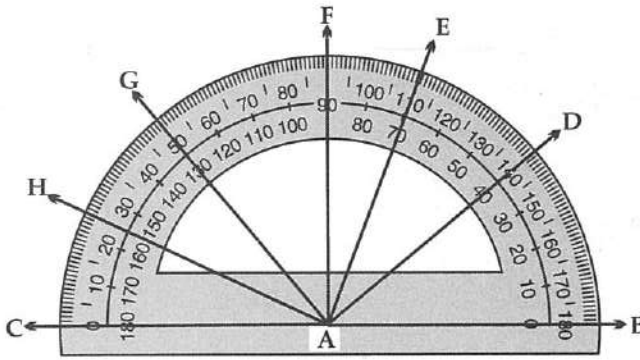


_____ reflex angle



_____ obtuse angle

6. State the measure of each angle.



a) $\angle HAC =$ _____ b) $\angle DAB =$ _____

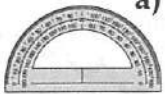
c) $\angle EAB =$ _____ d) $\angle FAB =$ _____

e) $\angle GAC =$ _____ f) $\angle HAB =$ _____

g) $\angle DAC =$ _____ h) $\angle GAB =$ _____

i) $\angle EAC =$ _____ j) $\angle CAB =$ _____

7. Use a protractor to draw the following angles.



a) 90°

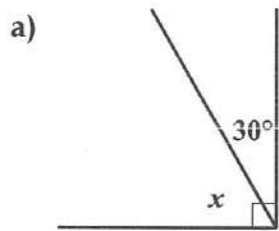
b) 35°

c) 120°

d) 64°

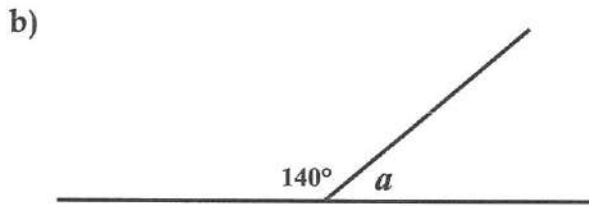


8. Find the missing angle measures.

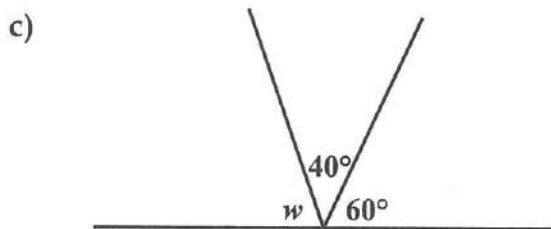


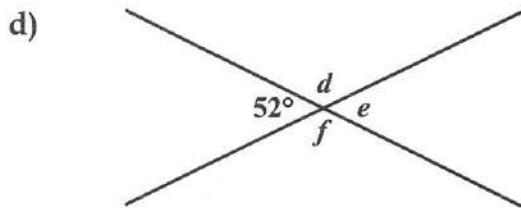
$$\angle x = 90^\circ - \square$$

$$\angle x = \underline{\hspace{2cm}}$$



A straight angle measures 180°.





$$\angle e = \underline{\hspace{2cm}}$$

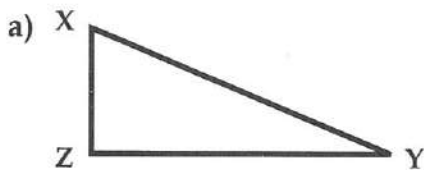
Hint: Opposite angles are equal.

$$\angle d = 180^\circ - 52^\circ$$

$$= \underline{\hspace{2cm}}$$

$$\angle f = \underline{\hspace{2cm}}$$

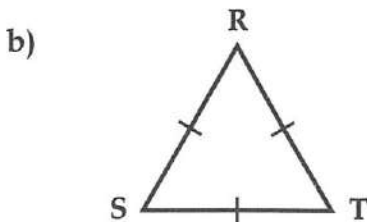
9. Name each of the following triangles.

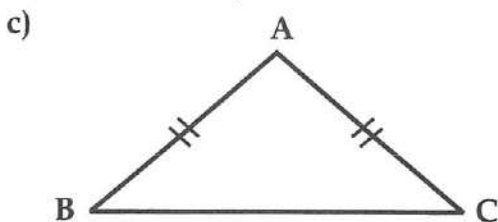


equilateral triangle

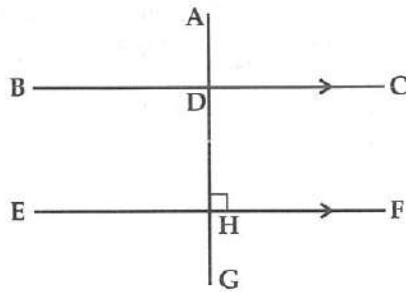
isosceles triangle

scalene triangle





10. In the diagram, how many angles are equal to $\angle ADB$? _____



Explain: _____

11.

→ or →
 → means parallel.

Transversal

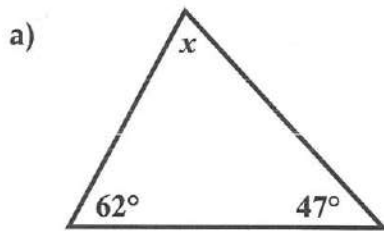
Alternate Angles	Corresponding Angles	Co-interior Angles	Co-exterior Angles
Alternate angles are equal. $\angle 4 = \angle 6$ $\angle 3 = \underline{\hspace{2cm}}$	Corresponding angles are equal. $\angle 3 = \angle 7$ $\angle 2 = \underline{\hspace{2cm}}$ $\angle 4 = \underline{\hspace{2cm}}$ $\angle 1 = \underline{\hspace{2cm}}$	Co-interior angles are supplementary. $\angle 4 + \angle 5 = 180^\circ$ $\angle 3 + \underline{\hspace{2cm}} = 180^\circ$	Co-exterior angles are supplementary. $\angle 2 + \angle 7 = 180^\circ$ $\angle 1 + \underline{\hspace{2cm}} = 180^\circ$

Complete the chart.

Diagram	Find the missing angle measures.	Give reasons for your answer.
a)	$\angle z = \underline{\hspace{2cm}}$ $\angle w = 180^\circ - \underline{\hspace{2cm}}$ $= \underline{\hspace{2cm}}$ $\angle x = \underline{\hspace{2cm}}$	<u>opposite angles</u> _____ _____ _____
b)	$\angle x = \underline{\hspace{2cm}}$ $\angle y = \underline{\hspace{2cm}}$	_____ _____



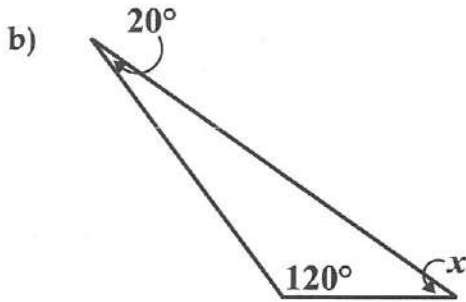
12. Find the missing angle(s).

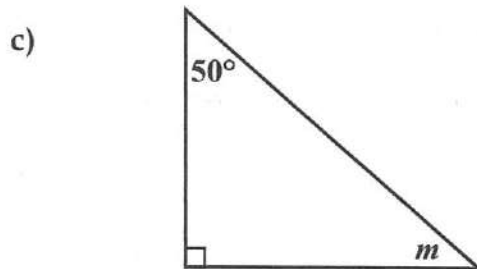


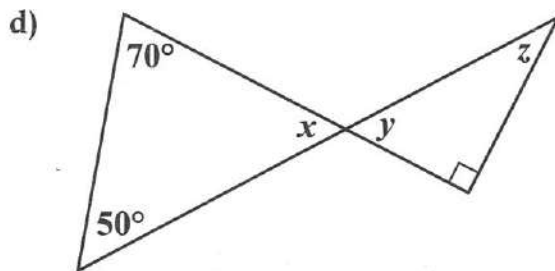
$$\angle x = 180^\circ - 62^\circ - 47^\circ$$

The sum of the angles of a triangle equals 180° .

$$\angle x = \underline{\hspace{2cm}}$$

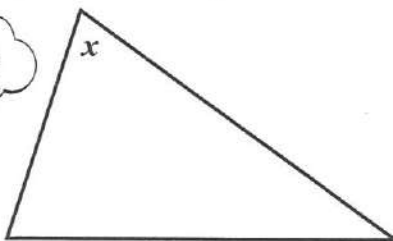




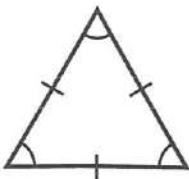


13. Two angles of a triangle are 72° and 36° . What is the measure of the third angle?

Place the measures in the diagram.



14. The **three angles** of a triangle are **equal**. What is the measure of each angle?



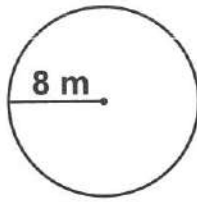
Chapter Check



1. Calculate the circumference.



a)



$$d = 2 \times r$$

$$C = \pi \times d$$

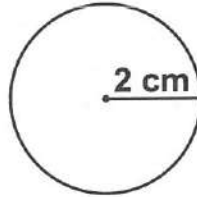
$$d = 2 \times \underline{\hspace{2cm}}$$

$$C = 3.14 \times \underline{\hspace{2cm}}$$

$$d = \underline{\hspace{2cm}}$$

$$C = \underline{\hspace{2cm}}$$

b)



$$d = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

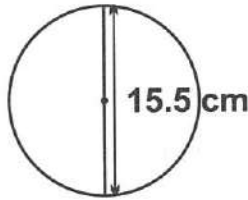
$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

c)



$$d = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

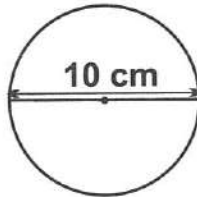
$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

d)



$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

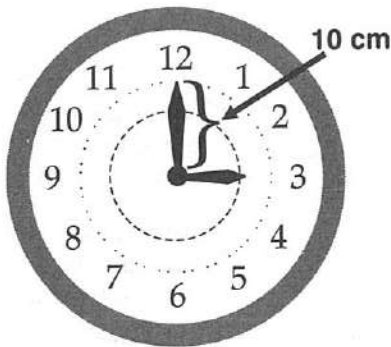
$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

2.



If the minute hand is 10 cm long, how far does the tip travel in one complete hour?

3. When it is 15:00 in Paris, France, what time is it in Victoria, British Columbia?

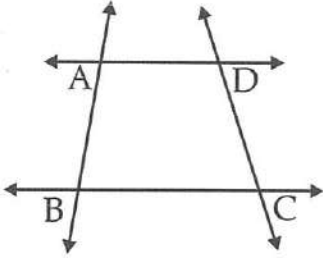
Use the time zones map on pages 388 and 389 of your MATHPOWER™ student text.



4. Regis lives in Winnipeg, Manitoba. At 18:30, he called his cousin in Halifax, Nova Scotia. What was the time in Nova Scotia?

Use the time zones map on pages 388 and 389 of your MATHPOWER™ student text.

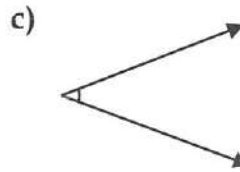
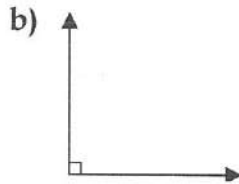
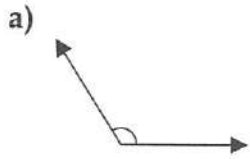
5. Use the diagram to name 4 of each of the following.



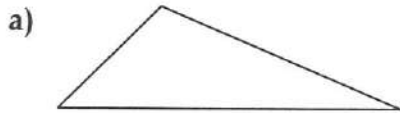
- a) Lines \overleftrightarrow{AB} , _____, _____, _____
 b) Line segments _____, _____, _____, _____
 c) Rays _____, _____, _____, _____
 d) Angles _____, _____, _____, _____

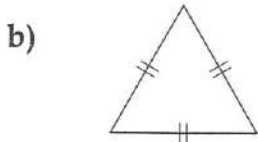
6. Classify each angle.

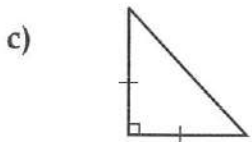
acute angle, obtuse angle, right angle



7. Classify each triangle in two ways.







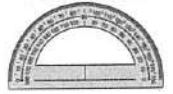
acute triangle,
 obtuse triangle,
 right triangle
 or
 equilateral triangle,
 isosceles triangle,
 scalene triangle

8. Draw the following angles.

a) 30°

b) 135°

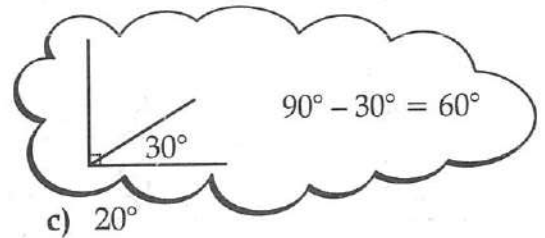
c) 75°



9. Write the complement of each angle.

a) 72°

b) 5°



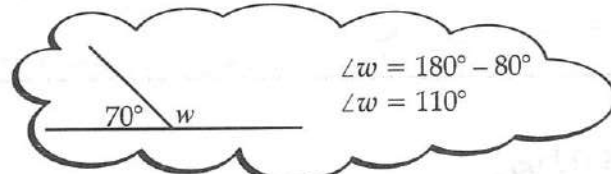
c) 20°

10. Write the supplement of each angle.

a) 80°

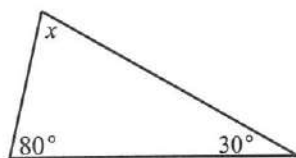
b) 170°

c) 75°

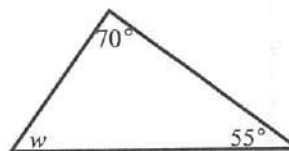


11. Find the missing measure of the angle.

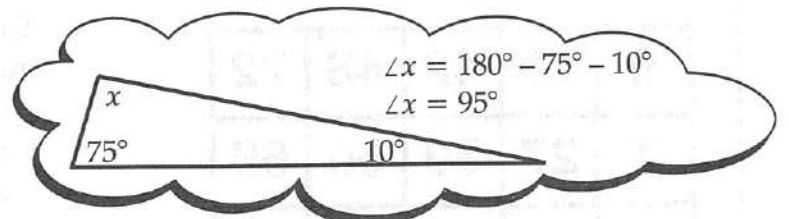
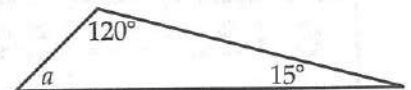
a)



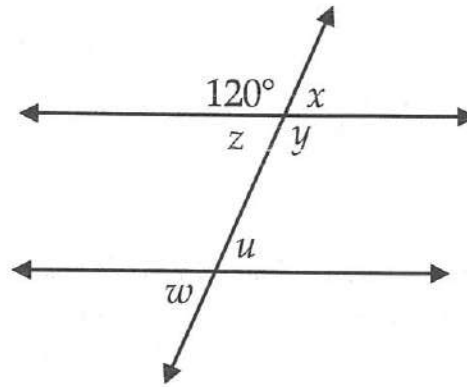
b)



c)



12. Find the missing measures of the angles.



$\angle y =$ _____

Opposite angles are equal.

$\angle x =$ _____

$\angle x = 180^\circ - 120^\circ$

$\angle z =$ _____

$\angle u =$ _____

$\angle w =$ _____



Five in a row makes a BINGO.

B I N G O

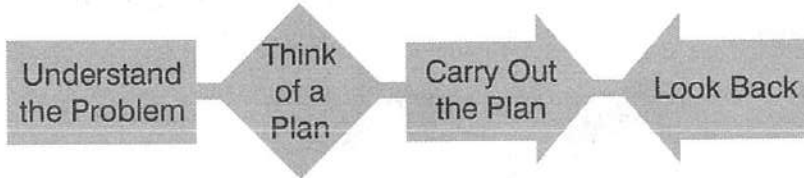
9	18	42	48	72
7	27	39	60	69
12	19	Free	52	75
6	30	36	54	64
15	16	45	49	63

To find the BINGO, mark an X on the numbers whose digits total 9.

Draw a line through the numbers that show the BINGO.

Problem Solving: Using the Strategies

Show your work on looseleaf.



1. A detective was investigating a crime. He learned that a cruise ship left port on the morning of February 10, 1992, and returned on the afternoon of March 3, 1992. How many nights did the passenger spend on the ship? *Use a calendar.*

Was 1992 a leap year?

2. Before school started, Erin bought 4 shirts at \$20.40 each and 3 pairs of socks at \$4.25 a pair. What is the total cost (without tax)?
3. Find the patterns and complete the tables.

a)

x	y
2	0
3	1
4	2
5	3
6	<input type="text"/>
7	<input type="text"/>
<input type="text"/>	9

b)

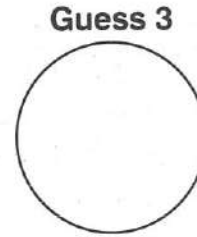
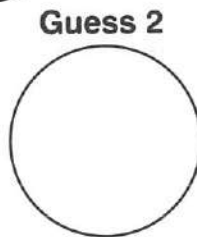
x	y
0	0
1	2
2	4
3	6
4	<input type="text"/>
5	<input type="text"/>
<input type="text"/>	12

4. How many rectangles are in the figure? (Remember, a square is also a rectangle.)

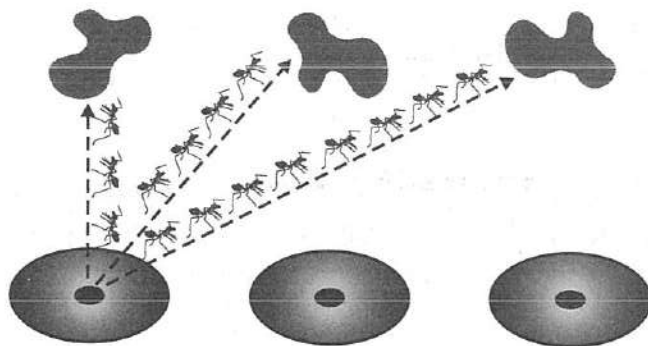


5. If you use 3 straight cuts, what is the largest number of pieces you can get from a round pizza?

Guess and Check



6. Three ant hills are along the edge of a sidewalk. Three big drops of cola are on the sidewalk. A line of ants connects each ant hill to each droplet. How many lines are there in all? (Complete the diagram.)



DATA BANK

Use the Data Bank on page 388 of your MATHPOWER™ student text.

1. It is 08:00 in Regina, what time is it in Toronto?

Use the Data Bank on pages 388 and 389 of your MATHPOWER™ student text.

2. a) What is the flying distance between Regina and Toronto?

- b) If a plane flies at 800 km/h, about how long does it take to fly from Regina to Toronto?

3. Use your Data Bank to create a problem. Have a classmate solve your problem.

9. a) scalene triangle
 b) equilateral triangle
 c) isosceles triangle
10. 7, They are all right angles.
11. a) $\angle z = 134^\circ$, opposite angles
 $\angle w = 46^\circ$, supplementary angles
 $\angle x = 134^\circ$, corresponding angles
 b) $\angle x = 30^\circ$, opposite angles
 $\angle y = 30^\circ$, corresponding angles
12. a) $\angle x = 71^\circ$ b) $\angle x = 40^\circ$
 c) $\angle m = 40^\circ$
 d) $\angle x = 60^\circ$
 $\angle y = 60^\circ$
 $\angle z = 30^\circ$
13. $\angle x = 72^\circ$ 14. 60°

Chapter Check pages 477–480

1. a) $C = 50.24$ m
 b) $C = 12.56$ cm
 c) $C = 48.67$ cm
 d) $C = 31.4$ cm
2. 62.8 cm 3. 06:00 4. 20:30
5. a) AD, BC, DC
 b) $\overline{AB}, \overline{BC}, \overline{AD}, \overline{DC}$
 c) $\overrightarrow{AB}, \overrightarrow{BA}, \overrightarrow{AD}, \overrightarrow{DA}, \overrightarrow{BC}, \overrightarrow{CB}, \overrightarrow{CD}, \overrightarrow{DC}$
 d) $\angle DAB, \angle ABC, \angle BCD, \angle DCB$
6. a) obtuse angle
 b) right angle
 c) acute angle
7. a) obtuse triangle
 scalene triangle
 b) acute triangle
 equilateral triangle
 c) right triangle
 isosceles triangle
9. a) 18° b) 85° c) 70°
10. a) 100° b) 10° c) 105°
11. a) $\angle x = 70^\circ$ b) 55°
 c) 45°
12. $\angle y = 120^\circ, \angle x = 60^\circ,$
 $\angle z = 60^\circ, \angle u = 60^\circ,$
 $\angle w = 60^\circ$

Number Zapper page 480

9, 27, Free, 54, 63

Problem Solving: Using the Strategies
 pages 481–482

1. 22 nights 2. \$94.35
 3. a) 4, 5, 11 b) 8, 10, 6
 4. 10 5. 7 6. 9

DATA BANK page 482

1. 10:00
 2. a) 2026 km
 b) approximately 2.5 h





Answers CHAPTER 9 Measurement

Skill Builder page 435

- 3, 6, 9, 12, 15
- 4, 8, 12, 16, 20
- 10, 20, 30, 40, 50
- 2, 4, 6, 8, 10
- 5, 10, 15, 20, 25

Mental Math pages 435–437

- \$6.98
 - \$8.98
 - \$8.98
 - \$81.90
- \$8.90
 - \$41.90
 - \$81.90
 - \$26.94
- \$4.94
 - \$29.93
 - \$29.93
 - \$26.94
- \$4.74
 - \$6.24
 - \$10.74
 - \$14.85
- \$8.97
 - \$49.95
 - \$14.85
 - \$14.85

Skill Builder page 437

- 68.098, 68.10
 - 25.483, 25.48
 - 98.423, 98.42
 - 28.971, 28.97
- 30
 - 90

9.1 Circumference pages 438–439

Practice

- Answers may vary.
- Answers may vary.
 - 30 cm
 - 20.096 cm
- 15.7 cm
 - 31.4 cm
 - 20.096 cm
 - 6.908 cm

Problems and Applications

- 18.84 cm
- 12 cm
 - 10 cm
 - 8 cm
 - 20 cm

Skill Builder page 440

- 6 cm
 - 20 km
 - 200 m
 - 4 km
- 10:30
 - 07:00
 - 23:00
 - 08:30

Math Zapper page 440

11:00

9.2 Time Zones pages 441–442

Practice

- 13:00
 - 01:00
- 08:00
 - 06:00
- 01:30
 - 10:30

Problems and Applications

- 18:30
- 12:56
 - 19:56, July 20, 1969
- Mountain Standard Time, Central Standard Time, Eastern Standard Time, Atlantic Standard Time, Newfoundland Standard Time
 - Eastern, Montreal
 - (i) 2 h (ii) 4 h
 - 12:00

Skill Builder page 443

- 35
 - 4
 - 0.5
 - 0.3
 - 0.75
- 3
 - 24
 - 0.17
 - 0.25
 - 0.4
- 48
 - 2
 - 0.99
 - 0.1
 - 0.85

9.3 Measuring Instruments

page 444

Practice

- $\frac{1}{2}$ full or $\frac{1}{2}$ empty
 - $\frac{3}{4}$ full or $\frac{1}{4}$ empty
- Answers may vary.
 - 70 km/h
 - 45 km/h

Problems and Applications

- 62.8 cm
- Answers may vary.

Logic Zapper page 445

equal

Skill Builder page 445

- Answers may vary.
- 200
 - 175
- circle
 - rectangle
 - triangle
 - trapezoid

9.4 The Language of Geometry pages 446–448

Practice

- Point B, B
 - Ray EA, \overrightarrow{EA}
 - Line segment AB, \overline{AB}
 - Line AB, \overleftrightarrow{AB}
 - Angle PQR, $\angle PQR$
- Line CB, \overleftrightarrow{CB}
 - Angle YXZ, $\angle YXZ$
 - Ray QR, \overrightarrow{QR}

Problems and Applications

- Answers may vary.
- A, B, C, D
 - \overline{AB} , \overline{AD} , \overline{BC} , \overline{CD}
 - \overleftrightarrow{AB} , \overleftrightarrow{AD} , \overleftrightarrow{BC} , \overleftrightarrow{CD}
 - \overrightarrow{AD} , \overrightarrow{BC} , \overrightarrow{DC} , \overrightarrow{DA} , \overrightarrow{CB} , \overrightarrow{CD} , \overrightarrow{AB} , \overrightarrow{BA}
 - $\angle ABC$, $\angle BCD$, $\angle CDA$, $\angle DAB$, $\angle CBA$, $\angle DCB$, $\angle ADC$, $\angle BAD$
- Answers may vary.
- 6, 10, 15

Logic Zapper page 449

22 times

Skill Builder page 449

- Answers may vary.
- 64
 - 8
 - 35
- 9
 - 4
 - 18
- 1000
 - 25
 - 8

9.5 Angles pages 450–452

Practice

- $\angle STV$, $\angle VTS$
 - $\angle DEG$, $\angle GED$
 - $\angle A$, $\angle CAB$, $\angle BAC$, $\angle B$, $\angle CBA$, $\angle BAC$, $\angle C$, $\angle ACB$, $\angle BCA$
- 30°
 - 70°
 - 15°
- 110°
 - 150°
 - 110°
- 165°
- 70°

Problems and Applications

- Estimates may vary.
 - 23°
 - 160°
 - 50°
- $\angle PAO = 20^\circ$, $\angle NAP = 60^\circ$
 $\angle KAO = 145^\circ$, $\angle JAM = 90^\circ$
 $\angle JAK = 15^\circ$, $\angle MAP = 90^\circ$
 $\angle JAL = 50^\circ$, $\angle KAM = 75^\circ$
 $\angle PAN = 60^\circ$, $\angle JAN = 120^\circ$

Skill Builder page 453

- 90°, 48°, 42°
 - 180°
- 130
 - 280
- 155
 - 285
- 135
 - 210
- 90
 - 210
- 150

9.6 Classifying Angles

pages 454–459

Practice

- acute
 - reflex
 - obtuse
 - reflex
 - acute
 - reflex
 - acute
 - obtuse
 - acute
 - reflex
 - acute
 - obtuse
 - acute
 - right
 - straight
 - obtuse
 - acute
 - reflex
 - acute
 - reflex
- acute
 - straight
 - obtuse
 - acute
 - obtuse
 - acute
 - reflex
 - acute
 - reflex

Problems and Applications

- 70°
 - 18°
- 30°
 - 36°
- 45
 - 77°
- 10°

4. a) 110° b) 130° c) 50° d) 145°
 e) 36° f) 112° g) 76°
 5. a) 115° b) 144° c) 50°
 d) 68° e) 20° f) 52°
 6. a) $\angle WZX$ and $\angle XZY$, $\angle WZV$ and $\angle VZU$
 b) $\angle ZUV$ and $\angle VZY$
 Answers may vary.
 7. a) 15°
 b) 105°
 8. east (E) 9. south (S)
 10. southeast (SE)

Skill Builder page 459

1. Answers may vary.
 a) $\angle BCJ$ b) $\angle ACD$
 c) $\angle BCD$ d) $\angle JCD$
 2. a) 66 b) 30 c) 27 d) 70
 e) 40 f) 90 g) 60 h) 74

9.7 Intersecting and Perpendicular Lines

pages 460–461

Practice

1. a) Answers may vary.
 b) $\overline{AB} \perp \overline{GH}$ $\overline{CD} \perp \overline{EF}$

Problems and Applications

2. a) $\angle x = 120^\circ$, $\angle y = 60^\circ$
 b) $\angle n = 45^\circ$, $\angle m = 135^\circ$
 c) $\angle x = 114^\circ$, $\angle y = 66^\circ$, $\angle z = 114^\circ$
 d) $\angle x = 49^\circ$, $\angle y = 131^\circ$, $\angle z = 49^\circ$

Skill Builder page 461

1. Answers may vary.
 a) $\angle JBA$ b) $\angle EGF$
 c) $\angle EGC$ d) $\angle JBF$
 e) $\angle EGF$, $\angle EGL$ f) $\angle EGC$, $\angle FGD$
 g) $\angle EGL$
 2. a) 70 b) 15 c) 14 d) 55
 e) 44 f) 18 g) 95 h) 155
 i) 15 j) 40

9.8 Angles and Parallel Lines

pages 462–464

Practice

1. $\angle 1$ and $\angle 4$, $\angle 4$ and $\angle 2$, $\angle 2$ and $\angle 3$,
 $\angle 7$ and $\angle 5$, $\angle 6$ and $\angle 8$, $\angle 7$ and $\angle 6$,
 $\angle 5$ and $\angle 8$
 2. $\angle 1$ and $\angle 4$, $\angle 2$ and $\angle 3$, $\angle 6$ and $\angle 7$
 3. $\angle 4$ and $\angle 5$, $\angle 2$ and $\angle 7$
 4. $\angle d$ and $\angle g$, $\angle c$ and $\angle e$, $\angle a$ and $\angle f$
 5. $\angle b$ and $\angle e$, $\angle d$ and $\angle g$
 6. $\angle a$ and $\angle f$
 7. a) co-interior angles
 b) alternate angles
 c) supplementary angles
 d) corresponding angles
 e) opposite angles

Problems and Applications

8. a) $\angle 1 = 45^\circ$, $\angle 5 = 45^\circ$
 $\angle 2 = 135^\circ$, $\angle 6 = 135^\circ$
 $\angle 3 = 45^\circ$, $\angle 7 = 45^\circ$
 $\angle 4 = 135^\circ$, $\angle 8 = 135^\circ$
 b) $\angle 1 = 105^\circ$, $\angle 5 = 105^\circ$
 $\angle 2 = 75^\circ$, $\angle 6 = 75^\circ$
 $\angle 3 = 75^\circ$, $\angle 7 = 75^\circ$
 $\angle 4 = 105^\circ$, $\angle 8 = 105^\circ$
 9. a) opposite angles,
 supplementary angles
 supplementary angles
 supplementary angles
 b) alternate angles
 opposite angles
 supplementary angles
 supplementary angles
 10. a) $\angle x = 110^\circ$, $\angle v = 110^\circ$,
 $\angle z = 110^\circ$, $\angle w = 70^\circ$,
 $\angle y = 70^\circ$
 b) $\angle y = 65^\circ$, $\angle z = 65^\circ$,
 $\angle w = 65^\circ$, $\angle v = 65^\circ$,
 $\angle x = 115^\circ$

Skill Builder

page 465

1. a) $\angle c = 66^\circ$, $\angle b = 114^\circ$,
 $\angle d = 114^\circ$
 b) $\angle 2 = 120^\circ$, $\angle 1 = 60^\circ$,
 $\angle 3 = 60^\circ$, $\angle 5 = 60^\circ$,
 $\angle 6 = 120^\circ$, $\angle 7 = 60^\circ$,
 $\angle 8 = 120^\circ$
 2. a) acute angle
 b) reflex angle
 c) supplementary angles
 d) right angle
 e) complementary angles
 f) obtuse angles

9.9 Classifying Triangles

pages 466–468

Practice

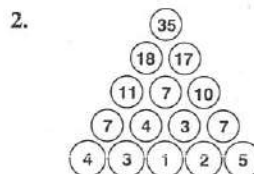
1. a) $\triangle ABC$, $\triangle ADC$
 d) $\triangle URS$, $\triangle TUS$
 2. a) equilateral triangle
 b) scalene triangle
 c) scalene triangle
 d) isosceles triangle
 3. a) acute triangle
 b) right triangle
 c) obtuse triangle
 d) right triangle
 4. a) obtuse triangle, scalene triangle
 b) right triangle, isosceles triangle
 c) acute triangle, equilateral triangle
 d) acute triangle, scalene triangle

Problems and Applications

5. a) equilateral triangle
 b) isosceles triangle
 c) scalene triangle
 d) isosceles triangle
 6. right scalene triangle

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9.10 The Sum of the Interior Angles in a Triangle

pages 469–470

Practice

1. a) 75° b) 60° c) 59°

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2. 50° 3. 60° 4. 62°
 5. $\angle y = 51^\circ$, $\angle x = 57^\circ$
 6. a) 2 b) 180° c) 360°
 7. a) 2 b) 3 c) 540°

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1. a) 45° b) 138°
 2. a) 5 b) 6 c) 25 d) 4
 e) 35 f) 50 g) 4.5 h) 12.5

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1. a) 40° b) 130° c) 90° d) 50°
 2. a) T b) F c) F d) T
 3. a) 30 b) 70 c) 60 d) 24
 e) 80 f) 25 g) 27 h) 1
 i) 100 j) 100 k) 200 l) 120

Review

pages 472–476

1. Estimates may vary.
 a) $d = 13$ cm, $C \approx 18$ cm,
 $C = 40.82$ cm
 b) $d = 22.5$ cm, $C \approx 60$ cm,
 $C = 70.65$ cm
 2. a) 15:00 b) 04:30 c) 08:00
 3. a) \overline{BC} , \overline{AC}
 b) \overline{AB} , \overline{AC} , \overline{BC}
 c) \overrightarrow{BC} , \overrightarrow{BA} , \overrightarrow{AB} , \overrightarrow{CB} , \overrightarrow{CA} , \overrightarrow{AC}
 d) $\angle BAC$, $\angle ACB$, $\angle CBA$
 4. b)
 A line segment is part of a line with two endpoints.
 c)
 A ray is part of a line with one endpoint. A ray begins at the endpoint and goes on forever in one direction.
 5. a) right angle b) acute angle
 c) obtuse angle d) reflex angle
 e) straight angle
 6. a) 25° b) 40° c) 70° d) 90°
 e) 50° f) 155° g) 140° h) 130°
 i) 110° j) 180°
 8. a) $\angle x = 60^\circ$ b) $\angle a = 40^\circ$
 c) $\angle w = 80^\circ$
 d) $\angle e = 52^\circ$, $\angle d = 128^\circ$, $\angle f = 128^\circ$