

Chapter 5

Angles and Parallel Lines



Angles and parallel lines provide BC's Liard River Bridge with strength, stability, and visual appeal. The bridge was built in 1942.

5.1

Measuring, Drawing, and Estimating Angles

REVIEW: WORKING WITH ANGLES

In this section, you will review types of angles and how to classify them.

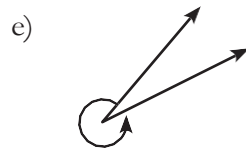
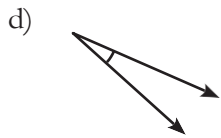
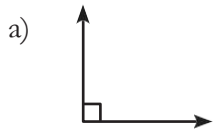
An angle is formed when two rays meet at a point called the vertex. Angles are usually measured in degrees using a protractor. Angle measures range from 0° to 360° .

Angles are:

- acute, if their measure is between 0° and 90° ;
- right, if their measure is 90° ; the two rays are perpendicular to each other;
- obtuse, if their measure is between 90° and 180° ;
- straight, if their measure is 180° ; and
- reflex, if their measure is between 180° and 360° .

Example 1

Identify the type of angle: acute, right, obtuse, straight, or reflex.



MATCH

_____ reflex angle. _____ right angle. _____ obtuse angles _____ straight angle _____ acute angle.

BUILD YOUR SKILLS

1. Identify the type of angle: acute, right, obtuse, straight, or reflex.

a) 68°

b) 215°

c) 91°

d) 32°

e) 180°

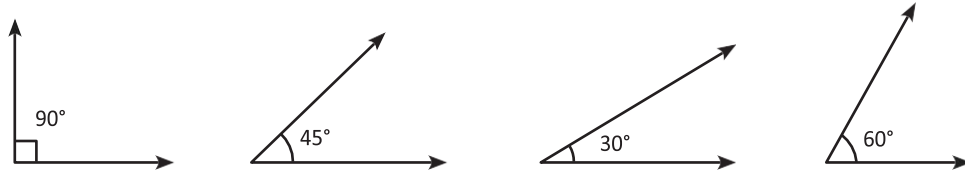
f) 99°

g) 195°

h) 265°

NEW SKILLS: WORKING WITH REFERENT ANGLES

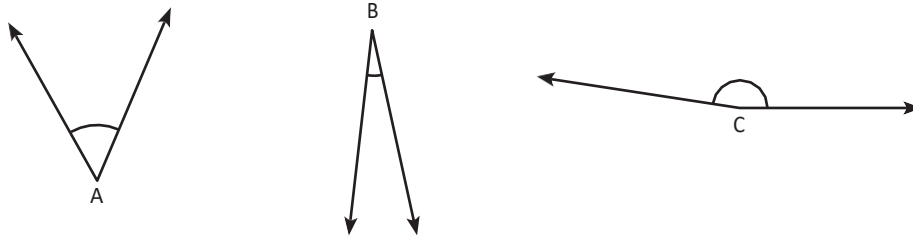
In many jobs, people have to draw angles or estimate their measure. To estimate the size of an angle, you can use referent angles, which are angles that are easy to visualize. You can use these referents to determine the approximate size of a given angle.



For more details, see page 174 of *MathWorks 10*.

Example 2

Use the referents above to estimate the size of each of the following angles. Use a protractor to check your answers.



SOLUTION

$\angle A$ is more than 45° so probably about _____.

$\angle B$ is less than _____, so it is probably about _____.

$\angle C$ is close to a _____ but it is probably about 10° _____. Therefore, $\angle C$ is approximately _____.

Using a protractor, measure the angles.

$\angle A$ is _____.

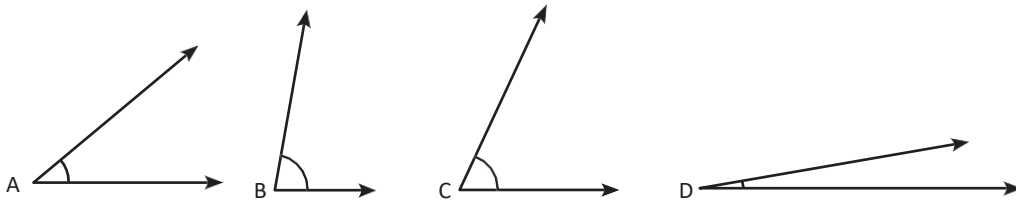
$\angle B$ is _____.

$\angle C$ is _____.

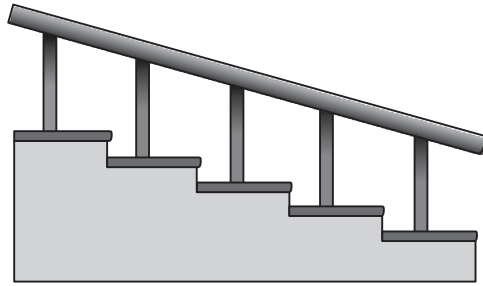
\angle is a symbol used to indicate an angle.

BUIL YOU SKILL

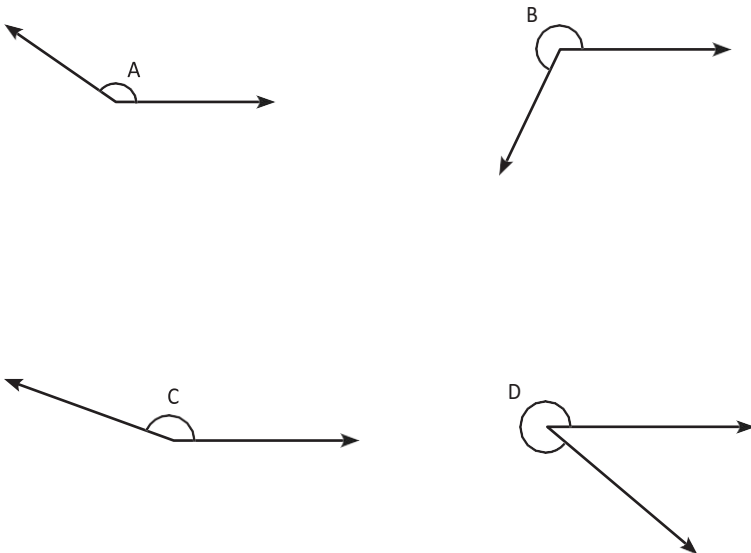
2. Use the referents to determine the approximate size of the following angles.



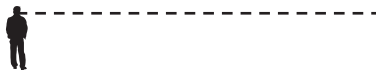
3. What is the approximate angle of the railing on the stairs?



4. Use the referents in the New Skills section to determine the approximate size of the following angles.



5. Jason is doing a survey of a city block. What is the approximate angle between his sightings of the two buildings?



complementary angles:

two angles that have measures that add up to 90°

supplementary angles:

two angles that have measures that add up to 180°

Two angles with the same measure are referred to as congruent.

Example 3

Given each of the following angles, determine the size of the **complement** and/or the size of the **supplement** (if they exist).

- a) 75°
- b) 43°
- c) 103°
- d) 87°
- e) 300°

SOLUTION

To find the complement, subtract the angle measure from 90° .

To find the supplement, subtract the angle measure from 180° .

- a) Complement _____ b) Complement – _____
 Supplement _____ Supplement _____
- c) Complement _____ d) Complement _____
 Supplement _____ Supplement: _____

BUILD YOUR SKILLS

6. Fill in the chart with the complement and the supplement of each angle, if they exist. If they don't exist, state why.

ANGLE COMPLEMENTS AND SUPPLEMENTS		
<i>Angle</i>	<i>Complement</i>	<i>Supplement</i>
45°		
78°		
112°		
160°		
220°		

7. The complement of an angle is 58° .
- What is the size of the angle?

 - What is the supplement of the angle?
8. The complement of an angle is 0° .
- What is the size of the angle?

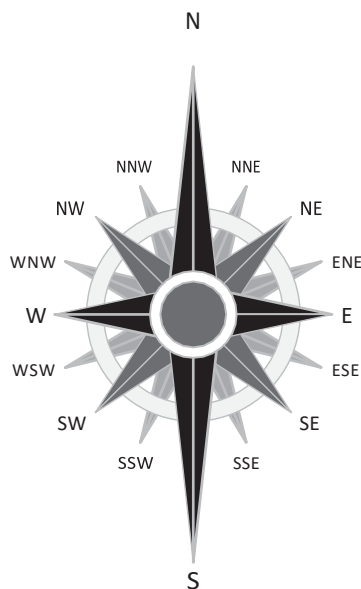
 - What is the size of the supplement of the angle?

NEW SKILLS: WORKING WITH TRUE BEARING

In navigation and map-making, people often measure angles from the vertical, or north. The angle, measured in a clockwise direction from a line pointing north, is referred to as the **true bearing**. Straight north has a bearing of 0° .

For more details, see page 182 of *MathWorks 10*.

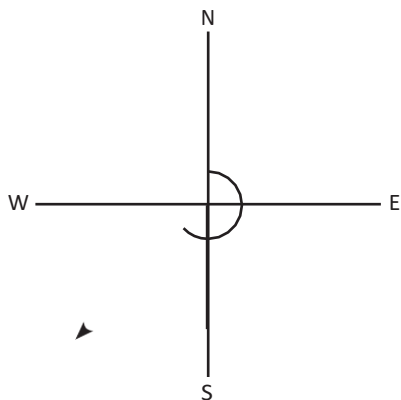
true bearing: the angle measured clockwise between true north and an intended path or direction, expressed in degrees



Example 4

A boat is heading directly southwest. What is its true bearing?

SOLUTION



If the boat is heading southwest, measuring from the vertical will give you an obtuse angle of 225° (45° beyond a straight angle).

BUILD YOUR SKILL

9. If a boat is travelling 25° south of straight east, what is its true bearing?

10. What is the true bearing of a boat travelling south?

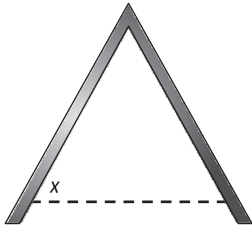
11. What is the true bearing of a boat travelling north-northwest?

PRACTISE YOUR SKILL

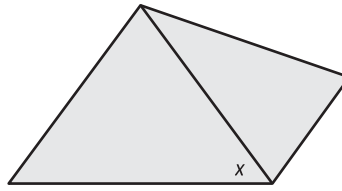
1. Identify the type of angle: acute, right, obtuse, straight, or reflex.
 - a) 56°
 - b) 91°
 - c) 270°
 - d) 170°
 - e) 43°
 - f) 192°

2. Estimate, using referents, the size of the angles indicated in the diagrams.

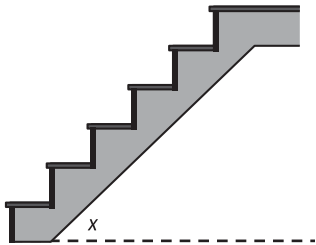
a)



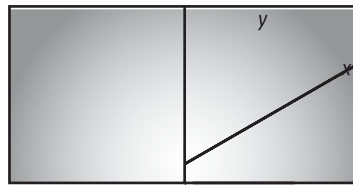
b)



c)



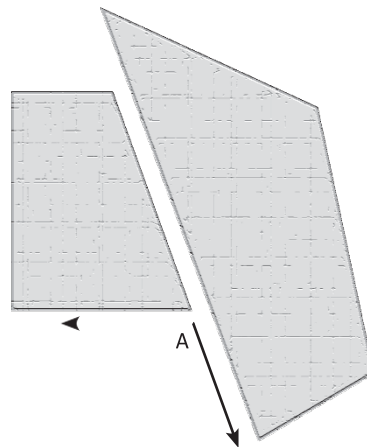
d)



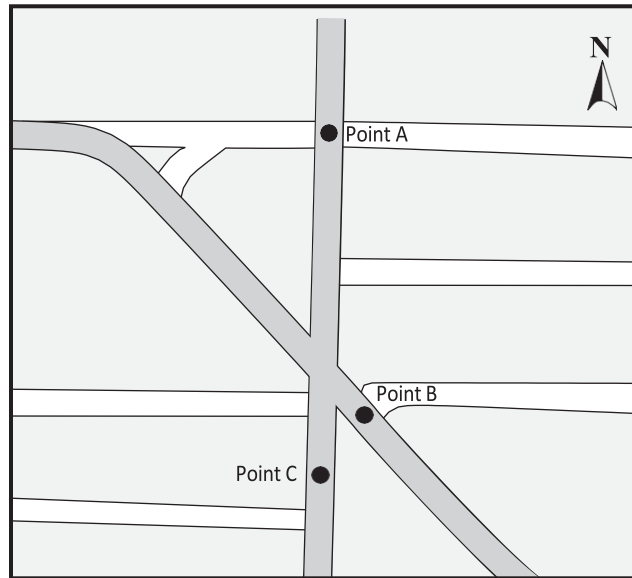
3. If Renata cuts a rectangular tile diagonally, one of the acute angles formed is 65° .

What is the size of the other acute angle?

4. Pete is laying irregularly shaped paving stones. He needs to find one to fit in position A. Approximately what size of angle will it have?



5. On the map below, what is the bearing from the following points?



a) A to B

b) B to C