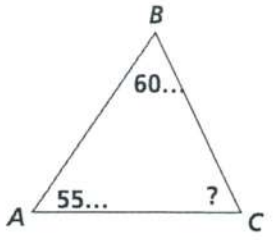
Name Date

Angle Measures in a Triangle

EXAMPLE

Theorem

$m\angle A + m\angle B + m\angle C = 180°$



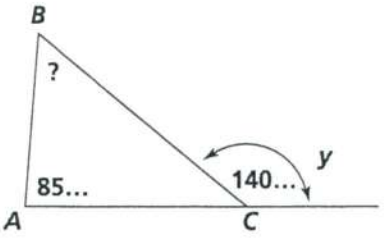
Find the measure of $\angle C$.

Let $n = m\angle C$.

$n + 60° + 55° = 180°$ Solve: $n = 65°$

Theorem

$m\angle A + m\angle B = m\angle y$



Find the measure of $\angle B$.

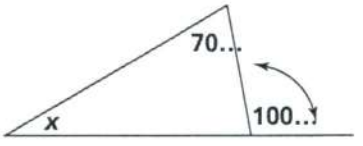
Let $k = m\angle B$.

$85° + k = 140°$ Solve: $k = 55°$

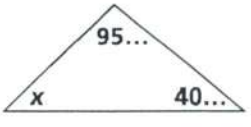
Directions Find $m\angle x$ in each triangle.

1. 40°

2. 15°



3. 30°



4. 45°

5. 105°

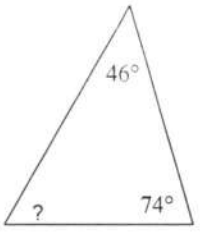
Geometry

Name_____

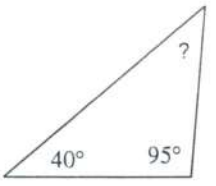
Triangle Sum

Date_____ Period____

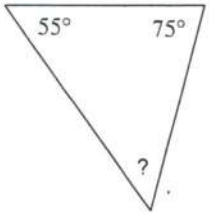
Find the measure of each angle indicated.

1) 

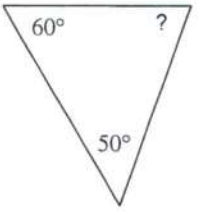
60°

2) 

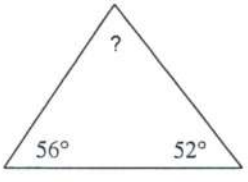
45°

3) 

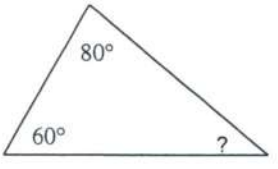
50°

4) 

70°

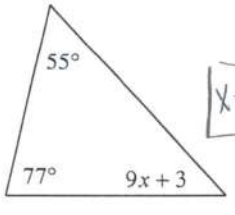
5) 

72°

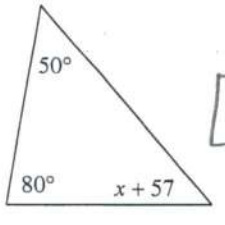
6) 

40°

Solve for *x*.

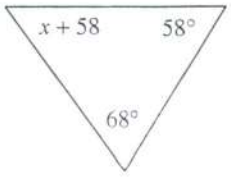
7) 

x = 5

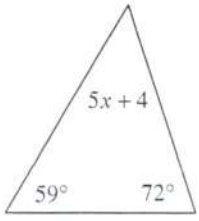
8) 

x = -7

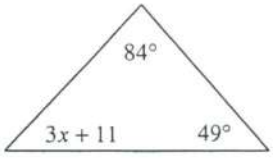
40

9) 

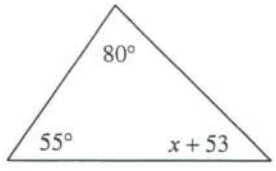
X = -4

10) 

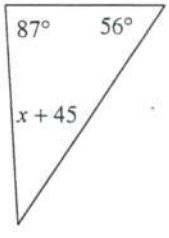
X = 9

11) 

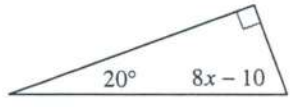
X = 12

12) 

X = -8

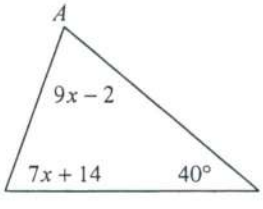
13) 

X = -8

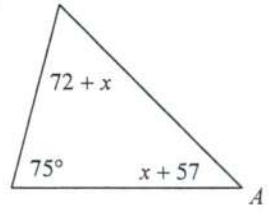
14) 

X = 10

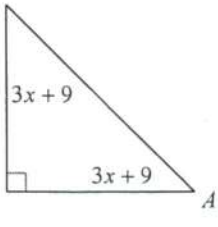
Find the measure of angle A.

15) 

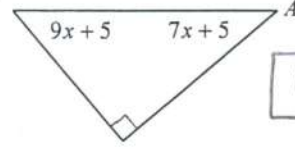
m<A = 70°

16) 

m<A = 45°

17) 

m<A = 45°

18) 

m<A = 40°

Geometry

ID: 2

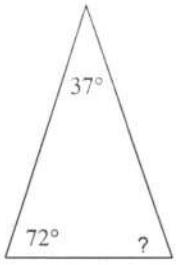
Name_____

Triangle Sum

Date_____ Period____

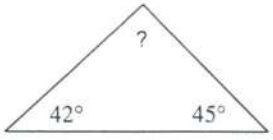
Find the measure of each angle indicated.

1)



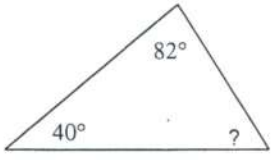
71°

2)



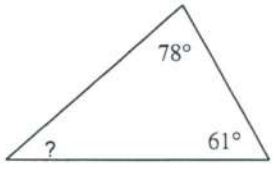
93°

3)



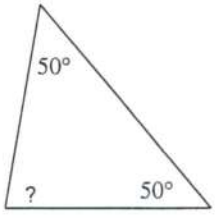
58°

4)



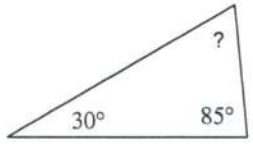
41°

5)



80°

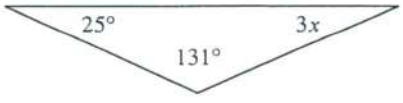
6)



65°

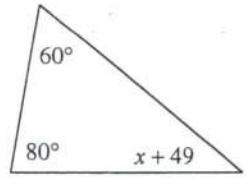
Solve for *x*.

7)



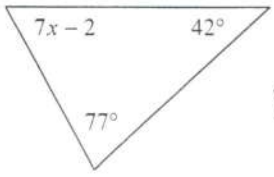
X= 8

8)

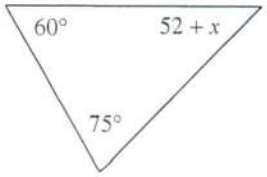


X= -9

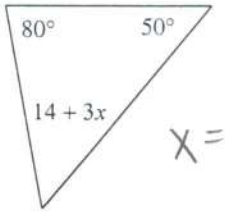
(42)

9) 

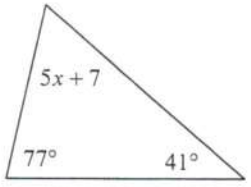
X = 9

10) 

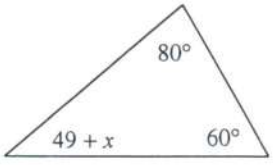
X = −7

11) 

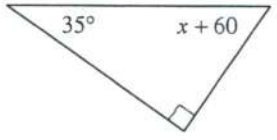
X = 12

12) 

X = 11

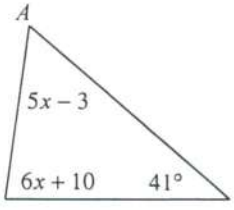
13) 

X = −9

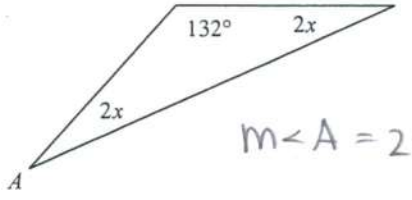
14) 

X = −5

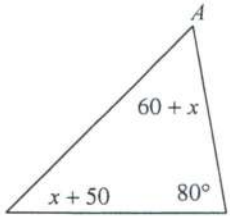
Find the measure of angle A.

15) 

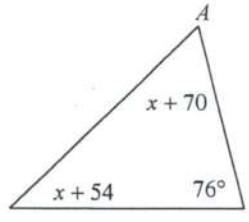
m∠A = 57°

16) 

m∠A = 24°

17) 

m∠A = 55°

18) 

m∠A = 60°

(43)

Geometry

ID: 1

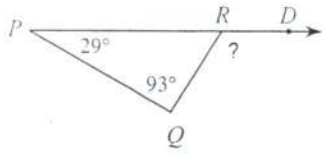
Name _____

Assignment

Date _____ Period ____

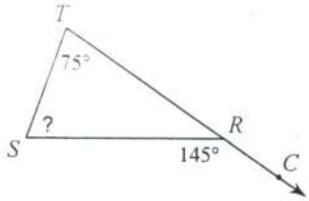
Find the measure of each angle indicated.

1)



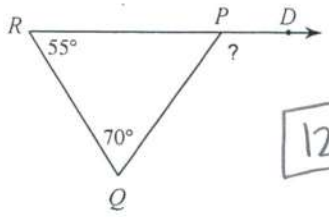
122°

2)



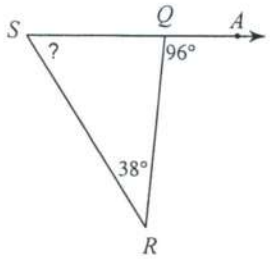
70°

3)



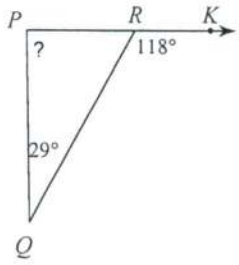
125°

4)



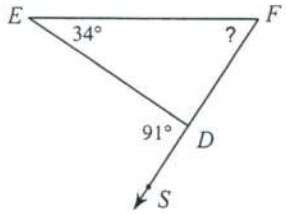
58°

5)



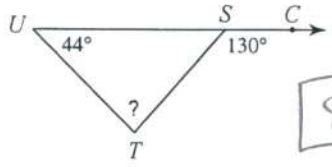
89°

6)



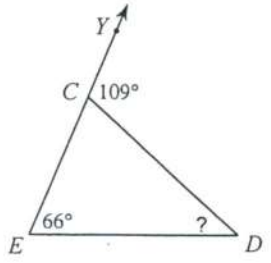
57°

7)



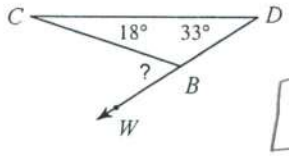
86°

8)



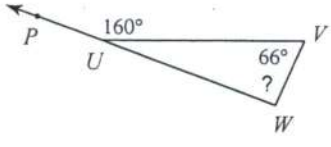
43°

9)



51°

10)



94°

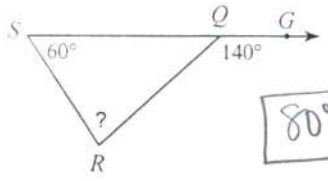
Geometry

Name_____ ID: 2

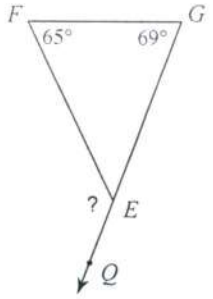
Assignment

Date_____ Period____

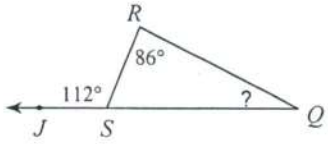
Find the measure of each angle indicated.

1) 

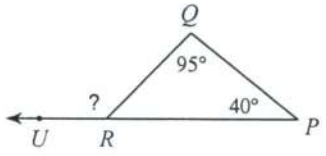
80°

2) 

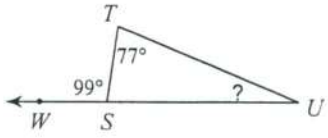
134°

3) 

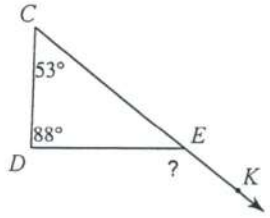
26°

4) 

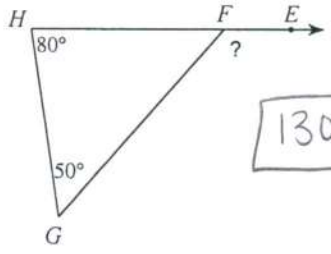
135°

5) 

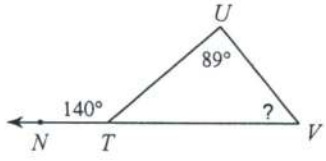
22°

6) 

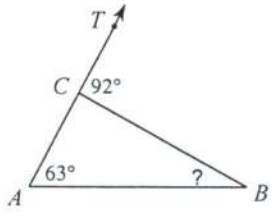
141°

7) 

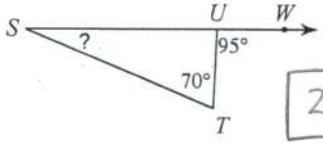
130°

8) 

51°

9) 

29°

10) 

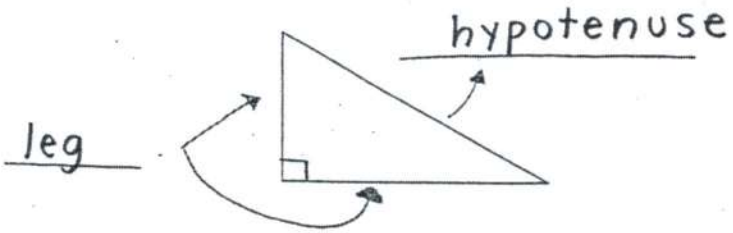
25°

The Pythagorean Theorem

Do Now: Evaluate each of the following:

1. $\sqrt{81} =$ 9
2. $12^2 =$ 144
3. $5^2 + 3^2 =$ 34 (HINT: Don't forget your order of operations!!)
4. $\sqrt{169} =$ 13
5. $3^2 + 10^2 =$ 109

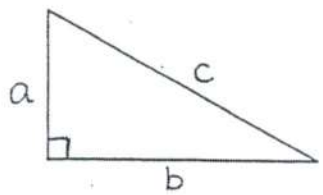
Right Triangle Terminology



The Pythagorean Theorem:

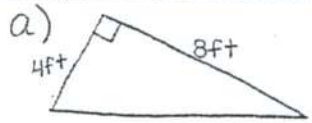
In words: If a triangle is a right triangle, then the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse.

In symbols: $a^2 + b^2 = c^2$



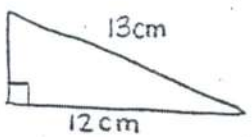
Example 1: Find the unknown length for the triangle shown:

a)



8.94 feet

b)



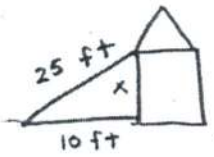
5cm

Guided Practice: The lengths of the legs of a right triangle are: a=5 and b=12. Find c.

c=13

Example 2: A ladder that is 25 feet long is placed against a house. The bottom of the ladder is 10 feet from the base of the house. How far up the house does the ladder reach? Round your answer to the nearest hundredth of a foot.

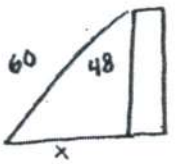
$10^2 + x^2 = 25^2$



22.91 feet

Guided Practice: A building is 48 feet tall. If a ladder is 60 feet long, how far away from the building must it be placed so that it reaches the roof?

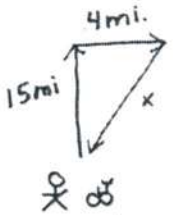
$48^2 + x^2 = 60^2$



36 feet

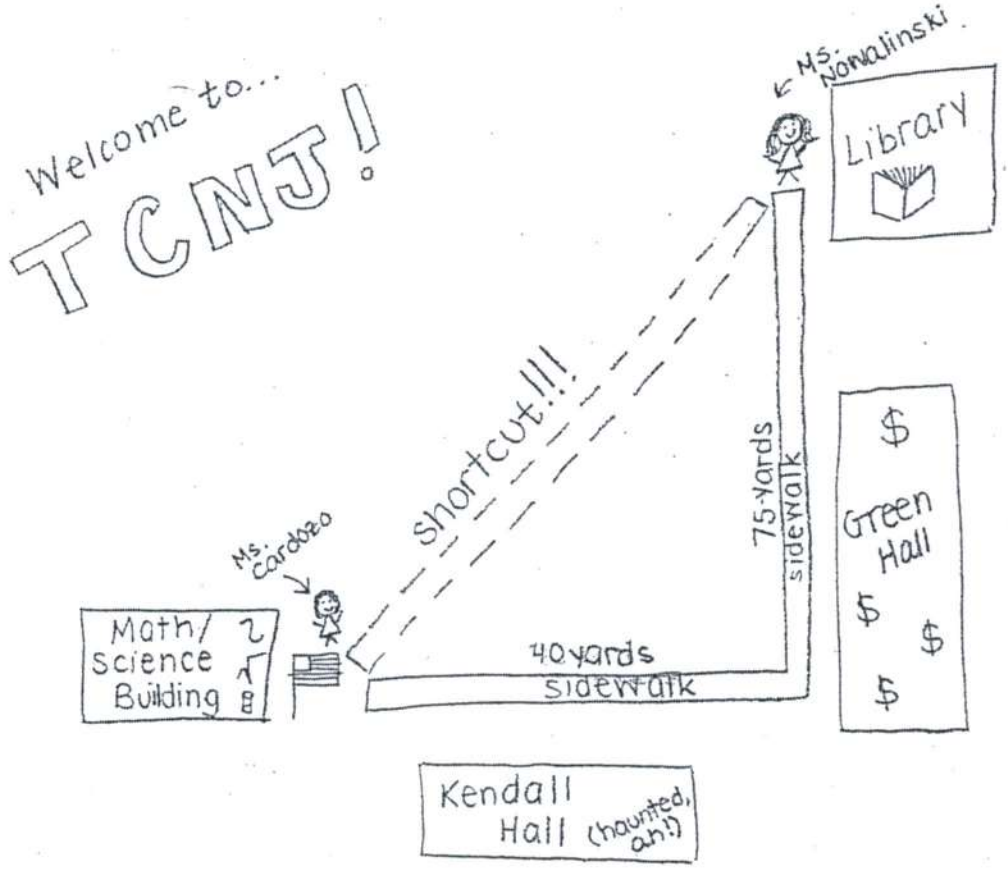
Example 3: Jimmy is riding his bike after school. He begins by traveling 15 miles north. He then turns and goes 4 miles east before his mother calls him to return home for dinner. What is his distance from home?

$15^2 + 4^2 = x^2$



15.52 mi.

Example 4: In college, Ms. Cardozo and Ms. Nowalinski often traveled from the Math/Science building to the library. When TCNJ first opened, students had to walk from the Math/Science building towards Green Hall, and then to the library. After receiving several complaints about the long walk, they finally created a shortcut across the "Quad." If Ms. Cardozo wants to meet Ms. N at the library, how much shorter would her walking distance be if she took the shortcut?



a) The original distance is 115 yards.

b) The shortcut is 85yards.

The shortcut is 30yards shorter than the original distance.

WALT: Identify right triangles.

Recall: If a triangle is a right triangle, then $a^2 + b^2 = c^2$. We can also use this information to tell whether or not a triangle is a right triangle.

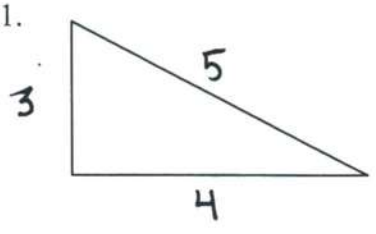
The Converse of the Pythagorean Theorem

If the three side lengths in a triangle satisfy the equation, $a^2 + b^2 = c^2$,

then the triangle is a right triangle.

For each example below, tell whether the given triangle is a right triangle.

1.



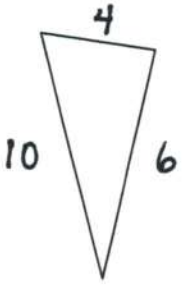
$3^2 + 4^2 \stackrel{?}{=} 5^2$

$9 + 16 = 25$

$25 = 25$ ✓

Yes

2.



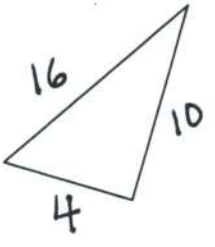
$4^2 + 6^2 \stackrel{?}{=} 10^2$

$16 + 36 \stackrel{?}{=} 100$

$52 \neq 100$

No

3.



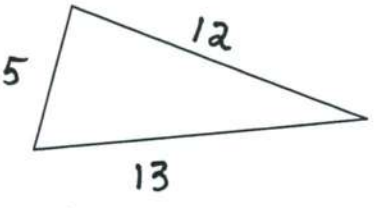
$4^2 + 10^2 \stackrel{?}{=} 16^2$

$16 + 100 \stackrel{?}{=} 256$

$116 \neq 256$

No

4.



$5^2 + 12^2 \stackrel{?}{=} 13^2$

$25 + 144 \stackrel{?}{=} 169$

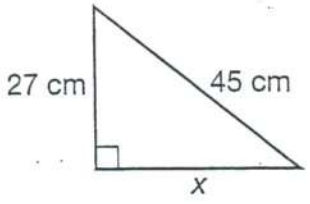
$169 = 169$ ✓

Yes

Lesson Practice

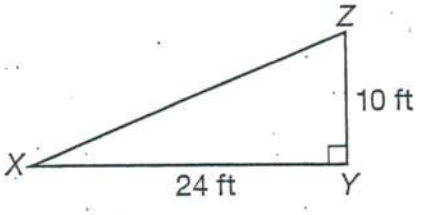
Choose the correct answer.
You may use the Reference Sheet on page 336 of this book to help you.

1. What length is represented by x?



A. 20 cm
B. 36 cm
C. 52 cm
D. 648 cm

2. What is the length of side XZ?

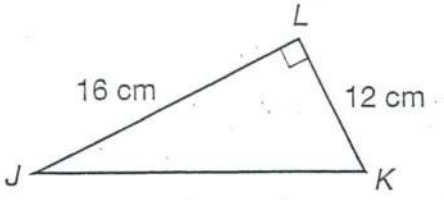


A. 338 ft
B. 26 ft
C. 21.8 ft
D. 14 ft

3. A rectangular park has a length of 40 meters and a width of 30 meters. How long will a diagonal path from one corner of the park to the other measure?

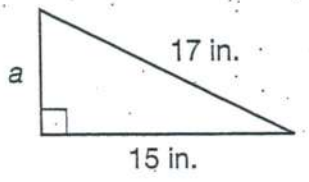
A. 10 meters
B. 26.5 meters
C. 30 meters
D. 50 meters

4. What is the length of side JK?



A. 4 cm
B. 11 cm
C. 20 cm
D. 200 cm

5. What length does a represent?



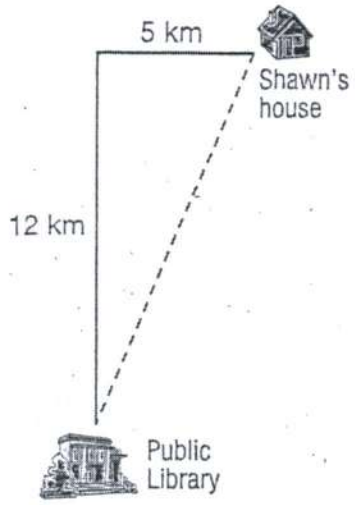
A. 8 in.
B. 7 in.
C. 5 in.
D. 2 in.

6. A right triangle has a hypotenuse that measures 10 yards and a leg that measures 6 yards. What is the length of the other leg?

A. 64 yards
B. 11.7 yards
C. 8 yards
D. 4 yards

OPEN-ENDED QUESTION

7. The solid lines below show the route that Shawn usually takes when he drives from his house to the public library. The dashed line shows a shortcut that Shawn recently discovered.



- If Shawn takes the shortcut, how many kilometers does he drive? Show your work.
- How many fewer kilometers does Shawn drive if he takes the shortcut than if he takes his regular route? Show your work.

- $12^2 + 5^2 = x^2$

$144 + 25 = x^2$

$169 = x^2$

$x = 13$

13 kilometers

- The original route is 17 km. By taking the shortcut, he is going 4 less kilometers.

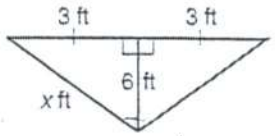
NAME _____ DATE _____

Practice

The Pythagorean Theorem

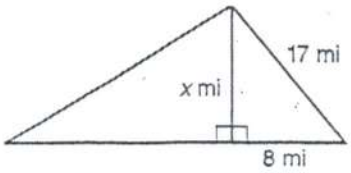
Write an equation you could use to solve for x. Then solve. Round decimal answers to the nearest tenth.

1.



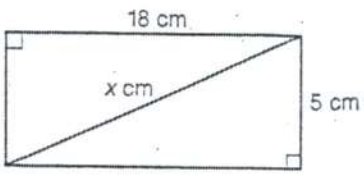
6.7 feet

2.



15 mi.

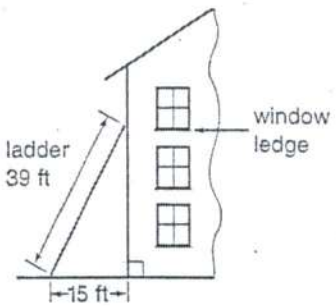
3.



18.7 cm

Solve. Round decimal answers to the nearest tenth.

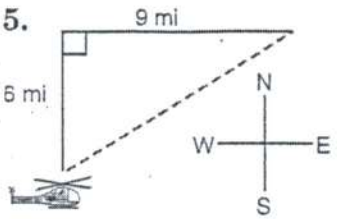
4.



How high is the top window ledge above the ground?

36 feet

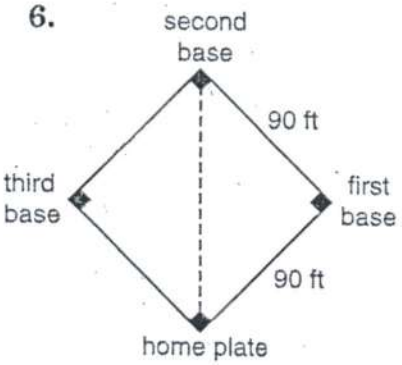
5.



How far is the helicopter from its starting point.

10.8 miles

6.



How far does a baseball travel from home plate to second base?

127.3 feet

In a right triangle, if a and b are the measures of the legs and c is the measure of the hypotenuse, find each missing measure. Round decimal answers to the nearest tenth.

7. $b = 16, c = 20$

a=12

8. $a = 6, c = 14$

b=12.6

9. $a = 9, c = 16$

b=13.2

10. $b = 15, c = 20$

a=13.2

11. $a = 8, c = 12$

b=8.9

12. $b = 5, c = 16$

a=15.2

The measurements of three sides of a right triangle are given. Determine whether each triangle is a right triangle.

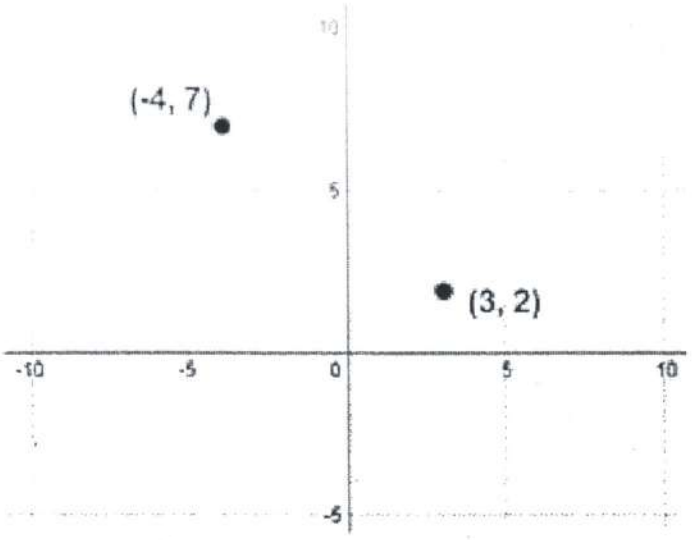
13. 8 km, 15 km, 17 km yes

14. 15 in., 20 in., 25 in. yes

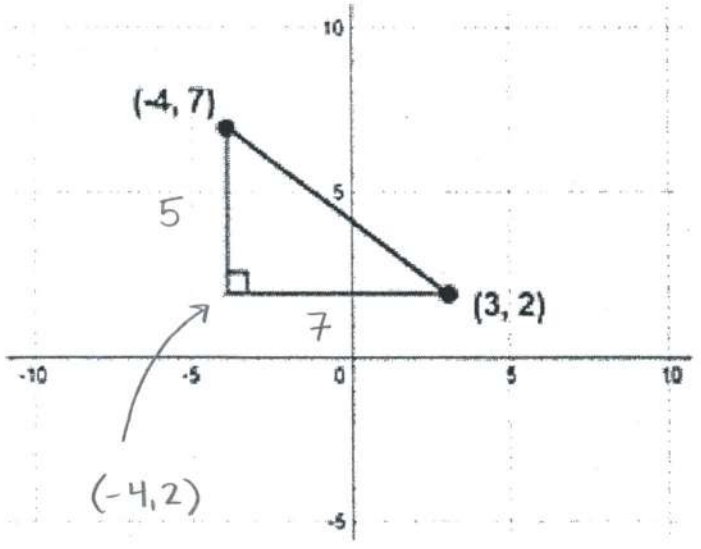
15. 8 mm, 9 mm, 15 mm no

16. 10 mi, 20 mi, 30 mi no

Sarah was mapping out the location of two historical sites in her hometown for a history project. One site was plotted at (–4, 7) and the other site was plotted at (3, 2) on the map. She needs to find the distance between the two sites. Each unit on the grid is one mile.



Sarah drew lines to form a right triangle using these two points as two of the corners.



Explain how Sarah can use the Pythagorean Theorem to find the distance between the two points so she can find the distance between the two historical sites.

She can draw in a right triangle and count the lengths of the horizontal and vertical segments. Then, use the Pythagorean Theorem to find the distance

$a^2 + b^2 = c^2$
$5^2 + 7^2 = c^2$
$25 + 49 = c^2$
$74 = c^2$

$c = \sqrt{74} \approx 8.6$ units