

KEY

Chapter 9 Pythagorean Theorem Review Problems

Simplify.

1. Are there any perfect squares left under the radical?
 $\sqrt{33}$ No. $33 = 3 \cdot 11$

Simplify. Write with no perfect squares under the radical.

2. $\sqrt{300} = 10\sqrt{3}$

3. $3\sqrt{121} = 3 \cdot 11 = 33$

4. $2\sqrt{12} \cdot 3\sqrt{30} = 6\sqrt{12 \cdot 30} = 6 \cdot 6\sqrt{10} = 36\sqrt{10}$

$$\begin{array}{r} 12 \cdot 30 \mid 2 \\ 6 \cdot 30 \mid 2 \ 5 \\ 30 \mid 2 \ 3 \\ 5 \mid 5 \end{array}$$

5. Identify the form of $2\sqrt{60} \cdot 3\sqrt{18}$ with no perfect squares under the radical.

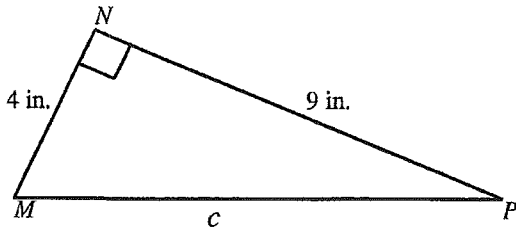
[A] $72\sqrt{30}$

[B] $3\sqrt{120}$

[C] $9\sqrt{20}$

$2 \cdot 2\sqrt{15} \cdot 3 \cdot 3\sqrt{2}$
[D] $36\sqrt{30}$

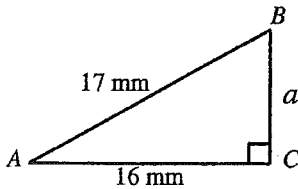
6. Find the perimeter of $\triangle MNP$. (Round to the nearest decimal place.)



$$c = \sqrt{4^2 + 9^2} = \sqrt{97} \approx 9.8$$

$$4 + 9 + 9.8 = \boxed{22.8}$$

7. Find the value of a . (Round to the nearest two decimal places.)

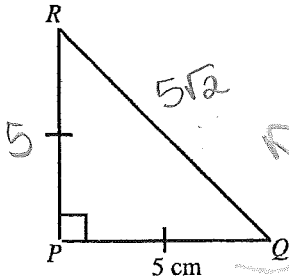


$$a^2 = 17^2 - 16^2$$

$$a^2 = (17-16)(17+16)$$

$$a = \sqrt{33} \approx \boxed{5.74}$$

8. Find the perimeter of $\triangle PQR$.



$$5 + 5 + 5\sqrt{2} = \boxed{10 + 5\sqrt{2}}$$

$\cdot \sqrt{2}$ or

$$5^2 + 5^2 = x^2$$

$$25 + 25 = x^2$$

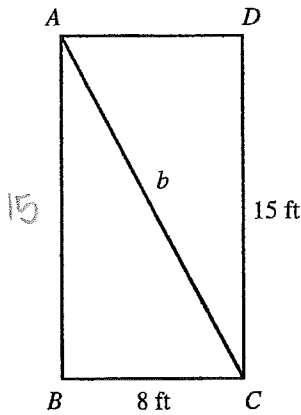
$$50 = x^2$$

$$x = \sqrt{50}$$

$$x = 5\sqrt{2}$$



9. $ABCD$ is a rectangle.
 $b = ?$



$$b^2 = 15^2 + 8^2$$

$$= 225 + 64$$

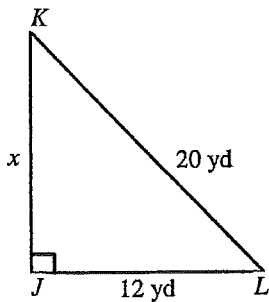
$$b^2 = 289$$

$$b = \sqrt{289}$$

$$\boxed{b = 17}$$

10. Solve for x to the nearest yard.

[A] 20 yd [B] 256 yd [C] 8 yd **[D] 16 yd**



$$x^2 = 20^2 - 12^2$$

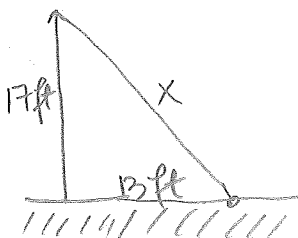
$$= 400 - 144$$

$$= 256$$

$$x = \sqrt{256}$$

$$x = 16$$

11. How long is a string reaching from the top of a pole 17 feet tall to a point at ground level 13 feet from the pole? (Round to the nearest decimal place.)



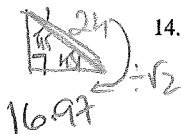
$$x^2 = 17^2 + 13^2 = 458$$

$$x = \sqrt{458} = \boxed{21.4}$$

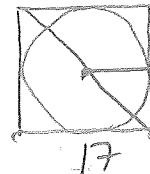
12. A business executive sets out from the city of Thornwall and travels to the city of Elidor, 70 miles north and 30 miles west. Upon reaching Elidor he finds that he has forgotten his passport, so he sends an urgent message to his family in Thornwall by homing pigeon. If the pigeon travels in a straight line back to Thornwall, estimate to the nearest mile how far it has to fly.

13. The sides of a right triangle are x , $x + 3$, and $x + 6$ units long. Find the side lengths of the triangle by solving for x .

14. Find the radius of the largest circle that can be cut from a square piece of paper with a diagonal length of 24 centimeters. (Round to the nearest decimal place.)



$$R = \frac{17}{2} = 8.5 \text{ cm}$$



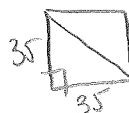
15. Mr. Jones built a fenced-in area for his horse in the shape of a square with each side 35 feet in length. Find the distance of the diagonal path from one corner to the opposite corner.

[A] 2450 ft

[B] $2450\sqrt{2}$ ft

[C] 35 ft

[D] $35\sqrt{2}$ ft



16. Find the distance between the points $(7, 6)$ and $(-7, -6)$. (Round to the nearest decimal place.)

$$x^2 = 14^2 + 12^2 = 196 + 144 = 340$$

$$x = 18.4$$

17. Is a triangle with sides of length 40 centimeters, 75 centimeters, and 86 centimeters a right triangle?

$$86^2 = 7396, \quad 40^2 + 75^2 = 7225$$

Not a right triangle.

18. Which of the triples below could be sides of a right triangle?

(8 mm, 14 mm, 17 mm)

$$17^2 \neq 8^2 + 14^2$$

$$289 \neq 260$$

(40 yd, 42 yd, 58 yd)

$$58^2 = 40^2 + 42^2$$

$$3364 = 3364$$

(12 km, 35 km, 38 km)

$$38^2 \neq 12^2 + 35^2$$

$$1444 \neq 1369$$

(20 ft, 48 ft, 53 ft)

$$53^2 \neq 20^2 + 48^2$$

$$2809 \neq 2704$$

19. Which set of side lengths does not form a right triangle?

[A] $\frac{3}{2}$ m, 2 m, $\frac{5}{2}$ m

[B] 3 cm, 4 cm, 5 cm

[C] 4 in., 4 in., 5 in.

[D] 6 ft, 8 ft, 10 ft

20. Find the center and radius of the circle.

$$(x+8)^2 + (y-2)^2 = 25$$

$$(-8, 2), \quad R=5$$

21. Quadrilateral $ABCD$ has vertices $A(-7, -3)$, $B(1, -3)$, $C(-1, -2)$, and $D(-5, -2)$. Find the length of each side of the quadrilateral.

22. The sides of a triangle are x , $x + 21$, and $x + 24$ units long. What would the value of x have to be for the triangle to be a right triangle?

$$AB^2 = 8^2 + 0^2$$

$$AB = 8$$

$$BC^2 = 2^2 + 1^2$$

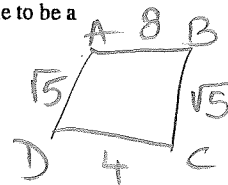
$$BC = \sqrt{5}$$

$$CD^2 = 4^2 + 0^2$$

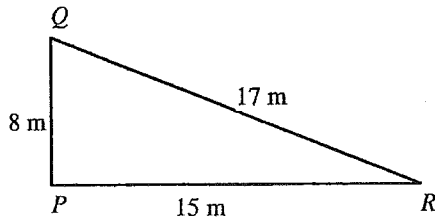
$$CD = 4$$

$$AD^2 = 2^2 + 1^2$$

$$AD = \sqrt{5}$$



23. Tell whether the triangle with the given side lengths is a right triangle. Explain why or why not.



$$17^2 = 8^2 + 15^2$$

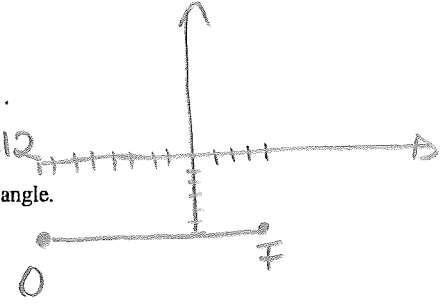
$$289 = 64 + 225$$

$$289 = 289$$

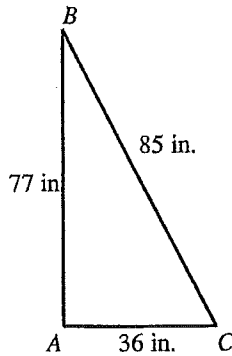
yes, it's a right triangle

24. Graph only the radius OF of circle O represented by the equation $(x+8)^2 + (y+6)^2 = 144$.

$F(4, -6)$ $O(-8, -6)$ $R=12$



25. Use the Converse of the Pythagorean Theorem to determine whether the triangle is a right triangle.



$$85^2 = 77^2 + 36^2$$

$$7225 = 5929 + 1296$$

$$7225 = 7225$$

yes.

26. Write an equation of a circle with center $C(-5, 2)$ and a radius of 5 meters.

$$(x+5)^2 + (y-2)^2 = 25$$

27. Find the equation of the circle.

Center = $(9, 4)$, $r = \sqrt{8}$

$$r^2 = 8 \quad (x-9)^2 + (y-4)^2 = 8$$

28. Find the coordinates of the center and the length of the diameter for the circle with the equation $(x+2)^2 + (y+6)^2 = 16$.

$(-2, -6)$ $R = \sqrt{16} = 4$ $D = 8$

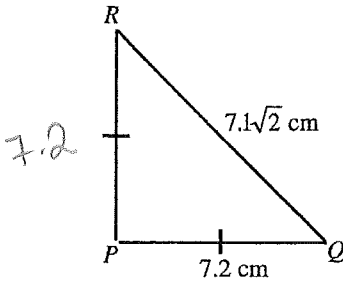
29. Classify the triangle defined by the points $A(3, -4)$, $B(5, -1)$, and $C(6, -2)$ as equilateral, isosceles, or scalene.

$$AB^2 = 2^2 + 3^2 = 4 + 9 = 13$$

$$AC^2 = 3^2 + 2^2 = 9 + 4 = 13$$

$$BC^2 = 1^2 + 1^2 = 2$$

30. Determine whether $\triangle PQR$ is a right triangle by using the Converse of the Pythagorean Theorem. If the triangle is not a right triangle, explain what value RQ could be changed to in order to make $\triangle PQR$ a right triangle.



It's not a right triangle
 RQ must be $7.2\sqrt{2}$ cm

31. Find the center and radius of the circle with the given equation:

$$(x-9)^2 + (y-5)^2 = 100$$

- [A] (9, 5); 10 [B] (5, 9); 100 [C] (5, -9); 10 [D] (-9, -5); 10

32. Write the equation of a circle passing through the origin with center (24, 45).

[A] $(x+24)^2 + (y+45)^2 = 2601$

[B] $(x-24)^2 + (y-45)^2 = 2601$

[C] $(x+24)^2 + (y+45)^2 = 51$

[D] $(x-24)^2 + (y-45)^2 = 51$

33. The lengths of two sides of a triangle are given below. What should the length of the missing side be for the triangle to be a right triangle?

13 in.; 21 in.

[A] 16.99 in.

[B] 610 in.

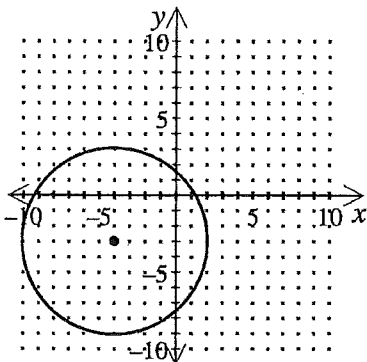
[C] 16.49 in.

[D] 272 in.

$$13^2 + 21^2 = 610$$

$$\sqrt{610} = 24.69$$

34. Which equation represents the circle graphed below?



center (-4, -3) Radius 6

$$21^2 = 13^2 + x^2$$

$$x^2 = 277$$

$$x = 16.49$$

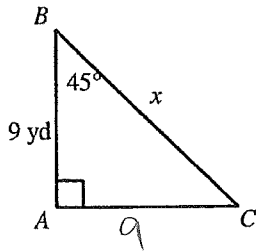
[A] $(x+4)^2 + (y+3)^2 = 36$

[B] $(x+4)^2 + (y-4)^2 = 72$

[C] $(x+4)^2 + (y-4)^2 = 36$

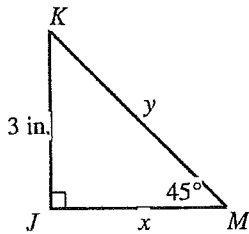
[D] $(x-3)^2 + (y-4)^2 = 72$

35. Find x .



$$x = 9\sqrt{2}$$

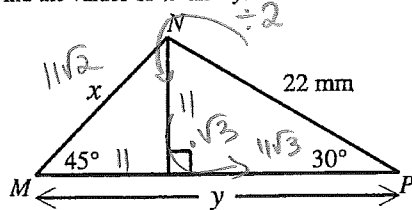
36. Find x and y .



$$x = 3$$

$$y = 3\sqrt{2}$$

37. Find the values of x and y .



$$x = 11\sqrt{2}$$

$$y = 11 + 11\sqrt{3}$$

$$JK = 4.47$$

$$KL = 16.40$$

$$LY = 12.04$$

38. Find the perimeter of $\triangle JKL$ with vertices $J(4, 4)$, $K(8, 6)$, and $L(-5, -4)$. (Round to the nearest tenth.)

$$JK^2 = 4^2 + 2^2 = 16 + 4 = 20 ; KL = 13^2 + 10^2 = 269 ; LY = 9^2 + 8^2 = 145$$

39. Determine the distance between the points $(3, -5)$ and $(0, -2)$.

$$\boxed{32.91}$$

(A) $3\sqrt{2}$

(B) $2\sqrt{2}$

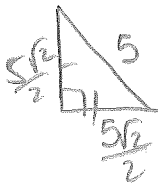
(C) $\sqrt{58}$

(D) $2\sqrt{17}$

$$x^2 = 3^2 + 3^2$$

$$x = 3\sqrt{2}$$

40. The hypotenuse of an isosceles right triangle is 5 inches. Find the perimeter.



$$\text{Perimeter} = 5\sqrt{2} + 5$$

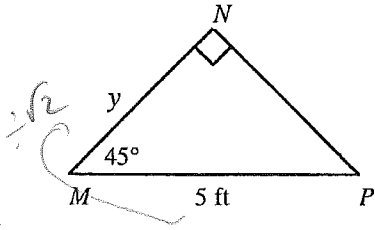
41. Find y .

[A] $10\sqrt{2}$ ft

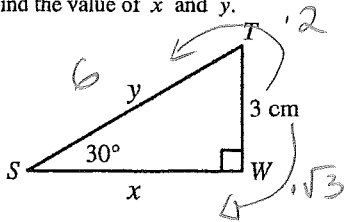
[B] $\frac{5\sqrt{3}}{2}$ ft

[C] $\frac{5\sqrt{2}}{2}$ ft

[D] $\frac{10}{3}$ ft

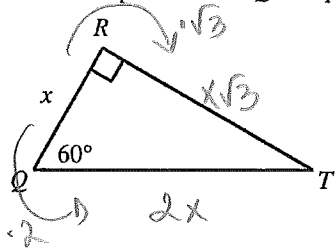


42. Find the value of x and y .



$y = 6$
 $x = 3\sqrt{3}$

43. Given that the perimeter of $\triangle QRT$ equals 33 inches, find the value of x . (Round answer to the nearest whole number.)



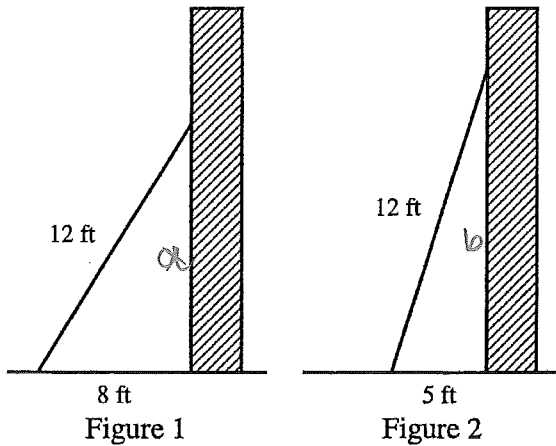
$x + 2x + x\sqrt{3} = 33$

$1.73x + 2x + x = 33$

$4.7x = 33$

$x = 7$

44. A 12-foot ladder is placed against the side of a building as shown in Figure 1 below. The bottom of the ladder is 8 feet from the base of the building. In order to increase the reach of the ladder against the building, the ladder is moved 3 feet closer to the base of the building as shown in Figure 2.



$a = \sqrt{12^2 - 8^2} = \sqrt{80} = 8.94$

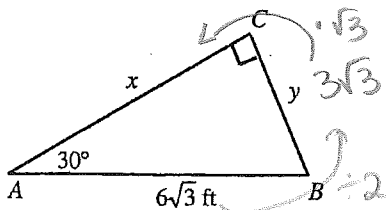
$b = \sqrt{12^2 - 5^2} = \sqrt{119} = 10.91$

$10.91 - 8.94 = 1.94$

2 ft farther up

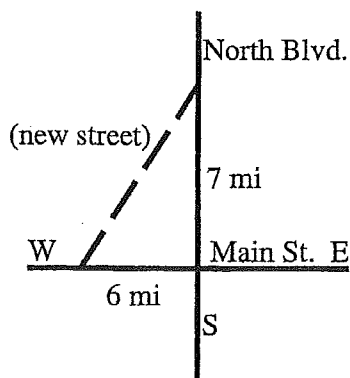
To the nearest foot, how much farther up the building does the ladder now reach? Show how you arrived at your answer.

45. Find x and y . Write all radicals in simplest form.



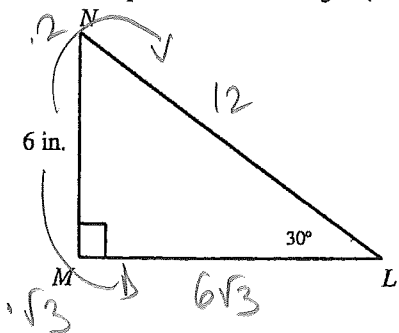
$$\begin{aligned} x &= 9 \\ y &= 3\sqrt{3} \end{aligned}$$

46. The city commission wants to construct a new street that connects Main Street and North Boulevard as shown in the diagram below. The construction cost has been estimated at \$110 per linear foot. Find the estimated cost for constructing the street. Round to the nearest dollar. (1 mi = 5280 ft)



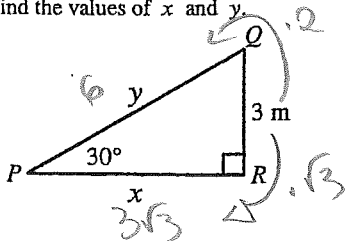
47. A rope is connected to a boat and to the boat's anchor that is resting on the ocean floor at a position not directly under the boat. The rope is 95 feet long and the water is 50 feet deep. To the nearest tenth of a foot, how far is the anchor from a point directly below the boat?

48. What is the perimeter of the triangle? (Round to the nearest decimal place.)



$$6 + 12 + 6\sqrt{3} = 18 + 6\sqrt{3} \approx \boxed{28.4}$$

49. Find the values of x and y .



$$\begin{aligned} x &= 3\sqrt{3} = 5.2 \text{ m} \\ y &= 6 \end{aligned}$$

- [A] $x = 5.2 \text{ m}, y = 3 \text{ m}$ [B] $x = 10.4 \text{ m}, y = 10.4 \text{ m}$ [C] $x = 5.2 \text{ m}, y = 6 \text{ m}$ [D] $x = 6 \text{ m}, y = 5.2 \text{ m}$