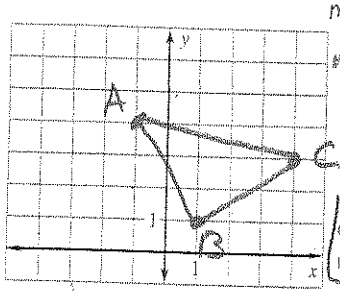
Adv. Geometry - 7.2 Converse of Pyth. key

Decide whether the numbers can represent the side lengths of a triangle. If they can, classify the triangle as *acute*, *right*, or *obtuse*.

1. 26, 35, 62 — Not a △
2. 14, 18, 29 — obtuse
3. 30, 72, 78 — right
4. 17, 19, 27 — acute
5. 27, 36, 45 — right
6. 25, 36, 49 — obtuse

Graph points *A*, *B*, and *C*. Connect the points to form △*ABC*. Decide whether △*ABC* is *acute*, *right*, or *obtuse*.

7. $A(-1, 4), B(1, 1), C(4, 3)$



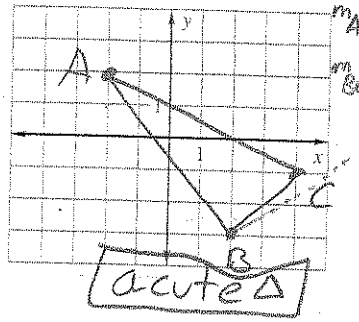
$m_{AB} = \frac{4-1}{-1-1} = \frac{3}{-2}$

$m_{BC} = \frac{1-3}{1-4} = \frac{-2}{-3} = \frac{2}{3}$

$AB \perp BC$

△ABC is a right △

8. $A(-2, 2), B(2, -3), C(4, -1)$

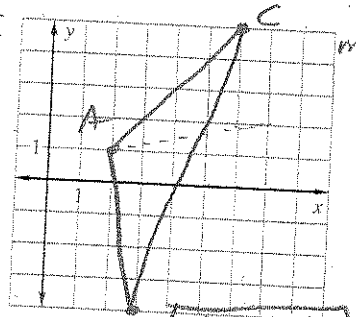


$m_{AB} = \frac{5}{-4}$

$m_{BC} = 1$

acute △

9. $A(2, 1), B(3, -4), C(6, 5)$



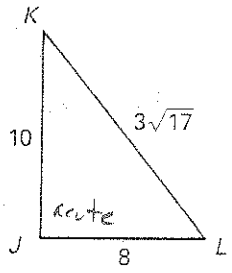
$m_{AB} = \frac{5}{-1}$

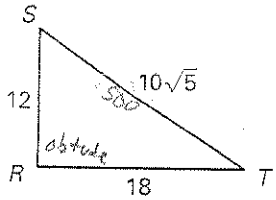
B obtused △

In Exercises 13 and 14, copy and complete the statement with <, >, or =, if possible. If it is not possible, *explain* why.

13. $m\angle J$ ___ $m\angle R$ — $<$

14. $m\angle K + m\angle L$ ___ $m\angle S + m\angle T$ — $>$





15. **Multiple Choice** What type of triangle has side lengths of 14, 11, and 25? Not a △ $14+11 \not> 25$

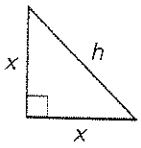
A. Acute **B.** Right **C.** Obtuse **D.** None

16. **Right Isosceles Triangle** A right isosceles triangle has two legs of the same length x and a hypotenuse of length h. What is the value of h in terms of x?

$x^2 + x^2 = h^2$

$\sqrt{2x^2} = \sqrt{h^2}$

$h = x\sqrt{2}$



The sides and classification of a triangle are given below. The length of the longest side is the integer given. What value(s) of *x* make the triangle?

18. $x, x, 10$; obtuse

(18) $x^2 + x^2 < 10^2$

$2x^2 < 10^2$

$\sqrt{x^2} < \sqrt{50}$

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

x must be greater than 5 to even form a △

20. $x, x-5, 24$; right

(20) $x^2 + (x-5)^2 = 24^2$

$x^2 + (x^2 - 10x + 25) = 576$

$2x^2 - 10x - 551 = 0$

$x = \frac{10 \pm \sqrt{100 - 4(2)(-551)}}{4}$

$x = \frac{10 \pm 67.14}{4}$

$x \approx 19.29$

22. $x-4, x+7, 45$; acute

(22) $(x-4)^2 + (x+7)^2 > 45^2$

$(x^2 - 8x + 16) + (x^2 + 14x + 49) > 2025$

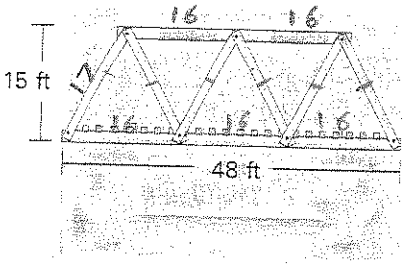
$2x^2 + 6x - 1960 > 0$

$x = \frac{-6 \pm \sqrt{36 - 4(2)(-1960)}}{4} = \frac{-6 \pm 125.363}{4}$

$x > 29.8$

In Exercises 23 and 24, use the diagram and the following information.

Railroad Bridge Many railroad bridges are designed using triangular structures like the one in the diagram. All five triangles in the design are congruent. The length of the bridge is 48 feet and the height is 15 feet.

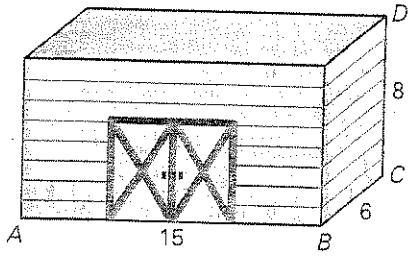


$\frac{48}{3} = 16$

23. Are the triangles in the structure *acute*, *right* or *obtuse* triangles? Acute

24. How many feet of material are needed to build one side of the bridge as shown in the diagram? 182 ft

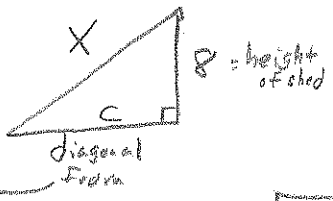
25. **Storage Shed** The figure represents a rectangular storage shed and its dimensions are given in feet. Can you fit an 18 foot 6 inch pipe in the shed?



Floor

$c^2 = 15^2 + 6^2$

$c^2 = 261$



$c^2 + 8^2 = x^2$

$261 + 64 = x^2$

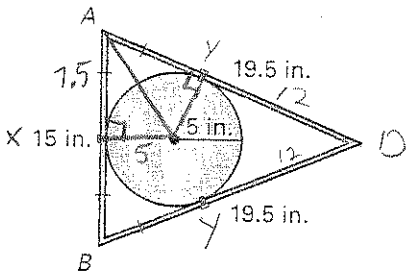
$325 = x^2$

$18.027 = x$

technically yes

realistically NO

7. **Wood Planter** You are building a triangular wood planter around a circular pot so that each wall of the planter touches the pot. A top view of the planter is shown in the diagram. You drill one screw into each wall of the planter to secure it to the pot. The screws are all located the same distance from corners *A* and *B* of the planter, as shown. Use the Converse of the Pythagorean Theorem to explain why these screw locations contact the pot exactly where it touches the walls of the planter.



The pot is a circle that touches each side of the triangle planter, that makes the center of the circle the incenter of the △.