Pythagorean Theorem Study Guide

1 The lengths of the sides of a right triangle can be

$8^2+10^2 \stackrel{?}{=} 13^2$
$64+100=169$
$164 \neq 169$

(1) 9, 12, 15

$a^2+b^2=c^2$
$9^2+12^2=15^2$
$81+144=225$
$225=225 \checkmark$

2) 8, 10, 13
3) 5, 5, 10
4) 4, 5, 6

$5^2+5^2=10^2$
$25+25=100$
$50 \neq 100$

$4^2+5^2=6^2$
$16+25=36$
$41 \neq 36$

2 Tanya runs diagonally across a rectangular field that has a length of 40 yards and a width of 30 yards, as shown in the diagram below.
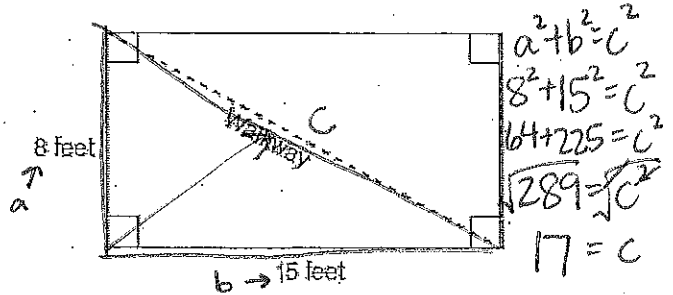
hypotenuse
x

40 yards → b

30 yards → a
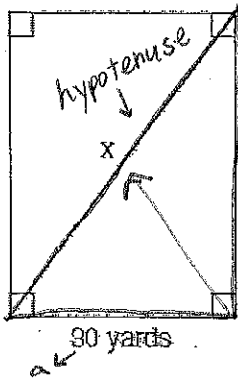
$a^2+b^2=c^2$
$30^2+40^2=c^2$
$900+1600=c^2$
$\sqrt{2500}=\sqrt{c^2}$
$50=c$

What is the length of the diagonal, in yards, that Tanya runs?

(1) 50
2) 60
3) 70
4) 80

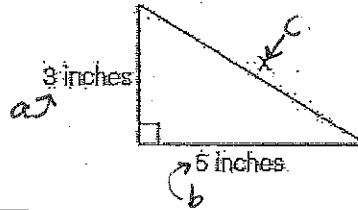3 Nancy's rectangular garden is represented in the diagram below.

walkway c

8 feet ↑ a

b → 15 feet

$a^2+b^2=c^2$
$8^2+15^2=c^2$
$64+225=c^2$
$\sqrt{289}=\sqrt{c^2}$
$17=c$

If a diagonal walkway crosses her garden, what is its length, in feet?

(1) 17
2) 22
3) $\sqrt{161}$
4) $\sqrt{529}$

4 What is the value of x, in inches, in the right triangle below?

c
3 inches a
x
5 inches b

1) $\sqrt{15}$
2) 8
(3) $\sqrt{34}$
4) 4

$a^2+b^2=c^2$
$3^2+5^2=c^2$
$9+25=c^2$
$\sqrt{34}=\sqrt{c^2}$
$\sqrt{34}=c$

5 The end of a dog's leash is attached to the top of a 5-foot-tall fence post, as shown in the diagram below. The dog is 7 feet away from the base of the fence post.

$a^2 + b^2 = c^2$

$c. \ 5^2 + 7^2 = c^2$

$25 + 49 = c^2$

$\sqrt{74} = \sqrt{c^2}$

$\sqrt{74} = c$
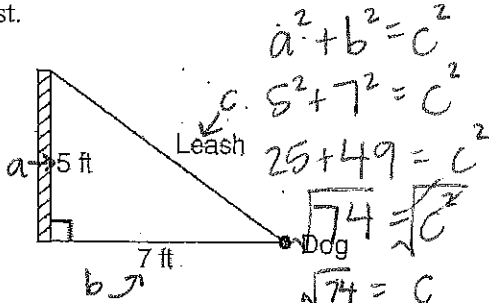
How long is the leash, to the *nearest tenth of a foot*?
1) 4.9
2) 8.6
3) 9.0
4) 12.0

$\sqrt{74} \approx 8.6$

$8 = \sqrt{64}$ $\sqrt{81} = 9$

6 The legs of an isosceles right triangle each measure 10 inches. What is the length of the hypotenuse of this triangle, to the *nearest tenth of an inch*?
1) 6.3
2) 7.1
3) 14.1
4) 17.1
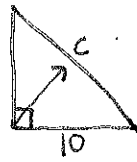
$a^2 + b^2 = c^2$

$10^2 + 10^2 = c^2$

$100 + 100 = c^2$

$\sqrt{200} = \sqrt{c^2}$

$\sqrt{200} = c$

$\sqrt{200} \approx 14.1$

$\sqrt{196}$
14

$\sqrt{225}$
15

7 The length of one side of a square is 13 feet. What is the length, to the *nearest foot*, of a diagonal of the square?
1) 13
2) 18
3) 19
4) 26

$a^2 + b^2 = c^2$

$13^2 + 13^2 = c^2$

$169 + 169 = c^2$

$\sqrt{338} = \sqrt{c^2}$

$\sqrt{338} = c$

$\sqrt{324}$
18

$\sqrt{361}$
19

8 The length and width of a rectangle are 48 inches and 40 inches. To the *nearest inch*, what is the length of its diagonal?
1) 27
2) 62
3) 88
4) 90

$a^2 + b^2 = c^2$

$40^2 + 48^2 = c^2$

$1600 + 2304 = c^2$

$\sqrt{3904} = \sqrt{c^2}$

$\sqrt{3904} = c$

$62 \approx c$

2

9 The rectangle shown below has a diagonal of 18.4 cm and a width of 7 cm.

To the *nearest centimeter*, what is the length, x, of the rectangle?
1) 11
2) 17
3) 20
4) 25

$a^2 + b^2 = c^2$

$7^2 + b^2 = 18.4^2$

$49 + b^2 = 338.56$

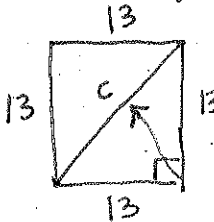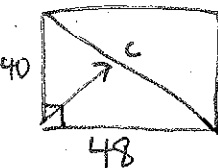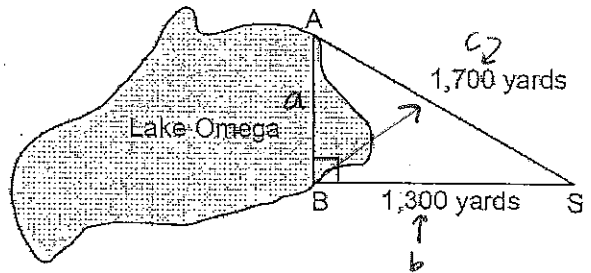$-49 \qquad -49$

$\sqrt{b^2} = \sqrt{289.56}$

$b \approx 17$

10 Campsite A and campsite B are located directly opposite each other on the shores of Lake Omega, as shown in the diagram below. The two campsites form a right triangle with Sam's position, S. The distance from campsite B to Sam's position is 1,300 yards, and campsite A is 1,700 yards from his position.

What is the distance from campsite A to campsite B, to the *nearest yard*?
1) 1,095
2) 1,096
3) 2,140
4) 2,141

$a^2 + b^2 = c^2$

$a^2 + 1300^2 = 1700^2$

$a^2 + 1690000 = 2890000$

$-1690000 \qquad -1690000$

$\sqrt{a^2} = \sqrt{1200000}$

$a = \sqrt{1200000}$

$a \approx 1095.4$

$a \approx 1095$