Date: **Key** /30 Name: _____

Pythagorean Theorem Assignment

A) Calculate the measure of x in each.
Where necessary, round you answer correct to ~~one~~ 2 decimal places
Complete on a separate piece of paper.

1.

$9^2 + 12^2 = x^2$
$81 + 144 = x^2$
$225 = x^2$
$\boxed{15 = x}$

(triangle with 12, x, 9)

2.

$10^2 + 24^2 = x^2$
$100 + 576 = x^2$
$676 = x^2$
$\boxed{26 = x}$

(triangle with x, 24, 10)

3.

$3^2 + 7^2 = x^2$
$9 + 49 = x^2$
$58 = x^2$
$\boxed{7.62 = x}$
$\boxed{X \approx 7.62}$

(triangle with 7, 3, x)

4.

$x^2 + 6^2 = 10^2$
$x^2 + 36 = 100$
$\quad -36 \quad -36$
$x^2 = 64$
$\boxed{x = 8}$

(triangle with x, 6, 10)

5.

$x^2 + 6^2 = 24^2$
$x^2 + 36 = 576$
$\quad -36 \quad -36$
$x^2 = 540$
$\boxed{x = 23.24}$
$\boxed{X \approx 23.24}$

(triangle with 24, 6, x)

6.

$1^2 + 1^2 = x^2$
$1 + 1 = x^2$
$2 = x^2$
$\boxed{1.41 = x}$
$\boxed{X \approx 1.41}$

(triangle with 1, 1, x)

7.

$x^2 + 8^2 = 21^2$
$x^2 + 64 = 441$
$\quad -64 \quad -64$
$x^2 = 377$
$\boxed{X = 19.42}$
$\boxed{X \approx 19.42}$

(triangle with 21, 8, x)

8.

$x^2 + 24^2 = 30^2$
$x^2 + 576 = 900$
$\quad -576 \quad -576$
$x^2 = 324$
$\boxed{x = 18}$

(triangle with 24, 30)

9.

$5^2 + 9^2 = x^2$
$25 + 81 = x^2$
$106 = x^2$
$\boxed{10.30 = x}$ $\boxed{X \approx 10.30}$

$3^2 + 5^2 = y^2$
$9 + 25 = y^2$
$34 = y^2$
$\boxed{5.83 = y}$

$y \approx 5.83$

(triangle with x, 5, 9, 3)

B) A ladder is leaning against the side of a 10m house. If the base of the
ladder is 3m away from the house, how tall is the ladder?
Draw a diagram and show all work.

(diagram: 10m, 3m, ?)
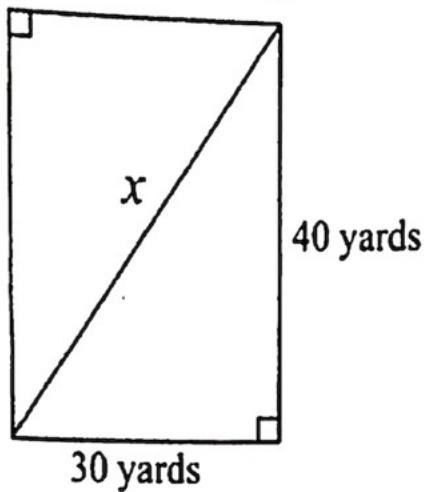
$3^2 + 10^2 = c^2$
$9 + 100 = c^2$
$109 = c^2$
$\sqrt{109} = c$
$\boxed{10.44 = c}$
$\boxed{C \approx 10.44 \, m}$

C) What is the length of the diagonal?

A rectangle with a diagonal labeled x, right side 40 yards, bottom 30 yards, right angles marked at corners.
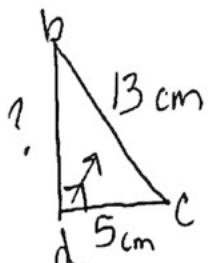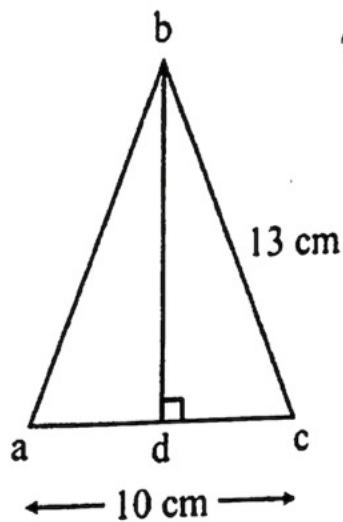
$$30^2 + 40^2 = x^2$$
$$900 + 1600 = x^2$$
$$2500 = x^2$$
$$\sqrt{2500} = x$$

$$\boxed{x = 50 \text{ yards}}$$

D) What is the length of bd?

A triangle with apex b, base from a to c, point d at bottom middle, right angle at d. Left side b to a, right side 13 cm, base 10 cm, altitude from b to d.

A smaller right triangle: b at top, 13 cm hypotenuse, d at bottom left, c at bottom right, 5 cm base, $?$ on left side.
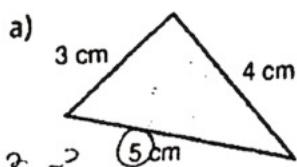
$$5^2 + b^2 = 13^2$$
$$25 + b^2 = 169$$
$$-25 \qquad\qquad -25$$
$$b^2 = 144$$
$$b = \sqrt{144}$$

$$\boxed{b = 12 \text{ cm}}$$

**E) Use the Pythagorean Theorem to find out if these are right triangles. Justify your answers.**

a) Triangle with sides 3 cm, 4 cm, 5 cm.

$$3^2 + 4^2 = 5^2$$
$$9 + 16 = 25$$
$$25 = 25$$
$$\boxed{\text{Yes}}$$

b) Triangle with sides 6.4 m, 5.6 m, 2.5 m.

$$5.6^2 + 2.5^2 = 6.4^2$$
$$31.36 + 6.24 = 40.96$$
$$37.61 \ne 40.96$$
$$\boxed{\text{NO}}$$

c) Triangle with sides 9.6 km, 12.8 km, 16.0 km.
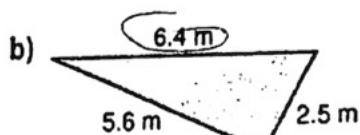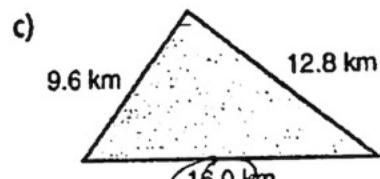
$$9.6^2 + 12.8^2 = 16^2$$
$$92.16 + 163.84 = 256$$
$$256 = 256$$
$$\boxed{\text{Yes}}$$

Solve

1. $\dfrac{-3x^2}{-3} = \dfrac{-1875}{-3}$

$x^2 = 625$

$\boxed{x = \pm 25}$

2. $-10 + x^2 = 15$
${+10}{+10}$

$x^2 = 25$

$\boxed{x = \pm 5}$

3. $525 = x^3 + 13$
${-13}{-13}$

$512 = x^3$

$\boxed{x = 8}$

4. $\dfrac{3}{5}x^2 = \dfrac{5}{12}$

$\dfrac{5}{3} \cdot \dfrac{3}{5}x^2 = \dfrac{5}{12} \cdot \dfrac{5}{3}$

$x^2 = \dfrac{25}{36}$

$\boxed{x = \pm \dfrac{5}{6}}$

5. $6 - 2x = -4$
$-6-6$

$\dfrac{-2x}{2} = \dfrac{-10}{-2}$

$\boxed{x = 5}$

Pythagorean Theorem

Find the missing side. Round to the nearest ~~tenth~~ hundredth if necessary.

6. $b = 5, c = 9$

$a^2 + 5^2 = 9^2$

$a^2 + 25 = 81$
${-25}{-25}$

$a^2 = 56$

$\boxed{a \approx 7.48}$

7. $a = 2, b = 10$

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

$4 + 100 = c^2$

$104 = c^2$

$\sqrt{104} = c$

$\boxed{10.20 \approx c}$

8. $a = 8, b = 6$

$8^2 + 6^2 = c^2$

$64 + 36 = c^2$

$100 = c^2$

$\sqrt{100} = \sqrt{c^2}$

$\boxed{10 = c}$

Right triangle or Not
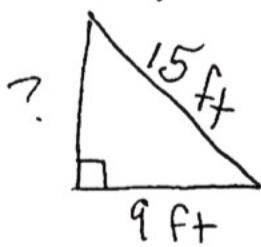
9. $10, 24, \boxed{26}$

$10^2 + 24^2 = 26^2$

$100 + 576 = 676$

$676 = 676$

Yes

10. $8, 6, \boxed{12}$

$8^2 + 6^2 = 12^2$

$64 + 36 = 144$

$100 \ne 144$

NO

11. $1, \boxed{3}, 2$

$1^2 + 2^2 = 3^2$

$1 + 4 = 9$

$5 \ne 9$

NO

Word problems – Round to the nearest tenth if necessary.

12. A 15 ft ladder is leaning against the side of the house. The base of the ladder is 9 ft away from the house. How far up the house does the ladder touch?
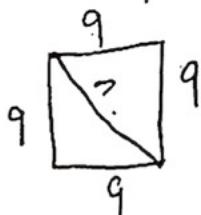
$9^2 + b^2 = 15^2$

$81 + b^2 = 225$
$-81-81$

$b^2 = 144$

$\sqrt{b^2} = \sqrt{144}$

$b = 12$

$\boxed{b = 12 \text{ feet}}$

13. The perimeter of a square is 36 cm. What is the length of the diagonal?

→ distance around
$36 \div 4 = 9$

$9^2 + 9^2 = c^2$
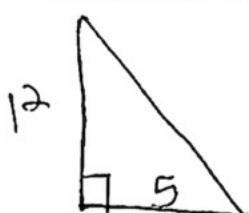
$81 + 81 = c^2$

$162 = c^2$

$\sqrt{162} = \sqrt{c^2}$

$C \approx 12.73 \, cm$

14. A 12 ft tall tree casts an 5 ft shadow on the ground. How far is it from the end of the shadow to the top of the tree?

$5^2 + 12^2 = c^2$

$25 + 144 = c^2$

$169 = c^2$

$\sqrt{169} = \sqrt{c^2}$
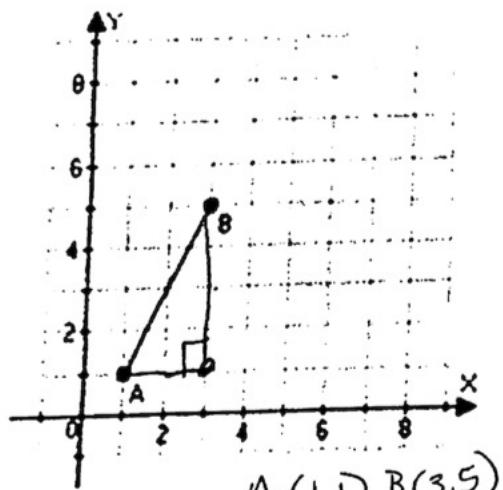
$13 = c$

$C = 13 \, ft$

Distance $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Find the distance of the line segment or set of points. Round to the nearest tenth if necessary.

15.

$A(1,1) \quad B(3,5)$

$2^2 + 4^2 = c^2$

$4 + 16 = c^2$ **or**

$20 = c^2$

$\sqrt{20} = \sqrt{c^2}$

$4.47 \approx c$
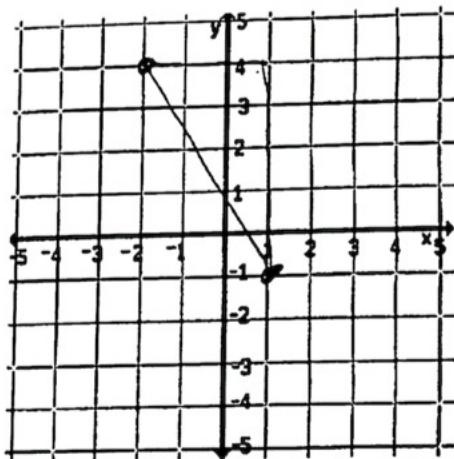
$D = \sqrt{(3-1)^2 + (5-1)^2}$

$\sqrt{(2)^2 + (4)^2}$

$\sqrt{4 + 16}$

$\sqrt{20}$

≈ 4.47

16. (-2, 4) (1, -1)

$5^2 + 3^2 = c^2$

$25 + 9 = c^2$

$34 = c^2$

$\sqrt{34} = \sqrt{c^2}$ **or**

$5.83 \approx C$

$d = \sqrt{(1-2)^2 + (-1-4)^2}$

$= \sqrt{(3)^2 + (-5)^2}$

$= \sqrt{9 + 25}$

$= \sqrt{34}$

≈ 5.83