

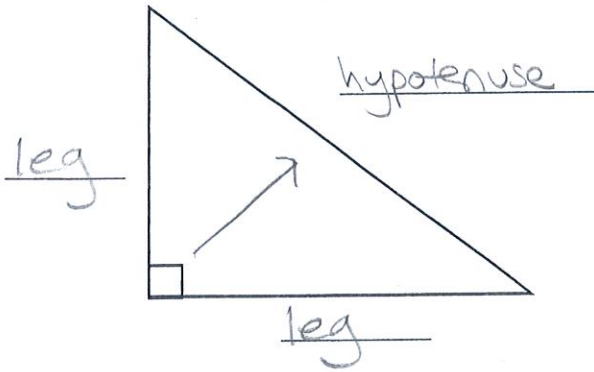
Geometry
Pythagorean Theorem

Name: Key

Date: _____

PYTHAGOREAN THEOREM

Recall: **Right Triangles**



- The side of the right triangle that is the longest and is always across from the right angle is called the **hypotenuse**.

- The two shorter sides are called the **legs** of the right triangle.

- **Pythagorean Theorem:** $a^2 + b^2 = c^2$
where "a" and "b" are legs and "c" is the hypotenus

Solve: $x^2 = 9$

$x^2 = 10$

1, 4, 9, 16, 25, 36, 49, 64, 81, 100.

Practice:

Find the missing side. Leave your answer in radical form.

1. $6^2 + 8^2 = c^2$
 $36 + 64 = c^2$
 $100 = c^2$
 $10 = c$

2. $5^2 + 7^2 = c^2$
 $25 + 49 = c^2$
 $74 = c^2$
 $c = \sqrt{74}$

3. $5^2 + b^2 = 13^2$
 $25 + b^2 = 169$
 $b^2 = 144$
 $b = 12$

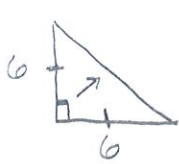
4. $4^2 + b^2 = 10^2$
 $16 + b^2 = 100$
 $b^2 = 84$
 $b = \sqrt{84}$
 $b = \sqrt{4 \cdot 21}$
 $b = 2\sqrt{21}$

5. $7^2 + b^2 = 12^2$
 $49 + b^2 = 144$
 $b^2 = 95$
 $b = \sqrt{95}$

6. $6^2 + 11^2 = c^2$
 $36 + 121 = c^2$
 $157 = c^2$
 $c = \sqrt{157}$

Application- Use the Pythagorean Theorem to solve these real world problems.

7. If the legs of an isosceles right triangle (2 sides are equal) are 6 units long, find the length of the hypotenuse.



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

$$36 + 36 = c^2$$

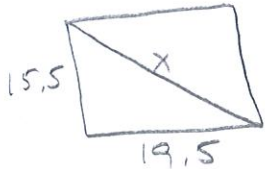
$$72 = c^2$$

$$c = \sqrt{72}$$

$$c = \sqrt{36} \sqrt{2}$$

$$c = 6\sqrt{2} \text{ units}$$

8. A television screen measures approximately 15.5 in. high and 19.5 in. wide. A television is advertised by giving the approximate length of the diagonal of its screen. How should this television be advertised?



$$15.5^2 + 19.5^2 = x^2$$

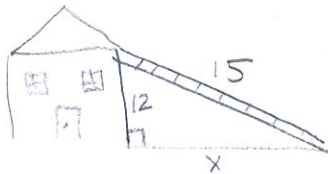
$$240.25 + 380.25 = x^2$$

$$620.5 = x^2$$

$$x = \sqrt{620.5}$$

$$x \approx 24.9 \text{ inches}$$

9. How far from the base of the house do you need to place a 15 foot ladder so that it exactly reaches the top of a 12 foot wall?



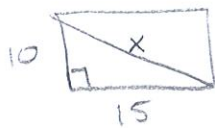
$$12^2 + x^2 = 15^2$$

$$144 + x^2 = 225$$

$$x^2 = 81$$

$$x = 9$$

10. What is the length of the diagonal of a 10 cm by 15 cm rectangle?



$$10^2 + 15^2 = x^2$$

$$100 + 225 = x^2$$

$$325 = x^2$$

$$x = \sqrt{325}$$

$$x = \sqrt{25} \sqrt{13}$$

$$x = 5\sqrt{13}$$

11. An isosceles triangle has congruent sides of 20 cm. The base is 10 cm. What is the height of the triangle? What is the area of the triangle? $A = \frac{1}{2}bh$

height

$$5^2 + h^2 = 20^2$$

$$25 + h^2 = 400$$

$$h^2 = 375$$

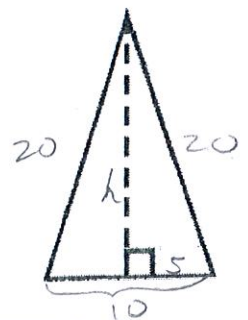
$$h = \sqrt{375}$$

$$h = \sqrt{25} \sqrt{15}$$

Area of Δ

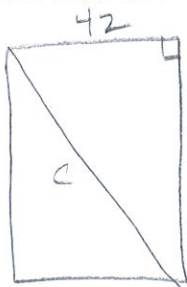
$$A = \frac{1}{2}(10)(5\sqrt{15})$$

$$A = 25\sqrt{15} \text{ cm}^2$$



$$h = 5\sqrt{15} \text{ cm}$$

12. Jill's front door is 42 inches wide and 84 inches tall. She purchased a circular table that is 96 inches in diameter. Will the table fit through the front door?



$$42^2 + 84^2 = c^2$$

$$1764 + 7056 = c^2$$

$$8820 = c^2$$

$$\sqrt{8820} = c$$

$$c \approx 93.9$$

96