Triangle Side Length Rules

(difference between other two sides) $<$ x $<$ (sum of other two sides)

$(8.5 - 8.0) < x < (8.5 + 8.0)$

$0.5 < x < 16.5$

$(8.8 - 8.0) < x < (8.8 + 8.0)$

$0.8 < x < 16.8$

Pythagorean Theorem

$a^2 + b^2 = c^2$ — hypotenuse

Two legs

$4^2 + 3^2 = c^2$

$16 + 9 = c^2$

$\sqrt{25} = \sqrt{c^2}$

$\boxed{5 = c}$

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

$4 + 100 = c^2$

$\sqrt{104} = \sqrt{c^2}$

$\boxed{c = \sqrt{104}}$

$$a^2 + (12)^2 = (13)^2$$

$$a^2 + 144 = 169$$

$$-144 \quad -144$$

$$\sqrt{a^2} = \sqrt{25}$$

$$\boxed{a = 5}$$

$$a^2 + 4^2 = 9^2$$

$$a^2 + 16 = 81$$

$$a^2 = 65$$

$$a = \sqrt{65}$$

Use Pythagorean theorem to find right triangle side lengths

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

$(3)^2 + (5)^2 = x^2$

$9 + 25 = x^2$

$34 = x^2$

$\sqrt{34} = x$

$a^2 + (2)^2 = (7)^2$

$a^2 + 4 = 49$

$a^2 = 45$

$a = \sqrt{45}$

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

$25 + 144 = c^2$

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

$\boxed{13 = c}$

$$a^2 + (4)^2 = 5^2$$

$$a^2 + 16 = 25$$

$$a^2 = 9$$

$$\boxed{a = 3}$$

$$4^2 + 5^2 = c^2$$

$$16 + 25 = c^2$$

$$41 = c^2$$

$$\boxed{\sqrt{41} = c}$$

$$a^2 + 5^2 = 12^2$$

$$a^2 + 25 = 144$$

$$a^2 = 119$$

$$a = \sqrt{119}$$

$$12^2 + 16^2 = c^2$$

$$144 + 256 = c^2$$

$$400 = c^2$$

$$\sqrt{400} = c$$

$$\boxed{c = 20}$$

Use Pythagorean theorem to find isosceles triangle side lengths

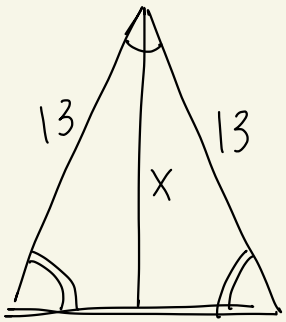
$$\left(\frac{x}{2}\right)^2 + 12^2 = 13^2$$

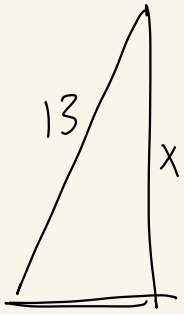
$$\frac{x^2}{4} + 144 = 169$$
$$-144 \quad -144$$

$$\frac{x^2}{4} = 25$$

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

$$\boxed{x = 10}$$





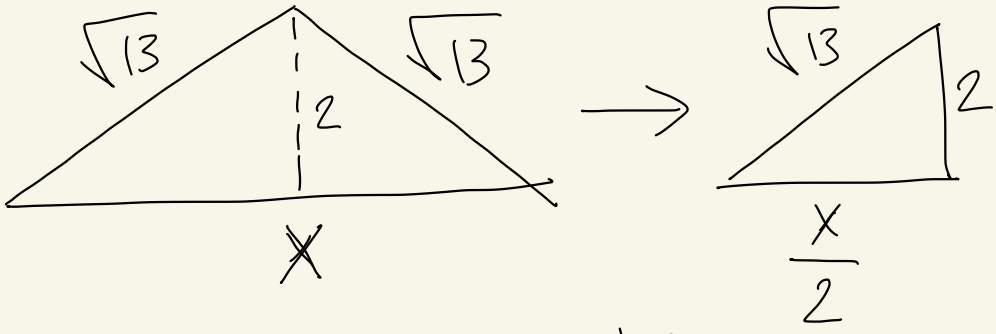
$10/2 = 5$

$5^2 + x^2 = 13^2$

$25 + x^2 = 169$

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

$x = 12$



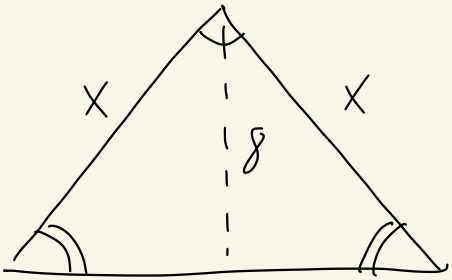
$$\left(\frac{x}{2}\right)^2 + 2^2 = \left(\sqrt{13}\right)^2$$

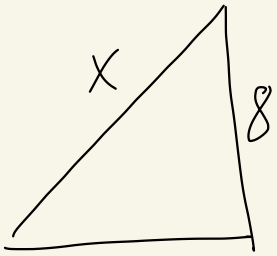
$$\frac{x^2}{4} + 4 = 13$$

$$\frac{x^2}{4} = 9 \quad \cdot 4 \quad \cdot 4$$

$$\sqrt{x^2} = \sqrt{36}$$

$$\boxed{x = 6}$$





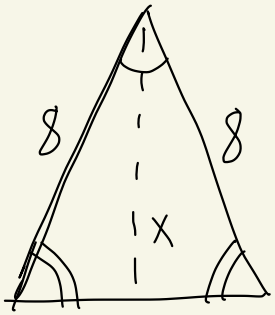
$$\frac{12}{2} = 6$$

$$6^2 + 8^2 = x^2$$

$$36 + 64 = x^2$$

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

$$\boxed{10 = x}$$



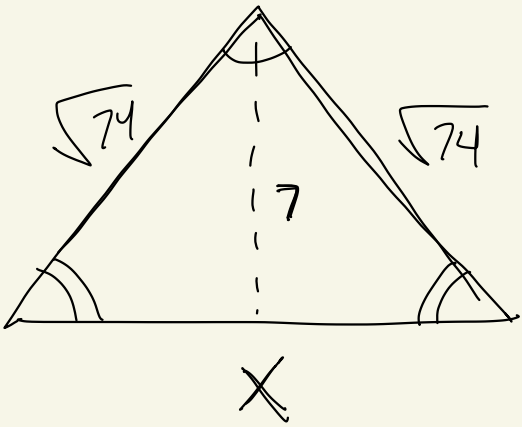
$\frac{6}{2} = 3$

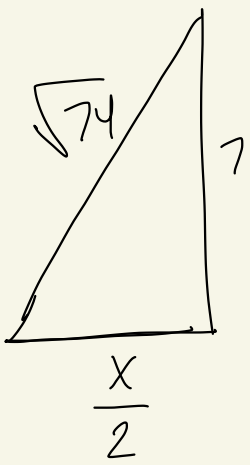
$3^2 + x^2 = 8^2$

$9 + x^2 = 64$

$x^2 = 55$

$x = \sqrt{55}$





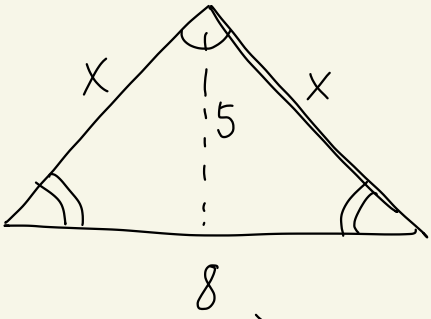
$$\left(\frac{x}{2}\right)^2 + (7)^2 = \left(\sqrt{74}\right)^2$$

$$\frac{x^2}{4} + 49 = 74$$
$$-49 \qquad -49$$

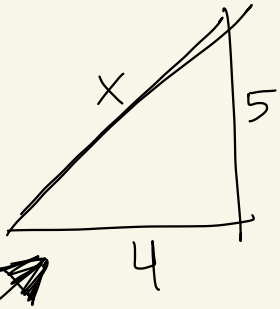
$$\frac{x^2}{4} = 25$$
$$\cdot 4 \qquad \cdot 4$$

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

$$\boxed{x = 10}$$



$8/2 = 4$

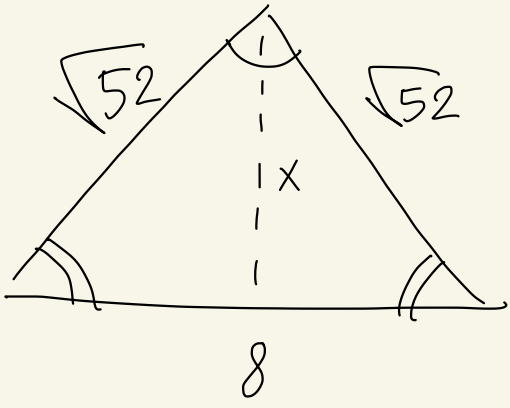


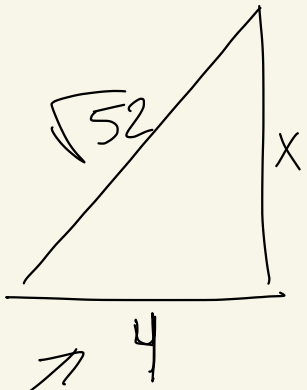
$4^2 + 5^2 = x^2$

$16 + 25 = x^2$

$41 = x^2$

$\sqrt{41} = x$





8/2

$(4)^2 + x^2 = (\sqrt{52})^2$

$16 + x^2 = 52$

$x^2 = 36$

$\boxed{x = 6}$

Right triangle side lengths

$9^2 + 12^2 = 15^2$

$81 + 144 = 225$

$225 = 225$

$2^2 + (\sqrt{38})^2 = 6^2$

$4 + 38 = 36$

$42 \neq 36$

$3^2 + 9^2 = (\sqrt{91})^2$

$9 + 81 = 91$

$90 \neq 91$

$5^2 + 12^2 = 13^2$

$25 + 144 = 169$

$169 = 169$ ✓

$4^2 + 4^2 = 8^2$

$16 + 16 = 64$

$32 \neq 64$

$2^2 + 3^2 = 4^2$

$4 + 9 = 16$

$13 \neq 16$

$5^2 + (\sqrt{30})^2 = 6^2$

$25 + 30 = 36$

$55 = 36$ ✗

$2.5^2 + (\sqrt{18})^2 = 5^2$

$6.25 + 18 = 25$

$24.25 \neq 25$ ✗

$(\sqrt{2})^2 + 2^2 = (\sqrt{6})^2$

$2 + 4 = 6$

$6 = 6$ ✓

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

$4 + 4 = 4$

$8 \neq 4$

$9^2 + 40^2 = 41^2$

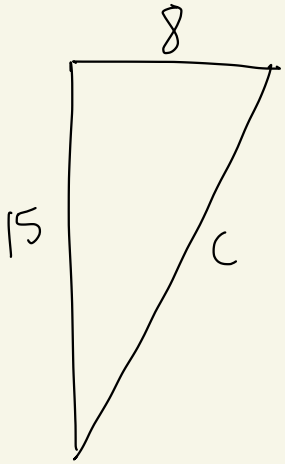
$81 + 1600 = 1681$

$1681 = 1681$ ✓

$(\sqrt{5})^2 + 10^2 = (\sqrt{125})^2$

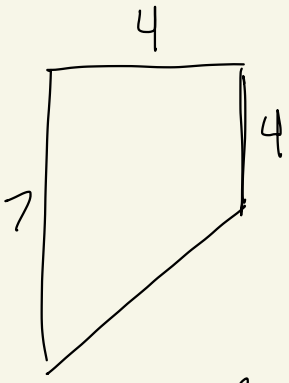
$5 + 100 = 125$

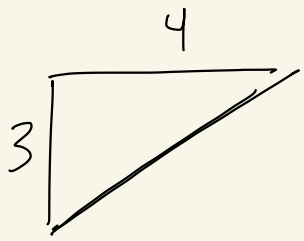
$105 \neq 125$



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

$$8 + 15 + 17 = \boxed{40}$$



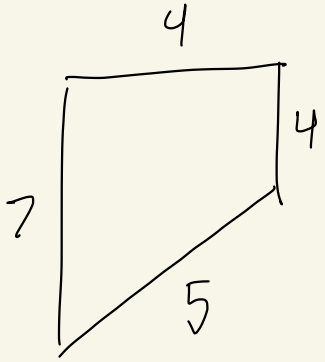


$$3^2 + 4^2 = c^2$$

$$9 + 16 = c^2$$

$$\sqrt{25} = \sqrt{c^2}$$

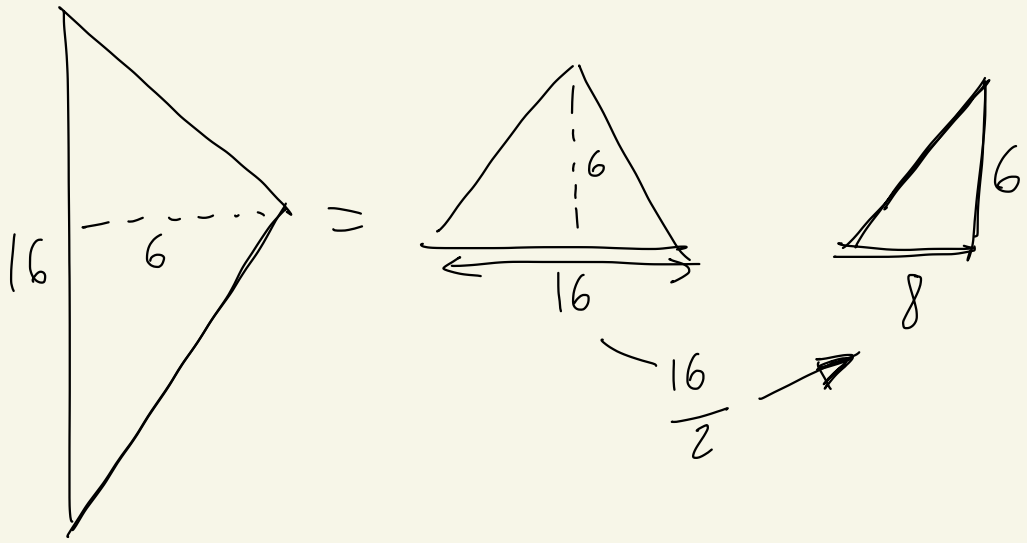
$$5 = c$$



$$7 + 5 + 4 + 4$$

$$12 + 8$$

$$\boxed{20}$$

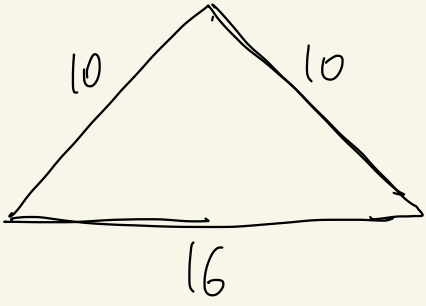


$$6^2 + 8^2 = c^2$$

$$36 + 64 = c^2$$

$$100 = c^2$$

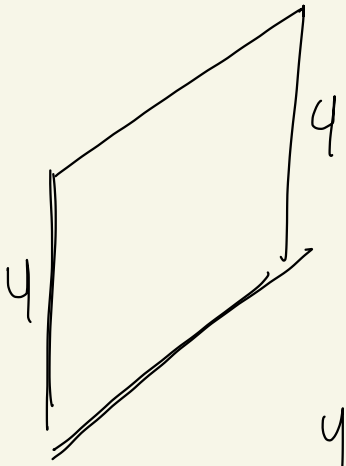
$$10 = c$$

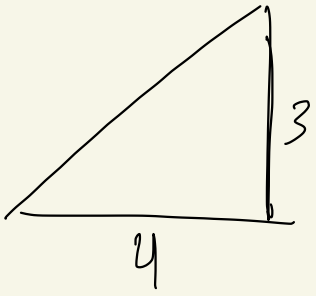


$$10 + 10 + 16$$

$$20 + 16$$

$$\boxed{36}$$



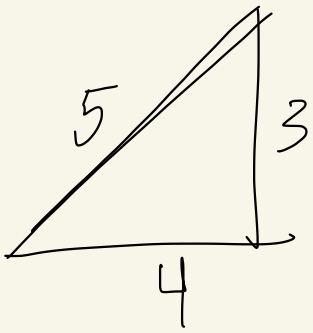


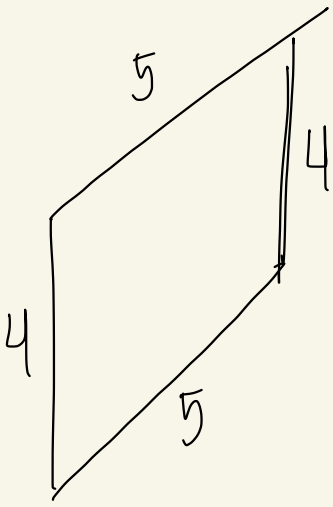
$$4^2 + 3^2 = c^2$$

$$16 + 9 = c^2$$

$$\sqrt{25} = \sqrt{c^2}$$

$$5 = c$$



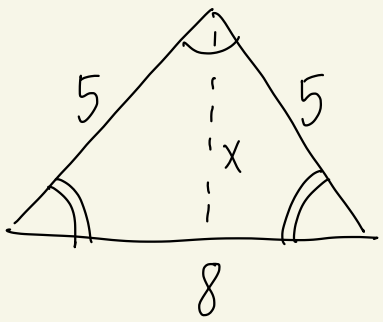


$$4 + 4 + 5 + 5$$

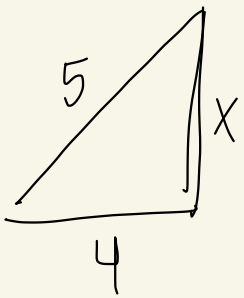
$$8 + 10$$

$$\boxed{18}$$

Use Pythagorean theorem to find area



$\frac{1}{2}bh$



$4^2 + x^2 = 5^2$

$16 + x^2 = 25$

$x^2 = 9$

$x = 3$

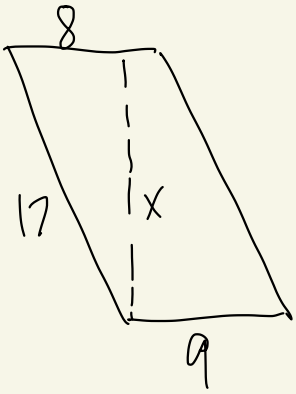
$b = 8$

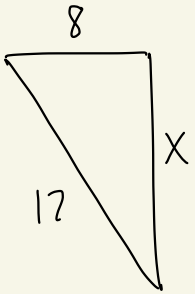
$h = 3$

$A = \frac{1}{2}bh = \frac{1}{2}(8)(3)$

$= \frac{1}{2}(24)$

$= \boxed{12}$



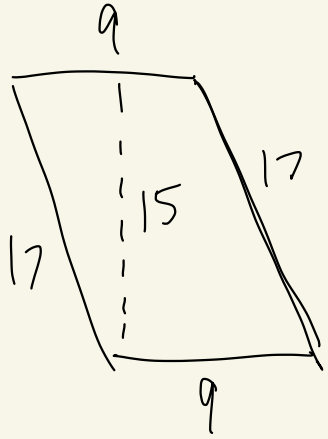


$$x^2 + 8^2 = 17^2$$

$$x^2 + 64 = 289$$

$$\sqrt{x^2} = \sqrt{225}$$

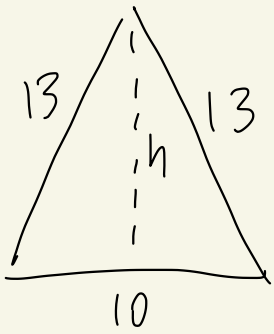
$$x = 15$$



$b = 9$

$h = 15$

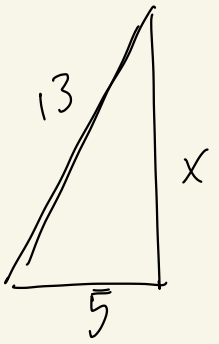
$A = bh = 9 \cdot 15 = \boxed{135}$



$A = \frac{1}{2}bh$

$b = 10$

$h = ?$



$x^2 + 5^2 = 13^2$

$x^2 + 25 = 169$

$x^2 = 144$

$x = 12$

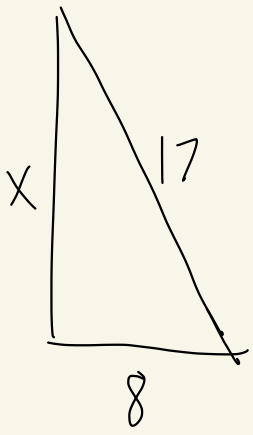
$b = 10$

$h = 12$

$A = \frac{1}{2}bh = \frac{1}{2}(10)(12)$

$= \frac{1}{2}(120)$

$= \boxed{60}$



$$x^2 + 8^2 = 17^2$$

$$x^2 + 64 = 289$$

$$x^2 = 225$$

$$x = 15$$

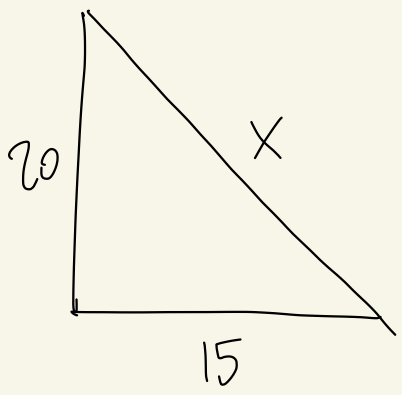
$b = 8$

$h = 15$

$$A = \frac{1}{2}(8)(15) = \frac{1}{2}(120)$$

$$= \boxed{60}$$

Pythagorean theorem word problems

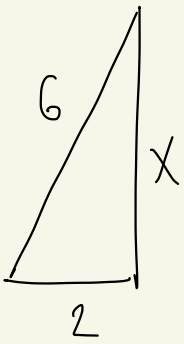


$20^2 + 15^2 = x^2$

$400 + 225 = x^2$

$\sqrt{625} = \sqrt{x^2}$

$x = 25$



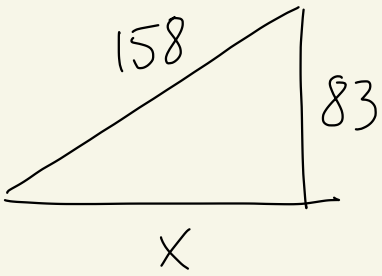
$2^2 + x^2 = 6^2$

$4 + x^2 = 36$

$\sqrt{x^2} = \sqrt{32}$

$x = 5.65$

$x = 5.7$

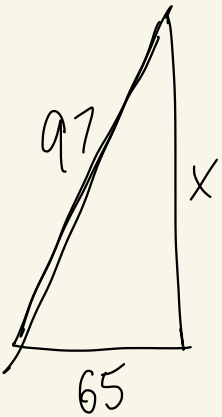


$X^2 + 83^2 = 158^2$

$X^2 + 6889 = 24964$

$\sqrt{X^2} = \sqrt{18075}$

$\boxed{X = 134.4}$



$X^2 + 65^2 = 97^2$

$X^2 + 4225 = 9409$

$-4225 \quad -4225$

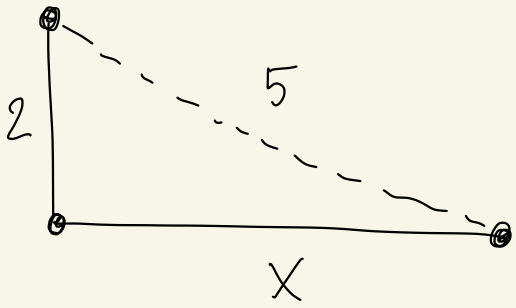
$\sqrt{X^2} = \sqrt{5184}$

$X = 72$

$97 = 97$

$65 + 72 = 137$

$137 - 97 = \boxed{40}$



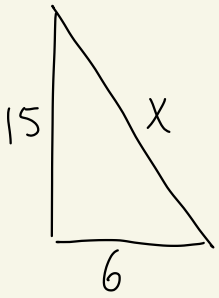
$2^2 + x^2 = 5^2$

$4 + x^2 = 25$

$x^2 = 21$

$x = 4.6$

Pythagorean theorem in 3D

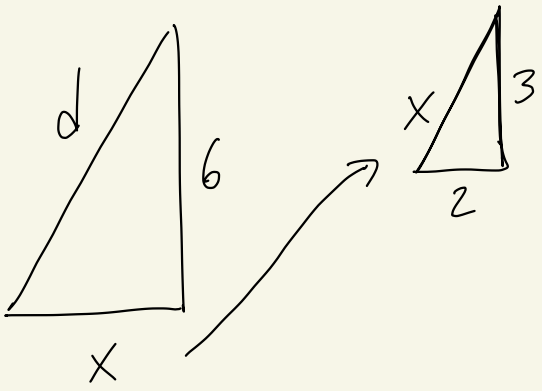


$$6^2 + 15^2 = x^2$$

$$36 + 225 = x^2$$

$$\sqrt{261} = \sqrt{x^2}$$

$$\boxed{x = 16.2}$$

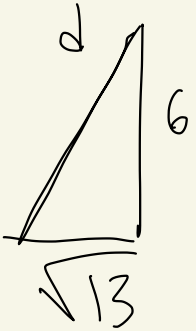


$$2^2 + 3^2 = x^2$$

$$4 + 9 = x^2$$

$$\sqrt{13} = \sqrt{x^2}$$

$$x = \sqrt{13}$$

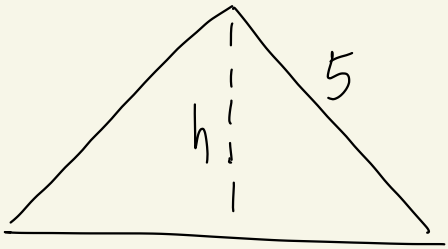


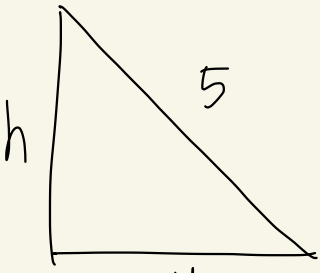
$$\left(\sqrt{13}\right)^2 + 6^2 = d^2$$

$$13 + 36 = d^2$$

$$\sqrt{49} = \sqrt{d^2}$$

$$\boxed{7 = d}$$





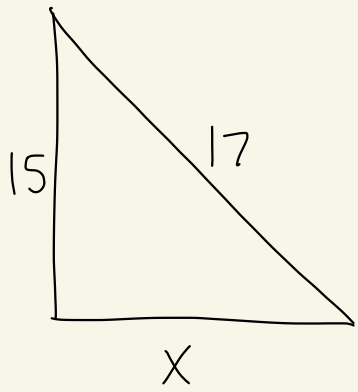
8 —— 8/2 = 4

$h^2 + 4^2 = 5^2$

$h^2 + 16 = 25$

$h^2 = 9$

$\boxed{h = 3}$



$$x^2 + 15^2 = 17^2$$

$$x^2 = 225 = 289$$

$$x^2 = 64$$

$$x = 8$$

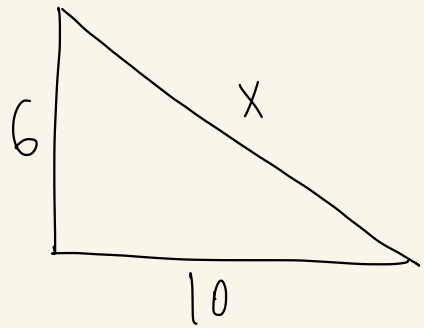
$$8 \cdot 2 = 16$$

$$\boxed{b = 16}$$

Distance between two points

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

$$d^2 = (\Delta x)^2 + (\Delta y)^2$$



$$6^2 + 10^2 = x^2$$

$$36 + 100 = x^2$$

$$\sqrt{136} = \sqrt{x^2}$$

(2, 4) (6, -5)

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

$$= \sqrt{(6-2)^2 + (-5-4)^2}$$

$$= \sqrt{(4)^2 + (-9)^2}$$

$$\sqrt{16 + 81}$$

$$\boxed{\sqrt{97}}$$

$(-6,8)$ $(-3,9)$

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

$$d = \sqrt{(-3-(-6))^2 + (9-8)^2}$$

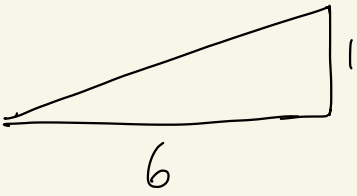
$-3+6$ $(1)^2$

$(3)^2$ $(1)^2$

$$\sqrt{(3)^2 + (1)^2}$$

$$= \sqrt{9+1}$$

$$= \boxed{\sqrt{10}}$$



$$1^2 + 6^2 = c^2$$

$$1 + 36 = c^2$$

$$\sqrt{37} = \sqrt{c^2}$$

$$\boxed{c = \sqrt{37}}$$

$(-2,7)$ $(7,9)$

$$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} = \sqrt{(7-(-2))^2+(9-7)^2}$$

$(7+2)^2 + (2)^2$

$(9)^2 + (2)^2$

$$\sqrt{(9)^2+(2)^2} = \sqrt{81+4} = \boxed{\sqrt{85}}$$

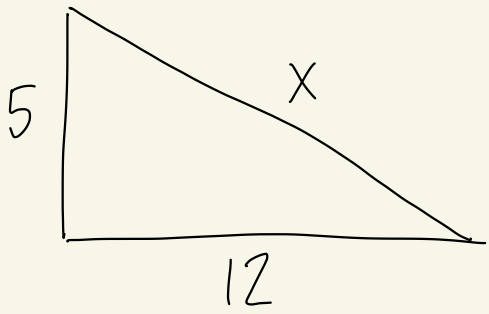
$(-9,-6)$ and $(-2,-2)$

$$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} = \sqrt{(-2-(-9))^2+(-2-(-6))^2}$$

$-2+9$ $\quad$ $-2+6$

7 $\quad$ 4

$$\sqrt{(7)^2+(4)^2} = \sqrt{49+16} = \boxed{\sqrt{65}}$$



$5^2 + 12^2 = x^2$

$25 + 144 = x^2$

$\sqrt{169} = \sqrt{x^2}$

$\boxed{13 = x}$

(4,2) and (8,5)

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(8-4)^2 + (5-2)^2}$

$= \sqrt{4^2 + 3^2}$

$= \sqrt{16 + 9}$

$= \sqrt{25}$

$= \boxed{5}$

(2,2) and (4,7)

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(4-2)^2 + (7-2)^2}$$

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

$$= \sqrt{4 + 25}$$

$$= \boxed{\sqrt{29}}$$

(-3,9) and (-6,8)

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(-6-(-3))^2 + (8-9)^2}$$

$$(-6+3)^2 \quad (-1)^2$$

$$(-3)^2 \quad 1$$

$$9 + 1$$

$$\boxed{\sqrt{10}}$$

$(1,8)$ and $(9,1)$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(9-1)^2 + (1-8)^2}$$

$$(8)^2 + (-7)^2$$

$$64 + 49$$

$$\sqrt{113}$$

(9,1) to (7,4)

$$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2} = \sqrt{(7-9)^2 + (4-1)^2}$$

$$(-2)^2 + (3)^2$$

$$4 + 9$$

$$\sqrt{13}$$

(7,4) to (1,8)

$$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2} = \sqrt{(1-7)^2 + (8-4)^2}$$

$$(-6)^2 + (4)^2$$

$$36 + 16$$

$$52$$

$$\sqrt{52}$$

$$\sqrt{13} \cdot 4$$

$$2 \cdot 2$$

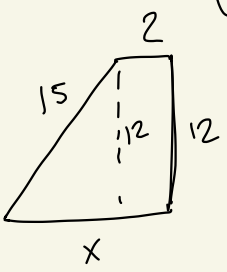
$$1 : 2$$

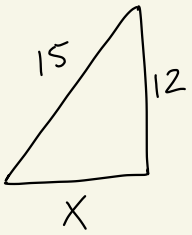
$$2\sqrt{13}$$

$$\sqrt{13} + 2\sqrt{13}$$

$$3\sqrt{13}$$

Unit Test





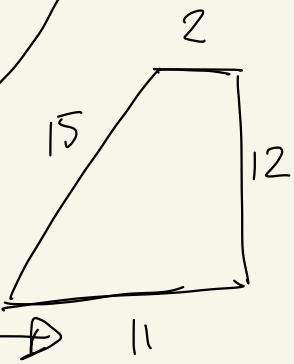
$x^2 + 12^2 = 15^2$

$x^2 + 144 = 225$

$\sqrt{x^2} = \sqrt{81}$

$x = 9$

$9 + 2 = 11$

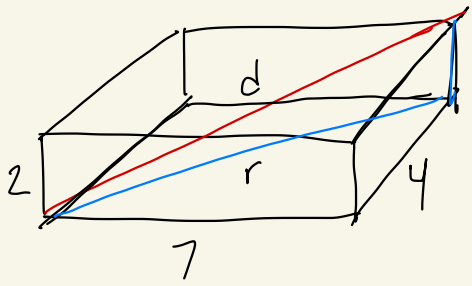


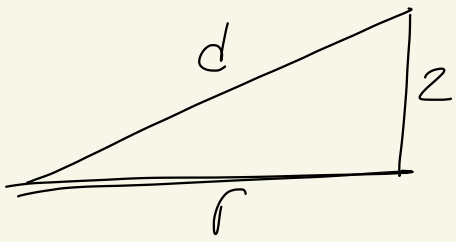
2.

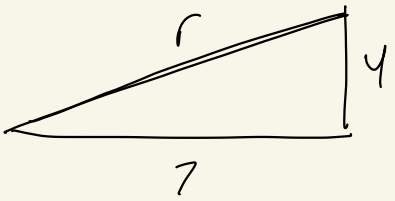
$$A = \frac{1}{2}(b_1 + b_2)h = \frac{1}{2}(2 + 11)12$$

$$= \frac{1}{2}(13)(12)$$

$$= \boxed{78}$$





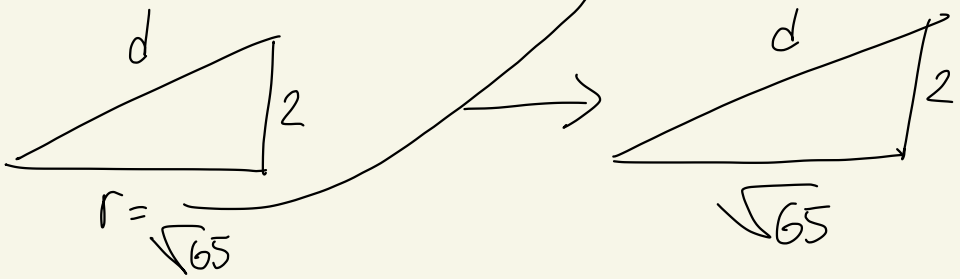


$\rightarrow 7^2 + 4^2 = r^2$

$49 + 16 = r^2$

$65 = r^2$

$\sqrt{65} = r$

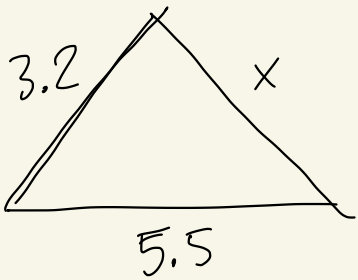


$(\sqrt{65})^2 + 2^2 = d^2$

$65 + 4 = d^2$

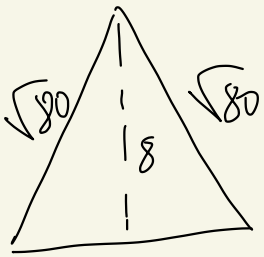
$\sqrt{69} = d$

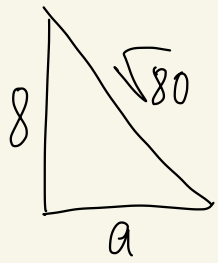
$8.306 \approx d \rightarrow \boxed{8.3}$



$(5.5-3.2) < x < (5.5+3.2)$

$\boxed{2.3 < x < 8.7}$





$a^2 + 8^2 = (\sqrt{80})^2$

$a^2 + 64 = 80$

$a^2 = 16$

$a = 4$

$2a = x$

$2(4) = x$

$\boxed{8 = x}$

$4^2 + 8^2 = 12^2$

$16 + 64 = 144$

$80 \neq 144$

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

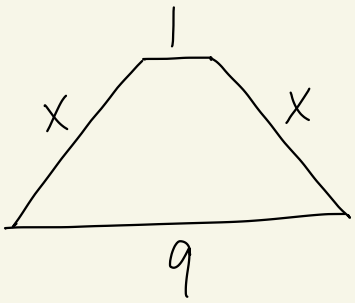
$4 + 5 = 9$

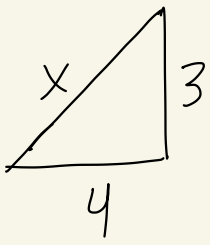
$9 = 9$ ✓

$2^2 + 2^2 = (\sqrt{8})^2$

$4 + 4 = 8$

$8 = 8$ ✓



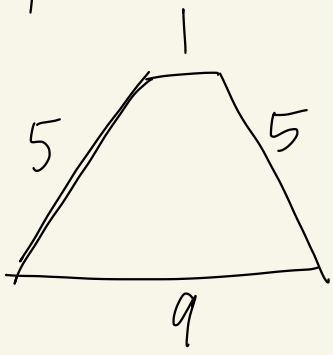


$3^2 + 4^2 = x^2$

$9 + 16 = x^2$

$\sqrt{25} = \sqrt{x^2}$

$5 = x$



$(5+5) + (1+9)$

$(10) + (10)$

20

d=