

5.2-Introduction to Solving Quadratic Equations

Solving Equations of the Form $x^2 = a$

If $x^2 = a$ and $a \geq 0$, then $x = \sqrt{a}$ or $x = -\sqrt{a}$, or simply $x = \pm\sqrt{a}$.

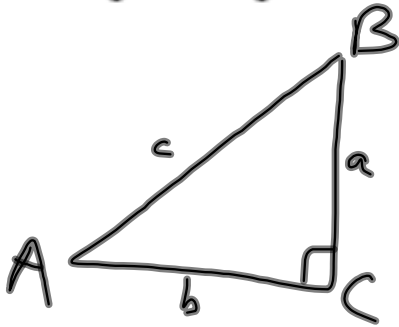
Properties of Square Roots

Product Property of Square Roots If $a \geq 0$ and $b \geq 0$: $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$

Quotient Property of Square Roots If $a \geq 0$ and $b \geq 0$: $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

Pythagorean Theorem

If $\triangle ABC$ is a right triangle with the right angle at C , then $a^2 + b^2 = c^2$.



$$\frac{4(x+2)^2}{4} = \frac{49}{4}$$

$$\sqrt{(x+2)^2} = \sqrt{\frac{49}{4}}$$

$$x+2 = \pm \frac{7}{2}$$

$$\begin{array}{r} -2 \\ \hline \end{array}$$

$$x = \pm \frac{7}{2} - 2$$

$$x = 1.5, -5.5$$

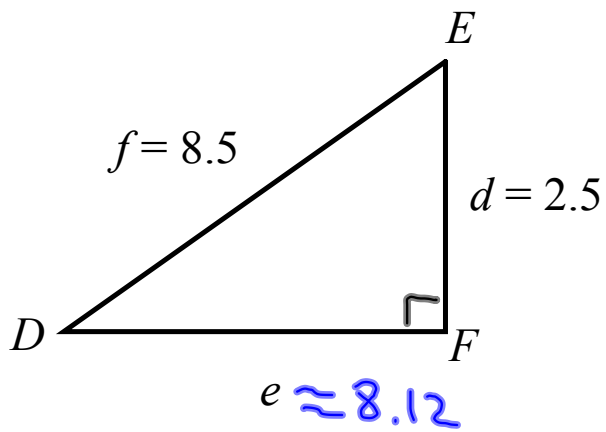
How many seconds will it take Nathan to hit the water if a helicopter drops him from a height of 34 feet?

$$\begin{array}{r} -16T^2 + 34 = 0 \\ \underline{-34 \quad -34} \end{array}$$

$$\begin{array}{r} -16T^2 = -34 \\ \underline{-16 \quad -16} \end{array}$$

$$\sqrt{T^2} = \sqrt{\frac{17}{8}}$$

$$T = \sqrt{\frac{17}{8}} \approx 1.45 \text{ sec}$$



$$\begin{aligned} e^2 + 2.5^2 &= 8.5^2 \\ e^2 + 6.25 &= 72.25 \\ - 6.25 &- 6.25 \\ \hline \sqrt{e^2} &= \sqrt{66} \\ e &= \sqrt{66} \end{aligned}$$

Homework

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$$14) \sqrt{x^2} = \sqrt{121} \quad x = \pm 11$$

$$16) \frac{3x^2}{3} = \frac{49}{3}$$

$$\sqrt{x^2} = \sqrt{\frac{49}{3}} \rightarrow x = \pm \frac{7}{\sqrt{3}}$$

$$x = \pm \frac{7\sqrt{3}}{3} \approx \pm 4.04$$

$$24) \quad 4x^2 + 5 = 20$$

$$\frac{4x^2}{4} = \frac{15}{4}$$

$$\sqrt{x^2} = \sqrt{\frac{15}{4}}$$

$$x = \pm \frac{\sqrt{15}}{2}$$

$$28) \sqrt{(T+2)^2} = \sqrt{7}$$

$$T+2 = \pm\sqrt{7}$$

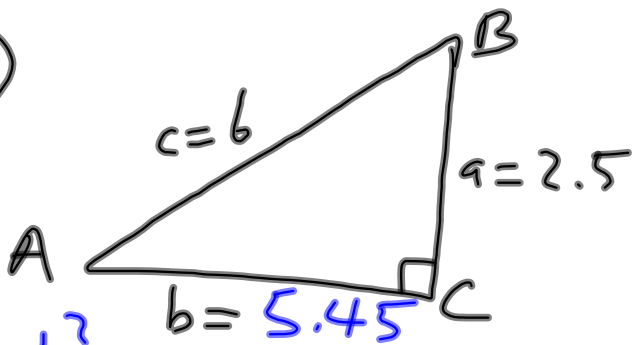
$$T = \pm\sqrt{7} - 2 \approx .65$$
$$\approx -4.65$$

$$29) \left\{ \frac{1}{3} (T^2 - 15) = 37 \right\}$$

$$\begin{array}{r} T^2 - 15 = 111 \\ + 15 \quad + 15 \\ \hline \sqrt{T^2} = \sqrt{126} \end{array}$$

$$T = \pm \sqrt{126}$$

32)



$$\begin{array}{r} a^2 + b^2 = c^2 \\ -a^2 \qquad -a^2 \\ \hline \end{array}$$

$$b^2 = c^2 - a^2$$

$$b^2 = 6^2 - 2.5^2$$

$$\sqrt{b^2} = \sqrt{29.75}$$

$$b = 5.45$$

$$42) \quad a = 9 \quad c = \sqrt{90}$$

$$(\sqrt{90})^2 - 9^2 = b^2$$

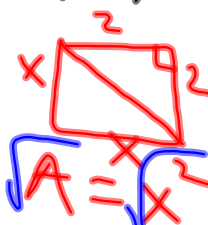
$$90 - 81 = b^2$$

$$9 = b^2$$

$$3 = b$$

$$44) \quad x^2 = 49 \rightarrow x^2 - 49 = 0$$

48)



Area	4	5	6	7	8	:	A
Side	2	$\sqrt{5}$	$\sqrt{6}$	$\sqrt{7}$	$\sqrt{8}$:	\sqrt{A}
Diagonal	$\sqrt{8}$	$\sqrt{10}$	$\sqrt{12}$	$\sqrt{14}$	4	:	$\sqrt{2A}$

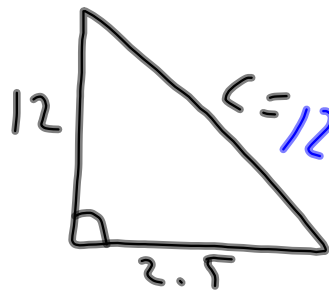
$$x = \sqrt{A}$$

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

$$\sqrt{8} = \sqrt{c^2}$$

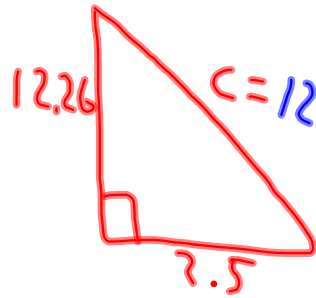
$$\sqrt{8} = c$$

50)



$$c = 12.26$$
$$12^2 + 2.5^2 = c^2$$
$$\sqrt{150.25} = \sqrt{c^2}$$

$$12.26 = c$$



$$c = 12.5$$
$$12.26^2 + 2.5^2 = c^2$$
$$\sqrt{156.56} = \sqrt{c^2}$$

$$12.5 = c$$

$$52) \quad 0 = -16T^2 + 12$$

$$\frac{-12}{-16} = \frac{-16T^2}{-16}$$

$$\sqrt{\frac{3}{4}} = \sqrt{T^2}$$

$$\frac{\sqrt{3}}{2} = T = \boxed{.87 \text{ seconds}}$$

$$58) \quad 0 = -4.9(3)^2 + h_0$$

$$\begin{array}{r} 0 = -44.1 + h_0 \\ +44.1 \quad +44.1 \\ \hline 44.1 \text{ m} = h_0 \end{array}$$