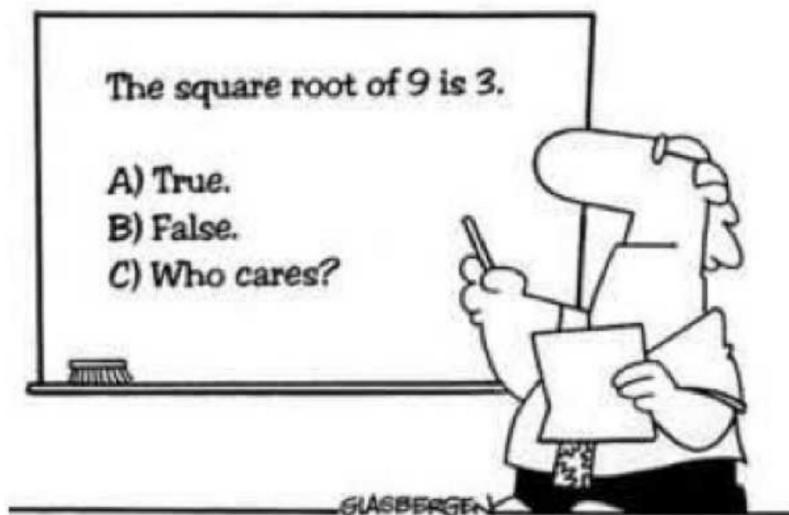


## Square Root Review Solving By Factoring



**Many students actually look forward  
to Mr. Atwadder's math tests.**

**HW:**

## Perfect Squares

$$1^2 = \underline{\hspace{2cm}}$$

$$7^2 = \underline{\hspace{2cm}}$$

$$2^2 = \underline{\hspace{2cm}}$$

$$8^2 = \underline{\hspace{2cm}}$$

$$3^2 = \underline{\hspace{2cm}}$$

$$9^2 = \underline{\hspace{2cm}}$$

$$4^2 = \underline{\hspace{2cm}}$$

$$10^2 = \underline{\hspace{2cm}}$$

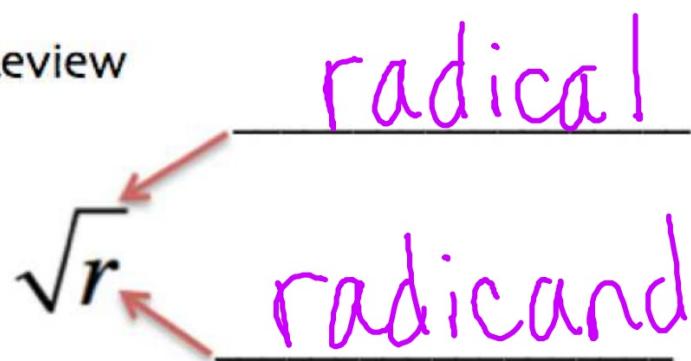
$$5^2 = \underline{\hspace{2cm}}$$

$$11^2 = \underline{\hspace{2cm}}$$

$$6^2 = \underline{\hspace{2cm}}$$

$$12^2 = \underline{\hspace{2cm}}$$

## Square Root Review



## Square Root Properties

- Multiplication:  $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$
- Division:  $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$        $\sqrt{4+9} \neq \sqrt{4} + \sqrt{9}$

\*There are NO sum ( $\sqrt{a+b}$ ) or difference ( $\sqrt{a-b}$ ) properties!!!

## Simplifying Radicals

$$\sqrt{r}$$

\*A radical is fully simplified when...

- the radicand has NO perfect square factors other than 1
- there is NO radical in the denominator
- the radicand does NOT involve decimals
- the radicand is positive

ex: Simplify.

a)  $\sqrt{25} = 5$

b)  $\sqrt{9} = 3$

ex: Simplify.

c)  $\sqrt{100} = 10$

d)  $-\sqrt{16} = -4$

ex: Simplify.

e)  $2\sqrt{36}$

$$\begin{array}{r} 2(6) \\ \hline 12 \end{array}$$

f)  $5\sqrt{-64}$

not possible (for now)

ex: Simplify.

g)  $\sqrt{9} - \sqrt{1}$

$$\begin{array}{r} 3 - 1 \\ \hline 2 \end{array}$$

h)  $\sqrt{100}\sqrt{4}$

$$\begin{array}{r} 10 \cdot 2 \\ \hline 20 \end{array}$$

ex: Simplify.

i)  $\sqrt{12}$

$$\frac{\sqrt{4} \cdot \sqrt{3}}{2\sqrt{3}}$$

j)  $\sqrt{27}$

$$\frac{\sqrt{9} \cdot \sqrt{3}}{3\sqrt{3}}$$

ex: Simplify.

k)  $\sqrt{500}$

$$\frac{\sqrt{100} \cdot \sqrt{5}}{10\sqrt{5}}$$

l)  $\sqrt{98}$

$$\frac{\sqrt{49} \cdot \sqrt{2}}{7\sqrt{2}}$$

$$49 \sqrt[2]{98}$$

ex: Simplify.

m)  $\sqrt{72}$

$$\frac{\sqrt{36} \cdot \sqrt{2}}{6\sqrt{2}}$$

$$\begin{aligned}\sqrt{9} \sqrt{8} \\ 3 \sqrt{8} \\ 3 \sqrt{4} \sqrt{2} \\ 3 \cdot 2 \sqrt{2} \\ 6\sqrt{2}\end{aligned}$$

n)  $\sqrt{\frac{9}{64}} = \frac{3}{8}$

*Rationalizing the denominator*

ex: Simplify.

$$\text{o) } \sqrt{\frac{25}{2}} = \frac{5}{\sqrt{2}} \cdot \left( \frac{\sqrt{2}}{\sqrt{2}} \right) = \frac{5\sqrt{2}}{2}$$

$$\text{p) } \sqrt{\frac{13}{5}} = \frac{\sqrt{13}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{65}}{5}$$

ex: Simplify.

$$q) \sqrt{\frac{10}{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{30}}{3}$$

$$r) \frac{5}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{2}$$

$$\frac{12\sqrt{3}}{2} \rightarrow 6\sqrt{3}$$

ex: Simplify.

$$s) \frac{4}{(2-\sqrt{3})} \cdot \frac{(2+\sqrt{3})}{(2+\sqrt{3})}$$

$$\frac{8+4\sqrt{3}}{4+2\sqrt{3}-2\sqrt{3}-3} = \frac{8+4\sqrt{3}}{1} = 8+4\sqrt{3}$$

$$t) \frac{2}{(1+\sqrt{5})} \cdot \frac{(1-\sqrt{5})}{(1-\sqrt{5})} = \frac{2-2\sqrt{5}}{1-\sqrt{5}+\sqrt{5}-5}$$

$$= \frac{2-2\sqrt{5}}{-4} = \frac{2(1-\sqrt{5})}{-4} =$$

$$\frac{1-\sqrt{5}}{-2}$$

Conjugate ~~FDL~~ FL

$$a+b$$

$$a-b$$

ex: Simplify.

$$u) \frac{5}{(3-\sqrt{2})} \cdot \frac{(3+\sqrt{2})}{(3+\sqrt{2})} = \frac{15+5\sqrt{2}}{9-2} = \frac{15+5\sqrt{2}}{7}$$

$$\sqrt{7} \cdot \sqrt{7} = 7$$

F~~L~~ L

FL

$$v) \frac{\sqrt{2}}{1+\sqrt{3}} \cdot \frac{(1-\sqrt{3})}{(1-\sqrt{3})} = \frac{\sqrt{2}-\sqrt{6}}{1-3} = \frac{\sqrt{2}-\sqrt{6}}{-2}$$

ex: Simplify.

$$w) \frac{\sqrt{5} - \sqrt{6}}{\sqrt{2} + \sqrt{3}}$$

ex: Simplify.

$$x) \frac{\sqrt{2}}{\sqrt{3} - \sqrt{8}}$$

## Solving Quadratic Equations By Factoring

\*Use solving by factoring when given a quadratic that is factorable.

ex: Solve. (Find the roots of the equation.)

a)  $x^2 - 1x - 30 = 0$

$$(x-6)(x+5) = 0$$

$$\begin{aligned} x-6 &= 0 & x+5 &= 0 \\ x &= 6 & x &= -5 \end{aligned}$$

$$\text{b)} -2x^2 + 34x = 0$$

$$\begin{aligned} -2x(x-17) &= 0 \\ \downarrow & \quad \downarrow \\ -2x = 0 & \quad x-17 = 0 \\ \boxed{x = 0, 17} \end{aligned}$$

Get the equation in  
standard form  
(if necessary)

$$\text{c)} x^2 = 64$$

$$\begin{aligned} x^2 - 64 &= 0 \\ (x-8)(x+8) &= 0 \\ x-8 = 0 & \quad x+8 = 0 \end{aligned}$$

$$\boxed{x = 8, -8}$$

$$d) \underline{4x^2} + 4x + 1 = 0$$

perfect square  
trinomial

$$(2x+1)(2x+1) = 0$$

$$(2x+1)^2 = 0$$

$$ax^2 + bx + c$$

$$e) 4x^2 - \underline{17x} - 15 = 0$$

$$(4x+3)(x-5) = 0$$

$$4x+3=0 \quad x-5=0$$

$$x = \frac{-3}{4} \quad x = 5$$

$$2x+1 = 0$$

$$x = -\frac{1}{2}, \text{ multiplicity of 2}$$

(mult. of 2)

$$f) 7x^2 - 42 = -35x$$

$$\begin{aligned} 7x^2 + 35x - 42 &= 0 \\ 7(x^2 + 5x - 6) &= 0 \\ 7(x+6)(x-1) &= 0 \end{aligned}$$

$$x+6=0 \quad x-1=0$$

$$x = -6, 1$$

$$g) x(x-4) = -4$$

$$\begin{aligned} x^2 - 4x &= -4 \\ x^2 - 4x + 4 &= 0 \\ (x-2)(x-2) &= 0 \end{aligned}$$

$$x-2=0$$

$$x=2, \text{ mult. of } 2$$

## Real Zeros

ex: Find the real zeros of the function.

a)  $f(x) = 14x^2 - 21x$

$$0 = 14x^2 - 21x$$
$$0 = 7x(2x - 3)$$

$$\begin{array}{l} 7x = 0 \\ \cancel{7} \quad \cancel{7} \\ x = 0 \end{array}$$
$$\begin{array}{l} 2x - 3 = 0 \\ +3 \quad +3 \\ 2x = 3 \\ \frac{2x}{2} = \frac{3}{2} \\ x = \frac{3}{2} \end{array}$$

b)  $y = 16x^2 - 2x - 5$

$$0 = 16x^2 - 2x - 5$$
$$0 = (2x+1)(8x-5)$$

$$\begin{array}{l} 2x + 1 = 0 \\ 8x - 5 = 0 \\ \hline x = -\frac{1}{2} \quad x = \frac{5}{8} \end{array}$$

ex: What is the difference between zeros, roots and solutions?

Zeros/Roots are when a function is equal to zero  $f(x) = x^2 - x - 6$  (set equal to 0)

Roots and solutions are for equations such as  $x^2 - x - 6 = 0$



ex: Write a quadratic function in standard form with integral coefficients given the zeros.

↙ integers

a)  $(9,0)$  &  $(-3,0)$

$$f(x) = (x-9)(x+3)$$

$$f(x) = x^2 - 6x - 27$$

$$\begin{aligned}x^2 + 7x + 6 &= 0 \\(x+6)(x+1) &= 0 \\x &= -6, -1\end{aligned}$$

b)  $x=4, -4$

$$f(x) = (x-4)(x+4)$$

$$f(x) = x^2 - 16$$

ex: Write a quadratic function in standard form with integral coefficients given the zeros.

c)  $(-1/3, 0)$  &  $(5/2, 0)$

d)  $x=0.5$  multiplicity of 2

ex: Find x.

- a) Area of rectangle = 36



$$\begin{aligned}x(x+5) &= 36 \\x^2 + 5x - 36 &= 0 \\(x+9)(x-4) &= 0 \\x = -9 \text{ or } 4\end{aligned}$$

ex: Find x.

- b) Area of triangle = 42

