Algebra 2 – Simplifying Expressions and Solving Equations
Notes and Examples

Order of Operations for Simplifying Expressions (Always working left to right!)

1. Parentheses
2. Powers and Roots
3. Multiplying and Dividing
4. Adding and Subtracting

Ex. 1 Simplify: $64 \div 4^2 + 3(3^2 - 1)$

$64 \div 4^2 + 3(8)$
$64 \div 16 + 3(8)$
$4 + 24$
28

Ex. 2 Simplify: $\left[3^3 - \left(2^3 + 2^2\right)\right] \div 5$

$\left[3^3 - (8 + 4)\right] \div 5$
$[27 - 12] \div 5$
$15 \div 5$
3

Ex. 3 Simplify the expression $\dfrac{z^2 - \left(x^2 - y^2\right)}{3y^2z}$ given that $x = 3$, $y = 2$, and $z = 5$.

$$\frac{(5)^2 - \left(3^2 - 2^2\right)}{3\left(2^2\right)(5)} = \frac{25 - (9 - 4)}{3(4)(5)} = \frac{25 - 5}{60} = \frac{20}{60} = \frac{1}{3}$$

Solving equations involves the REVERSE order of operations.

Ex. 4 Solve the equation: $7x + 12 = 47$

$$\begin{aligned} 7x + 12 &= 47 \\ 7x + 12 - 12 &= 47 - 12 \\ 7x &= 35 \\ x &= 5 \end{aligned}$$

Ex. 5 Solve the equation: $5(2z - 9) = 7z - 60$

$$\begin{aligned} 5(2z - 9) &= 7z - 60 \\ 10z - 45 &= 7z - 60 \\ 10z - 7z - 45 &= 7z - 7z - 60 \\ 3z - 45 &= -60 \\ 3z - 45 + 45 &= -60 + 45 \\ 3z &= -15 \\ z &= -5 \end{aligned}$$

Ex. 6 Solve the equation: $3(2m-3)=6(m+1)-10$

$$\begin{aligned}3(2m-3)&=6(m+1)-10\\6m-9&=6m+6-10\\6m-9&=6m-4\\6m-6m-9&=6m-6m-4\\-9&=-4\\&\varnothing\end{aligned}$$

Ex. 7 Solve the equation: $\dfrac{6x-2(x-4)}{3}=8$

$$\begin{aligned}3\left[\frac{6x-2(x-4)}{3}\right]&=[8]3\\6x-2x+8&=24\\4x+8&=24\\4x+8-8&=24-8\\4x&=16\\x&=4\end{aligned}$$

Ex. 8 Solve the equation: $15-\dfrac{1}{8}x=-1$

$$\begin{aligned}8\left(15-\frac{1}{8}x\right)&=(-1)8\\120-x&=-8\\-x&=-128\\x&=128\end{aligned}$$

Ex. 9 Determine whether – 2 is a solution to $\dfrac{x+12}{x-4}=x-3$.

$$\frac{(-2)+12}{(-2)-4}=(-2)-3$$

$$\frac{10}{-6}=-5$$

$$-1\tfrac{2}{3}\neq -5$$

NO!

Ex. 10 Solve for h in the formula: $V=\dfrac{1}{3}s^2h$

$$3(V)=\left(\frac{1}{3}s^2h\right)3$$

$$3V=s^2h$$

$$\frac{3V}{s^2}=h$$