

M9

Equation Solving

3.4 and 3.5

- To solve an equation is to find the numerical value of the variable.
- When solving equations, it is important to remember to apply the same operation to each side of the equation.
- Once we find the value of the variable, we have to carry out the "Check" to show that even after substituting the solution into the original equation LS=RS.

One-Step Equations:

Solve	Check
$2x = 5$ $\frac{2x}{2} = \frac{5}{2}$ $x = \frac{5}{2}$ $x = 2.5$	$2x = 5$ $2(2.5) = 5$ $5 = 5$ $LS = RS \checkmark$
$x - 4 = 15$ $\begin{matrix} \swarrow +4 & \searrow +4 \end{matrix}$ $x = 19$	$x - 4 = 15$ $19 - 4 = 15$ $15 = 15$ $LS = RS \checkmark$
$-x = -8$ \downarrow $\frac{-x}{-1} = \frac{-8}{-1}$ $x = 8$	$-x = -8$ $-(8) = -8$ $LS = RS \checkmark$
$\frac{x}{-3} = 21 \times (-3)$ $x = -63$	$\frac{x}{-3} = 21$ $\frac{-63}{-3} = 21$ $21 = 21$ $LS = RS \checkmark$

- **Remember:** To carry the check properly, substitute the solution and solve the LS separately from the RS. It is very important that you do not repeat the algebra steps you used to solve the equation. This could lead to a fake LS=RS result.

Bedmas in Reverse (SAMDEB)

Two-Step Equations:

1. Subtract 2. Add 3. Multiply 4. divide 5. Exponents

6. Bracket

	Solve	Check
LVL1	$2 - x = 12$ -2 $\frac{-1x}{-1} = \frac{10}{-1}$ <div style="border: 1px solid green; padding: 2px; display: inline-block; margin-top: 5px;">$x = -10$</div>	$2 - x = 12$ $2 - (-10) = 12$ $12 = 12$ $LS = RS \checkmark$
LVL2	$\frac{x}{2} - 10 = 16$ $\frac{x}{2} - 10 = 16$ $\frac{x}{2} + 10 = 26$ $\frac{x}{2}$ $\frac{x}{2} = 26(2)$ <div style="border: 1px solid green; padding: 2px; display: inline-block; margin-top: 5px;">$x = 52$</div>	$\frac{x}{2} - 10 = 16$ $\frac{52}{2} - 10 = 16$ $26 - 10 = 16$ $16 = 16$ $LS = RS \checkmark$

Solve	Check
<p>LVL 3</p> $-16 = 3r - 8$ $\begin{array}{r} -16 = 3r - 8 \\ +8 \qquad +8 \end{array}$ $-8 = \frac{3r}{3}$ $\frac{-8}{3} = r$ <div style="border: 1px solid green; padding: 2px; display: inline-block;"> $r = \frac{-8}{3}$ </div>	$-16 = 3r - 8$ $-16 = 3\left(\frac{-8}{3}\right) - 8$ $-16 = \frac{3}{1} \times \frac{(-8)}{3} - 8$ $-16 = (-8) - 8$ $-16 = -16$ $LS = RS \checkmark$
Solve	Check
<p>LVL 4</p> $\frac{4}{1} \times \frac{(6+x)}{4} = -21 \times 4$ <p style="text-align: right; margin-right: 20px;">Reverse BEDMAS</p> $\begin{array}{r} (6+x) = -84 \\ -6 \qquad -6 \end{array}$ <div style="border: 1px solid green; padding: 2px; display: inline-block;"> $x = -90$ </div>	<p style="text-align: right; margin-right: 20px;">Bedmas</p> $\frac{(6+x)}{4} = -21$ $\frac{(6+(-90))}{4} = -21$ $\frac{-84}{4} = -21$ $-21 = -21$ $LS = RS \checkmark$

Distributive Property

or
"Distribution" or "Feeding the chickens"

$$2(x + 9) = 2x + 18$$

Apply the distributive property:

$3(x - 7)$ $3x - 21$	$-3(2x - 7)$ $-6x + 21$
! $-(x + y)$ $-1x - 1y$ or $-x - y$	$6(-x - 20)$ $-6x - 120$
$-3(a - 5)$ $-3a + 15$ $-3a - (-15)$	LVL 4 $\frac{3}{8}(a + 1) + 5 = \frac{3}{8} \times \frac{a}{1} + \frac{3}{8} \times \frac{1}{1} + \frac{5}{1}$ $= \frac{3a}{8} + \frac{3}{8} + \frac{5 \times 8}{1 \times 8} = \frac{3a}{8} + \frac{3 + 40}{8}$ $= \frac{3a}{8} + \frac{43}{8}$
$-0.5(c + 4)$ $-0.5c - 2$	LVL 4 $-9(3x + y - 5) - 2z$ $-27x - 9y - 2z + 45$