

Dividing by Nonzero Denominator

Dividing any numerator by any nonzero denominator *always* gives a TRUE equation. Each result is verified with multiplication so there is a SOLUTION.

Examples:

$\frac{6}{3} = 2$ is verified since $6 = 2 \cdot 3$ TRUE equation

$\frac{0}{1} = 0$ is verified since $0 = 0 \cdot 1$ TRUE equation

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Dividing by Zero Denominator – Two Cases

Case 1: – Dividing any nonzero numerator by a zero denominator *always* gives a FALSE equation. Each result is *not* verified with multiplication so there is NO SOLUTION.

Examples:

$\frac{1}{0} = a$ is *not* verified since $1 \neq a \cdot 0$ FALSE equation

$\frac{2}{0} = b$ is *not* verified since $2 \neq b \cdot 0$ FALSE equation

$\frac{3}{0} = c$ is *not* verified since $3 \neq c \cdot 0$ FALSE equation

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Case 2: – Dividing a zero numerator by a zero denominator gives a TRUE equation, since the result is verified with multiplication. However, the issue is that the answer can be either *a* or *b* or *c* or *any* number. There can be INFINITE SOLUTIONS for $0 \div 0$. We simply say there is NO SOLUTION.

Examples:

$\frac{0}{0} = a$ is verified since $0 = a \cdot 0$ TRUE equation

$\frac{0}{0} = b$ is verified since $0 = b \cdot 0$ TRUE equation

$\frac{0}{0} = c$ is verified since $0 = c \cdot 0$ TRUE equation

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Courtesy of George Hartas

Resource: Basic College Mathematics, 11th Edition, Marvin L. Bittinger, 2010, Pearson Education