

Find the value for the variable that makes the statement true. (SHOW WORK NEATLY)

1. $2y - 4 + 5y = 4 - 3y + 5$

$$\begin{array}{r} 7y - 4 = 9 - 3y \\ +3y \quad +3y \quad \leftarrow y \\ \hline 10y - 4 = 9 \\ +4 \quad +4 \quad \# \rightarrow \\ \hline 10y = 13 \\ \frac{10y}{10} = \frac{13}{10} \end{array}$$

$y = 1.3$ ✓

2. $3g - 6 + 2g + 1 = 11 - 8g$

$$\begin{array}{r} 5g - 5 = 11 - 8g \\ +8g \quad +8g \quad \leftarrow g \\ \hline 13g - 5 = 11 \\ +5 \quad +5 \quad \# \rightarrow \\ \hline 13g = 16 \\ \frac{13g}{13} = \frac{16}{13} \end{array}$$

$g = \frac{16}{13}$

3. $-7x = 91$

$x = -13$

$-7(-13) = 91$ ✓

4. $123 = 3m$

$41 = m$

5. $\frac{2}{3}x = 12$

$\frac{3}{1} \cdot \frac{2}{3}x = 3 \cdot 12$

$2x = 36$

$x = 18$

6. $3x + 2 = 14$

$$\begin{array}{r} 3x = 12 \\ -2 \quad -2 \\ \hline \frac{3x}{3} = \frac{12}{3} \end{array}$$

$x = 4$ ✓

7. $2a - 6 = 5a$

$$\begin{array}{r} -6 = 3a \\ -2a \quad -2a \\ \hline \frac{-6}{3} = \frac{3a}{3} \end{array}$$

$-2 = a$ ✓

8. $32 = -8 - 10b$

$$\begin{array}{r} 40 = -10b \\ +8 \quad +8 \\ \hline \frac{40}{-10} = \frac{-10b}{-10} \end{array}$$

$-4 = b$

9. $3(m - 4) + 2m = 8$

$$\begin{array}{r} 3m - 12 + 2m = 8 \\ 5m - 12 = 8 \\ +12 \quad +12 \\ \hline \frac{5m}{5} = \frac{20}{5} \end{array}$$

$m = 4$ ✓

10. $-2(h - 3) + 5h = 5(2 + h)$

$$\begin{array}{r} -2h + 6 + 5h = 10 + 5h \\ 3h + 6 = 10 + 5h \\ -3h \quad -3h \\ \hline 6 = 10 + 2h \\ -10 \quad -10 \\ \hline -4 = 2h \\ \frac{-4}{2} = \frac{2h}{2} \end{array}$$

$-2 = h$ ✓

I. Eliminate parenthesis by distributing.

Example

$$2(3x - 4) = 5$$

$$6x - 8 = 5$$

II. Eliminate fractions by multiplying each term by the lowest common denominator.

Example

$$\frac{1}{3}x - \frac{1}{2} = \frac{x}{4}$$

$$\frac{1}{3}x - \frac{1}{2} = \frac{x}{4}$$

$$4x - 6 = 3x$$

III. Combine like terms on each side of the equation.

Example

$$\begin{array}{r} 4x + 2 - 7x = 2 + x + 8 \\ \hline -3x + 2 = 10 + x \end{array}$$

IV. Move the "variable" term to one side of the equation and the constants to the other side using addition or subtraction.

Example

$$\begin{array}{r} 3x + 2 = 6x - 5 \\ -3x \quad -3x \\ \hline 2 = 3x - 5 \\ +5 \quad +5 \\ \hline 7 = 3x \end{array}$$

V. Divide both sides by the coefficient (the number in front of the variable).

Example

$$\begin{array}{r} 4x = 12 \\ \frac{4x}{4} = \frac{12}{4} \\ \hline x = 3 \end{array}$$

$$11. 2(w-3) - 2w = 7$$

$$\begin{aligned} 2w - 6 - 2w &= 7 \\ \cancel{2w} - 6 &= 7 \end{aligned}$$

$$-6 = 7$$

FALSE STATEMENT

EMPTY SET

$$12. 3(2a+3) - 2a = 2(5+2a) - 1$$

$$\begin{aligned} 6a + 9 - 2a &= 10 + 4a - 1 \\ \cancel{4a} + 9 &= 9 + \cancel{4a} \\ -4a & \quad -4a \end{aligned}$$

$$9 = 9$$

TRUE STATEMENT

$A = \text{ALL REAL NUMBERS } (\mathbb{R})$

$$13. \frac{1}{3}x + \frac{3}{2} - \frac{5}{6}x = 3$$

$$\begin{aligned} \frac{6}{6} \cdot \frac{1}{3}x + \frac{6}{6} \cdot \frac{3}{2} - \frac{6}{6} \cdot \frac{5}{6}x &= 6 \cdot 3 \\ \frac{2x}{6} + \frac{18}{6} - \frac{5x}{6} &= 18 \\ 2x + 9 - 5x &= 18 \\ -3x + 9 &= 18 \\ -3x &= 9 \\ -\frac{3x}{-3} &= \frac{9}{-3} \\ x &= -3 \end{aligned}$$

$$x = -3$$

$$14. \frac{2}{5}(x-6) = \frac{5}{2}$$

$$\begin{aligned} \frac{2}{5}x - \frac{12}{5} &= \frac{5}{2} \\ \frac{10}{10} \cdot \frac{2}{5}x - \frac{10}{10} \cdot \frac{12}{5} &= \frac{10}{10} \cdot \frac{5}{2} \\ \frac{20x}{10} - \frac{120}{10} &= \frac{50}{10} \\ 4x - 24 &= 25 \\ 4x &= 49 \\ x &= \frac{49}{4} \end{aligned}$$

$$x = \frac{49}{4}$$

$$15. \frac{1}{2}x + \frac{3}{4} - \frac{5}{2}x = \frac{3}{4} + \frac{1}{4}x$$

$$\begin{aligned} \frac{4}{4} \cdot \frac{1}{2}x + \frac{4}{4} \cdot \frac{3}{4} - \frac{4}{4} \cdot \frac{5}{2}x &= \frac{4}{4} \cdot \frac{3}{4} + \frac{4}{4} \cdot \frac{1}{4}x \\ \frac{2x}{4} + \frac{12}{4} - \frac{10x}{4} &= \frac{3}{4} + \frac{1x}{4} \\ 2x + 3 - 10x &= 3 + x \\ -8x + 3 &= 3 + x \\ +8x & \quad +8x \\ 3 &= 3 + 9x \\ -3 & \quad -3 \\ 0 &= 9x \\ 0 &= x \end{aligned}$$

$$0 = x$$

$$16. 2(2x-2) = 1 - \frac{5}{2}x + 5$$

$$\begin{aligned} 4x - 4 &= 1 - \frac{5}{2}x + 5 \\ 2 \cdot 4x - 2 \cdot 4 &= 2 \cdot 1 - \frac{2 \cdot 5}{2}x + 2 \cdot 5 \\ 8x - 8 &= 2 - 5x + 10 \\ 8x - 8 &= 12 - 5x \\ +5x & \quad +5x \\ 13x - 8 &= 12 \\ +8 & \quad +8 \\ 13x &= 20 \\ \frac{13x}{13} &= \frac{20}{13} \\ x &= \frac{20}{13} \end{aligned}$$

$$x = \frac{20}{13}$$

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$$\begin{aligned} 4x + 2 - 7x &= 2 + x + 8 \\ -3x + 2 &= 10 + x \end{aligned}$$

IV. Move the "variable" term to one side of the equation and the constants to the other side using addition or subtraction.

Example

$$\begin{aligned} 3x + 2 &= 6x - 5 \\ -3x & \quad -3x \\ 2 &= 3x - 5 \\ +5 & \quad +5 \\ 7 &= 3x \end{aligned}$$

V. Divide both sides by the coefficient (the number in front of the variable).

Example

$$\begin{aligned} 4x &= 12 \\ \frac{4x}{4} &= \frac{12}{4} \\ x &= 3 \end{aligned}$$

$$17. 3\left(\frac{1}{2}x - \frac{4}{6}\right) = \frac{5}{2}x + 5$$

$$\frac{3}{2}x - 2 = \frac{5}{2}x + 5$$

$$\frac{2}{1} \cdot \frac{3}{2}x - 2 \cdot 2 = \frac{2}{1} \cdot \frac{5}{2}x + 2 \cdot 5$$

$$3x - 4 = 5x + 10$$

$$\begin{array}{r} -3x \\ \hline -4 = 2x + 10 \\ -10 \\ \hline -14 = 2x \\ \frac{-14}{2} = \frac{2x}{2} \\ -7 = x \end{array}$$

$$19. 2(x + 2y) - 2 = 3x + 3 \quad (\text{solve for } y)$$

$$2x + 4y - 2 = 3x + 3$$

$$4y - 2 = x + 3$$

$$\frac{4y}{4} = \frac{x+5}{4}$$

$$y = \frac{x+5}{4}$$

or

$$y = \frac{x}{4} + \frac{5}{4}$$

$$18. 3t + 4x = 6 - 2x \quad (\text{solve for } t)$$

$$\frac{3t}{3} = \frac{6-6x}{3}$$

$$t = \frac{6}{3} - \frac{6}{3}x$$

$$t = 2 - 2x$$

$$20. ax + 2b = 5b - c \quad (\text{solve for } b)$$

$$ax = 3b - c$$

$$\frac{ax+c}{3} = \frac{3b}{3}$$

or

$$\frac{ax}{3} + \frac{c}{3} = b$$

$$21. \text{ If } 3a + 1 - a = 9 \text{ then what is the value of } 5a + 2?$$

$$2a + 1 = 9$$

$$\frac{2a}{2} = \frac{8}{2}$$

$$a = 4$$

$$5(4) + 2$$

$$20 + 2$$

$$22$$

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IX. Move the "variable" term to one side of the equation and the constants to the other side using addition or subtraction.

Example

$$3x + 2 = 6x - 5$$

$$\begin{array}{r} -3x \quad -3x \\ \hline 2 = 3x - 5 \\ +5 \quad +5 \\ \hline 7 = 3x \end{array}$$

X. Divide both sides by the coefficient (the number in front of the variable).

Example

$$4x = 12$$

$$\frac{4x}{4} = \frac{12}{4}$$

$$x = 3$$

FIND LCD

3, 6, 9, 12
2, 4, 6, 8

$$2 \cdot \frac{2x+1}{1} = \frac{x+1}{2} \cdot 3$$

$$2(2x+1) = (x+1)3$$

$$4x+2 = 3x+3$$

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

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

$$\boxed{x = 1}$$

FIND LCD

3, 6, 9, 12, 15, ...
2, 4, 6, 8, ...
6, 12, 18, ...

$$23. \frac{x+1}{3} + \frac{2x-1}{2} = \frac{3x-1}{6}$$

$$2 \cdot \frac{x+1}{1} + \frac{2x-1}{1} = \frac{3x-1}{1}$$

$$2(x+1) + 2x-1 = 3x-1$$

$$2x+2+2x-1 = 3x-1$$

$$\begin{array}{r} 4x+1 = 3x-1 \\ -3x \\ \hline x+1 = -1 \end{array}$$

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

$$\boxed{x = -2}$$

$$24. 2^x = 64$$

$$2^1 = 2$$

$$2^2 = 2 \cdot 2 = 4$$

$$2^3 = 2 \cdot 2 \cdot 2 = 8$$

$$2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$$

$$2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$$

$$2^6 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 64$$

$$\boxed{x = 6}$$

$$25. 3^x = 243$$

$$3^1 = 3$$

$$3^2 = 3 \cdot 3 = 9$$

$$3^3 = 3 \cdot 3 \cdot 3 = 27$$

$$3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$$

$$3^5 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 243$$

$$\boxed{x = 5}$$

$$26. 5^x = 125$$

$$5^1 = 5$$

$$5^2 = 5 \cdot 5 = 25$$

$$5^3 = 5 \cdot 5 \cdot 5 = 125$$

$$\boxed{x = 3}$$