Solving Equations With Fractions | MFM2P

Review Skill: Multiply with fractions

Multiply the following fractions with Mr. Smith. This will help you solve equations that involve fractions.

Rule: Multiply by the numerator (top), divide by the bottom.

a) $5 \times \frac{1}{5} = 1$ b) $20 \times \frac{1}{5} = 4$ c) $\frac{1}{4} \times 24 = 6$ d) $\frac{1}{8} \times 72 = 72 \times 1 \div 8$

$= 9$

You can use the same rule to multiply more involved fractions:

e) $5 \times \frac{3}{5}$ f) $20 \times \frac{4}{5}$ g) $\frac{3}{4} \times 24$ h) $\frac{5}{8} \times 72$

$= 5 \times 3 \div 5$ $= 20 \times 4 \div 5$ $= 24 \times 3 \div 4$ $= 72 \times 5 \div 8$

$= 3$ $= 16$ $= 18$ $= 45$

Now that we've reviewed that skill, let's motivate today's type of solving: Solve the following 3 equations:

a) $2x + 1 = 5$

$-1 \quad -1$

$2x = 4$

$\boxed{x = 2}$

b) $4x + 2 = 10$

$-2 \quad -2$

$4x = 8$

$\boxed{x = 2}$

c) $8x + 4 = 20$

$-4 \quad -4$

$8x = 16$

$\boxed{x = 2}$

What did you notice about the 3 solutions? Same solution

How are the three equations above related? The 3 equations are multiples of each other.

KEY IDEA: You can multiply any equation by a number and not change the solution.

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Examples:

Equation: $2\left(\frac{1}{2}x + 4 = 7\right)$

What is it asking for?
Half of what number, plus 4 is equal to 7.

To clear the fractions:
Multiply the equation by 2

Solution:

$$x + 8 = 14$$
$$-8 \quad -8$$
$$\boxed{x = 6}$$

Am I right?

Does $\frac{1}{2}(6) + 4 = 7$?

$3 + 4 = 7$

$7 = 7$ ✓✓

Equation: $3\left(\frac{1}{3}x + 4 = \frac{2}{3}x + 1\right)$

To clear the fractions:
Multiply the equation by 3

Solution:

$$x + 12 = 2x + 3$$
$$-2x \quad -2x$$
$$-1x + 12 = 3$$
$$-12 \quad -12$$
$$\frac{-1x}{-1} = \frac{-9}{-1}$$
$$\boxed{x = 9}$$

Am I right?

Does $\frac{1}{3}(9) + 4 = \frac{2}{3}(9) + 1$

$3 + 4 = 6 + 1$

$7 = 7$ ✓✓

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Equation:	
$10\left(\frac{1}{2}x-1=\frac{1}{5}x+5\right)$	$0.5x-1=0.2x+5$
To clear the fractions: Multiply by a common denominator (10 in this case)	

Solution:

$$5x-10=2x+50$$
$$-2x \qquad -2x$$
$$3x-10=50$$
$$+10 \qquad +10$$
$$\frac{3x}{3}=\frac{60}{3}$$
$$\boxed{x=20}$$

Am I right?

$\frac{3}{7}$

$\frac{5}{9}$

Try the following as practice!

Equation:	
$5\left(\frac{1}{5}x-3=2\right)$	

Solution:

$$x-15=10$$
$$+15 \qquad +15$$
$$\boxed{x=25}$$

Am I right?

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Equation:	
$12\left(\frac{1}{3}x+1=\frac{1}{4}x+3\right)$	
Solution:	**Am I right?**

$4x + 12 = 3x + 36$

$-3x \qquad -3x$

$x + 12 = 36$

$-12 \quad -12$

$\boxed{x = 24}$

Try These! The first 3 only have one fraction to clear, the final 3 have two.

a) $\frac{1}{10}x + 17 = 22$

b) $\frac{2}{3}x - 2 = 8$

c) $\frac{1}{4}x + 4 = 9$