

MATH 5: HANDOUT 7
EQUATIONS WITH FRACTIONS

Today we discussed equations involving fractions.

EXAMPLE 1

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

Solution:

$$\begin{aligned}\frac{x}{3} + 2 &= 5 \\ \frac{x}{3} + 2 - 2 &= 5 - 2 && \text{(Subtract 2 from both sides)} \\ \frac{x}{3} &= 3 \\ 3\left(\frac{x}{3}\right) &= 3 \cdot 3 && \text{(Multiply both sides by 3)} \\ x &= 9\end{aligned}$$

Alternative solution:

$$\begin{aligned}\frac{x}{3} + 2 &= 5 \\ 3\left(\frac{x}{3} + 2\right) &= 3 \cdot 5 && \text{(Multiply both sides by 3)} \\ 3 \cdot \frac{x}{3} + 3 \cdot 2 &= 15 \\ x + 6 &= 15 \\ x + 6 - 6 &= 15 - 6 && \text{(Subtract 6 from both sides)} \\ x &= 9\end{aligned}$$

EXAMPLE 2

Solve $\frac{5}{7}x = 15$

To solve equation $\frac{5}{7}x = 15$, we multiply it by 7 to get $5x = 105$, then divide by 5 to get $x = 21$. Or we could solve it faster by multiplying both sides by $\frac{7}{5}$, to get

$$x = 15 \times \frac{7}{5} = \frac{15 \times 7}{5} = 21$$

HOMEWORK

1. Compute:

(a) $5 \div 7\frac{1}{2}$

(b) $(2 - 3\frac{1}{2}) \times \frac{2}{3}$

(c) $3\frac{2}{11} \div \frac{5}{7}$

2. Simplify the following expressions

(a) $x + 4(1 - x)$

(b) $2 + 5x - 4(3 - x)$

(c) $5(x - 1) - 3(2x + 1)$

(d) $x - \frac{4}{5}(1 - x)$

(e) $(\frac{2}{3}x + 1) \div \frac{6}{7}$

(f) $2 \div (3 \div x - 1)$

3. Solve the following equations.

(a) $\frac{3}{4}x = 12$

(b) $\frac{1}{2}x + \frac{1}{7}x = 18$

(c) $\frac{2}{3}(x + 7) = 12$

(d) $2\frac{1}{10}x + \frac{1}{5}x + 1 = 9$

4. John bought a large bag of red, green, and blue candies for Halloween, 74 candies in all. The number of red candies is one less than the number of green candies, and there are as many blue candies as red and green together. How many pieces of candy of each color are there?
5. A boy had a bag of apples. He gave $\frac{1}{2}$ of them to his parents, $\frac{1}{5}$ to his brother, $\frac{1}{4}$ to his sister and the last apple he ate himself. How many apples did he originally have?
6. Right now, Jane is 5 and her father is 42. In how many years will he be twice as old as she? Three times as old? (hint: denote the number of years by x and write the equation for x).
7. A hot water tap fills the bath in 5 minutes. The cold water tap fills the bath in 3 minutes. With both taps open, how long will it take to fill the bath?