Math 60, Sections 3.2 and 3.3 Notes and Practice Name: Solutions

Section 3.2 Linear Equations and Inequalities with Fractions

Equivalent Equations

1. Could you write an equivalent equation that is easier to solve? Write an equivalent equation and solve it. Check your solution in both equations.

$\frac{2}{3}y+\frac{1}{3}=\frac{7}{3}$

Check:

$\frac{2}{3}\cdot\frac{3}{1}+\frac{1}{3}\stackrel{?}{=}\frac{7}{3}$

$\frac{2\cdot3}{1\cdot3}+\frac{1}{3}\stackrel{?}{=}\frac{7}{3}$

$\frac{6}{3}+\frac{1}{3}=\frac{7}{3}$ ✓

$2y+1=7$

$-1\quad -1$

$\frac{2y}{2}=\frac{6}{2}$

$y=3$

$\{3\}$

Check

$2\cdot3+1\stackrel{?}{=}7$

$6+1=7$ ✓

Clearing Fractions

2. Clear the fractions and then solve the equation or inequality. Check your solution.

a. $\frac{1}{2}t+\frac{1}{3}=\frac{1}{6}t-\frac{1}{3}$

$6\cdot\frac{1}{2}t+6\cdot\frac{1}{3}=6\cdot\frac{1}{6}t-6\cdot\frac{1}{3}$ multiply both sides by the LCD

$\frac{3}{6}\cdot\frac{1}{2}t+\frac{2}{6}\cdot\frac{1}{3}=\frac{1}{6}\cdot\frac{1}{6}t-\frac{2}{6}\cdot\frac{1}{3}$

$3t+2=t-2$ cleared the fractions

$-t\qquad -t$

$2t+2=-2$

$-2\quad -2$

$\frac{2t}{2}=\frac{-4}{2}$

$t=-2$ $\{-2\}$

Check:

$\frac{1}{2}\cdot\frac{(-2)}{1}+\frac{1}{3}=\frac{1}{6}\cdot\frac{-2}{1}-\frac{1}{3}$

$\frac{-1\cdot3}{1\cdot3}+\frac{1}{3}=-\frac{1}{3}-\frac{1}{3}$

$-\frac{3}{3}+\frac{1}{3}=-\frac{1}{3}-\frac{1}{3}$

$-\frac{2}{3}=-\frac{2}{3}$ ✓

30|60

b. $\frac{1}{3}m-\frac{2}{5}=\frac{3}{4}m-\frac{7}{6}$

20 12 15 10

·60 ·60 ·60 ·60

$20m-24=45m-70$

$-45m \qquad -45m$

$-25m-24=-70$

$+24 \qquad +24$

$\frac{-25m}{-25}=\frac{-46}{-25}$

$m=\frac{46}{25}$

$\left\{\frac{46}{25}\right\}$

or $\overset{20}{\cancel{3}}\frac{1}{\cancel{3}}m-\frac{2\cdot12}{5\cdot12}=\frac{3\cdot15}{4\cdot15}m-\frac{7\cdot10}{6\cdot10}$

$\frac{20}{60}m-\frac{24}{60}=\frac{45}{60}m-\frac{70}{60}$

$20m-24=45m-70$

10 6 3

c. $\frac{2}{3}x-\frac{1}{5}\geq\frac{3}{10}x+\frac{2}{1}$ ·30 ·30 ·30 ·30

LCD=30

$20x-6\geq 9x+60$

$-9x \qquad -9x$

$11x-6\geq 60$

$+6 \qquad +6$

$\frac{11x}{11}\geq\frac{66}{11}$

$x\geq 6$

$[6,\infty)$

$\{x\,|\,x\geq 6\}$

2b) $\frac{1}{3}\cdot\frac{20}{1}m - \frac{2}{5}\cdot\frac{12}{1} = \frac{3}{4}\cdot\frac{15}{1} - \frac{7}{6}\cdot\frac{10}{1}$

if you want to write this step

$20m - 24 = 45m - 70$

$-45m \qquad -45m$

$-25m - 24 = -70$

$+24 \qquad +24$

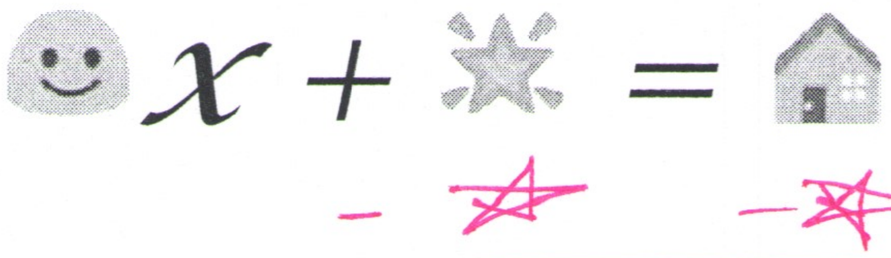
$\frac{-25m}{-25} = \frac{-46}{-25}$

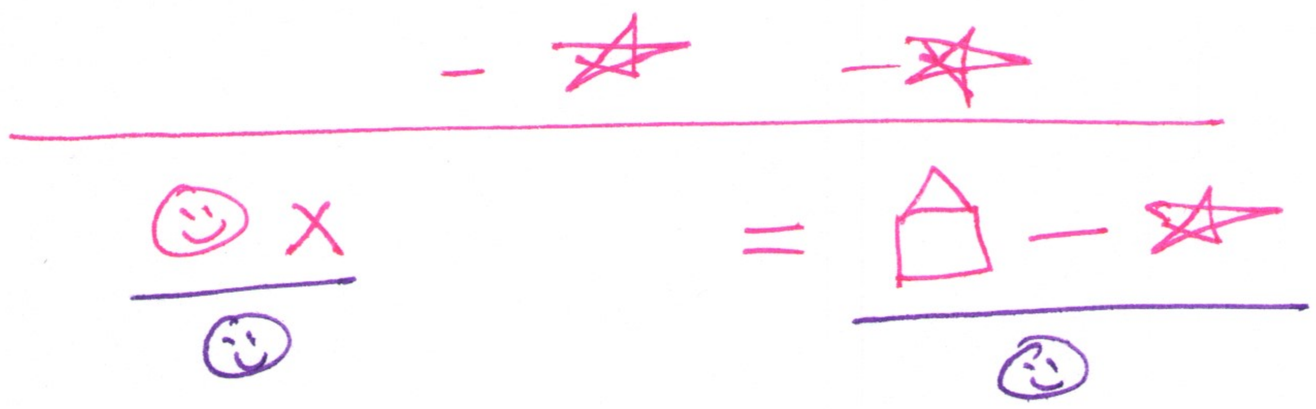
$m = \frac{46}{25}$

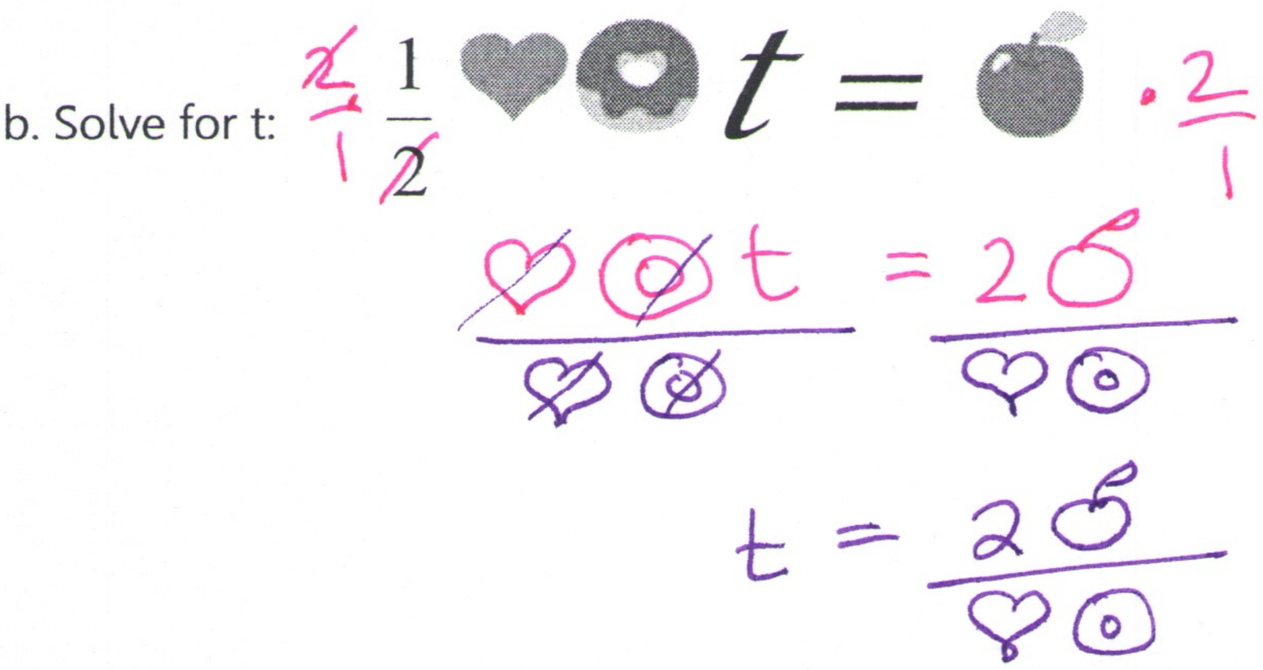
$\left\{\frac{46}{25}\right\}$

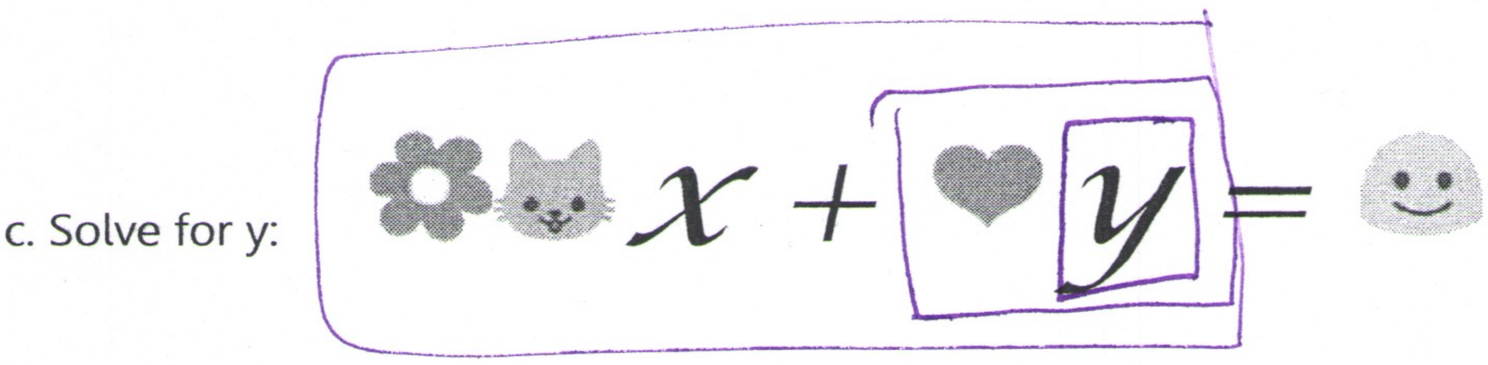
Section 3.3 Isolating a Linear Variable (Solving Literal Equations)

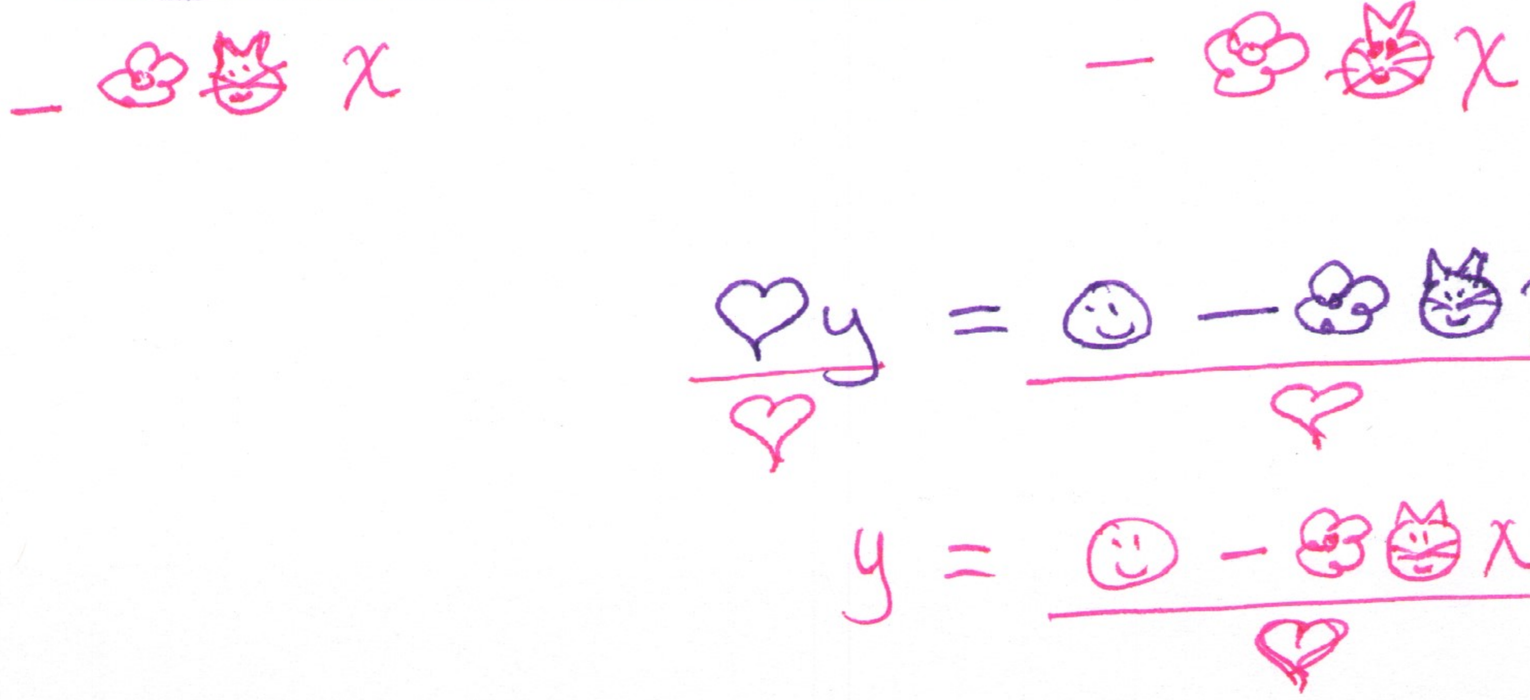
3. Solve the following emoji equations, showing your operations. Since we are working with symbols, our answer will be another equation or formula.

a. Solve for x: 



b. Solve for t: 

c. Solve for y: 



4. Solve each equation for the specified variable. If it helps, draw boxes around the operations, starting with the variable you are solving for.

a. $T = B + cM$, for B

$-cM \quad -cM$

$T - cM = B$

b. ~~A~~ $V = \frac{1}{3}\pi r^3 h$, for h Change this formula to $V = \frac{1}{3}\pi r^2 h$

3. ~~3.~~ $V = \frac{1}{3}\pi r^2 h$, for h

$\frac{3V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2}$

$\frac{3V}{\pi r^2} = h$

c. $F = \frac{9}{5}C + 32$, for C

$-32 \quad -32$

$\frac{5}{9}(F-32) = \frac{9}{5}C \cdot \frac{5}{9}$

$\frac{5}{9}(F-32) = C$

More Practice

5. Clear the fractions and solve the equation or inequality.

a. $\frac{1}{2}w-3=\frac{11}{5}-\frac{3}{4}w$

10 4 5
·20 ·20 ·20 ·20

LCD = 20

$10w-60=44-15w$

$+15w \qquad +15w$

$25w-60=44$

$+60 \quad +60$

$\frac{25w}{25}=\frac{104}{25}$

$w=\frac{104}{25}$

$\left\{\frac{104}{25}\right\}$

b. $\frac{1}{2}t-\frac{3}{4}<-\frac{2}{5}t+\frac{3}{5}$

10 5 4 4
·20 ·20 ·20 ·20

LCD = 20

$10t-15<-8t+12$

$+8t \qquad +8t$

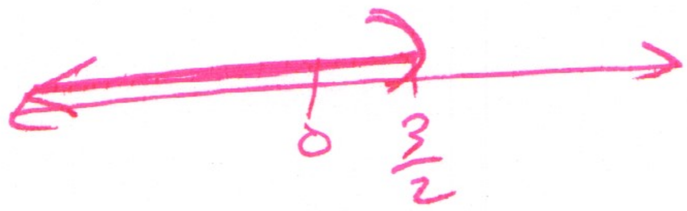
$18t-15<12$

$+15 \quad +15$

$\frac{18t}{18}<\frac{27}{18}$ ÷9 ÷9

$t<\frac{3}{2}$

$\{t \mid t<\frac{3}{2}\}$



$(-\infty, \frac{3}{2})$

6. Solve each equation for the specified variable.

a. $C = \pi d$, for d

$\frac{C}{\pi} = \frac{\pi d}{\pi}$

$\frac{C}{\pi} = d$

or

$d = \frac{C}{\pi}$

b. $A = \frac{1}{2}bh$, for b

$2 \cdot A = \frac{1}{2} \cdot 2 \cdot b \cdot h$

$\frac{2A}{h} = \frac{bh}{h}$

$\frac{2A}{h} = b$

c. $Ax + By = C$, for y

$-Ax \qquad -Ax$

$\frac{By}{B} = \frac{C - Ax}{B}$

$y = \frac{C - Ax}{B}$