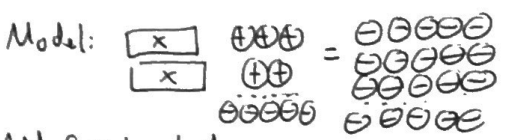
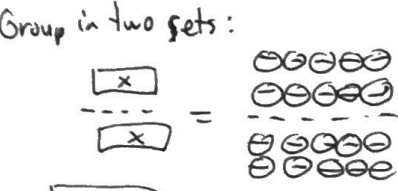


9.2.20] a)  $2x + 5 = -15$

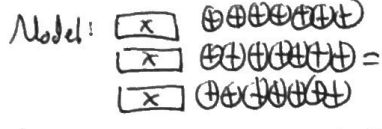


Add 5 ⊖ to each side:

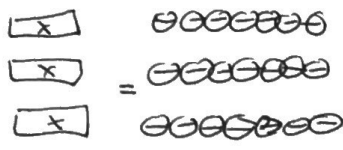


$x = -10$

b)  $3x + 21 = 0$

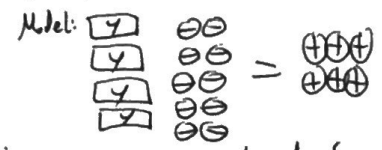


Add 21 ⊖ to each side/group in thirds:

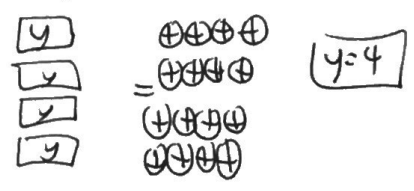


$x = -7$

c)  $4y - 10 = 6$



Add 10 ⊕ to each side/correl/group in fourths:



d) Similar.  $y = 1$

9.2.22 bdfh]

b)  $3x + 7 = 19$   
 $-7 \quad -7$   
 $3x = 12$   
 $\frac{3x}{3} = \frac{12}{3}$   
 $x = 4$

Check:  $12 + 7 = 19 \checkmark$

d)  $17 = \frac{w}{5} + 13$   
 $-13 \quad -13$   
 $4 = \frac{w}{5}$   
 $5(4) = \frac{w}{5} \cdot 5$   
 $20 = w$   
 $17 = 4 + 13 \checkmark$

f)  $3.2 + \frac{x}{2.5} = 4.6$   
 Clear decimals: multiply by 5  
 $16 + 2x = 23$   
 $-16 \quad -16$   
 $2x = 7$   
 $\frac{2x}{2} = \frac{7}{2}, x = \frac{7}{2}$   
 $3.2 + \frac{7}{2} \cdot \frac{2}{5} = 4.6 \checkmark$   
1.4

h)  $10 = \frac{2}{7}n + 4$   
 $-4 \quad -4$   
 $6 = \frac{2}{7}n$   
 $3 \cdot \frac{7}{2} = n$   
 $n = 21$   
 $10 = \frac{2}{7} \cdot 21 + 4 \checkmark$   
6

9.2.28] A discounted ticket is \$14.75 less than original and costs \$54.

Let  $p$  be the original price. Then  $p - 14.75 = 54$ , so  $p = \$68.75$

9.2.30] Need 124 spoons. Bought 1 box of 60 spoons and  $n$  boxes of 8 spoons.

So,  $60 + 8n = 124 \Rightarrow 8n = 64 \Rightarrow n = 8$  boxes of 8 spoons

9.2.46]  $\frac{1}{6}$  of 4<sup>th</sup> graders &  $\frac{1}{3}$  of 5<sup>th</sup> graders missed school. 8 4<sup>th</sup> graders & 18 5<sup>th</sup> graders missed.

So  $\frac{1}{6}(\# \text{ 4}^{\text{th}} \text{ graders}) = 8 \Rightarrow \# \text{ 4}^{\text{th}} \text{ graders} = 48$  &  $\frac{1}{3}(\# \text{ 5}^{\text{th}} \text{ graders}) = 18 \Rightarrow \# \text{ 5}^{\text{th}} \text{ graders} = 54$

9.2.50] Let  $x$  = your age,  $y$  = your cousin's age. Since you are 10 years older,  $x = y + 10$ .

Since 2 years ago, you were 3 times as old as your cousin's age now,  $x - 2 = 3y$ . Then

$x = y + 10$  gives  $(y + 10) - 2 = 3y$ , so  $y + 8 = 3y$ , so  $8 = 2y$ ,  $y = 4$  years old and  $x = 14$  years old.

9.3.6] a) True. by definition. b) False. All fractions are rational, so are not irrational.

9.3.8] a)  $\frac{2}{7}$ , rational b) 0.9 rational c)  $\sqrt{3}$  irrational since 3 is not a perfect square

d)  $\sqrt{36} = 6$  rational e)  $7 \div \sqrt{6} = \frac{7}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{7\sqrt{6}}{6}$  irrational (6 is not)

f)  $11 - \sqrt{9} = 11 - 3 = 8$  rational

9.3.10 | a) Compare decimal expansions, noticing that  $\frac{1}{4} = 0.25$ ,  $\sqrt{0.25} = \sqrt{\frac{1}{4}} = \frac{1}{2} = 0.5$ .

$$0.\overline{2} < 0.\overline{225} < 0.\overline{225} < 0.25 < 0.\overline{25} < 0.2\overline{5} < 0.5$$

$\begin{matrix} \parallel \\ \frac{1}{4} \end{matrix}$ 
 $\parallel$ 
 $\parallel$ 
  
 $\frac{1}{4}$ 
 $\frac{1}{4}$ 
 $\sqrt{0.25}$

b)  $\sqrt{0.47} = \sqrt{\frac{47}{100}} = \frac{\sqrt{47}}{10} \approx \frac{7}{10} = 0.7$      $\sqrt{0.4} = \frac{\sqrt{4}}{\sqrt{10}} = \frac{2\sqrt{10}}{10} \approx \frac{2\sqrt{9}}{10} = \frac{6}{10} = 0.6$

$\frac{4}{7} = \frac{8}{14} = \frac{1}{2} + \frac{1}{14}$  is between  $0.5$  and  $0.5 + \frac{1}{10} = 0.6$ .

So, comparing decimal expansions of the other 4 numbers:

$$0.4 < 0.47 < 0.\overline{47} < 0.\overline{477} < \frac{4}{7} < \sqrt{0.4} < \sqrt{0.47}$$

9.3.12 | a)  $1 < \sqrt{2}, \sqrt{3} < 6$     b)  $\frac{3}{10} < \left(\frac{\sqrt{10}}{10}, \frac{\sqrt{11}}{10}\right) < \frac{8}{10} = \frac{4}{5}$     c)  $0.\overline{12} < \left(\frac{\pi}{10}, \frac{e}{10}\right) < 0.\overline{8}$

$\begin{matrix} \parallel \\ \frac{4}{3} \end{matrix}$ 
 $\parallel$ 
 $\parallel$ 
  
 $\frac{4}{3}$ 
 $\frac{8}{9}$ 
 $\frac{8}{9}$

d)  $\sqrt{5} < \sqrt{6}, \sqrt{7} < \sqrt{8}$

9.3.22 | a)  $n = (\sqrt{n})^2 = 36$     b)  $n^2 = 49 \Rightarrow n = \sqrt{n^2} = \sqrt{49} = 7$

c)  $\sqrt{n^2} = n = 64$     d)  $\sqrt{n} = \frac{4}{9}$  so  $n = (\sqrt{n})^2 = \left(\frac{4}{9}\right)^2 = \frac{16}{81}$

9.3.36 | a)  $m=1, n=3$

b)  $a=3^2-1^2=8$      $b=2 \cdot 3 \cdot 1=6$      $c=3^2+1^2=10$

c) Show  $a^2+b^2=c^2$  holds:  $8^2+6^2=64+36=100=10^2$ .