

# Algebra II

5-9

## Word Problems

(Hardest Word Problems of the Year!!!)

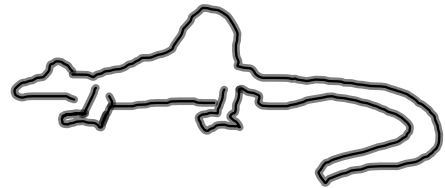
1) Find two positive numbers that differ by 8 and whose reciprocals differ by  $\frac{1}{6}$ .

(pg 250)

Let  $x = 1^{\text{st}}$  number 

12
4

  
 $x-8 = 2^{\text{nd}}$  number



Small Fraction  
Big Bottom

$$\frac{1}{x} - \frac{1}{x-8} = \frac{1}{6}$$

or  $\left(\frac{1}{x-8} - \frac{1}{x} = \frac{1}{6}\right) \times (x-8)6$

Domain:  $\mathbb{R}$  except  $\{8, 0\}$

$$\frac{1}{5} > \frac{1}{9}$$

$$6x - 6(x-8) = x(x-8)$$

$$\cancel{6x} - \cancel{6x} + 48 = x^2 - 8x$$

$$\{12, \cancel{4}\} \quad \begin{aligned} 0 &= x^2 - 8x - 48 \\ 0 &= (x-12)(x+4) \end{aligned}$$

- 5) A town's old street sweeper can clean the streets in 60 h. The old sweeper together with a new sweeper can clean the streets in 15 h. How long would it take the new sweeper to do the job alone?

$$\frac{\text{together}}{\text{alone}} + \frac{\text{together}}{\text{alone}} = 1$$

Let  $x =$  new sweeper alone 20 hrs

$$\left( \frac{15}{60} + \frac{15}{x} = 1 \right) 60x$$

Domain:  $\mathbb{R}$  except  $\{0\}$

$$15x + 60(15) = 60x$$

$$15x + 900 = 60x$$

$$900 = 45x$$

$$20 = x$$

11) Members of the Computer Club were assessed equal amounts to raise \$1200 to buy some software. When 8 new members joined, the per-member assessment was reduced by \$7.50. What was the new size of the club?

Let  $x =$  size of old club  $\boxed{32}$

$x+8 =$  new size  $\boxed{40}$

amount  
everyone  
chipped  
in  
originally

$$\frac{1200}{x} = \frac{1200}{x+8} + 7.50$$

amt everyone  
pitched in with  
new members.

Domain:  $\mathbb{R} \setminus \{0, -8\}$

$$\left(\frac{1200}{x} = \frac{1200}{x+8} + 7.5\right) \times (x+8)$$

$$1200(x+8) = 1200x + 7.5x(x+8)$$

$$\cancel{1200}x + 9600 = \cancel{1200}x + 7.5x^2 + 60x$$

$$0 = 7.5x^2 + 60x - 9600$$

$$0 = x^2 + 8x - 1280$$

$$0 = (x+40)(x-32)$$

$$\{-40, 32\}$$

Pg 250  
2-20,  
even