



Math Olympiad and Problem Solving Programs  
E120 - Honors Algebra Problem Solving  
Problem Set 28.2 - Word Problems

Name:

Date:

1.  $\boxed{37, 47, 89}$

2.  $\boxed{\text{bonds: } \$28,000, \text{ stocks: } \$12,000}$

3.  $\boxed{2 \text{ days}}$

4. This problem may have been graded incorrectly. The information tells us 500,000 square feet is 1.5 times its present space. If  $x$  is the area of the present office space, then  $500000 = 1.5x$ . This means the present office space is  $x = \boxed{333,333 \text{ sq ft}}$ .

5.  $\boxed{6 \text{ hr}}$

6. The information tells us that in 1982 there were 300,000 cars sold. The decline in car sales was  $\frac{1}{6}$  of the sales in 1979 minus 3,000. This means if we let the number of cars sold in 1979 be  $x$ , we get the following equation:

$$300000 = x - \left(\frac{1}{6}x - 3000\right)$$

$$300000 = x - \frac{1}{6}x + 3000$$

$$297000 = \frac{5}{6}x$$

$$x = \boxed{356,400}$$

Now this means the decline in car sales in 1982 was  $356400 - 300000 = \boxed{56,400}$ .

7. We need to first find the rates at which the pipes fill the reservoir. Pipe A fills  $\frac{1}{15}$  of the reservoir in one day. Pipe B fills  $\frac{1}{20}$  of the reservoir in one day.

Pipe A is on for 2 days, filling a total of  $2 \times \frac{1}{15} = \frac{2}{15}$  of the reservoir, before it breaks down. This leaves  $\frac{13}{15}$  of the reservoir left for Pipe B to fill. Pipe B will now take  $\frac{13}{15} \div \frac{1}{20} =$

$\boxed{\frac{52}{3} = 17\frac{1}{3} \text{ days}}$  to finish filling the reservoir.

8. Before the second bus leaves the station, the first bus has already travelled  $56 \times 0.5 = 28$  miles. If we let  $t$  be the time, in hours, it takes for the second bus to catch the first bus, we get the following equation:

$$28 + 56t = 60t$$

$$28 = 4t$$

$$t = \boxed{7 \text{ hrs}}$$



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9. Say the wrestlers weighed  $x, y$  pounds respectively. After the first wrestler gains 15% of his weight, he then weighs  $1.15x$  pounds. After the second wrestler loses 10% of his weight, he then weighs  $0.9y$  pounds. We now have the following system of equations:

$$\begin{cases} x + y & = 450 \\ 1.15x + 0.9y & = 461.25 \end{cases}$$

Solving gives us  $x = y = \boxed{225 \text{ lb}}$ .

10. With tail wind, the jet travels at a rate of  $\frac{500 \text{ km}}{\frac{40}{60} \text{ hr}} = 750 \text{ km/hr}$ . With head wind, the jet travels at a rate of  $\frac{500 \text{ km}}{\frac{50}{60} \text{ hr}} = 600 \text{ km/hr}$ .

We know that if the jet's speed is  $j$  and the wind's speed is  $w$ , then with tail wind the jet travels at a rate of  $j + w$  and with head wind the jet travels at a rate of  $j - w$ . This gives us the following system of equations to solve:

$$\begin{cases} j + w & = 750 \\ j - w & = 600 \end{cases}$$

Solving gives us  $j = 675 \text{ km/hr}$ ,  $w = \boxed{75 \text{ km/hr}}$ .