



Math Olympiad and Problem Solving Programs
E220 - Intermediate Math Competitions
Problem Set 28.2 - Attendance and Proportion

Name:

Date:

1. Let a be the number of adult tickets, and let c be the number of child tickets. Then we know $a + c = 1500$, and we know $3.5a + 1.25c = 4575$. Now we have a system of equations. Solve by substitution. Rewrite the first equation as $c = 1500 - a$. Substitute c in the second equation with this equality: $3.5a + 1.25(1500 - a) = 4575 \Rightarrow 3.5a + 1875 - 1.25a = 4575 \Rightarrow 2.25a = 2700 \Rightarrow a = 2700 \div 2.25 = \boxed{1200}$. The since $c = 1500 - a$, we know $c = 1500 - 1200 = \boxed{300}$.
2. $\boxed{\$350}$
3. $\boxed{500}$
4. $\boxed{10}$
5. $\boxed{A = C = 120, B = 190}$
6. $\boxed{1,120}$
7. Let x be the number of bench seats and let y be the number of box seats. We know that $x = 5000 + y$ and $7.5x + 12.5y = 637500$. We want to solve for x , so rewrite the first equation as $y = x - 5000$ and substitute: $7.5x + 12.5(x - 5000) = 637500 \Rightarrow 7.5x + 12.5x - 62500 = 637500 \Rightarrow 20x = 700,000 \Rightarrow x = 700,000 \div 20 = \boxed{35,000}$.
8. $\boxed{450 \text{ ft}}$
9. We need $weight_1 \times length_1 = weight_2 \times length_2$. Let d be the distance from the fulcrum that the weight needs to be placed. Then we have $130 \times 14 = 140 \times d \Rightarrow d = \boxed{13 \text{ in}}$
10. We know, from the equation $d = rt$, that $r = \frac{d}{t}$. So the downstream speed is $\frac{50}{2.5} = 20$ mph. The upstream speed is $\frac{50}{4} = 12.5$ mph. The downstream speed is the speed of the boat (S_B) pushed along by the speed of the current (S_C), and the upstream speed is the speed of the boat fighting the speed of the current. So we have the two equations:

$$S_B + S_C = 20, \quad S_B - S_C = 12.5$$

If we add the two equations together, we get $S_B + S_C + S_B - S_C = 20 + 12.5 \Rightarrow 2S_B = 32.5 \Rightarrow S_B = \boxed{16.25 \text{ mph}}$.

Then we can substitute this into one of the equations, and get $\boxed{S_C = 3.75 \text{ mph}}$