



Math Olympiad and Problem Solving Programs
E210 - Introductory Math Competitions
Problem Set 23.2 - Percent

Name:

Date:

1. $.45, \frac{9}{20}, 45\%$

2. 7225

3. Jae

4. Let x be the price of renting a car for two days 5 years ago. The cost has increased by $20\% \times x = .2x$, so the new price the old price plus the increase, or $x + .2x = 1.2x$. Let's set up an equation:

$$1.2x = \$264$$

This equation means *new price = new price*, so it makes sense. Now we solve by making the decimal into a fraction:

$$\frac{12}{10}x = \$264$$

Now we multiply both sides by the inverse the fraction, $\frac{10}{12}$, which gives us $x = \frac{10}{12} \cdot 264 =$
 $\$220$

5. On Jan 1, 2006, the value of the vase goes up by 15% once. 15% of \$156,000 is $.15 \times 156,000 =$
 $\$23,400$, so the new value is *old value + increase* = $156,000 + 23,400 = \$179,400$.

On Jan 1, 2007, the value of the vase goes up by 15% again. So 15% of \$179,400 is $.15 \times$
 $179,400 = 26,910$, and the new value is $179,400 + 26,910 =$ $\$206,310$

6. 20% goes to rent, which is $.20 \times 1850 = \$370$. So he spends $\$370 + \$690 + \$940 = \2000 . So
he overspends by $\$2000 - \$1850 = \$150$. The percentage of overspending is $\frac{\$150}{\$1850} = \overline{.081} =$
 8.1%

7. Let x be the man's income. We know that 128% of x is his income plus \$756, so we write
the equation $1.28x = x + 756$. Now we solve for x . Subtract x from both sides: $.28x = 756$,
divide both sides by 0.28: $x = \frac{756}{.28} =$ $\$2,700$

8. $.12 \times 330 = \$39.60$, and $3.30 \times 12 = \$39.60$. The values are the same .

9. Let x be Ankur's allowance. If it's raised by 30%, so his new allowance is $1.3x$. Then it's
raised by 20%, so the new allowance is $1.2(1.3x) = 1.56x$. Now consider the other way. Raise
it by 20%, so we have $1.2x$. Now raise it by 30%, so we have $1.3(1.2x) = 1.56x$. So if Ankur's
goal is to get the most money in the long run, it doesn't matter which he get's first, so both
choices are the same .

10. (a) $\$1944$

(b) Let x be Mitchell's salary after the increase. It was increased by 8%, so there was
an increase of $8\% \times x = .08x$. Now his income is $x + .08x = 1.08x$. Write the equation
 $1.08x = 1728$, and solve for x by dividing by 1.08 on both sides. $x = 1728 \div 1.08 =$ $\$1600$