

Set up the equation and solve.

1. A worker's take-home pay is \$492, after deductions totaling 40% of the gross pay have been subtracted. What is the gross pay?

Gross pay - deductions = Net pay (take home)

$$x - .40x = 492$$

$$\frac{.60x}{.60} = \frac{492}{.60}$$

$x = \$820$

2. A workman's basic hourly wage is \$10, but he receives one and a half times his hourly rate for any hours worked in excess of 40 per week. If his paycheck for the week is \$595, how many hours of overtime did he work?

$1.5 \times 10 = 15$

$$40(10) + 15(x) = 595$$

$$400 + 15x = 595$$

$$\frac{15x}{15} = \frac{195}{15}$$

$x = 13$

3. Six hundred people attended the premiere of a motion picture. Adult tickets cost \$5, and children were admitted for \$2. If box office receipts totaled \$2400, how many children attended the premiere?

(children) (adults)

$$x(2) + (600-x)(5) = 2400$$

$$2x + 3000 - 5x = 2400$$

$$\frac{-3x}{-3} = \frac{-600}{-3}$$

$x = 200$ children

4. A pharmacist is to prepare 15 mL of special eye drops for a glaucoma patient. The eye-drop solution must have a 2% active ingredient, but the pharmacist only has 10% solution and 1% solution in stock. How much of each type of solution should be used to fill the prescription?

$$\begin{array}{|c|} \hline x \\ \hline 1 \\ \hline \end{array} + \begin{array}{|c|} \hline 15-x \\ \hline 10 \\ \hline \end{array} = \begin{array}{|c|} \hline 15 \\ \hline 2 \\ \hline \end{array}$$

$$x(1) + (15-x)(10) = 15(2)$$

$$x + 150 - 10x = 30$$

$$\frac{-9x}{-9} = \frac{-120}{-9}$$

$x = 13\frac{1}{3}$

$13\frac{1}{3}$ mL 1%
 $1\frac{2}{3}$ mL 10%

5. Two children, who are 224 meters apart, start walking toward each other at the same instant at rates of 1.5 m/sec and 2 m/sec, respectively.

(a) When will they meet? $1.5t + 2t = 224$
 $3.5t = 224$

$t = 64 \text{ sec}$

- (b) How far will each have walked?

$64(1.5) = 96 \text{ m.}$
 $64(2) = 128 \text{ m.}$

6. Two children own two-way radios that have a maximum range of 2 miles. One leaves a certain point at 1:00 P.M., walking due north at a rate of 4 mi/hr. The other leaves the same point at 1:15 P.M., traveling due south at 6 mi/hr. When will they be unable to communicate with one another?

$4(t + .25) + 6t = 2$
 $(rt + rt = d)$
 $4t + 1 + 6t = 2$

$\frac{10t}{10} = \frac{1}{10} \quad t = \frac{1}{10} \text{ hr or } 6 \text{ min.}$

1:15
+ :06
after 1:21 p.m.

7. A bullet is fired horizontally at a target, and the sound of its impact is heard 1.5 seconds later. If the speed of the bullet is 3300 ft/sec and the speed of sound is 1100 ft/sec, how far away is the target?

Time to target + Time from target = Time total

$3300 \left(\frac{x}{3300} + \frac{x}{1100} = 1.5 \right)$

$x + 3x = 4950$
 $\frac{4x}{4} = \frac{4950}{4}$

$x = 1237.5 \text{ ft.}$

8. A woman begins jogging at 3:00 P.M., running due north at a 6-minute-mile pace. Later, she reverses direction and runs due south at a 7-minute-mile pace. If she returns to her starting point at 3:45 P.M., find the total number of miles run.

$x = \text{miles in one direction}$

* 6-minute-mile pace is equivalent to a rate of $\frac{1}{6}$ miles/minute.

Minutes north + Minutes south = Minutes Total

$\frac{x}{\frac{1}{6}} + \frac{x}{\frac{1}{7}} = 45$

$6x + 7x = 45$

$\frac{13x}{13} = \frac{45}{13}$

$x = \frac{45}{13}$

$D = 2 \cdot \frac{45}{13} = \frac{90}{13} \text{ mi.}$

or $6 \frac{12}{13} \text{ mi.}$

$r \cdot t = d$
 $t = \frac{d}{r}$

$r \cdot t = d$
 $t = \frac{d}{r}$

9. With water from one hose, a swimming pool can be filled in 8 hours. A second, larger hose used alone can fill the pool in 5 hours. How long would it take to fill the pool if both hoses were used simultaneously? (Use hourly rates)

$$40 \left(\frac{1}{8} + \frac{1}{5} = \frac{1}{x} \right)$$

$$5 + 8 = \frac{40}{x}$$

$$13 = \frac{40}{x};$$

$$x = \frac{40}{13} \text{ or } 3\frac{1}{13} \text{ hours}$$

10. A college student has finished 48 credit hours with a GPA of 2.75. To get into the program she wishes to enter, she must have a GPA of 3.2. How many additional credit hours of 4.0 work will raise her GPA to 3.2?

$$\text{GPA} = \frac{\text{total weighted honor pts.}}{\text{total credit hours}}$$

$$3.2 = \frac{48(2.75) + x(4.0)}{48 + x}$$

$$153.6 + 3.2x = 132 + 4x$$

$$21.6 = .8x$$

$$x = 27 \text{ credit hours}$$