

## 1.2 An Introduction to Problem Solving

### **\*Independent/Dependent**

**Ex.** The length of a swimming pool is 20 ft longer than the width. Express the length and the width of the pool.

**Ex.** The force of gravity on the moon is approximately one-sixth the force of gravity on Earth. Express the force of gravity on moon and Earth.

**Ex.** A mixture of nuts contains five pounds more peanuts than cashews. Express the amount of peanuts and cashews in the mixture.

### **\* Strategy:**

1. Analyze the problem and **assign a variable** to unknown
2. **Set up an equation** and solve the equation
3. **Interpret** the solution

**ex.** In 2009, Citigroup and Wells Fargo were two of the nation's top employers in the banking industry. Their combined work forces totaled 605,850 people. If Wells Fargo employed 43,850 fewer people than Citigroup, how many employees did each company have?

**ex.** A three-part drive consists of a first part that is 1 miles longer than the second, and a third part that is 1 mile longer than four times the second part. If the entire drive is 17 miles, find the length of each part.

**ex.** A trucking company had its logo embroidered on the front of baseball caps. The caps are normally \$20 each but will be reduced by \$0.05 per hat for large orders. How large an order is needed for the price of per hat to be \$15?

**ex.** Tickets to a Broadway show normally sell for \$90 per person. This price is reduced by \$0.50 per person for large groups. How large a group is needed for the price to be \$75 per person?

**ex.** To start training for a triathlon, an athlete runs 8 times longer than she swims, and cycles 45 miles longer than she runs. If she covers a overall distance of 70.5 miles, find the length of each part of her workout.

**ex.** In 2009, FedEx and United Parcel Service (UPS) were two of the nation's top employers. Their combined work force totaled 680,142 people. If UPS employed 171,858 more people than FedEx, how many employees did UPS have?

**\* Solve Number-Value Problems**

**Quantity • Unit price = Total value**

**ex.** An electronics store can buy the video games FIFA Soccer for \$61 each, Madden NFL for \$50 each, and Guitar Hero for \$53 each. If they placed an order for an equal number of FIFA Soccer and Madden NFL games and three times that number of Guitar Hero games, and the purchase totaled \$13,500, how many of each game did they buy?

**ex.** A college bought some Apple iPads (at \$345 each), twice as many Amazon Kindles (at \$180 each), and half as many Barnes & Noble Nooks (at \$150 each) as iPads. If the purchase totaled \$15,60, how many of Amazon Kindles and Barnes & Noble Nooks did they buy?

**\* Solve Geometry Problems**

- *Acute Angle* : measure is greater than  $0^\circ$  and less than  $90^\circ$
- *Right Angle* : measure is  $90^\circ$
- *Obtuse Angle* : measure is greater than  $90^\circ$  and less than  $180^\circ$
- *Straight Angle* : measure is  $180^\circ$
- *Complementary Angles* : sum of two angles equal to  $90^\circ$
- *Supplementary Angles* : sum of two angles equal to  $180^\circ$
- *Right Triangle* : a triangle with one right angle
- *Isosceles Triangle*: a triangle with two sides of equal measure and the angle opposite the equal sides are equal
- *Equilateral Triangle*: a triangle with all sides and all angles are equal

**Theorem** : The sum of all the interior angles of a triangle is  $180^\circ$  .

**ex.** The measure of  $\angle 1$  of a triangle is  $25^\circ$  more than that of  $\angle 2$ . The measure of  $\angle 3$  is  $5^\circ$  more than three times the measure of  $\angle 2$ . Find the measure of each angle.

**ex.** In an isosceles triangle, the measure of one angle is  $30^\circ$  less than twice the measure of one of the equal angles. Find the measure of each angle.

**ex.** The measure of the largest angle of a triangle is three times that of the smallest angle, and the measure of the mid-sized angle is  $20^\circ$  more than the smallest. Find the measure of each angle.

**ex.** The perimeter of a rectangular lot is 460 ft. If the length is 20 ft longer than the width, find the dimensions of the lot.

**ex.** The perimeter of a rectangle is 80 m. The width of the rectangle is 11 m less than twice the length. Find the length and the width of the rectangle.

**\* Total / Partial**

**Ex.** An investor invested \$5000 into MF account and MM account. Express the amount invested into each account.

**Ex.** A wire eight feet long is cut into two pieces, one shorter than the other. Express the length of shorter piece and longer piece.

**\* Solving Investment Problems**

**Simple Interest = Principal • Interest Rate • Time**

$$I = Prt$$

1. An investor has a total of \$10,000 deposit in two simple interest accounts. On one account, the annual simple interest rate is 7%. On the second account, the annual simple interest rate is 8%. How much should be invested in each account so that the total annual interest earned is \$785?







6. An investment counselor for a corporation invested 70% of the company's investment account in 6.54% short-term certificates. The remainder was invested in 6% corporate bonds. The annual interest earned from the two investments was \$127,560. What was the total amount invested?

**\* Solving Mixture Problems**

**- Value Mixture**

$$\text{Quantity} \cdot \text{Unit Price} = \text{Total Value}$$

1. A coffee merchant wants to make 9 lb of a blend of coffee costing \$6 per pound. The blend is made using a \$7 grade and a \$4 grade of coffee. How many pounds of each of these grades should be used?





6. A gardener has 20 lb of a lawn fertilizer that cost \$0.90 per pound. How many pounds of a fertilizer that cost \$0.75 per pound should be mixed with this 20 lb of lawn fertilizer to produce a mixture that costs \$0.85 per pound?

**- Percent Mixture**

1. A chemist wishes to make 3 L of a 7% acid solution by mixing a 9% acid solution and a 4% acid solution. How many liters of each solution should the chemist use?





6. How many ounces of pure water must be added to 75 oz of a 20% salt solution to make a salt solution that is 15% salt?

**\* Solving Uniform Motion Problems**

$$\begin{aligned} \text{distance} &= \text{rate} \cdot \text{time} \\ d &= r t \end{aligned}$$

1. Two cars leave the same town at the same time. One travels north at 60 mph and the other south at 45 mph. In how many hours will they be 420 mi apart?



