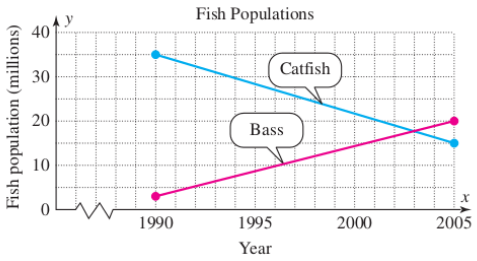
1. The graph below compares the populations of bass and catfish in Lake Shelbyville after 1990.



a. Use the two points (1990, 3) and (2005, 20) to write an equation for the line showing the bass population.

b. Use the two points (1990, 35) and (2005, 15) to write an equation for the line showing the catfish population.

c. Solve the system of equations from parts a and b.

d. Interpret the meaning of the x- and y-coordinates of the solution from part c.

A. a. $y = \frac{18}{13}x - \frac{6727}{3}$ b. $y = -\frac{5}{3}x + \frac{8354}{3}$ c. $(x, y) = (\frac{74197}{38}, \frac{677}{38}) \approx (2003, 17.7)$ d. This means that in 2003 there were approximately 17.7 million bass and 17.7 million catfish, (i.e., the populations had equal numbers).

B. a. $y = \frac{19}{12}x - \frac{6437}{12}$ b. $y = -\frac{5}{3}x + \frac{8354}{3}$ c. $(x, y) = (\frac{74197}{37}, \frac{677}{37}) \approx (2003, 17.7)$ d. This means that in 2003 there were approximately 17.7 million bass and 17.7 million catfish, (i.e., the populations had equal numbers).

C. a. $y = \frac{17}{11}x - \frac{6727}{11}$ b. $y = -\frac{5}{2}x + \frac{8354}{2}$ c. $(x, y) = (\frac{74197}{36}, \frac{644}{36}) \approx (2003, 17.7)$ d. This means that in 2003 there were approximately 17.7 million bass and 17.7 million catfish, (i.e., the populations had equal numbers).

D. a. $y = \frac{17}{11}x - \frac{6727}{11}$ b. $y = -\frac{5}{2}x + \frac{8354}{2}$ c. $(x, y) = (\frac{74197}{36}, \frac{644}{36}) \approx (2003, 17.7)$ d. This means that in 2003 there were approximately 17.7 bass and 17.7 catfish, (i.e., the populations had equal numbers).

E. a. $y = \frac{17}{15}x - \frac{6757}{3}$ b. $y = -\frac{4}{3}x + \frac{8065}{3}$ c. $(x, y) = (\frac{74110}{37}, \frac{655}{37}) \approx (2003, 17.7)$ d. This means that in 2003 there were approximately 17.7 bass and 17.7 catfish, (i.e., the populations had equal numbers).

F. a. $y = \frac{18}{13}x - \frac{6727}{3}$ b. $y = -\frac{5}{3}x + \frac{8354}{3}$ c. $(x, y) = (\frac{74197}{38}, \frac{677}{38}) \approx (2003, 17.7)$ d. This means that in 2003 there were approximately 17.7 bass and 17.7 catfish, (i.e., the populations had equal numbers).

G. a. $y = \frac{17}{15}x - \frac{6757}{3}$ b. $y = -\frac{4}{3}x + \frac{8065}{3}$ c. $(x, y) = (\frac{74110}{37}, \frac{655}{37}) \approx (2003, 17.7)$ d. This means that in 2003 there were approximately 17.7 million bass and 17.7 million catfish, (i.e., the populations had equal numbers).

H. a. $y = \frac{19}{12}x - \frac{6437}{12}$ b. $y = -\frac{5}{3}x + \frac{8354}{3}$ c. $(x, y) = (\frac{74197}{37}, \frac{677}{37}) \approx (2003, 17.7)$ d. This means that in 2003 there were approximately 17.7 bass and 17.7 catfish, (i.e., the populations had equal numbers).

2. The dosage of a medicine ordered by a doctor is 75 mL of a 18% solution. A nurse has available both a 25% solution and a 7% solution of this medicine. How many milliliters of each could be mixed to prepare this 75-mL dosage? Round your answer to the nearest mililiter.

A. The nurse should mix 38 mL of 25% solution and 38 mL of the 7% solution.

B. The nurse should mix 21 mL of 25% solution and 54 mL of the 7% solution.

C. The nurse should mix 42 mL of 25% solution and 33 mL of the 7% solution.

D. The nurse should mix 17 mL of 25% solution and 58 mL of the 7% solution.

E. The nurse should mix 46 mL of 25% solution and 29 mL of the 7% solution.

F. The nurse should mix 33 mL of 25% solution and 42 mL of the 7% solution.

G. The nurse should mix 29 mL of 25% solution and 46 mL of the 7% solution.

H. The nurse should mix 25 mL of 25% solution and 50 mL of the 7% solution.

3. A small boat can go 29 km downstream in 2 hr but only 19 km upstream in 2 hr. Determine the rate of the boat and the rate of the current.

A. The speed of the boat is 12.8 km/hr and the speed of the current is 2.1 km/hr.

B. The speed of the boat is 12 km/hr and the speed of the current is 2.5 km/hr.

C. The speed of the boat is 12.4 km/hr and the speed of the current is 1.7 km/hr.

D. The speed of the boat is 12.3 km/hr and the speed of the current is 3.2 km/hr.

E. The speed of the boat is 11.8 km/hr and the speed of the current is 2.4 km/hr.

F. The speed of the boat is 11.2 km/hr and the speed of the current is 3.3 km/hr.

G. The speed of the boat is 11.6 km/hr and the speed of the current is 2.8 km/hr.

H. The speed of the boat is 12.7 km/hr and the speed of the current is 2.3 km/hr.

4. A small building contractor plans to add a bricklayer to his full-time crew. He has two bricklayers on a current job that he is considering for this position. On Monday, he observed that these two bricklayers each worked 7 hours and laid a total of 3428 bricks. On Tuesday, the older bricklayer worked 5 hours, the younger bricklayer worked 8 hours, and they laid a total of 3562 bricks. Letting r_1 be the work rate of the older brick layer, and r_2 the work rate of the younger, determine the system of equations which models this situation, and when solved, gives the approximate work rates of both workers.

A. The system is $\left\{ \begin{array}{c} 7r_1 + r_2 = 3562 \\ 8r_1 + 5r_2 = 3428 \end{array} \right\}$.

B. The system is $\left\{ \begin{array}{c} 7(r_1 + r_2) = 3562 \\ 5r_1 + 8r_2 = 3428 \end{array} \right\}$.

C. The system is $\left\{ \begin{array}{c} 7(r_1 + r_2) = 3428 \\ 8r_1 + 5r_2 = 3562 \end{array} \right\}$.

D. The system is $\left\{ \begin{array}{c} 7r_1 + r_2 = 3428 \\ 5r_1 + 8r_2 = 3562 \end{array} \right\}$.

E. The system is $\left\{ \begin{array}{c} 7(r_1 + r_2) = 3428 \\ 5r_1 + 8r_2 = 3562 \end{array} \right\}$.

F. The system is $\left\{ \begin{array}{c} 7(r_1 + r_2) = 3562 \\ 8r_1 + 5r_2 = 3428 \end{array} \right\}$.

G. The system is $\left\{ \begin{array}{c} 7r_1 + r_2 = 3562 \\ 5r_1 + 8r_2 = 3428 \end{array} \right\}$.

H. The system is $\left\{ \begin{array}{c} 7r_1 + r_2 = 3428 \\ 8r_1 + 5r_2 = 3562 \end{array} \right\}$.

5. Billy Bob is mixing up a batch of his famous "Mother Lode Mountain Punch." Here's Billy Bob's secret recipe:

1) Lots of sugar.
2) Several Kool Aid drink mix packets.
3) Pure mountain spring water.
4) Bourbon.

Now, Billy Bob is a bright, well-liked fellow, but he doesn't remember any algebra, so he needs a little help. Billy Bob is planning a hootenanny and needs to know how much of the mixed Sugar Kool Aid drink (no alcohol) and bourbon (41 percent alcohol) he needs to mix together to make 30 gallons of Mother Lode Mountain Punch which is 15 percent alcohol. Write a system of two equations in two unknowns which models this situation.

A. The system is $\left\{ \begin{array}{c} 0 \cdot x + y = 0.15 \cdot 30 \\ 0.41x + y = 0.15 \cdot 30 \end{array} \right\}$.

B. The system is $\left\{ \begin{array}{c} 0 \cdot x + 0.15y = 30 \\ 0.41x + 0.15y = 30 \end{array} \right\}$.

C. The system is $\left\{ \begin{array}{c} x + y = 30 \\ 0 \cdot x + 0.41y = 0.15 \cdot 30 \end{array} \right\}$.

D. The system is $\left\{ \begin{array}{c} x + y = 0.15 \cdot 30 \\ 0 \cdot x + 0.41y = \ 30 \end{array} \right\}$.

E. The system is $\left\{ \begin{array}{c} 0 \cdot x + y = 30 \\ 0.41x + y = 0.15 \cdot 30 \end{array} \right\}$.

F. The system is $\left\{ \begin{array}{c} 0 \cdot x + y = 0.15 \cdot 30 \\ 0.41x + y = \ 30 \end{array} \right\}$.

G. The system is $\left\{ \begin{array}{c} x + y = 30 \\ 0 \cdot x + 0.41y = 30 \end{array} \right\}$.

H. The system is $\left\{ \begin{array}{c} 0 \cdot x + y = 0.15 \cdot 30 \\ x + 0.41y = \ 30 \end{array} \right\}$.

6. The fourth step in the word problem strategy given in this book is to _____ the equation or system of equations and to answer the question completely in the form of a sentence.

A. If necessary, make a sketch and translate the problem into a word equation or a system of word equations. Then translate each word equation into an algebraic equation.

B. Check the reasonableness of your answer.

C. Select a variable to represent each unknown quantity. Specify precisely what each variable represents, and note any restrictions on each variable.

D. Read the problem carefully to determine what you are being asked to find.

E. Solve the equation or the system of equations, and answer the question completely in the form of a sentence.

7. Billy Bob made an investment of $11000. One part of the investement went into a bond fund which paid a rate of 3 percent per year, and the rest of the investment went into stocks which earn interest at a rate of 7 percent per year. Write a system of equations which, when solved, give the amounts which were invested at each rate.

A. The system is $\left\{ \begin{array}{c} x+y=516 \\ 3x+7y=11000 \end{array} \right\}$.

B. The system is $\left\{ \begin{array}{c} x+y=11000 \\ 0.03x+0.07y=516 \end{array} \right\}$.

C. The system is $\left\{ \begin{array}{c} x+0.03y=11000 \\ 0.07x+y=516 \end{array} \right\}$.

D. The system is $\left\{ \begin{array}{c} 0.03x+y=11000 \\ x+0.07y=516 \end{array} \right\}$.

E. The system is $\left\{ \begin{array}{c} x+y=11000 \\ 3x+7y=516 \end{array} \right\}$.

F. The system is $\left\{ \begin{array}{c} x+y=516 \\ 3x+y=7\cdot 11000 \end{array} \right\}$.

G. The system is $\left\{ \begin{array}{c} x+y=516 \\ 0.03x+0.07y=11000 \end{array} \right\}$.

H. The system is $\left\{ \begin{array}{c} x+y=11000 \\ 0.03x+y=0.07\cdot 516 \end{array} \right\}$.

8. A small building contractor plans to add a bricklayer to his full-time crew. He has two bricklayers on a current job that he is considering for this position. On Monday, he observed that these two bricklayers each worked 7 hours and laid a total of 3458 bricks. On Tuesday, the older bricklayer worked 9 hours, the younger bricklayer worked 4 hours, and they laid a total of 3559 bricks. Determine for the contractor the rate of work for each bricklayer, assuming that both bricklayers work at a fairly consistent rate. Round your answer to the nearest brick per hour.

A. The younger bricklayer laid 171 bricks/hour, and the older laid 316 bricks/hour.

B. The younger bricklayer laid 173 bricks/hour, and the older laid 324 bricks/hour.

C. The younger bricklayer laid 180 bricks/hour, and the older laid 323 bricks/hour.

D. The younger bricklayer laid 184 bricks/hour, and the older laid 314 bricks/hour.

E. The younger bricklayer laid 177 bricks/hour, and the older laid 317 bricks/hour.

F. The younger bricklayer laid 175 bricks/hour, and the older laid 320 bricks/hour.

G. The younger bricklayer laid 174 bricks/hour, and the older laid 315 bricks/hour.

H. The younger bricklayer laid 183 bricks/hour, and the older laid 311 bricks/hour.