STUMPERS 11

(1) Temperature is measured in both Celsius and Fahrenheit degrees. These two systems are of course related: the *Fahrenheit* temperature is obtained by adding 32 to 9/5 of the *Celsius* temperature. In the following questions, let C represent the Celsius temperature and F the Fahrenheit temperature.

(a) Write an equation that expresses F in terms of C.

(b) Use this equation to find the value of F that corresponds to $C = 20$.

(c) On the Celsius scale, water freezes at 0° and boils at 100°. Use your formula to find the corresponding temperatures on the Fahrenheit scale. Do you recognize your answers?

(d) A quick way to get an approximate Fahrenheit temperature from a Celsius temperature is to double the Celsius temperature and add 30. Explain why this is a good approximation. Convert 23° Celsius the quick way. What is the difference between your answer and the correct value? For what Celsius temperature does the quick way give the correct value?

(2) The Millers must make a 70-mile Thanksgiving trip to visit their grandparents. Pat Miller believes in driving at a steady rate of 50 miles per hour.

(a) How much time will it take Pat to make the trip?

(b) How many miles will the Millers travel in 18 minutes?

(c) Write an expression for the number of miles they will cover in t minutes of driving.

(d) After t minutes of driving, how many miles remain to be covered?

(3) The length of a certain rectangle exceeds its width by exactly 8 cm, and the perimeter of the rectangle is 66 cm. What is the width of the rectangle? Although you may be able to solve this problem using a method of your own, try the following approach, which starts by guessing the width of the rectangle. Study the first row of the table below, which is based on a 10-cm guess for the width. Then make your own guess and use it to fill in the next row of the table. If you have not guessed the correct width, use another row of the table and try again.

guess	*length*	*perimeter*	*target*	*check?*
10	$10 + 8 = 18$	$2(10) + 2(18) = 56$	66	no

Now use the experience gained by filling in the table to write an equation for the problem: Write w in the *guess* column, fill in the length and perimeter entries in terms of w, and set your expression for the perimeter equal to the target perimeter. Solve the resulting equation. This approach to creating equations is called the *guess-and-check* method.

(4) Solve for x: (a) $3x - 4 = 11$ (b) $-2x + 5 = -1$ (c) $7x + 4 = 12$ (d) $ax + b = c$