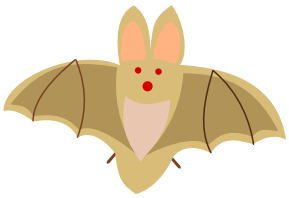

Problem of the Week
Problem A and Solution
Weighing Brown Bats

Problem

"Brown bats, common in Canada, weigh as much as two nickels and a dime."
(From: The Canadian Reader, Issue 4:2014-2015)

Riya, who has always been curious about bats, decided to count the number of bats that flew through her yard. Riya counted 15 bats in one hour. She wondered what the total weight of these bats would be using the information from the quotation above. She made a table to figure out how much 15 bats would weigh, if we actually measured weight in terms of nickels and dimes.

A) Finish her table.

B) In Canada, a nickel is worth 5¢ (5 cents), a dime is worth 10¢, and $1 (one dollar) is equal to 100¢. What would the total value of 15 bats be if each bat was actually worth *"two nickels and a dime"*?

Solution

A) Here is the completed table:

Number of Bats	Number of Nickels	Number of Dimes
1	2	1
2	4	2
3	6	3
4	8	4
5	10	5
6	12	6
7	14	7
8	16	8
9	18	9
10	20	10
11	22	11
12	24	12
13	26	13
14	28	14
15	30	15

B) According to the table, 15 bats are equal to 30 nickels and 15 dimes.

- The value of the nickels is: $30 \times 5 = 150¢$.
- The value of the dimes is: $15 \times 10 = 150¢$.
- Total value of 15 bats would be: $150 + 150 = 300¢$ or \$3.

Another way to calculate the total monetary value of the bats would be to add a column to the table. The extra column in the table can be used to keep track of how much the bats are worth.

Since 2 nickels are equal to: $5 + 5 = 2 \times 5 = 10¢$, then the value of 2 nickels and a dime would be: $10 + 10 = 20¢$.

Number of Bats	Number of Nickels	Number of Dimes	Value in ¢
1	2	1	20
2	4	2	40
3	6	3	60
4	8	4	80
5	10	5	100
6	12	6	120
7	14	7	140
8	16	8	160
9	18	9	180
10	20	10	200
11	22	11	220
12	24	12	240
13	26	13	260
14	28	14	280
15	30	15	300

Teacher's Notes

The solution for part B) of this problem can be determined algebraically. If we let x represent the number of bats, and let y represent their monetary worth in cents, we can write the following equation: $y = ((2 \times 5) + 10) \times x$

This equation can be simplified to: $y = 20x$

This equation shows a *linear relationship* between the number of bats and their monetary value. We can see that it is a linear relationship in the equation because it reflects one of the standard equations for a line: $y = mx + b$

This standard equation shows a relationship between variables x and y, given the constants m and b. The constants in our equation $y = 20x$ are:

- 20 for the value of m
- 0 for the value of b

The constant m in this form of the equation of a line represents the *slope* of the line. The slope is defined as the rise (the amount y changes) over the run (the amount x changes) between two points on the line. The slope of a line is the same for every pair of points on the line. Using our table, we can check the slope using two random pairs of values. For example, according to the table, when we have 12 bats, the monetary value is 240¢, and when we have 7 bats, the monetary value is 140¢. So the rise over run is:

$$\frac{(240 - 140)}{(12 - 7)} = \frac{100}{5} = 20$$

The constant b in this form represents the *y-intercept* of the line. The y-intercept is the place where the line crosses the Y-axis if we draw a graph the equation. It is also the value of y when x is 0. In our equation, when the number of bats is 0 then the monetary value is 0.