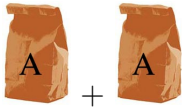


Problem

In each of the equations (A), (B), (C) below, the bags each contain the same number of loonies, but the number may differ from one equation to another.

(A)  = 12 loonies

(B)  + 3 loonies = 7 loonies

(C)  + 4 loonies = 19 loonies



- (i) How many loonies are in each bag in equation (A)? in (B)? in (C)?
- (ii) Is it possible to determine the total number of loonies in all seven bags WITHOUT knowing how many are in each bag? If so, show how.
- (iii) Match the following story to one of the equations (A), (B), or (C):

Twins Sara and Jesse have each saved the same amount from their allowances. They want to go together to buy a toy spaceship that costs \$7.00, but they need to save \$3.00 more.



- (iv) Make up stories that match the other two equations, using different situations from the one in part (iii).

Extension:

1. In the following problems, \square and \diamond are two whole positive numbers whose sum is 11, i.e., $\square + \diamond = 11$.
 - a) What are the possible values of \square and \diamond ?
 - b) If it is also true that $\square - \diamond = 3$, what could \square and \diamond be?
 - c) If it is also true that $\square \times \diamond = 24$, what could \square and \diamond be?
 - d) Could $\square \times \diamond = 20$? Why or why not?

Hints**Part (i)**

Hint 1 - If your Mom has 12 loonies to share equally between you and your sister, how many will each of you get?

Hint 2 - What is the total number of loonies in the two bags in equation (B)?

Hint 3 - What is the total number of loonies in the three bags in equation (C)?

Extension:

Hint 1 - Is $3 + 8$ a different choice than $8 + 3$ for \square and \diamond for any part of the Extension?

Solution

- (i) Each bage in equation (A) contains 6 loonies.

Since $\square{B} + \square{B} = 7 - 3$, or 4 loonies, each bag in (B) contains 2 loonies.

Since $\square{C} + \square{C} + \square{C} = 19 - 4$, or 15 loonies, each bag in (C) contains 5 loonies.

- (ii) Since $\square{A} + \square{A} = 12$ loonies, $\square{B} + \square{B} = 4$ loonies, and $\square{C} + \square{C} + \square{C} = 15$ loonies, we see that the total number of loonies in all seven bags is the sum of the left sides of these three equations, which must equal $12 + 4 + 15$, or 31 loonies, the sum of the right sides.

- (iii) This story matches equation (B), where the bag \square{B} represents the amount each twin has saved, and their desired total is \$7.00.

- (iv) Have several students read their stories, and discuss with the other students how well the stories match the given equations.

Extension:

- 1.a) If $\square + \diamond = 11$, the possible values of \square and \diamond are, in pairs,
 $(\square, \diamond) = (1, 10), (2, 9), (3, 8), (4, 7), (5, 6), (6, 5), (7, 4), (8, 3), (9, 2), (10, 1)$.
- b) If $\square - \diamond = 3$ as well, then the only possibility is $(\square, \diamond) = (7, 4)$.
- c) If $\square \times \diamond = 24$, then possible pairs are $(\square, \diamond) = (3, 8)$ or $(\square, \diamond) = (8, 3)$.
- d) If $\square \times \diamond = 20$, there are NO possible solutions.