EXPLORATION 16

CONFUSING THINGS

Let's be honest: Many things in mathematics are confusing. Let's see if we can sort out a slew of confusing things once and for all.

TOPICS COVERED: The word "more" and the word "less." Percentages. The word "of." Ratios. The equals sign.

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A. GETTING STARTED

We are often told that certain words act as specific pointers to mathematical operations. For example, "sum" means to add and "take away" means to subtract. But one has to be careful of the context in which words are placed in order to be clear which mathematical action is needed.

Question 1: Consider the following three questions:

a) What is 30 take away 20?
b) Mr. Biggles said we had to read pages 20 through 30 of our textbooks for homework tonight. How many pages of text must we each read?
c) How many whole numbers lie between 20 and 30?

Do all three problems have the same answer? Do they all make use of exactly the same mathematical operation?

Question 2: Sonia understood the word "more" to mean "addition." Every time she saw the word "more" in a problem she added numbers. Is she correct?

Here are two problems:

1. Gislene had 80 cents. Her mother gave her 25 *more* cents. How much money does she now possess?
2. Alfinio sold 18 candy bars to help his little league team. Fermin sold 29 candy bars. How many *more* did Fermin sell?

Any comments?

Some words are just confusing! In everyday language "reduce" means to make smaller, but when mathematicians simplify a fraction they call it reducing the fraction, even though the fraction itself isn't getting smaller! For example, "reducing" $\frac{15}{20}$ gives $\frac{15}{20}=\frac{3\cdot 5}{4\cdot 5}=\frac{3}{4}$, yet the fractions $\frac{15}{20}$ and $\frac{3}{4}$ are <u>equal</u> in value!

Question 3: Something <u>is</u> being "reduced" in writing $\frac{15}{20}$ as $\frac{3}{4}$. What exactly is being made smaller?

Comment: As we said in book 10, many teachers prefer to avoid confusion by calling this process "simplifying" the fraction instead.

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Other words are confusing not because of what they mean, but because it is tricky to set up the correct mathematics for them.

Question 4: MULTIPLE CHOICE
If the number *a* is four less than the number *b*, then which of the following statements are correct:

a) $a = b - 4$
b) $a = b + 4$
c) $a + 4 = b$
d) $a - 4 = b$

If *x* is five more than *y*, then which of the following are correct:

a) $x = y - 5$
b) $x = y + 5$
c) $x + 5 = y$
d) $x - 5 = y$

HINT: Notice that 12 is four less than 16. So if we set $a = 12$ and $b = 16$, which of four statements for the first question seem to work? (Two of them do.) Now that you see which two do, can you understand why they are the correct two?

Can you handle the second question in a similar way?

Question 5: Thirteen golden apples weigh one pound less than twenty golden bananas. If one golden apple and one golden banana together weigh five pounds, how much more does do three golden apples weigh compared to two golden bananas?

Comment: It is puzzles like these that put people off of mathematics! This question is obnoxious. Feel free to ignore it if you wish!

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