MATH IN MOTION

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Every year there are students placed in Algebra I who should not be there. Why this happens is of concern, but may be out of our control. What is in our control is how we adapt to teach abstract concepts to students who have trouble with abstractions.

Students who do not understand abstract concepts when taught by the traditional method of voice and sight will sometimes respond if able to act out the concept. While teaching this course I have been developing some ways of achieving this goal. The following ideas may seem crazy but they do work.

Addition and subtraction of signed numbers

Instead of putting examples on the board and finding a pattern, try this. Starting the first week of school, whenever there are a few extra minutes at the end of a class, have the students stand by their desks facing the front of the room — at ground zero. Direct them to step 4 paces to the right and face forward, and then take 5 steps to the left and face forward once more. Ask them where they are relative to ground zero. Some will answer one step to the left, and others one step negative.

Follow with having them return to zero and take 3 steps to the left followed by 5 steps to the right and ask the same question. It will be natural for the students to start using positive and negative in their responses. The goal is that they get a feel for the idea that they are finding the difference between two distances, and in the direction of the greater distance. Of course, this is the same as the sum of -3 and 5.

To demonstrate subtraction, have the students turn around so they are facing the opposite direction whenever they hear the word "minus". Practice this using just the words "plus" and "minus" with them standing in place at ground zero.

To show subtraction, have the students step 3 paces to the right $(+3)$, say "minus" and have students face the back of the room and take 2 steps to their right $(+2)$. Have them face the front of the room and tell where they are in relation to ground zero. They should be at $+1$, demonstrating the problem $(+3) - (+2)$.

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Having the students face the opposite direction for subtraction introduces the abstract concept of subtraction being the same as adding opposites (additive inverses).

It will not be long before students ask about adding and subtracting integers that are impractical to step off in the classroom. Depending on the level of understanding at this point, more concrete examples can be done with a number line and "walking with the fingers".

If you do this, have the students position the number line vertically. They have to be contortionists to turn their arm around at the word "minus" if the line is positioned horizontally.

After the abstract rules for addition and subtraction are introduced, you may still find students who check their work with finger stepping on a number line.

Motion statement problems

Solving problems algebraically may be difficult for those students who have trouble with the concepts involved and even for some who don't. One way of overcoming the fear of a statement problem or verbal problem is to act out the situation as if it were a story.

Example: A car and a truck start towards each other from 240 miles apart. If the car travels at twice the average rate of the truck, how far does each travel until they meet.

Mark off 24 units on the chalkboard as far apart as possible within limits of the board. Select one student to act as the truck and one to act as the car with the instructions that they are to start at opposite ends of the 24 units and walk one unit or two units, respectively, each time a time unit is indicated.

Have a third student keep track of the time units on the board. When the two students meet, count the number of time units.

Doing these things takes time, but it makes the transition to a purely abstract $D + 2D = 240$ easier.

For those algebra students still needing the concrete approach, try to put your MATH IN MOTION.

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Dear Editors:

For some time I have been meaning to write to you with an idea which might catch on if enough everyday teachers like it or just a few hot shots. You seem like sensible people who would tolerate an occasional different slant on things, so here goes. My concern over a long, worrisome career has been students who do their homework with two hands; one holding a pencil, and one holding that place at the back of the book where the answers are. Those kids will bend every rule and some numbers to come up with the right answer. No matter how often I tell them, "How you do the problem is important," they just want to know the answers. So, my idea to shift their attention from result to procedure is to make all answers the same. Let $x = 14$ all the way through! No matter how complicated the equation or story problem may be, the answer turns out to be 14 every time. Think what that would do to those kids! I suppose you could relieve some of the monotony by making chapter one answers one, chapter two answers two, and so on. Or a problem set could begin by saying that all answers in this set are negative five.

Well, see what you think.

Veteran Kid Watcher

Dear V.K.W.:

We are certainly tolerant of others' odd views as long as they are in line with ours.

Your idea of multiple—choice questions with one choice just might work! We like your suggestion and hereby pass it on to teachers and textbook writers. Anything to force folks to focus on the foremost.

Joe and Diane

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