"I HAVE....WHO HAS....?"

Give your students a chance to practice some good listening skills while refreshing their algebraic skills.

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How does a teacher in a low-ability class reinforce much needed skills without a great deal of unmotivated and uninteresting drill? This is the problem that faced me in a class of ninth-grade students who were extremely poor at translating algebraic sentences into spoken sentences and vice versa. What follows is an example of one way in which I dealt with this problem. The game is a nice way for students to get the much needed practice with this concept. It offers an indirect application for what they are learning—making the material more pleasant to learn and more applicable to themselves.

Scene: A low-ability, ninth-grade algebra class. The thirty students have been divided into two groups. A deck of 4" x 6" cards has been distributed to each group, one card per student. The cards look like this:

<table>
<thead>
<tr>
<th>Ellen</th>
<th>John</th>
<th>Pete</th>
<th>Francievale</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n+1$</td>
<td>$n-2$</td>
<td>$2n+1$</td>
<td>$7n-1$</td>
</tr>
<tr>
<td>$n-2$</td>
<td>$2n+1$</td>
<td>$7n-1$</td>
<td>$n+7$</td>
</tr>
</tbody>
</table>

Teacher: "Ellen, you start in group one. Sam, you start in group two." (We will follow group one having the cards above.)

Ellen: "I have one more than a number. Who has two less than a number?"

John: "I have two less than a number. Who has one more than two times a number?"

Pete: "I have one more than two times a number. Who has one less than seven times a number?"

Making Up the Game

The students are divided into two groups, each group having its own set of cards. These teams compete against each other for the longest number of responses without a mistake. A student may be assigned as scorekeeper in each group so that the teacher can focus on the game.

Each card has an address expression and a call expression:

$$n+1 \quad \rightarrow \quad \text{address expression}$$
$$n-2 \quad \rightarrow \quad \text{call expression}$$

The object is to look at the algebraic expression and give a response as a spoken sentence. For instance, in the example above the student would hear the address expression, "Who has one more than a number?" and would respond, "I have one more than a number. Who has two less than a number?" This response says, "I have address expression. Who has call expression?"

In this activity each student must perform two related, but very different, tasks:

1. Translate a sentence that is heard into an algebraic expression.
2. Translate an algebraic expression into a spoken sentence.

A team makes a mistake if one of its members fails to respond when his or her address is called. When this happens, locate the student that failed to respond by saying the expression that should have been called.

Adjusting the Number of Participants in the Game

The game is designed to be circular (i.e., the last card calls the first card). Making use of this fact, the number of cards can be
adjusted almost instantly by the teacher. First, when making up the game it helps to number the cards in order. Since you don’t want students to refer to these numbers, make the numbers small and place them on the reverse side of the card. A yellow marking pen is useful for this.

Then, by using this numbering, you can adjust the number of cards. Consider, for example, that we have a deck of twenty cards but that we will have only fourteen students in a group.

First, arrange the cards in order (fig. 1). Merely remove cards 14–20, replacing card 14 with a card that has the same address expression, but with the call expression of card 1.

\[
\begin{array}{c}
 n - 1 \\
 n + 1
\end{array}
\]

This will produce the required loop with 14 cards.

\[
\begin{array}{c}
1 \\
2 \\
\ldots \\
13 \\
14 \\
\ldots \\
20
\end{array}
\]

\[
\begin{array}{c}
 n + 1 \\
7n \\
3 - 2n \\
3 + n \\
n - 1 \\
2(n + 3) \\
7 - 2x \\
n + 1
\end{array}
\]

Fig. 1

Cards 14–20 are eliminated and the game is then adjusted to fourteen players. Once this is done the order in which the cards are distributed will not matter because the game will always return to the person who starts the game. Order is only important in adjusting the length of the game. An auxiliary deck or a separate list-

ing can be made up for reference to help adjust the game to any desired length.

**Variation 1**

After the students have mastered translating algebraic expressions into sentences, the game can then be changed to include sentences on the cards instead of expressions. Students would have to translate sentences into algebraic expressions. The game would be played using the same format as above with each team having its own set of cards. The cards could also be mixed so that the student would have to give an algebraic expression for a sentence and a sentence for an algebraic expression.

\[
\begin{array}{c}
\text{Twice a number} \\
7y + 3
\end{array}
\]

Responding student: “I have 2n. Who has three more than seven times a number?”

**Variation 2**

Once a student has given a response in the original format, or as in variation 1, that student’s responsibility has then been completed. In order to maintain more continuous involvement, the cards can also be made up so that some students have a variety of responses from which to choose, for example:

\[
\begin{array}{c}
n + 2 \\
n + 7 \text{ or } 3n \text{ or } 5y
\end{array}
\]

Using this variation, students must always be attentive because they may be called on more than once within a cycle.

To avoid “inner loops,” which would defeat the game, an additional rule could be added that a student may not use the same response twice unless all other responses have been used. The format here is also like the one in the original game where each team would have its own deck.

**Variation 3**

Instead of each team going on until someone misses, a time limit may be given. The team would continue even if someone

October 1980 505
made a mistake, but would not go on to the next person until the student having made the mistake has made the correction. The score then is the number of correct responses in the given time limit. This also makes it easier for the teacher to plan time for the game—so it always reaches a conclusion.

Since two teams may not be performing for the same length of time, it might be necessary to consider the ratio of correct responses to time in order to determine the winner. Students would have to know something about ratio in order to understand the scoring.

**Variation 4**

Here the game is constructed so that one team will have to respond to the other team. Instead of two decks, the game is now played with only one deck.

The easiest way to do this, if you have numbered the deck in order, is to give the even numbers to one team and the odd numbers to the other. (Make the even and odd cards different colors so that sorting them can be done quickly and with a minimal amount of confusion.)

In this variation the students might be encouraged to search for more difficult, but equivalent, ways of describing an expression such as the following:

\[
\frac{n + 1}{n + 2}
\]

Student: “If \( n \) is an integer, I have the next consecutive integer. If \( n \) is even, who has the next consecutive even integer?”

Further examples may be as follows:

\[
\begin{align*}
2n & \quad \text{Four times a number divided by two} \\
7n - 1 & \quad \text{One less than a multiple of seven}
\end{align*}
\]

or

\[
\begin{align*}
2n & \quad \text{I have an even number.} \\
2n - 1 & \quad \text{Who has an odd number?}
\end{align*}
\]

When a student misses, the card is revealed and the correct response is given by the other team. The game then continues, and the team that has the fewest incorrect responses wins.

The original design of the game was to prepare students to deal with word problems. After a few weeks of playing this game for a few minutes each day, students are better able to recognize relationships within a word problem in order to help them write an equation with far less difficulty. The original goal was met, but the student excitement and interest generated by this type of activity has led me to consider variations of both the content of the game and its procedures. This game could easily be used when studying factoring. For example:

\[
\begin{align*}
x^2 + 2x + 1 \\
x^2 + 7x + 6
\end{align*}
\]

Student: “I have \((x + 1)^2\). Who has the product of \((x + 1)(x + 6)\)?”

Cards also could have expressions to be multiplied out reinforcing the inverse of factoring or even a combination of the two.

The extensions are numerous, and I hope at this point that readers can think of more.

The students enjoy this game and are very enthusiastic when playing it. It reinforces many of the needed skills in algebra without a tremendous amount of drill for drill’s sake. In addition, students are required to communicate with each other in a constructive way. Not only must they respond to each other in order to gain points, but they must listen carefully to each other—an important skill in the learning process. It has made learning fun and enjoyable to all of us in the classroom.

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