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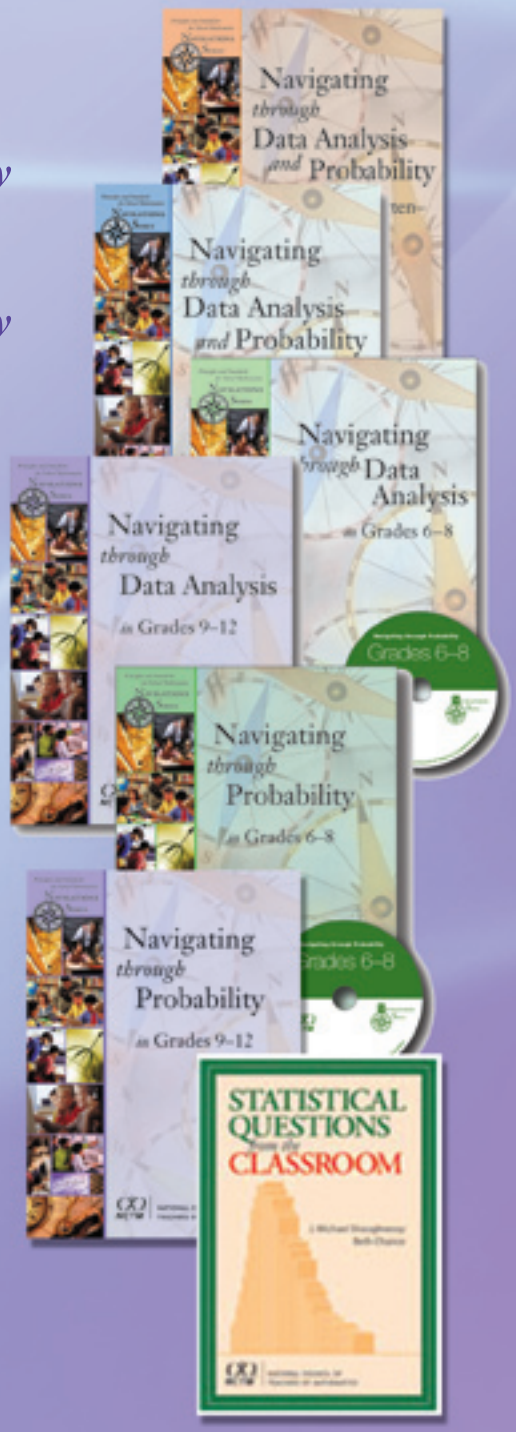

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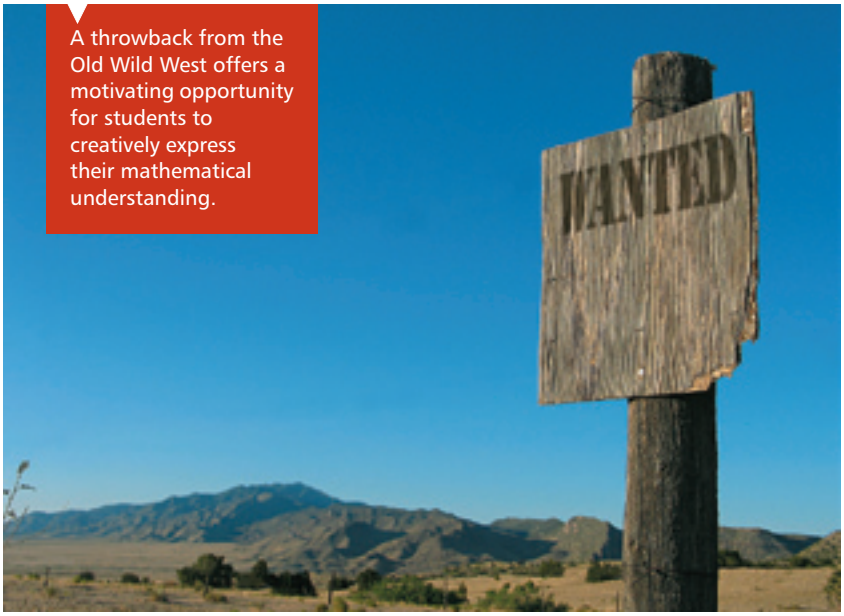
Amanda Lambertus, Karen Keene, and Helen Coats

Wanted: your number sense



A throwback from the Old Wild West offers a motivating opportunity for students to creatively express their mathematical understanding.

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Before technology became so prevalent, wanted posters were a means that law enforcement officers used to communicate information about alleged criminals. These posters depicted a sketch or a photograph of the wanted person; information regarding the person's physical attributes, such as height, eye color, and appearance; alternative names that the person had been know to use; and the crimes for which they were accused.

Today's modern version of such posters still line the walls of some post offices, and replicas from the old Wild West can be purchased or re-created on the Internet (see www.tombstone1880.com/wildbill/interest.htm or www.glassgiant.com/wanted/).

Wanted posters offer a different purpose in the mathematics classroom: a method for students to convey their knowledge about whole numbers in a manner that invokes creativity and thought. The general idea for the Wanted poster activity originated from a book of projects and activities for students in grades 3–5 (Brunetto 1997). Imagine an assessment activity that measures what students know rather than what they do not know. Using the Wanted poster activity allows students to apply their number sense and mathematical vocabulary to specific numbers.

The activity was implemented with a group of ten members of a fourth-grade Academically/Intellectually Gifted (AIG) pullout class at the end of a unit covering whole-number sense and concepts as a means to assess students' understanding of whole numbers. Students had studied different concepts with connections to whole numbers, multiplication, and division facts: perfect squares, composite numbers, prime numbers, factor pairs, and divisors.

The class was diverse in terms of gender and ethnicity. Two students were English Language Learners (ELLs). This activity allowed the ELLs to practice their English skills with specific mathematical vocabulary.

Goals, materials, and objectives

Students create wanted posters for a number of their choosing. They use precise mathematical vocabulary and whole-number information to describe in detail the number they select. To do the activity, they need a copy of the template (available online), blank paper, and markers. This activity helps teachers evaluate what students know about a specific number, if students can properly use new and previously learned mathematical vocabulary, and whether they can apply whole-number facts.

The Wanted poster activity meets North Carolina's Standard Course of Study Objective 1.01a, to develop number sense for rational numbers 0.01 through 99,999 by connecting "model, number word, and number using a variety of representations" (2003). It also addresses the National Council of Teachers of Mathematics (NCTM) Number and Operations Standard for grades 3–5: All students should be able to "recognize equivalent representations for the same number and generate them by decomposing and composing numbers" (NCTM 2000, p. 148).

Implementation

First, the teacher modeled the activity for students, creating a wanted poster for the number 60 on the board with their assistance. She asked them to think about the number. Using a vocabulary list she had generated before class and based on their lessons during the previous two weeks, she prompted students to create a list of twelve phrases to describe 60. They used their knowledge of the vocabulary words to express sentences about the number, which they wrote on the board. The vocabulary list included adjectives to describe numbers, such as *even*, *prime*, *perfect*, *square*, and *composite*; as well as terms such as *factor pairs*.

Students then generated phrases: *Sixty is an even number*. S*ixty is not a perfect square*. *I use the number 60 to help me tell time*. *Half of 60 is 30*. *Six is a factor of 60*.

The teacher encouraged students to focus on their most recent unit, multiplication and division facts. However, the same activity could be used with a focus on addition and subtraction facts as well.

After the class had produced this mock wanted poster together for the number 60, students were ready to try it themselves. Each student chose a different number and worked on creating his or her own poster for a total of ten different posters. The only restriction on the number a student could choose was that it had to be a whole number. Most students chose numbers between 1 and 100. The teacher had no problems asking such a small group to choose different numbers; even a class of twenty to twenty-five students could easily create unique posters.

Before materials were distributed, each student wrote ideas for mathematical phrases and factors on notebook paper. Typically, these phrases were modeled after the phrases on the board about the number 60. Students were encouraged to write as many sentences as they could; surprisingly, most wrote at least eight to ten sentences. They were required to write one real-world example concerning their chosen number. The example had to be one that was true all the time for a number. The following conversation took place as the teacher (**T**) helped one student, April (**A**; all names are pseudonyms), create a real-world example for the number 25:

A: There are 25 books on a shelf.
T: Is this true for all books on a shelf?
A: I guess not.
T: OK, think of another example.
A: A tree can be 25 feet tall.
T: Is this true for all trees? Can some trees never reach 25 feet tall?
A: Yeah, some trees are really small.
T: Where do you see the number 25 when you are not in class?
A: On the speed limit sign by the railroad tracks at my house.

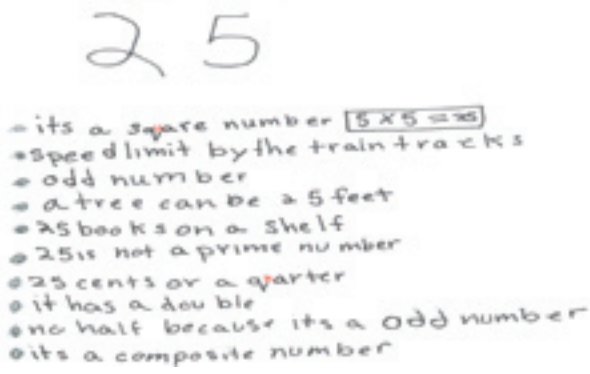
Some students did not have such difficulty. Jacklyn wrote that "you can see the number 100 on a hundred dollar bill" and that "100 pennies is the same as 1 dollar." On the other hand, for the student who chose 72 for his poster, creating a real-world sentence was quite challenging. He settled on, "72 is the same as 6 dozen."

After generating their lists, students shared their phrases with classmates in order to check one another's work before creating the final product. Sharing also prompted ideas for more sentences about students' own numbers. They were not to ask one another for help generating phrases for their respective numbers, but they could share ideas about what types of sentences to write.

For example, the student with whom April shared her list (see **fig. 1**) had chosen the number 18 but had not written anything about whether it is a square number. After seeing April's list, he subsequently added a phrase to his list: "18 is not a square number."

FIGURE 1

After April shared her number sentences below, her classmate added "18 is not a square number" to his own list.



After students received confirmation from the teacher that what they wrote on their notebook paper was acceptable, they chose a minimum of five phrases to write on their posters (see **fig. 2**). They wrote both positive statements, such as "12 is a composite number," and negative statements, such as "15 is not prime."

FIGURE 2

Jacklyn's poster shows the types of phrases most students used on their final products.

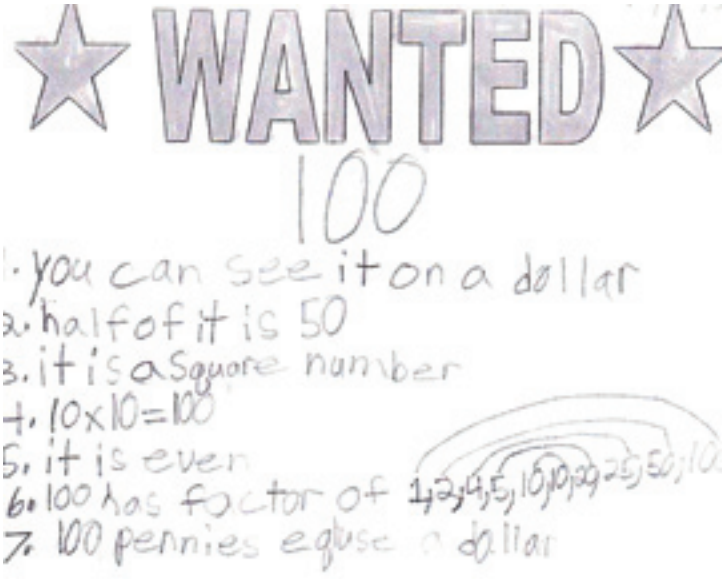
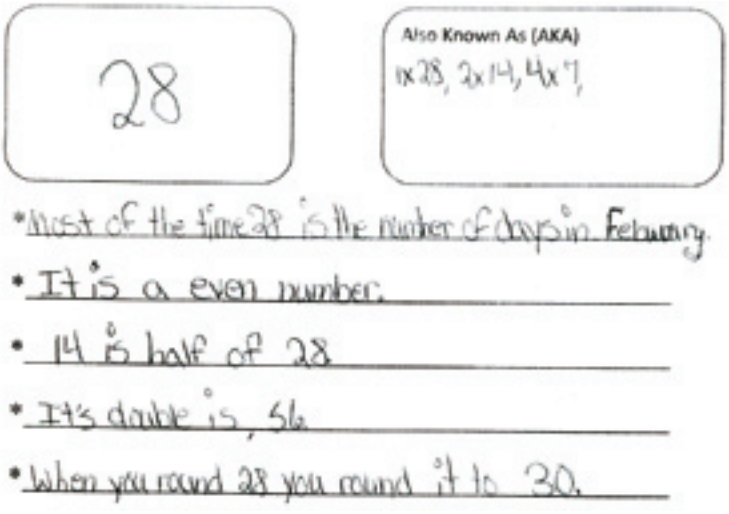


FIGURE 3

Gina's rough draft gives a better assessment than her final poster.



One phrase had to relate the number to the real world. Students also listed the factor pairs for the number on the poster. Students found that thinking about the number in the real world was particularly interesting. When they shared these sentences, they used phrases such as these: "Oh, yeah, there are 28 days in February most of the time."

"The speed limit is 10 miles per hour in my neighborhood, too."

Because wanted posters have students address various number concepts and mathematical vocabulary, this activity has a versatility that makes it applicable for multiple grades and topics. For example, students learning fractions and decimals can use wanted posters to discuss the relationship between the fraction for one-half and its decimal representation, or between the fraction three-quarters and its decimal representation. Students working on fact families in addition can use mathematical vocabulary and phrases related to addition and subtraction. Another unique aspect of the activity is that students choose their own number, meaning that a class could examine and discuss twenty-five different completed posters.

Wanted posters allow students to use their mathematical knowledge and creativity. These students demonstrated a wide range of ability, as well as interest in different aspects of numbers.

This activity was used as an assessment, so the notebook paper with the students' original phrase lists were just as important as their final products. For instance, Gina selected halving, doubling, and estimation phrases from a long list she had written on her notebook paper (see **fig. 3**). Her rough draft demonstrates what she was able to write about her selected numbers without using a calculator, a mathematics textbook, or other reference tools, and it gives a better assessment than Gina's final poster.

The Wanted posters activity is an excellent tool for students in elementary school grades, assessing their number sense though a creative process that permits them to make connections among different mathematical concepts. It allows teachers to discover what students know after completing a lesson and how well students can apply difficult math vocabulary. It is also highly adaptable to the teacher, the

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classroom setting, and the content area. Directions can be easily changed to suit the needs of individual classrooms and students.

To score posters, teachers could use a four-point rubric (see **table 1**), which allows them to modify elements of the activity to better suit a particular context or classroom setting. Give the rubric to students before the activity starts so that they understand what the teacher expects and how the activity will be graded.

Students could first assess one another's posters and make comments about the validity of the statements. This allows students to think about numbers and related mathematical statements that differ from what they chose. Once a student evaluation is completed, the creators have another chance to correct their posters before the final evaluation.

At the end of the lesson or assessment, post students' work around the room or in the hallway so others can see it and learn more about the individual numbers on the posters.

TABLE 1

A scoring rubric gives students the opportunity to self-correct before the teacher's final assessment.

Wanted poster scoring rubric

4	Draft list is complete (has at least eight written statements). At least five statements demonstrate number sense and use precise mathematical vocabulary. Student uses precise mathematical language. All the statements are correct. Poster is complete, and all factor pairs are present.
3	Draft list is complete (has at least seven written statements). At least four statements demonstrate number sense and use precise mathematical vocabulary. Student uses precise mathematical language. Statements contain no more than one error. Poster is complete, but student is missing one or more factor pairs or has an incorrect factor pair.
2	Draft list is complete (has at least six written statements). Student uses little precise mathematical language and does not clearly demonstrate number sense concepts related to the chosen number. Statements contain two errors. Poster was begun but not finished.
1	Draft list was attempted. Student did not use precise mathematical language. Statements contain more than two errors. Poster was not created.
0	No attempt was made to complete either the poster or the initial list.

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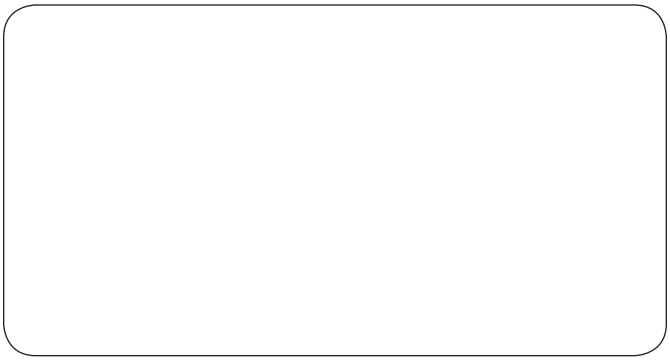
Full-sized templates for the Wanted poster activity and the scoring rubric (see **table 1**) accompany the online version of this article at **www.nctm.org/tcm**. To create Wanted posters, also see www.glassgiant.com/wanted/ or www.tombstone1880.com/wildbill/interest.htm.

Name_____

★ WANTED ★



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Wanted poster scoring rubric

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