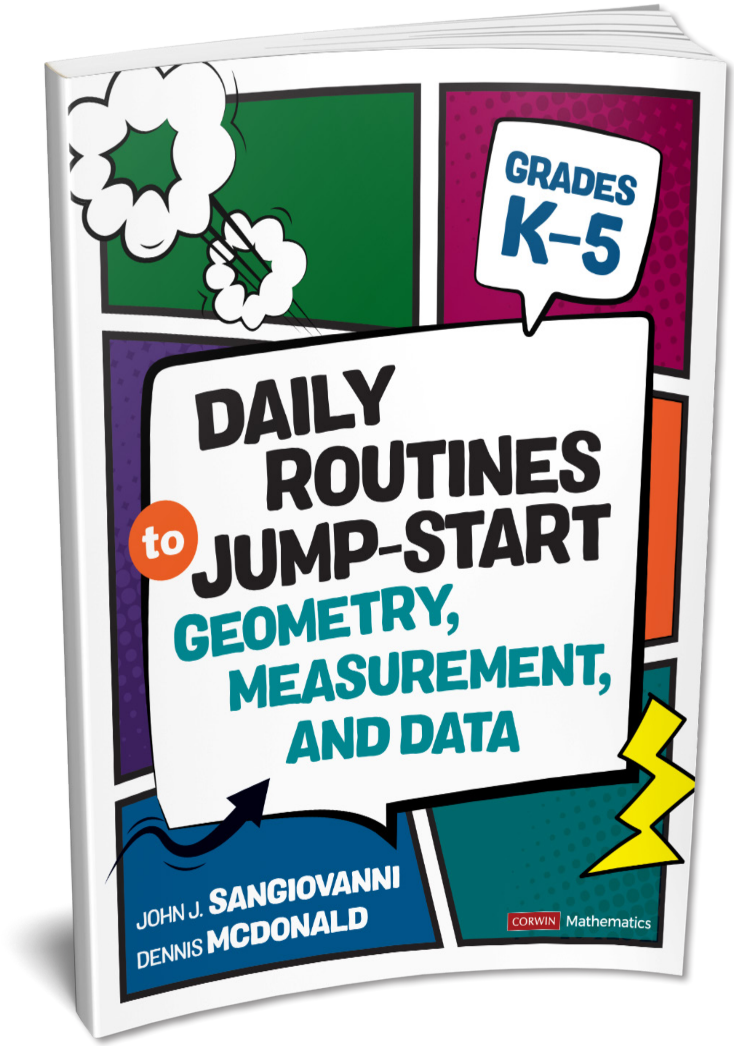

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ROUTINE 20

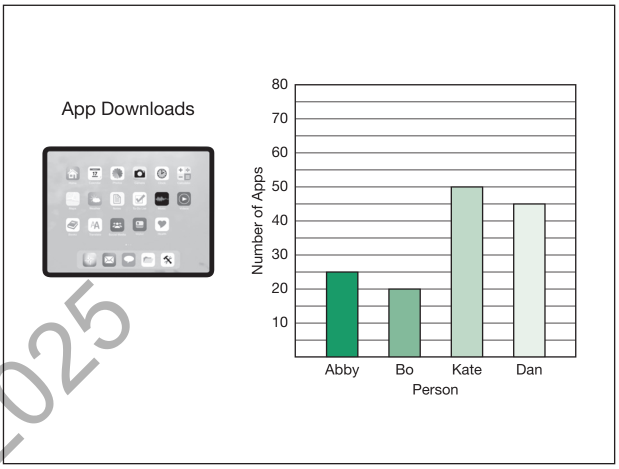
NOT QUITE RIGHT

ABOUT THE ROUTINE

A challenge for students, regardless of mathematics content, is using and interpreting the language of mathematics. Part of the challenge is math-specific in terms of using academic vocabulary like *quotient*. Another part is that some vocabulary, like *sum* can sound like another word *some*, which is commonly used in contexts different than math. A third part of the challenge is that the grammar of mathematics and the English language are sometimes at odds. An example of this is when a student says, “4 divided by 32 is 8” to describe $32 \div 4 = 8$ or “3 minus 10 is 7” for $10 - 3 = 7$. Though this can be a symptom of conceptual misunderstanding it’s often a simple matter of confused language. For example, when you ask students, “What is 5 less than 12?” or “How many 7s can you make with 28?”, they may write expressions that match the grammar of the question, $5 - 12$ and $7 \div 28$, yet still perform the operations correctly to match the question! In other words, it isn’t always the math that is the issue, it can also be the language of math.

Students can stumble with language the same way when trying to describe data displays. When talking about the bar graph in the example, a student may say, “Abby has twice as many apps as Kate”, or when asked, “What is the difference between the number of apps Dan has and Kate has?”, they may respond, “Dan’s bar is shorter, but Kate’s bar is taller.” As you know, both of these are not quite right.

This routine is designed to help students build proficiency with interpreting both data displays



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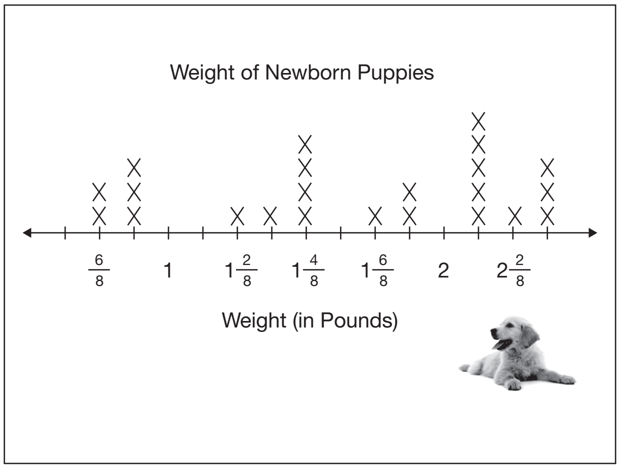
as well as mathematical statements about those data displays. It builds on the work students did in other routines, such as I Would Say (Routine #16) where students summarize data and Asked and Answered (Routine #17) where students determine whether they can or cannot be answered. With this routine, you present students with a data display and a statement that is “not quite right,” and students must identify what is incorrect about the statement and how they can change the statement so that it is correct. For the bar graph about app downloads, some not quite right statements to use could be

- Abby has 20 more apps than Dan.
- Kate has the tallest bar in the graph.
- Dan has more than Bo but less than Abby.

There is no right or wrong way to go about the routine. You can focus on imprecise statements

online resources All routines can be downloaded for your use at **https://companion.corwin.com/courses/jumpstartroutines-geometry** like the second one: "Kate has the tallest bar in the graph." You can make incorrect or incomplete comparisons like the first bulleted statement. You might summarize the data incorrectly like the second or third bulleted statements. You might use the wrong numbers to describe the data.

The routine is not relegated to early grades or primary grades. In all grades, you want your students to grapple with inaccuracy, be it their own or that of someone else. As graphs become more complex, it becomes even more important for them to interpret the data and question statements that are not quite right. Examples of not quite right statements for this fourth- or fifth-grade line plot could be



Source: istockphoto.com/101cats

- Most of the puppies weighed less than 1 pound.
- The same number of puppies weighed $\frac{7}{8}$ pounds as weighed $1\frac{7}{8}$ pounds.
- Twice as many puppies weighed $\frac{6}{8}$ pounds as weighed $1\frac{4}{8}$ pounds.

The first statement is not quite right because most of the puppies weighed more than 1 pound. For the second statement, the same number of puppies weighed $\frac{7}{8}$ of a pound and $2\frac{3}{8}$ pounds not $1\frac{7}{8}$ pounds. The last statement is reversed. Twice as many puppies weighed $1\frac{4}{8}$ pounds than those that weighed $\frac{6}{8}$ pounds.

This routine also helps students practice critical analysis of statements about data. It causes them to look carefully at data displays. It helps them think about what is incorrect about statements or data for that matter. You can begin with basic questions about reading the data display, like the first question about puppies in the example. You can work toward questions that require some degree of problem-solving like the third statement.

As mentioned, students should also tell how the not quite right statement should be revised to be accurate. They can also identify how the data would need to change so that the statement is true. For example, for the first statement to be true at least 14 more puppies would need to weigh less than a pound because 18 weigh more than a pound and 5 weigh less. For the second statement, 1 more puppy would need to weigh $1\frac{7}{8}$ pounds for there to be the same number as those weighing $\frac{7}{8}$.

HOW THIS ROUTINE HELPS

This routine builds data literacy skills by providing opportunities for students to

- make sense of information within data displays;
- retell or summarize a display in their own words (MP3);
- identify the important information in a data display (MP1);
- analyze statements about data (MP3);
- attend to precise statements about data (MP6);
- listen to how others interpret and describe data (MP3); and
- give feedback to others about their ideas (MP3).

WHAT TO DO

1. Prepare three or four statements that are close but not quite right or accurate about a data display.
2. Present the data display like a line plot as shown in the example or picture graphs and bar graphs as shown in the variations.
3. Give students a few moments to observe the information.
4. Optional: Have students summarize the data with a partner.
5. Present one of the not quite right statements about the data. Optional: You can tell students that there is something not quite right about the statement.
6. Have students read and determine what isn't right about the statement.
7. Ask students to share ideas with a partner about what isn't correct about the statement.
8. Bring the whole class together to share what is inaccurate about the statement.
9. Optional: Have students discuss how the statement should be revised so that it is accurate.
10. Repeat the process with the other statements.

SOMETHING TO THINK ABOUT: WHOLE SCHOOL AGREEMENTS

Whole school agreements are decisions that an entire school takes on for a cohesive, coherent mathematics experience that benefits each and every student (Karp et al., 2021). Schools need agreements about the language used, the "tricks" they won't teach, the shortcuts they'll avoid because they don't always work, the strategies for computation that students will learn, and what common notations and generalizations will be used and encouraged. Whole school agreements about problem-solving and problem-solving routines have great value as well.

Agreements about using routines consistently, even talking about which routines might be used in different grades is also helpful. Think about it. Students who learn how to engage with a routine one year are prepared to use it the following years. They have opportunity to deepen their understanding of the experience and are positioned to transfer their skills to new content. Imagine a second grader who works with this routine over the course of the year. Then, when they get to third grade, their teacher continues to use it with more complicated bar graphs before working in area and perimeter or some other content. In fourth grade, those students might use it with line plots as shown in the opening example and so on. Repeatedly analyzing statements about data or other content in the same way undoubtedly yields much more capable thinkers and doers.

NOT QUITE RIGHT (VARIATIONS): USING THEIR ERRORS

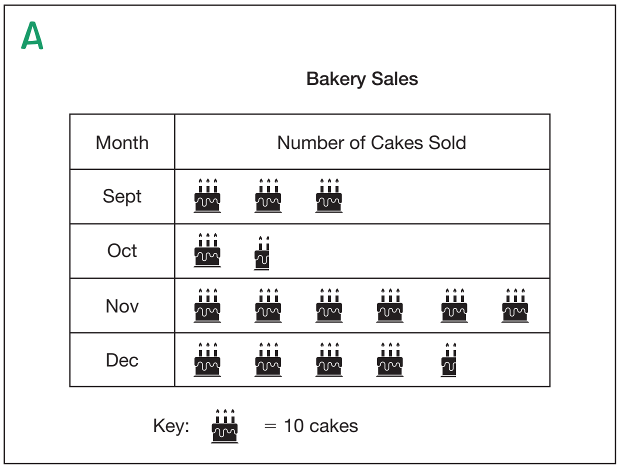
Descriptive feedback supports students' understanding of mathematics concepts and skills (Martin, 2021). Feedback can be provided in writing or through discussion. Routines provide a great opportunity for such feedback that affirms ideas and strategies or corrects misperceptions or errors. They can also serve to trigger certain points of feedback. For example, you might find that your students often overlook the scale in a bar or picture graph. If so, use those in your routines and in this routine include not quite right statements that contain errors relative to the scale of the graph. Manipulate routines and variations so that you can target areas of feedback to help your students advance their understanding of data or any other math content.

Variation A: Picture Graphs

Using the bakery sales data, not quite right statements could be

- $4\frac{1}{2}$ cakes were sold in December.
- A total of 80 cakes were sold in October and November.
- 15 fewer cakes were sold in December than in September.

Not Quite Right works well at any grade with any type of graph. You can use it with basic bar graphs, tally tables, or picture graphs. It can be a good tool for practicing scaled bar picture graphs. These graphs can present a challenge to students who rely on counting by 1s. Moreover, scales with 2 or 10, like the one shown, can be difficult when a half is represented like the months of October and December in the graph. The first statement takes aim at this misstep. There are 4 and half pictures of cakes. But, as you know, December sales were 45 not 4 and a half. Statements about combinations (middle statement) or comparisons (last statement) are great to include in this routine regardless of grade level, though you might first begin with simply reading a certain type of graph with or without a scale.



Source: istockphoto.com/Studiostockart

Variation B: Bar Graphs

Using the game controller sales data, not quite right statements could be

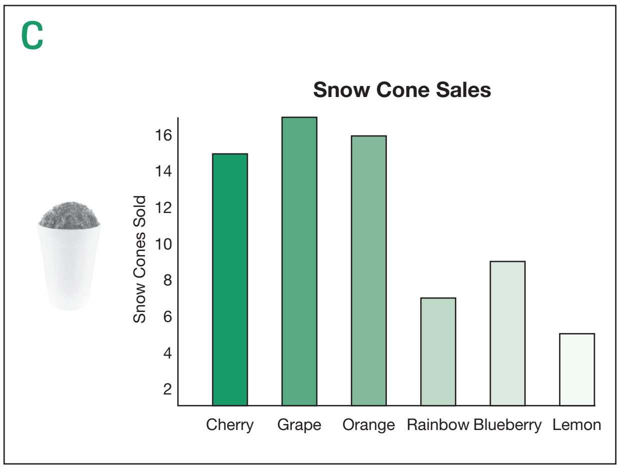
- 9 controllers were sold in October.
- 5 more controllers needed to be sold in December to equal November sales.
- November had the greatest sales of the year.

Source: istockphoto/Chimpinski

Like picture graphs, bar graphs also come with scales. The sales of game controllers is reported in groups of 5 rather than singles. When in a rush, students can overlook the scale and simply count the bars. That's why a little practice with this routine and not quite right statements like the first two have great value. The first statement isn't quite right, as 45 controllers were sold rather than 9. The second statement isn't right either because November sales were 25 controllers more than December sales, not 5. Focusing student attention on scales through these not quite right statements is a good idea. But all three questions don't have to focus on that misstep. The third is a nice alternative that students might struggle to answer. November does have the most sales of the three months in the graph but there are nine other months missing from the graph. The last statement needs a small adjustment to be accurate. This also reminds us that while this bar graph using three categories might be within the standard of your grade level, it doesn't mean you have to limit students to experiencing only three. A nice way to enrich, extend, or deepen their understanding is to use four or more categories like shown in the next example. And if you do use more categories, just be sure that you don't hold them accountable (i.e., grade or assess) on the more complex graphs.

Variation C: Student Statements Are Not Quite Right

Having students create situations, prompts, or examples has been suggested a few times throughout this book. It helps you create content to use with your class. Most importantly, it requires them to take a close look at situations, analyze them, decide what is true, and in this routine, come up with something that isn't correct. Though this routine typically features three or four incorrect statements for students to work with, you can ask your students to create just one statement. They can write them on sticky notes or index cards. You can have them write statements independently or collaboratively. Remember to keep your expectations in check. They might write tough statements to consider or simple ones like, "Orange has the greatest sales." They might write statements that seem to be answered with the data but aren't. For example, a statement like, "Lemon is the least favorite flavor" isn't quite right though it has the fewest sales. Maybe the first five sold were lemon and the seller ran out of the flavor. The graph tells what was sold not what was the favorite. And they might even write statements that aren't statistical or data-based statements as discussed in Asked and Answered (Routine #17).

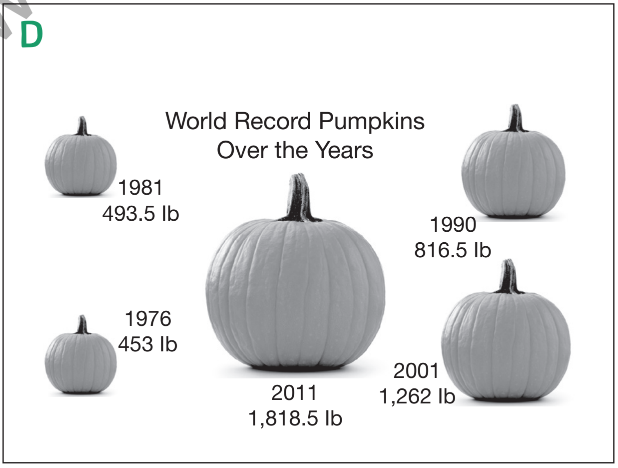


Source: istockphoto.com/duckycards

Variation D: Data With Infographics

Using the pumpkin data, not quite right statements could be

- The world records are shown every 10 years.
- 2011 was the largest pumpkin ever.
- The 1990 pumpkin was more than 1976 and 1981 combined.



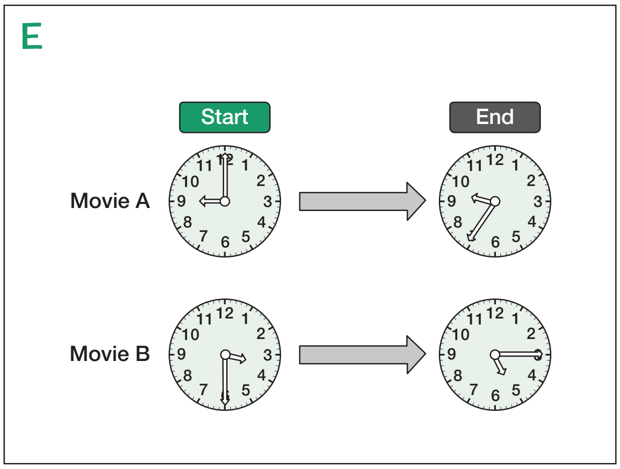
Source: istockphoto/MariuszBlach

Infographics were first mentioned in I Would Say (Routine #16). They would work great with this routine as well. Using these graphics with faulty statements should also provide the added benefit of causing students to ask questions about the data they encounter in these displays, among others. This notion pops with the first two statements especially. For the first statement, the world records aren't shown every 10 years but rather about every 10 years. That should spark the question, "why?" for your students. Was there no world record in 1971 or 1991? Were those years omitted because they were larger than other years? Look at the second statement. The year 2011 had the largest pumpkin ever according to the data presented. It can be assumed that it was the largest up to that point but maybe not. And 2011 was more than a decade ago. Have any larger pumpkins been grown since then?

Variation E: Elapsed Time

Using the movie time information, not quite right statements could be

- Movie A is an hour and a half.
- Movie B is an hour and 15 minutes.
- Movie A is longer.

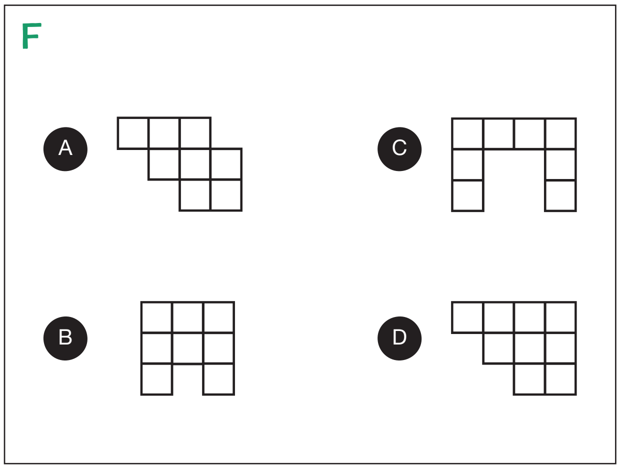


Elapsed time is an important and challenging measurement topic for students to practice. It will work well with other routines like See It, Build It (Routine #1). Here, you give two or more examples of elapsed time. Putting them in context, like lengths of a movie, can be helpful for posing questions. Students determine what isn't quite right about the statements that go with the information. In the example, movie A is an hour and 35 minutes. To make it a correct statement, students could say, "Movie A is more than a half hour." Movie B is an hour and 45 minutes not an hour and 15 minutes and movie B is longer. These two statements can be revised by simply making the information correct (i.e., movie B is longer). But to keep the experience fresh, and potentially more rigorous, ask students how the information might be changed so that the statements could be true. For example, movie B isn't an hour and 15 minutes. But if it was, how would the end time change if the start time is correct? Or how does the start time change if the end time of 5:15 is correct? In short, there is no one way to correct the statements.

Variation F: Area and Perimeter

Using figures A, B, C, and D, not quite right statements could be

- They all have the same area.
- Each figure has the same perimeter.
- Figure B has an area of 9.



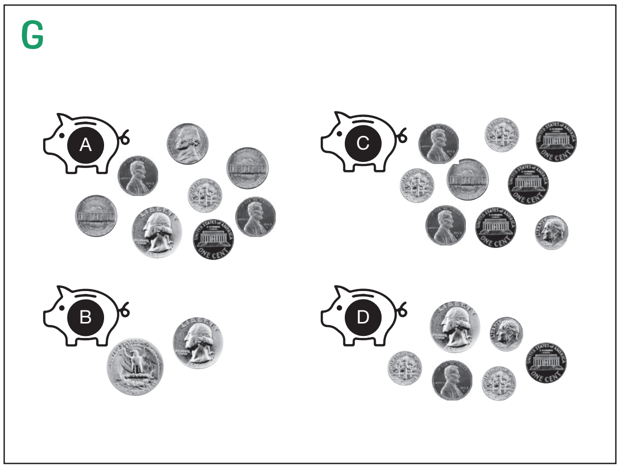
Area and perimeter are measurement topics that students sometimes confuse with each other and other times correlate. In other words, sometimes students see a static, unchanging relationship between area and perimeter. If a shape has an area of 12 and a perimeter of 16 then every shape with an area of 12 has a perimeter of 16. These students might think that as an area increases by 1 the perimeter increases by 1 and so on. That's why pentomino activities (See It, Build It, Routine #1, Variation E) have great value because they help students understand that figures with an area of 5 don't always have the same perimeter. Another way to practice this is to use a routine like this one where students compare the area and perimeter of different figures. These figures are good starting points because students can see the squares that make up each figure. In later experiences, or later grades for that matter, students would work with "open" figures with nothing more than the dimensions of each side provided. In this example, the first statement is not quite right because figure C has a different area. Figure D has a different perimeter, and figure B has an area of 8 making the middle and bottom statements incorrect, respectively.

Variation G: Money

For piggy banks A, B, C, and D, not quite right statements could be

- Piggy Bank B has the least amount of money.
- Piggy Bank A has less than 50¢.
- The total amount of money in all the piggy banks is over $5.00.

This routine offers a great opportunity to practice counting coins and comparing amounts of money. Students are presented with sets of coins and statements to evaluate. In this case, the coins represent money in four different piggy banks. The first statement is not true because piggy bank C has the least amount of money. The second statement is not quite right because bank A is just over 50¢. The third statement shows how you can incorporate all options into a statement. The banks do not total more than $5. Expect some students to count each coin in each bank to justify their thinking while others might reason that each of the four banks is less than $1 so in total they cannot be more than $5. This is more likely to happen when a statement, like the third, is offered after other banks have been discussed.



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