

MathLinks

**PROFICIENCY CHALLENGES
GRADE 6
SETS 5-8**

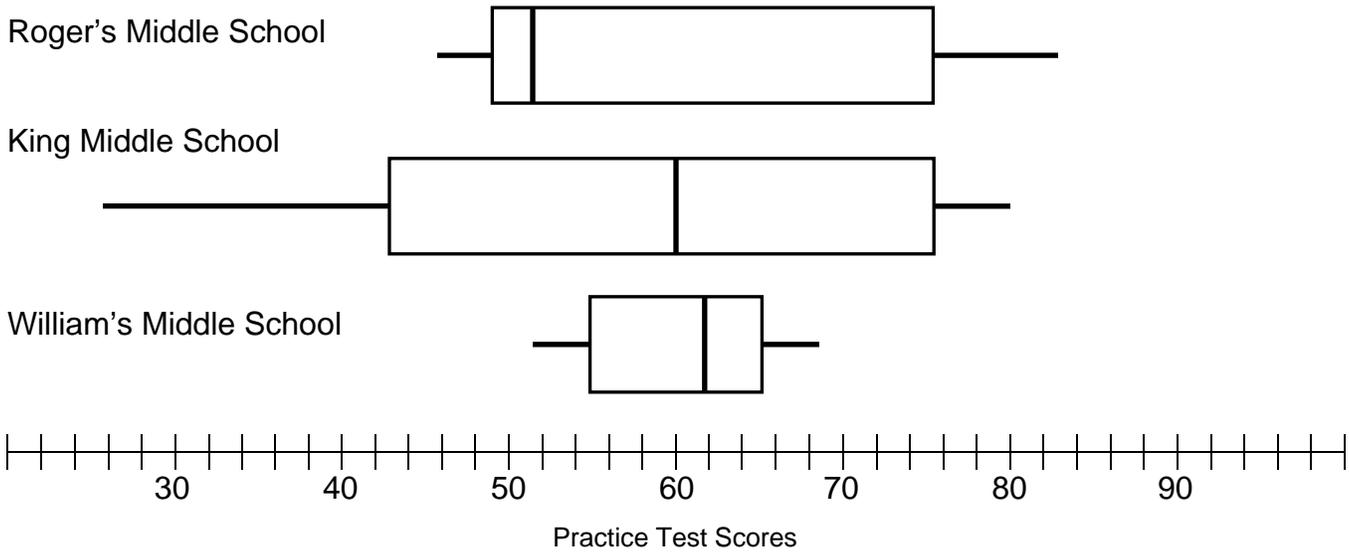
Proficiency Challenges are sets of interesting, mixed-topic problems. It may take a lot of time to complete each set, so consider doing only one or two parts at a time.

PROFICIENCY CHALLENGE 5

1. Mr. Bosman’s first period class of 40 students averaged 85% on the last math test. His second period class of 20 students averaged 97% on the same test.

Sarah thinks that the overall average on the test was a 91%.

- a. What reasoning might Sarah have used to arrive at her answer?
 - b. Critique her reasoning and then find a more accurate average test score for all of Mr. Bosman’s students.
2. Three different middle schools had teams competing in a mathematics challenge. Each team has 40 students. They each took a practice test right before the competition. Each team’s data was compiled and displayed below.



- a. What is the data being measured? Based on this data, rank the teams from strongest to weakest. Explain your reasoning using different measures of center and spread.
- b. Would your rankings change if only the top 50% of scores counted for each team? Explain.
- c. Would your rankings change if only the top 25% of scores counted for each team? Explain.
- d. Which team appears to have the smallest Mean Absolute Deviation (MAD)? Which team appears to have the largest MAD? How might this statistic relate to a team’s strength and performance in the competition?

PROFICIENCY CHALLENGE 6

1. Minh, Jon, and Isaac participated in a watermelon-eating contest to raise money for charity. The winner is the person that eats the most. Minh ate $2\frac{1}{4}$ small watermelons. Jon ate $1\frac{1}{3}$ medium watermelons. Isaac ate $\frac{3}{4}$ of a large watermelon.
 - a. If a large watermelon was twice as large as a medium watermelon and a medium watermelon was twice the size of a small watermelon, who won the contest?
 - b. Who came in last place?
 - c. If each small watermelon weighs 24 ounces and they raised \$0.25 for every ounce they ate, how much money did they raise in total?

2. The Walton family is ordering pizza for dinner. Olivia wants $\frac{1}{3}$ of a veggie pizza and a $\frac{1}{6}$ of a pepperoni pizza. John-Boy plays football and wants $\frac{1}{3}$ of a veggie pizza and $\frac{3}{4}$ of a pepperoni pizza. Zebulon only wants $\frac{1}{6}$ of a veggie pizza and $\frac{1}{6}$ of a pepperoni pizza. Esther wants $\frac{1}{2}$ of a veggie pizza and no pepperoni pizza.
 - a. The pizza place only makes whole pizzas of each type, and all the pizzas are the same size. How many whole pizzas of each type must the Waltons order to satisfy everyone in the family?
 - b. How much pizza of each type is left over for lunch the following day?

PROFICIENCY CHALLENGE 7

1. The *Mona Lisa* is a famous painting by Leonardo DaVinci. Many people who see the painting at the Louvre in Paris are often surprised at how small the painting is. It measures only $2\frac{1}{2}$ feet by $1\frac{3}{4}$ feet and is about 6 times the size of this sheet of paper.
 - a. What is the area of *Mona Lisa*?

Michelangelo painted a mural on the ceiling of the Sistine Chapel. The mural measures 133 feet by 46 feet.
 - b. How many whole copies of the *Mona Lisa* painting would fit in their entirety on the ceiling of the Sistine Chapel?
 - c. How many copies of the *Mona Lisa* painting would fit if you could cut the copies?
 - d. Compare the procedures in the previous two answers. How are they different? How are they the same?
2. Takara is making cookies for the school bake sale. She has $3\frac{1}{2}$ cups of sugar. The recipe calls for $\frac{3}{4}$ of sugar for one batch of cookies. She thinks she can figure how many batches she can make by computing $3\frac{1}{2} \times \frac{3}{4}$.
 - a. Show Takara that this computation will not lead to a logical answer.
 - b. Then show a correct computation and justify it with a picture.
3. Baker Bob will cut 6 identical loaves of bread into pieces that are $\frac{1}{4}$ of a loaf each.
 - a. After he cuts the 6 loaves, how many pieces will Baker Bob have? Show your work using numbers, words, and pictures.
 - b. He plans to sell only $\frac{2}{3}$ of the pieces that he cut. How many pieces will Baker Bob sell?
 - c. Of the remaining pieces he doesn't sell, he plans to give $\frac{3}{4}$ away to the local soup kitchen.
 - d. How many pieces does he give away?

PROFICIENCY CHALLENGE 8

1. The corner convenience store sells limes for 25¢, lemons for 40¢, and oranges for 55¢ (tax included). List all the ways that Krysta can spend exactly \$1.40 on these fruits.

2. Lee wants to buy pies for his party. About 30 to 40 people will be coming to the party. A pie will serve 4 to 5 people. Each pie costs \$8.75.
 - a. How many pies should Lee buy?
 - b. What will the total cost be?
 - c. If Lee has a budget of \$123 for the party, how much is left over?

3. People often say, "A journey of 1,000 miles begins with a single step."

What does this statement mean in your own words?

How many steps would you need to take to finish a journey of 1,000 miles?

What estimations or assumptions do you need to make in order to answer this question?

How will your answer change if the journey was 1,000 kilometers? Explain.

4. Sarah has \$14.56 to spend on beads. She buys 5 bags of large beads that cost \$1.15 per bag. She buys 7 bags of medium beads that cost \$0.85 per bag.
 - a. How much does she have left over to spend on bags of small beads?
 - b. If each bag of small beads costs \$0.70, how many bags of small beads can she buy?
 - c. How much money does she have left over after buying all her beads?