Math Links

PROFICIENCY CHALLENGES
GRADE 6
SETS 1-4

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.

Name_____   Period _____   Date _____

PROFICIENCY CHALLENGE 1

1. There are 31 people going on a trip and each van can hold 7 people, including the driver. Answer the following questions and explain your reasoning in a sentence for each answer. Drawing a diagram might be a helpful strategy here.

   a. How many vans will be needed to transport all 31 people?

   b. What is the greatest number of vans that can be filled?

   c. How many more people could go on the trip without requiring more vans?

   d. For the number of vans you found in part a, is it possible for all the vans to have less than 7 people?

2. A spider is at the bottom of a 14-foot well. Every day she crawls up 2 feet, but at night slips down 1 foot.

   How many days does it take the spider to get to the top of the well?

3. Mrs. Doodle bought 6 boxes of crayons to share with her students. Each box contains a total of 64 crayons.

   a. What is the total number of crayons Mrs. Doodle bought at the store?

   b. Mrs. Doodle has 32 students in her class. How many crayons should each student get if she wants to give each student an equal number?

   c. How many more boxes of crayons does Mrs. Doodle need if she wants each of her students to have 16 crayons?

4. A rectangle has an area of 120 square inches. Its length and width are whole numbers of inches. Making a table or a list might be a helpful strategy here.

   a. What are all the possibilities for the length and width?

   b. Which one gives the smallest perimeter?

PROFICIENCY CHALLENGE 1 (Continued)

5. Stephanie stops at a street corner and asked for directions to the Harietta's Hair Salon. Unfortunately, the person she asked was Louis Longway who gave her these complicated directions. "You are now facing north. Go straight for 2 blocks. Turn left. Go straight for 1 block. Turn right. Go straight for 3 blocks. Turn right. Go straight for 5 blocks. Turn right. Go straight for 3 blocks. Turn left. Go straight for 1 block. Turn right. Go straight for 4 blocks. Turn left. Go straight for 2 blocks. Turn left. Go straight for 1 block. Turn left. Go straight for 5 blocks and you are there." But by the time Stephanie gets there, Harietta's Hair Salon was closed.

    What would have been the shortest way to get to the salon? (You cannot cut diagonally through blocks.)

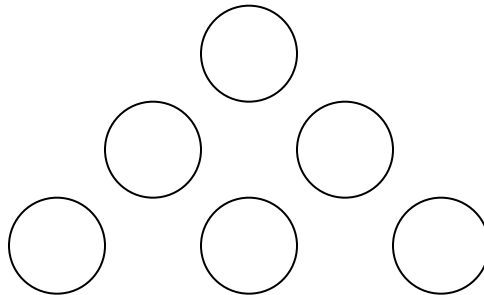6. Use the digits 0-9 once each to fill in the blanks in this puzzle:

    $4 + \_\_\_ = \_\_\_$ $\_\_\_ \cdot \_\_\_ = 2\_\_$ $\_\_\_ \cdot \_\_\_ = \_\_\_$ $6 - \_\_\_ = \_\_\_$

7. To complete this Magic Triangle, use the digits 1-6 once each. Place one digit in each circle so that the entries on each side of the triangle have a sum of 11.

Name_____   Period _____   Date _____

PROFICIENCY CHALLENGE 2

1. Write an expression that is equivalent to 49 using each of the following seven numbers and symbols once in the expression.

6	6	6	2 (an exponent of 2)	( )	+	÷

2. How many 9-inch-square floor tiles are needed to cover a rectangular kitchen floor that measures 144 inches by 180 inches?

3. The corner store sells hard candy for 5 cents, gum for 10 cents, and lollipops for 15 cents (with tax included in all the prices). List all the ways Kyrie can spend 35 cents on candy.

4. Juan threw five darts. The possible scores on the target were 2, 4, 6, 8, and 10. Each dart hit the target.

    From the list of total scores below, which are you certain are not possible? Explain for each.

    38, 23, 58, 30, 42, 31, 26, 6, 14, 15.

5. There are several eggs in a basket.
    If the eggs are removed two at a time, one egg will remain.
    If the eggs are removed three at a time, two eggs will remain.
    If the eggs are removed four at a time, three will remain.
    If the eggs are removed five at a time, four will remain.
    If the eggs are removed six at time, five eggs will remain.
    However, if they are taken out seven at a time, no eggs will be left over.

    What is the smallest number of eggs that could be in the basket?

6. Jean is practicing her long jumps for the track team.

    Her first jump measured 3 yards, 1 foot, and 2 inches.
    Her second jump measured 2 yards, 2 feet, and 9 inches.

    How much farther was her first jump compared to her second jump? Be sure to include the units of measurement in your answer.

Name_____   Period _____   Date _____

PROFICIENCY CHALLENGE 3

1. Examine each pair of fractions below. Determine which fraction in the pair is greater and explain your reasoning.

   $\dfrac{9}{10}$ and $\dfrac{19}{20}$ $\qquad\qquad$ $\dfrac{99}{100}$ and $\dfrac{999}{1000}$ $\qquad\qquad$ $\dfrac{999}{1000}$ and $\dfrac{1000}{1001}$

2. A ball is dropped from a height of 160 feet. After hitting the ground, it rebounds to a height of 80 feet and then continues to rebound at one-half of its former height thereafter. Find the total distance traveled by the ball when it hits the floor for the fifth time.

   How many times do you think the ball will bounce before it stops? Explain your reasoning.

3. Roberto is a courier (a messenger) in a large office building. He's currently on the middle floor of the building. He goes down five floors to retrieve a document and then goes up six floors to deliver that document. Finally he goes down ten floors to the main entrance of the building and leaves to go to lunch.

   How many floors are in the office building?

4. Veggie Fuel Motors is planning an employee and family day at the baseball park. They plan to reserve 6,000 seats. Each section at the ballpark has 15 seats in each row and is 18 rows deep and the ballpark will only allow them to reserve entire sections.

   How many sections does the ball club need to set aside for the employees and families?

   How many empty seats are there left over?

   Must every section be completely filled?

   Must every row be completely filled?

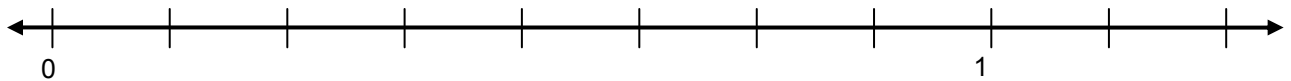Name_____   Period _____   Date _____

PROFICIENCY CHALLENGE 4

1. Roo and Tigger decided to have a race. Their racecourse was 123 feet long.

   Roo jumps 2 feet then 3 feet then 2 feet then 3 feet and keeps alternating in that pattern.

   Tigger jumps 4 feet then 1 foot then 4 feet then 1 foot and keeps alternating in that pattern.

   If every jump takes the same amount of time, who wins the race? Explain your reasoning.

2. The picture below shows six squares of equal area. The total area of the picture is 54ft^2.
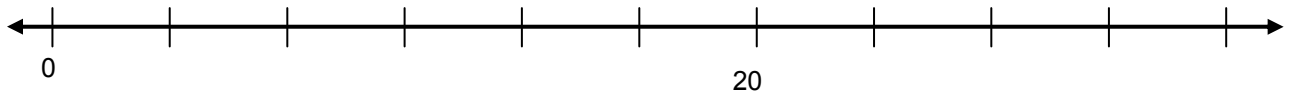   What is the perimeter?
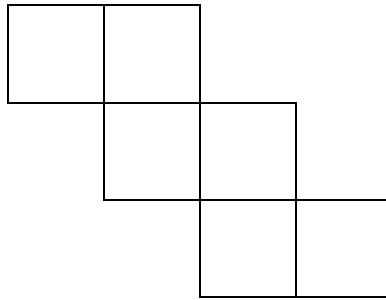
3. Write the number that corresponds to each marking on the number lines below. Then write
   letters above the line to estimate the placement of the given numbers.

   a.   (A) 0.1   (B) 1.10   (C) 1.01   (D) 0.874   (E) 0.876   (F) $\dfrac{9}{8}$

   0   1

   b.   (G) 3.3   (H) 3.3333   (J) 15   (K) 16.6   (L) 16.67   (M) $\dfrac{85}{3}$

   0   20

PROFICIENCY CHALLENGE 4 (Continued)

4. Color each of the three squares below so they all meet the following conditions. Show your calculations and explain your reasoning.

- ✓ 40% of the area is blue.

- ✓ $\dfrac{1}{5}$ of the area is red.

- ✓ $\dfrac{25}{100}$ of the area is yellow.

- ✓ one tenth of the area is green.

- ✓ 5% of the area is unshaded.