Math Links

PROFICIENCY CHALLENGES
GRADE 7
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.

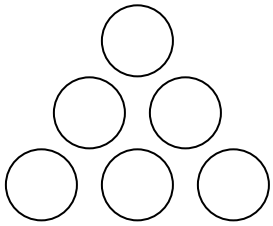
Name_____ Period _____ Date _____

PROFICIENCY CHALLENGE 1

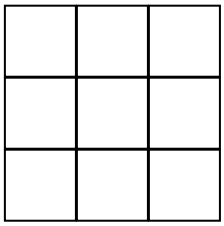
1. Use long division to find the decimal representation of $\frac{1}{11}$.

   Based on this decimal, what might the fraction representation be for $0.0\overline{45}$? Explain your reasoning and then check using long division.

2. Complete the circles puzzle by using the digits 1 through 6 once. Place one digit in each circle so that the sum of each side of the triangle is 11.



3. Complete the square puzzle by using the digits 0 through 8 exactly once. The sum of each row, column, and diagonal must be 12. Try to find more than one solution.



4. Mr. Bosman builds tricycles and bicycles in his shop. He has a total of exactly 29 wheels.

   What are some possible combinations of tricycles and bicycles he can make if he wants to use all the wheels?

   Write your answers as ordered pairs (# of tricycles, # of bicycles) and graph them on a coordinate plane. Describe any patterns you see.

5. Use only the numbers below to complete the following problems.

   3 2 1 7 8 9 1,000

   a. Write three fractions that have a value less than 1.
   b. Write three fractions that have a value greater than 1.
   c. Write two fractions that have a value between 1 and 2.
   d. Write two fractions that have a value between 3 and 10.
   e. Write a fraction that represents the least possible value.

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PROFICIENCY CHALLENGE 2

1. Draw a coordinate plane on graph paper. Then create the following map of a town by plotting points to represent each location.

   Town hall is located at the origin.
   A bank is located at (-7, 6).
   A school is at (-7, -5).
   A park is at (5, 6).
   A post office is at (-8, 6).
   A store is at (-8, -5).

   Based on your map, determine if the following statements are true or false.

   a. The bank is closer to the school than the post office.
   b. The distance from the bank to the school is equal to |6| + |-5|.
   c. The location of a library has the same *y*-coordinate as the store. If the library is the same distance from the store as the park is from the bank, then the *x*-coordinate of the library is 3.
   d. The distance from the bank to the post office is equal to -1.

   If your friend lives equidistant from the park and the post office, list a coordinate that could represent the location of her house?

   Do you think there are several coordinates that are equidistant from the park and the post office? Explain.

2. On a coordinate plane, create a map of a college campus based on the following description.

   a. The student center is at the origin.
   b. The science building is located 8 units from the student center.
   c. The math building is located 5 units from the science building and more than 4 units from the student center.
   d. The dorm is located 6 units from the student center and 14 units from the science building.
   e. The anthropology building is located at (-7, -11).
   f. The humanities building is located 12 units from the anthropology building.

   Find the coordinates for each building on your map.

   Carlos thinks that the dorm and the science building must be located directly across from the student center. Do you agree or disagree with Carlos's assertion? Explain..

   Juan located his humanities building at (5, 1) because the y-values have a different of 12. What mistake is Juan making? How would you explain his error to him?

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PROFICIENCY CHALLENGE 3

1. Use the numbers below to complete the following problems.

   1 -12 -7 5 -4 -2 7 -5 4 12 -1 0

   a. Plot all numbers on a single number line.
   b. List all zero pairs.
   c. Find a set of three numbers whose sum is zero.
   d. List two unique pairs of numbers that each have a sum of 5.
   e. List two unique pairs of numbers that each have a sum of -5.
   f. List two unique pairs of numbers in the correct order that make the following equation true:

      _____ − _____ = 8

   g. List two unique pairs of numbers in the correct order that make the following equation true:

      -(_____) – _____ = -3

2. Brianna thinks that the sum of all integers from -100 to 100 is equal to zero. Determine if Brianna is correct and explain your reasoning.

3. Find the sum of all the integers from -20 and 15. Try to take shortcuts to make your calculations easier. Explain any shortcuts that you take.

4. List several real-world experiences in your life that might be examples of the following. Be creative!

   a. The additive inverse property
   b. The additive identity property

5. Samantha counted the lines of a page in her math text book. When she counted by threes, she got a remainder of 2. When she counted by fives, she also got a remainder of 2. Counting by sevens gave her a remainder of 5. How many lines were on the page?

   Show your work and explain your reasoning.

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PROFICIENCY CHALLENGE 4

1. For each statement, identify all the numbers in the list below that make the statement true. You may use numbers in the list more than once.

-5.2	4.9	$\frac{3}{2}$	$-\frac{7}{3}$	-6	6	-1.75	1.34

Statement	Numbers that make the statement true
a. -4.8 + _____ = a positive number	
a. a negative number = _____ - $1\frac{1}{2}$	
b. _____ + 6 = 0	
c. -2.21 - _____ = a negative number	

2. Each of the following sets of ordered pairs represents three vertices of a rectangle. Find the missing coordinates of the fourth vertex. Use numerical reasoning. Check by graphing.

A (1.2, -3.4)

B (1.2, -4.5)

C (3.1, -3.4)

D (___, ___)

E $\left(1\frac{1}{2},\ -3\frac{1}{4}\right)$

F $\left(\text{—},\ \text{—}\right)$

G $\left(1\frac{1}{2},\ -4\frac{3}{5}\right)$

H $\left(-\frac{2}{3},\ -3\frac{1}{4}\right)$

Which of the two rectangles has the greater perimeter? Justify your conclusion.