

Appendix H

Math Writing Tasks



Students will benefit from practicing a variety of writing tasks as they learn to effectively communicate their math ideas.

Illustrate (and Label) a Problem or Concept

Mathematical content can be conveyed and/or clarified through the inclusion of pictures and diagrams. Teachers might begin by asking students to show what they know through pictures and labels, and then assist them in combining text and diagrams to better explain the ideas. The following are some sample prompts.

- Draw 3 red apples and 5 green apples.
- Draw more than 3 kites. Write the number to show how many are in your picture.
- Draw a square with a circle above it and a triangle below it.
- Choose 4 space figures. Draw a real-life example that illustrates each one.
- Draw a picture to show $12 + 5 = 17$.
- Illustrate the following fractions: $\frac{2}{3}$, $\frac{1}{5}$, $\frac{0}{7}$, $\frac{4}{4}$. Write a phrase to describe each picture.
- Draw a picture to help you solve the following problem: $\frac{1}{3}$ of 27 = ?
- Draw and label a right angle, an obtuse angle, and an acute angle.
- Illustrate area and perimeter.
- Draw and label some polygons.
- Illustrate flips, slides, and turns.
- Draw and label 2 similar figures and 2 congruent figures.
- Draw a picture that shows symmetry; draw the line of symmetry.
- Draw a picture to show the difference between 3 tens and three tenths (.3).

- Draw 3 different rectangles that each have an area of 24 square units.
- Draw and label a diagram to show that you understand radius, circumference, and diameter.

Give Examples/Make Lists

Providing examples is a powerful way to communicate understanding. The use of examples in math will help many students more clearly communicate their ideas. The following are some sample prompts.

- List numbers that are less than 10.
- Make a list of things that come in pairs.
- List things you could measure with a ruler.
- List places where you might see fractions.
- List 5 things you would buy if you won \$100.00.
- Give an example of events in your life that you consider (1) certain, (2) impossible, (3) likely but not certain, and (4) unlikely but not impossible.
- Make a list of things that are about 5 centimeters long.
- List as many U.S. coins as you can.
- Give examples of times when you might need to know how to count money.
- Give examples of space figures and plane figures.
- Take a walk around the school, then list examples of things you saw that had right angles (or are a certain shape).
- Give examples of ways that decimals are used in the world.
- List fractions that are equivalent to $\frac{1}{4}$.
- Give examples of everyday uses of mathematics.
- Make a list of types of graphs you might use to display data.
- List things that are packaged in a cylinder.
- List measures of capacity (or distance, weight, etc.).
- Make a list of metric units of measurements for distance; order them from smallest to largest.

Write a Word Problem

Writing word problems provides a critical link between *doing* math (computational skills) and *understanding* math (conceptual understanding). Having students write word problems helps teachers assess their understanding of math concepts and provides a strong foundation for math problem solving. The following are some sample prompts.

- Write a story problem to go with this picture (choose from pictures in a piece of literature, a newspaper, or a magazine).
- Write a problem that can be solved using division (addition, subtraction, or multiplication).
- Write a problem that can be solved using this equation: $4 \times 12 = 48$.
- Find a newspaper ad; write a problem that can be solved using the data from it.
- Write a problem that can be solved using the formula: $A = L \times W$.
- Write a word problem that must be solved in at least 2 steps.
- Write a problem about the sale price of a shirt.

Predict/Estimate an Answer or Outcome

Writing predictions provides students with practice in building number sense, supports students' development of sound problem-solving skills, and tests students' reasoning skills as they justify their predictions or estimates. The following are some sample prompts.

- Predict how many paper clips will fit from one end of your desk to the other. Why did you predict that number?
- Predict how many nickels are in 30 cents. Explain your prediction.
- Predict which is more, 3 dimes or 4 nickels. Explain your prediction.
- Predict how many times you can write your name in one minute. Explain your prediction.
- Estimate how many cubes are in the container. Explain how you arrived at your estimate.
- Looking at this grocery list (milk, \$1.79; bread, \$1.65; steak, \$5.45; cereal, \$3.24), estimate how much money you will need to buy the items listed. Explain how you arrived at your estimate.
- Estimate the average age of children who are 9, 11, 12, 16, and 17. Explain your estimate.
- If you can write your name 8 times in a minute, predict how many times you can write your name in an hour. Explain your prediction.
- Predict whether the probability game is fair (specify a particular game). Explain your answer.
- Predict the most frequently used letter of the alphabet. Explain your prediction.

Describe/Define

Definitions and descriptions allow students to show what they know about math terms and concepts. Use the following sample prompts or some of your own.

Describe a Concept or Process

- Describe this pattern (any pattern that is grade level appropriate).
- Describe a rectangle.
- Describe a rectangular prism.
- Describe how to find the area of a triangle (rectangle, etc.).
- Describe the data on this graph.
- Describe the data in this table.
- Describe an isosceles triangle.

Define a Word or Concept

- Define (word of the day).
- What is a pattern?
- What is a fraction?
- Define triangle, pentagon, and hexagon using the word *polygon*.
- Define perimeter.
- A congruent figure is . . .
- Define probability.
- What is a polyhedron?
- What is a tessellation?
- What is surface area?

Explain a Process (Write Instructions/Directions)

Written explanations for how to do a math process are clearer if students indicate the steps and order for doing that process. The following are some sample prompts.

- Explain how to measure the length of your pencil using paper clips.
- Explain how to tell time.
- Explain the strategy you used to solve this problem.
- Imagine you are buying new carpeting for your room. Explain how you will figure out how much carpeting to buy.
- Write directions for rounding a whole number to the nearest 100.
- Explain how to find a common denominator.
- Explain how to add fractions with unlike denominators.
- Write directions for reducing a fraction to lowest terms.
- Explain how to compare (or order) fractions (or decimals).
- Imagine you are helping a friend understand decimals. Explain to your friend how you would add 1.23 and 3.5.
- Write directions for using a matrix to solve a logic problem.
- Explain how to multiply (or divide) decimals (or fractions).
- Explain how to determine the area of a rectangular yard that has a width of 25 feet and a length that is 15 feet more than its width.
- Explain how to solve for X : $2,053 = X - 516$.

Compare and/or Contrast Concepts, Processes, or Solutions

Comparing and contrasting ideas helps students build a stronger understanding of those ideas. The following are some sample prompts.

- How are a penny and a nickel alike? How are they different?
- Compare/contrast a square and a triangle.
- Compare/contrast Brendan and Katie's methods of solving the problem.
- Compare/contrast a hexagon and an octagon.
- Compare/contrast a rectangular prism and a rectangle.
- Compare/contrast the math used in a menu and a recipe.
- How are fractions and decimals alike? How are they different?
- Compare/contrast obtuse and acute angles.
- Compare/contrast money and decimals.
- Compare/contrast area and perimeter.
- Compare/contrast intersecting, parallel, and perpendicular lines.
- Using the baseball statistics in a newspaper, compare/contrast the batting of Derek Jeter and Alex Rodriguez.
- Compare/contrast positive and negative numbers.
- Compare/contrast multiplying whole numbers and multiplying decimals.
- Compare/contrast proportions and ratios.
- Compare/contrast fractions, decimals, and percents.
- Compare/contrast independent and dependent events.
- Compare/contrast experimental and theoretical probability.

Justify a Process or Solution

Justifying a process or solution requires that students elaborate on *why* they believe the answer is correct or the process was reasonable. The use of specific mathematical data, combined with logical reasoning, strengthens student justifications. The following are some sample prompts.

- Would a dog be 2 feet tall or 20 feet tall? Justify your answer.
- Which is worth more, 2 dimes or 3 nickels? Justify your answer.
- Which of these does not belong: a penny, a nickel, a dime, a dollar? Why?
- Using today's predicted temperatures, decide what you will wear to go outside to play. Justify your decision.
- Which is greater, $32 - 8$ or $27 + 3$? Justify your answer.
- Brendan is 4 feet 6 inches tall. When Katie grows 7 more inches, she will be 5 feet tall. Who is taller? Prove your answer.
- Why is it important to estimate when using a calculator?
- Why is repeated subtraction another name for division?
- Why do we have to line up decimal points when adding?
- Why do we need a common denominator to add (or subtract) fractions?
- A 12" round pizza costs \$6.50. A 10" \times 14" rectangular pizza costs the same amount. Which pizza is the better buy? Justify your answer.
- Why do we need to learn math?
- Why do we need 0 in our number system?
- Which problem-solving strategy did you use to solve this problem? Why did you choose this strategy?

Write a Summary

Writing summaries requires students to be able to pinpoint key ideas learned. Summaries are great closure activities for daily lessons or math units. The following are some sample prompts.

- What did you learn in math class this week?
- KWL—What do you **K**now about this math topic? What do you **W**ant to know? (and later . . . What have you **L**earned?)
- Summarize what you learned about _____.
- Write 3 tips for someone learning about this topic.
- The most important things to know about _____ are . . .
- Summarize the key points from this math unit/chapter.

Reflect on Learning

Reflective writing can focus on content knowledge, mathematical connections, or students' feelings and attitudes about learning math. Reading students' reflections can provide teachers with insights into their successes, challenges, and frustrations; and they can help teachers make sound instructional decisions to clarify misunderstandings, reteach difficult skills, connect math concepts, or support frustrated learners. The following are some sample prompts.

- What was difficult/easy about today's activity?
- During today's math lesson, I felt . . .
- Is there anything about today's lesson that you had trouble understanding?
- What questions do you have about today's lesson?
- What can you do today that you couldn't do yesterday?

- What lesson would you like to hear again? Why?
- Reading my math book is different than reading other books. When I read my math book, I . . .
- What have you learned about solving problems? What is difficult about problem solving?
- When I get stuck on a math problem, I . . .
- Solving problems is easy if . . .
- “Math is fun!” Do you agree or disagree? Explain your answer.
- Has writing in your math journal helped you better understand the math we do in class? Explain.
- Today I made this mistake . . . I learned . . .
- Can you describe any connections between what you learned today and other subject areas or real-life situations?
- How will understanding mathematics help you in science class?
- How will understanding mathematics help you in social studies class?
- How does your family use math?
- I will use the math I learned in this unit when . . .
- Understanding math will help me . . .
- What careers might require an understanding of math? Explain.
- Math is important in sports because . . .

Create a Poem or Essay (Creative Writing)

Creative writing is a motivating way to blend content knowledge and language arts skills. Students are able to share their understanding of mathematical concepts as they use their creativity to write stories, poems, or tall tales. The following are some sample prompts.

- Create a counting book about animals (or toys or food).
- Create a math poem to express your feelings about math or demonstrate your understanding of a math skill or concept.
- Create an acrostic poem using a math word (e.g., FRACTION—each letter of the word is to begin a line that refers to the concept of fractions).
- Write a story about a country where there are no numbers.
- You just visited The Land of Shapes. Write a letter to your best friend explaining some of the things you saw and did.
- Create a children’s story that teaches measurement.
- If I was 5 cm tall . . .
- Write a tall tale that uses math data.
- Write a story about the problems of an athlete who does not understand math.