

# Standard 3—Mathematics

Elementary

## Mathematical Reasoning

1. Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument.

Students:

- use models, facts, and relationships to draw conclusions about mathematics and explain their thinking.
- use patterns and relationships to analyze mathematical situations.
- justify their answers and solution processes.
- use logical reasoning to reach simple conclusions.

*This is evident, for example, when students:*

- ▲ build geometric figures out of straws.
- ▲ find patterns in sequences of numbers, such as the triangular numbers 1, 3, 6, 10, . . . .
- ▲ explore number relationships with a calculator (e.g.,  $12 + 6 = 18$ ,  $11 + 7 = 18$ , etc.) and draw conclusions.

## Number and Numeration

2. Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

Students:

- use whole numbers and fractions to identify locations, quantify groups of objects, and measure distances.
- use concrete materials to model numbers and number relationships for whole numbers and common fractions, including decimal fractions.
- relate counting to grouping and to place-value.
- recognize the order of whole numbers and commonly used fractions and decimals.
- demonstrate the concept of percent through problems related to actual situations.

*This is evident, for example, when students:*

- ▲ count out 15 small cubes and exchange ten of the cubes for a rod ten cubes long.
- ▲ use the number line to show the position of  $1/4$ .
- ▲ figure the tax on \$4.00 knowing that taxes are 7 cents per \$1.00.

### Sample Problems

16. Marlene is designing a uniform for her soccer team. She can choose from 2 different shirts and 3 different pairs of shorts. How many different uniforms can she make if she uses all the shirts and all the shorts?



Answer \_\_\_\_\_

Explain how you got your answer with a picture or diagram.

Ms. Rivera's class must collect 180 soda cans to win the recycling contest. The chart below shows how the class is doing. How many cans must they collect in the fourth week to reach the goal of 180?

Week	Cans
1	42
2	74
3	18
4	
Goal	180

Answer \_\_\_\_\_

Key ideas are identified by numbers (1).  
Performance indicators are identified by bullets (•).  
Sample tasks are identified by triangles (▲).

**Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry.**

## **Operations** **Modeling/Multiple Representation**

**3. Students use mathematical operations and relationships among them to understand mathematics.**

Students:

- add, subtract, multiply, and divide whole numbers.
- develop strategies for selecting the appropriate computational and operational method in problem-solving situations.
- know single digit addition, subtraction, multiplication, and division facts.
- understand the commutative and associative properties.

*This is evident, for example, when students:*

- ▲ use the fact that multiplication is commutative (e.g.,  $2 \times 7 = 7 \times 2$ ), to assist them with their memorizing of the basic facts.
- ▲ solve multiple-step problems that require at least two different operations.
- ▲ progress from base ten blocks to concrete models and then to paper and pencil algorithms.

**4. Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships.**

Students:

- use concrete materials to model spatial relationships.
- construct tables, charts, and graphs to display and analyze real-world data.
- use multiple representations (simulations, manipulative materials, pictures, and diagrams) as tools to explain the operation of everyday procedures.
- use variables such as height, weight, and hand size to predict changes over time.
- use physical materials, pictures, and diagrams to explain mathematical ideas and processes and to demonstrate geometric concepts.

*This is evident, for example, when students:*

- ▲ build a  $3 \times 3 \times 3$  cube out of blocks.
- ▲ use square tiles to model various rectangles with an area of 24 square units.
- ▲ read a bar graph of population trends and write an explanation of the information it contains.

### **Sample Problems**

7. Shanelle earns \$3.50 per hour for babysitting. Each week she babysits for 4 hours.

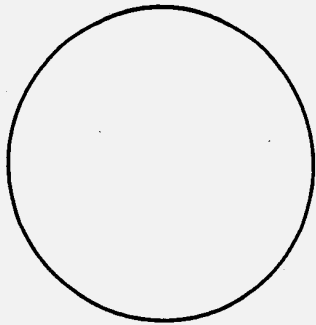
A) How much money does she earn in 1 week?

Answer \_\_\_\_\_

B) How much money does she earn in 4 weeks?

Answer \_\_\_\_\_

11. Bobbie's family bought a pizza. Her mother and sister together ate  $\frac{1}{2}$  of the pizza. Bobbie ate  $\frac{1}{2}$  of what was left. Use the circle to draw a picture that shows how much of the pizza Bobbie ate.



What fraction of the whole pizza did Bobbie eat?

Answer \_\_\_\_\_

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## Measurement

**5. Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.**

**Students:**

- understand that measurement is approximate, never exact.
- select appropriate standard and nonstandard measurement tools in measurement activities.
- understand the attributes of area, length, capacity, weight, volume, time, temperature, and angle.
- estimate and find measures such as length, perimeter, area, and volume using both nonstandard and standard units.
- collect and display data.
- use statistical methods such as graphs, tables, and charts to interpret data.

*This is evident, for example, when students:*

- ▲ measure with paper clips or finger width.
- ▲ estimate, then calculate, how much paint would be needed to cover one wall.
- ▲ create a chart to display the results of a survey conducted among the classes in the school, or graph the amounts of survey responses by grade level.

## Uncertainty

**6. Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations.**

**Students:**

- make estimates to compare to actual results of both formal and informal measurement.
- make estimates to compare to actual results of computations.
- recognize situations where only an estimate is required.
- develop a wide variety of estimation skills and strategies.
- determine the reasonableness of results.
- predict experimental probabilities.
- make predictions using unbiased random samples.
- determine probabilities of simple events.

*This is evident, for example, when students:*

- ▲ estimate the length of the room before measuring.
- ▲ predict the average number of red candies in a bag before opening a group of bags, counting the candies, and then averaging the number that were red.
- ▲ determine the probability of picking an even numbered slip from a hat containing slips of paper numbered 1, 2, 3, 4, 5, and 6.

### Sample Problems

It's Saturday and you're going to meet your friends for lunch and a movie. You have to leave your home at 11:30 AM. Your parents say you can't go until you finish your work. Your work includes your homework and your Saturday chores:

- 40 minutes of math homework.
- 30 minutes to clean your room.
- 15 minutes to fold the laundry
- 5 minutes to take out the garbage
- 60 minutes to eat and get ready to go

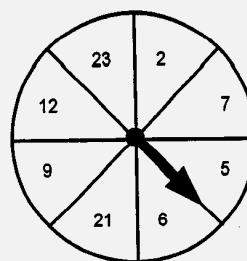
A) At what time should you get started doing your work?  
Show all the math you did to figure this out.

Answer \_\_\_\_\_ AM

B) Describe how you would use your time between when you wake up and when you leave at 11:30 AM to go to lunch and the movie.

Key ideas are identified by numbers (1).  
Performance indicators are identified by bullets (•).  
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The spinner below was used by Jodie's class for the school fair:



A) If the spinner is spun once, what is the probability of the spinner landing on an even number?

Answer

B) If the spinner is spun a second time, what is the probability of the spinner landing on a number that is divisible by 3?

Answer

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## Patterns/Functions

**7. Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently.**

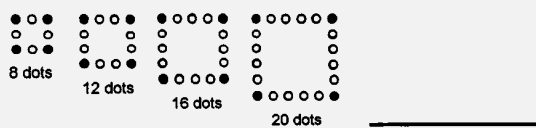
**Students:**

- recognize, describe, extend, and create a wide variety of patterns.
- represent and describe mathematical relationships.
- explore and express relationships using variables and open sentences.
- solve for an unknown using manipulative materials.
- use a variety of manipulative materials and technologies to explore patterns.
- interpret graphs.
- explore and develop relationships among two- and three-dimensional geometric shapes.
- discover patterns in nature, art, music, and literature.

*This is evident, for example, when students:*

- ▲ represent three more than a number is equal to nine as  $n + 3 = 9$ .
- ▲ draw leaves, simple wallpaper patterns, or write number sequences to illustrate recurring patterns.
- ▲ write generalizations or conclusions from display data in charts or graphs.

### Sample Problem



Draw the next figure in this pattern. How many dots are in the figure you drew?

Answer \_\_\_\_\_

Write one or two sentences to describe how the figure is changing.

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