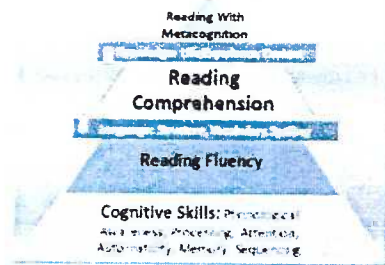


## Reading Comprehension



### Explicitly Teaching Inferences

1. Based on the facts on page \_\_\_\_, what conclusion can you make?
2. Why is it important that \_\_\_\_\_?
- 3 After looking at the picture on page \_\_\_\_, what can you know about a \_\_\_\_\_?

### Explicitly Teaching Critical Literacy

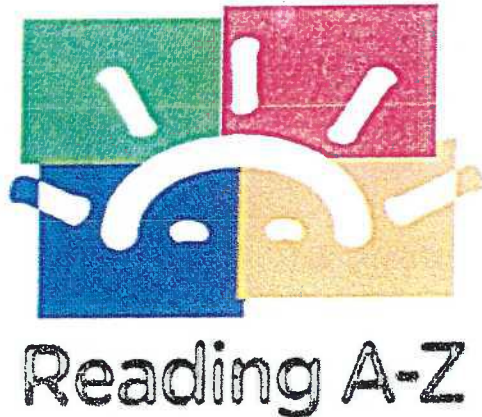
1. What was the author's purpose in writing this story?
2. Where can you find the author's purpose? (It is always the main idea in the first paragraph on the first page)
3. Why is writing about this topic important?
4. Was the story difficult to understand? Why or why not?

### Explicitly Teaching Creative Literacy

1. Can you tell me about a time when \_\_\_\_\_?
2. Can you tell me about a \_\_\_\_\_ you have seen?
3. If you were going to write this story how would you chose to end it?  
Why would you chose that ending?
4. What other information could the author have given the audience? Why would that information be important to know?

### Teaching Visual Literacy Skills

Visual literacy is the ability to evaluate, apply, or create conceptual visual representations. Skills include the evaluation of advantages and disadvantages of visual representations, to improve shortcomings, to use them to create and communicate knowledge, or to devise new ways of representing insights.



## FLUENCY STANDARDS TABLE

Recommended reading rates, or words read per minute, for grades one through six were examined from three separate research studies. The findings of these studies were used by Reading A-Z to establish an average early and end reading rate per grade level. Your student's reading rates can be compared to these average rates as a way to determine whether they are making progress in their ability to recognize words automatically. The comparison can also be used to determine whether a student's reading rate is near the grade level standard. For example, a beginning third grade student with a reading rate of 110 WPM can be considered on level. However, a third grade student with a reading rate of 60 WPM is recognizing words at a rate similar to a first grader and will likely need additional instructional support to increase his or her reading rate.

### READING A-Z RECOMMENDATIONS WORDS PER MINUTE (WPM)

GRADE	BEGINNING RATE	MID-YEAR RATE	END RATE
1	50	60	70
2	70	80	100
3	100	120	130
4	130	135	140
5	140	150	160
6	160	165	170

# Grade 6

## Expository Composition

### Definition of an Expository Composition

In Grade 6, students write a variety of expository compositions which emphasize description, explanation, comparison/contrast or problem/solution. In these types of writing, students state a thesis or purpose in the writing, explain a situation, and follow an organizational pattern appropriate to the type of composition.

This guide will provide activities and instruments to assess the student's ability to write expository compositions that **compare and contrast**.

### Importance

Comparing and contrasting two or more subjects provides students an opportunity to operate at a higher level of thinking. In order for students to determine how subjects are alike and different, they must first fully analyze each subject. Once students know the subjects well enough, they are able to more intelligently dissect the characteristics of each subject and identify similarities and differences.

### Prior Instruction for Writing Comparison/Contrast Essays

The prior instruction necessary for students to meet the grade level standards in writing requires the implementation of a balanced writing program. This includes daily whole-class demonstrations and instruction (writing aloud, shared writing, interactive writing), frequent individual instruction (guided writing), and daily opportunities to write independently.

Below are suggestions for classroom activities designed to prepare students to meet writing standards, especially those related to writing expository compositions.

### Organize a Comparison/Contrast Essay

In a comparison/contrast essay, students may organize their essays in one of the following ways:

#### Subject by Subject

Features are addressed first, then compared or contrasted with those of another subject. The writer transitions between the two subjects midway through the essay.

#### Subject #1

- Feature:
- Feature:
- Feature:

#### Subject #2

- Feature:
- Feature:
- Feature:

**Feature by Feature**

Each feature from the two subjects is addressed one at a time. The writer transitions between features throughout the body of the essay.

**Feature**

- Subject #1:
- Subject #2:

**Feature**

- Subject #1:
- Subject #2:

**Feature**

- Subject #1:
- Subject #2:

**Organize a Multiple-Paragraph Essay**

Students need to practice the organization of a multiple-paragraph essay which includes a strong introduction, well-developed supporting paragraphs, and a satisfying conclusion. Instruction should include ample teacher modeling, analysis of anonymous student samples illustrating various levels of writing performance from poor to excellent, opportunity to practice, and timely teacher feedback which guides further efforts.

The Grade 6 writing assessment asks students to create a multiple-paragraph comparison/contrast expository composition which includes a(n):

- **Introduction** which engages the interest of the reader and states a clear purpose for the essay,
- **Body** which develops the topic with supportive details and precise verbs, nouns, and adjectives in order to paint a visual image in the mind of the readers
- **Conclusion** which features a detailed summary linked to the purpose of the composition.

**Include Relevant Detail and Description**

Students should have numerous opportunities to learn the ways in which detail and description add depth and breadth to writing, as well as many chances to practice and refine these skills. Providing instruction in such literary elements as sensory detail, precise and vivid vocabulary, and figurative language (e.g. simile, metaphor) help students to understand the difference between “showing” versus “telling” the information they wish to relate to the reader. Analyzing a variety of written models, including anonymous student samples, assists in conveying these points more concretely.

## **Directions for the Writing Assessment Comparison/Contrast Expository Composition**

**To the Teacher**

You are encouraged to treat this prompt as a series of class lessons, even though the student work produced may be used to determine if the student has met state standards. These directions provide guidelines, but please use your own discretion in walking students through the prompt. If you plan to use the student writing to determine whether the student has met, in part, the grade level standards in writing, then you should conduct the following as consistently as possible throughout the school.

Once prior instruction has taken place, the three-part assessment process begins. The number of class days involved will vary according to individual teaching situations and preferences. However, if this assessment is being used across the school site or district at this grade level, this process should also be as consistent as possible.

### **General Guidelines for Assessing Students**

In order to maintain consistency, the following guidelines may be useful:

- Use the same prewriting activities for each trial.
- Follow the directions at each step.
- Do not provide answers to student questions that would directly meet the standards.
- Students may use spelling resources which are regularly available in the classroom (wall charts, word lists, dictionaries, thesaurus). Students may **not** use computers or electronic spelling aids.
- Do not allow peer or teacher assistance during the actual writing process.
- Do not allow papers to be taken home during the assessment process.

The following may be adjusted to meet student needs:

- Rephrase the directions for better student understanding.
- Allow students access to their primary language if that will assist in understanding the task.

### **Materials**

Materials included:

- Teacher Instructions
- Prewriting Graphic Organizer
- Prewriting Categorization Chart
- Student Writing Prompt
- Student Checklist
- Teacher Scoring Guide

To be provided by the teacher and/or student:

- Writing paper
- Writing utensils
- Dictionaries, thesaurus, and other resources regularly used in the classroom

### **Time Limits**

Three sessions are required for the assessment portion of this lesson. These sessions may take place over three days or less, depending on site and teaching considerations. Parts I and II should last no more than 60 minutes each. Part III should last no more than 120 minutes.

## Introducing the Assessment

### Part I: Prewriting (60 minutes)

The purpose of the prewriting activity is to connect the activities included in the prior instruction component to the actual writing students will do. This portion of the assessment allows students the opportunity to organize their ideas into well-written comparison/contrast expository compositions.

#### Materials Needed

- Butcher paper or transparency for Prewriting Graphic Organizer/Brainstorming Chart
- Individual copies of Prewriting Graphic Organizer/Brainstorming Chart—one per student (blackline master included in Grade 6 Appendix)
- Individual copies of Prewriting Categorization Chart—one per student (blackline master included in Grade 6 Appendix)

### Model, Practice, and Apply the Prewriting Process

The following activities will prove most successful if the teacher first models the process as a whole class, allows students to practice each step in small groups or pairs, and then asks students to apply the same process independently.

#### Whole Class Brainstorm for Comparing/Contrasting

Use the Prewriting Graphic Organizer/Brainstorming Chart below, copied onto a large piece of butcher paper or overhead transparency, to guide students through these steps:

- Introduce the prompt, discussing as needed for understanding and generating ideas.
- Explain the purpose of using the graphic organizer.
- Model the appropriate steps involved in completing the chart.
- List student-generated ideas in appropriate sections of the chart.
- Note to students that ideas offered are not always factual and may instead be based upon personal preference or experience.

#### Prewriting Graphic Organizer/Brainstorming Chart Comparing/Contrasting Fast Food Restaurants

Restaurant	Features	Positive Descriptive Words	Negative Descriptive Words

#### Example of Partially Completed Brainstorming Chart

Restaurant	Features	Positive Descriptive Words	Negative Descriptive Words
McDonalds	large menu, good prices, great french fries, children's meals	varied, inexpensive, salty, piping hot, kid-friendly	noisy, crowded, slow, predictable
Taco Bell	Mexican food, special offers, playground, clean eating area	unusual, spicy, fun, spacious, meticulous, inexpensive	greasy, fattening, noisy, messy

**Whole Class Categorizing of Information**

Students categorize the features brainstormed above by applying them to the Prewriting Categorization Chart below. Some of the features listed for Subject #1 will be similar to those for Subject #2; others will be different. Students note the common characteristics of each, as well as those they do not share.

**Prewriting Categorization Chart**

SUBJECT #1 Restaurant:	SUBJECT #2 Restaurant:	
Features Different from Subject #2	Features Similar to Each Other	Features Different from Subject #1

**Brainstorm and Categorize Subjects Individually**

Once a number of fast-food restaurants have been discussed and shared, and their features and positive/negative descriptions listed, students work individually to complete their own Brainstorming and Categorization Charts. Be sure each student chooses only two fast-food restaurants to compare and contrast; they may also add, delete, and/or revise the information to fit their personal preferences and experiences.

Note: The completed whole-class Brainstorming Chart should be saved for future reference and individual Categorization Charts collected for use with the activity included in the next session.

**Part II: Writing (60 minutes)**

When students are ready to begin their first drafts of the writing prompt, the following steps should be followed:

- Pass out collected papers from Part I.
- Review prewriting ideas as necessary and/or desired.
- Review the writing prompt.
- Explain and clarify the student checklist
- Students write first drafts individually—no outside help is allowed at this point.
- If time allows, students may begin editing and revising their own drafts using dictionaries, thesaurus, other regular classroom resources, and the checklist as guides.
- Collect all student papers at the end of Part II.

## Grade 6 Writing Prompt

### Comparing and Contrasting Fast Food Restaurants

**Writing Situation:**

A Martian has just landed at the park. He can only read and write. He shows you a sign that says: "Earthling, I am hungry! Can you help?"

"Well Mr. Martian," you reply, "there are only two fast food restaurants around here. Which would you rather go to?"

The Martian writes: "Describe them."

**Writing Directions:**

For your Martian friend, write an essay describing the ways in which two fast food restaurants are alike and different. Use the two restaurants from your **Prewriting Categorization Worksheet** to compare and contrast. Consider the food and special features of each restaurant. Remember to use transition words to compare and contrast the two restaurants. Use descriptive words to make your essay interesting and to help Mr. Martian understand exactly what you mean when you tell him about these restaurants.

**Part III: Editing/Revision and Final Draft (120 minutes)**

This final portion of the assessment allows students the time and opportunity to improve their drafts before writing the final pieces. Final drafts will be assessed according to the content standards criteria presented on the scoring guide. This same criteria is outlined on the student checklist which will be used during this session to focus attention on areas in need of improvement. The steps for completing this portion are:

- Pass out collected papers from Part II.
- Students edit and revise their first drafts using allowable classroom resources and checklist.
- If desired, peer response sessions may also be conducted using this checklist. In that case, clean copies will need to be supplied for each student.
- Students write final drafts legibly using dark ink.
- When final drafts are complete, students assemble all materials used in the three-part process, stapling final drafts on top, and submit to the teacher.



## Grade 6 Student Checklist Comparing/Contrasting Fast Food Restaurants

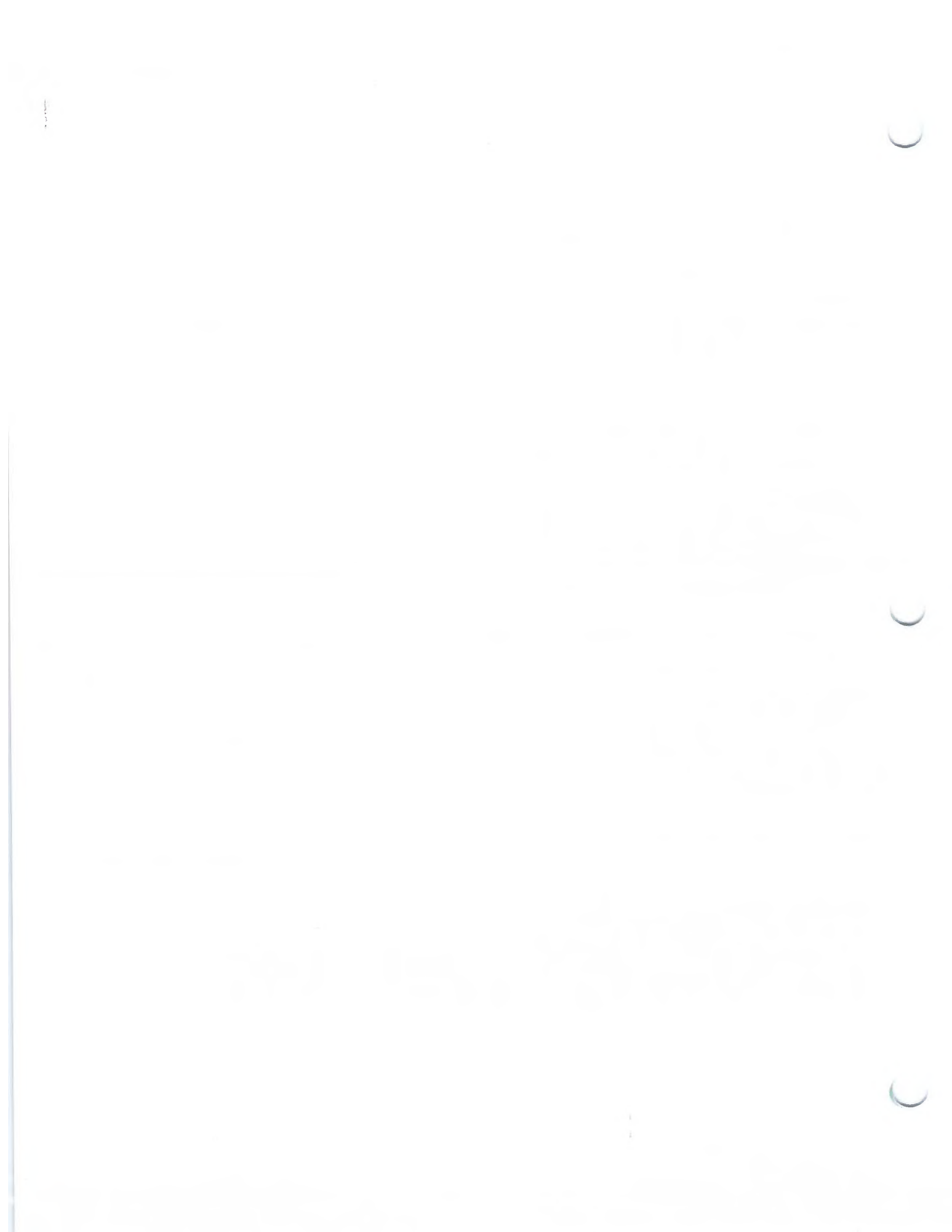
Blackline master is in Grade 6 Appendix

Please check the draft of the essay for the following items:

Writing Applications Compare/Contrast Essay	Yes	No	Comments
<ul style="list-style-type: none"> <li>• I have clearly identified the restaurants I am comparing and contrasting</li> <li>• I have included an introduction, supporting paragraphs, and conclusion</li> <li>• I have made my essay interesting for my reader</li> <li>• I have used precise verbs, nouns, and adjectives to describe the restaurants</li> </ul>			
Writing Strategies			
<ul style="list-style-type: none"> <li>• I have provided supportive details in my body paragraphs that follow from the introductory paragraph</li> <li>• I have linked paragraphs to each other with transition words</li> <li>• I have written a conclusion that summarizes my points</li> <li>• I have balanced my descriptions of each restaurant</li> </ul>			
Writing Conventions			
<ul style="list-style-type: none"> <li>• I have used complete sentences.</li> <li>• I have used correct capitalization</li> <li>• I have used correct spelling</li> <li>• I have used correct punctuation</li> </ul>			

### Scoring Student Writing

Using the attached four-point scoring guide (blackline master included in Grade 6 Appendix), teachers holistically score student papers in each of three standards-based areas: Writing Applications, Writing Strategies, and Writing Conventions. Students who score a "3" are considered to be at grade level according to this assessment.





LIGHTING THE PATHWAYS TO LEARNING

WRAP Writing Assessment Portal Program

# 6+1 Trait<sup>®</sup> Writing

## Grades 3-8

Name \_\_\_\_\_

Date \_\_\_\_\_

T<sub>1</sub> T<sub>2</sub> T<sub>3</sub>



Page 2

WRAP Score OACS Score	Organization	Support	Sentence Fluency	Word Choice	Mechanics	Presentation	Overall Development
<b>3 Paper</b> 2	Lack of planning evident; Poor transitions; andom sequencing*; Attempts closure*; Shift in focus	Details lack elaboration; Insufficient relevant details; Important details are omitted	Little sentence variety; Errors in structure or usage interfere with meaning; Over-reliance on simple or repetitive constructions; Chaining; Noticeable errors in usage	Simplistic vocabulary with acceptable but limited word choice; Some errors in word choice	Some mechanical errors that do interfere with communication; Errors are disproportionate to the length or complexity of the piece (errors cause major problems for readers)	60-75% of words, letters, slant, or formation are correct. Presentation is readable, but not particularly neat or of good quality.	Somewhat developed; Some awareness of audience and purpose; Repetitive or too general
<b>2 Paper</b> 1	Lack of planning evident; Thought patterns are difficult to follow; Ideas are not clear or sequenced*; Resembles free-writing, rambling; Continual shifts in focus	Supporting details are listed; Repetitious details; Too few details	No sentence variety; Serious errors in structure or usage; Too brief to demonstrate variety	Simplistic vocabulary with inappropriate and/or incorrect word choice	Noticeable mechanical errors that interfere with communication; Errors are disproportionate to the length or complexity of the piece (errors cause major problems for readers)	About half of the presentation has distracting errors in letter formation, slant, or spacing. The quality of the presentation detracts significantly from readability.	Poorly developed; Poor awareness of audience; or purpose; Ideas and details are not clear
<b>1 Paper</b> 1	Little or no planning; So short or muddled that it lacks organization or focus	Virtually no details; Irrelevant details	Lack of sentence sense; Riddled with errors at the sentence level; Riddled with errors in usage; Too brief to evaluate	Extremely limited vocabulary; Riddled with errors in word choice; Too brief to evaluate	Mechanical errors that seriously interfere with communication; Too brief to evaluate	Letter formation, spacing, slant is imbalanced, cluttered, and shows a lack of pride in the quality of work. The presentation quality interferes with readability.	Not developed; Restates topic; No awareness of audience or purpose; Inappropriate response; Too brief to show development



LIGHTING THE PATHWAYS  
TO LEARNING

# 6<sup>th</sup> Writing

Name \_\_\_\_\_ Date \_\_\_\_\_  
T<sub>1</sub> T<sub>2</sub> T<sub>3</sub>

WRAP Writing Assessment Portal Program

Grades 3-8



Osceola Adventist Christian School

Organization		Support	
Fluency		Word Choice	
Mechanics		Presentation	
Overall Development		Mode of Cumulative Record	

WRAP Score OACCS Score	Organization	Support	Sentence Fluency	Word Choice	Mechanics	Presentation	Overall Development
6 Paper 4	Plan is developed and well followed including the topic, audience, and purpose and an appropriate plan-type. Carefully but subtly organized from beginning to end. Logical order (well sequenced*); Elegant flow of ideas; Provides closure	Supporting details are rich, interesting, and informative throughout; fully developed; Details are relevant and appropriate for the focus	Sentence structures enhance style and effect; Virtually no errors in structure or usage; Successfully uses more sophisticated, varied sentence patterns	Rich, effective vocabulary throughout; Vivid language; May use figurative language and imagery	Very few or no mechanical errors relative to length or complexity	Presentation shows a pride in the quality of work, all letters are neatly on the line and formed correctly with even spacing, correct slant, and the written presentation is attractive and helps readers understand and remember the information.	Fluent, richly developed; Clear awareness of audience and purpose; Distinctive, engaging voice; Original, insightful, or imaginative
5 Paper 3	Organized from beginning to end including a plan that is developed with topic, audience, purpose, and plan-type; Logical order (sequenced*); Subtle transitions; Provides closure	Details are strong and varied throughout; Details are relevant and appropriate for the focus	Sentence structures are appropriate to style and effect; Few errors in structure or usage; Moderately successful in using more sophisticated sentence patterns	Effective vocabulary; Generally successful in using rich language	Few mechanical errors relative to length or complexity	Presentation shows basic neatness with no more than two letters formed and spaced incorrectly, and overall design of the written presentation helps readers understand the information.	Fluent, fully developed; Clear awareness of audience and purpose; Evidence of voice, compositional risks attempted; Cohesive
4 Paper 3	Topic, audience, purpose and plan-type is developed by may not be followed causing minor lapses in order or structure (some breaks in sequencing*); Meaning is subordinate to organizational devices; Contrived transitions; Provides closure	Details are adequate to support the focus; Details are generally relevant to the focus	Some sentence variety; Generally correct structure and usage; Attempts to use more sophisticated sentence patterns	Acceptable vocabulary; Attempts to use rich language; Misuse of bigger grade-level appropriate vocabulary words	Some mechanical errors that do not interfere with communication; Limited text, but mechanically correct	Presentation is readable and basically neat. There are no more than four words spaced incorrectly per line, or four letters per line written incorrectly.	Moderately fluent, adequately developed; Awareness of audience and purpose; Ideas developed but somewhat limited in depth

# Assessment for Common Core Mathematics Standards Grade 6

## Summary Sheet

Name \_\_\_\_\_ T<sub>1</sub> T<sub>2</sub> T<sub>3</sub>

School \_\_\_\_\_ Year \_\_\_\_\_

Teacher \_\_\_\_\_

0 1 2 3 4 \_\_\_\_\_ % **Number Sense**

0 1 2 3 4 \_\_\_\_\_ % **Algebraic Functions & Operations**

0 1 2 3 4 \_\_\_\_\_ % **Measurement & Geometry**

0 1 2 3 4 \_\_\_\_\_ % **Data, Statistics and Probability**

# Assessment for Common Core Mathematics Standards Grade 6

## Introduction: Summary of Goals

### GRADE SIX

By the end of grade six, students have mastered the four arithmetic operations with whole numbers, positive fractions, positive decimals, and positive and negative integers; they accurately compute and solve problems. They apply their knowledge to statistics and probability. Students understand the concepts of mean, median, and mode of data sets and how to calculate the range. They analyze data and sampling processes for possible bias and misleading conclusions they use addition and multiplication of fractions routinely to calculate the probabilities for compound events. Students conceptually understand and work with ratios and proportions; they compute percentages (e.g., tax, tips, and interest). Students know about  $\pi$  and the formulas for the circumference and area of a circle. They use letters for numbers in formulas involving geometric shapes and in ratios to represent an unknown part of an expression. They solve one-step linear equations.

# Assessment for Common Core Mathematics Standards Grade 6

## Number Sense

NS 1.1

- a. After each number, write the letter that corresponds to the place it would be on the number line:

$$\frac{-13}{10} \quad \underline{\hspace{2cm}}$$

$$1.8 \quad \underline{\hspace{2cm}}$$

$$-0.5 \quad \underline{\hspace{2cm}}$$

$$0.6 \quad \underline{\hspace{2cm}}$$

$$2.40 \quad \underline{\hspace{2cm}}$$

$$-2.4 \quad \underline{\hspace{2cm}}$$

F

B

D

A

E

C



- b. List these values from lowest to highest: 2.3, -1.3, 1.8, -0.2

# Assessment for Common Core Mathematics Standards Grade 6

NS 1.2

a. Write the following:

1. The ratio of tricycles to tricycle wheels: \_\_\_\_\_

2. The ratio of hands to fingers: \_\_\_\_\_

b. If there are 6 tricycle wheels, how many tricycles are there? \_\_\_\_\_

c. If there are 45 fingers, how many hands are there? \_\_\_\_\_

d. If the ratio of boys to girls on the team is 2:3 and there are 12 girls, how many boys are there? \_\_\_\_\_

NS 1.3

a. Solve for  $n$ :  $\frac{8}{12} = \frac{n}{3}$   $n = \underline{\quad}$

b. Solve for  $n$ :  $\frac{5}{6} = \frac{n}{12}$   $n = \underline{\quad}$



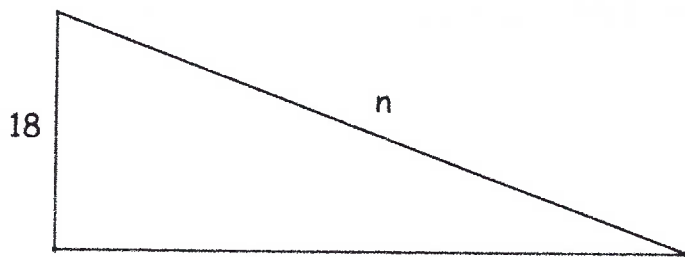
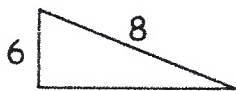
# Assessment for Common Core Mathematics Standards Grade 6

NS 1.3

- c. Make a proportion and solve for the unknown.

A car went 70 miles in 4 hours. If it continues going the same speed, how long will it take to go 175 miles? \_\_\_\_\_

- d. Here are two triangles whose corresponding sides are in proportion (i.e., the triangles are similar).



Find  $n$ , the length of the longest side in the larger triangle.  $n =$  \_\_\_\_\_

- e. Joe can type 11 words in 8 seconds. At this rate, how many words can he type in two minutes? \_\_\_\_\_
- f. We made a bowl of punch using lemonade and soda pop. The ratio of lemonade to soda pop is 2:3. If there are 25 gallons of punch, how much lemonade is needed? \_\_\_\_\_ gallons.

# Assessment for Common Core Mathematics Standards Grade 6

NS 1.4

- a. A coat usually costs \$45. During a sale, its price was reduced 20%.  
What is the price during the sale? \_\_\_\_\_
  
- b. A car cost \$12,000. During a sale, it will cost only \$10,920  
What percent was the price reduced? \_\_\_\_\_
  
- c. A meal cost \$15. We gave the waiter \$18 and told him that the  
difference was his tip. What percent of the cost of the meal was the  
tip we gave? \_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

NS 2.1

Calculate and reduce to lowest terms:

a.  $3\frac{5}{12} + 2\frac{1}{2} + 3\frac{4}{15} =$  \_\_\_\_\_

b.  $124 \div 3\frac{1}{2} =$  \_\_\_\_\_

c.  $9\frac{2}{3} - 4\frac{1}{2} =$  \_\_\_\_\_

NS 2.2

a. Half of the children in our school watch television every night. Three-fourths of those children watch for more than an hour. What fraction of the total children watch for more than an hour a night? \_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

[CONTINUED]

NS 2.2

b. A fraction  $\frac{m}{n}$  satisfies the equation  $\frac{m}{n} \times \frac{3}{5} = \frac{138}{415}$

Find  $\frac{138}{415} \div \frac{m}{n} =$  \_\_\_\_\_

It is not necessary to solve  $\frac{m}{n}$ .

2.3

Find integer solutions:

a.  $-16(-8 + 9) =$  \_\_\_\_\_

b.  $(-8)(-4)(12) =$  \_\_\_\_\_

c.  $-20 \div 5 =$  \_\_\_\_\_

d.  $-12 + (3 + 6) =$  \_\_\_\_\_

e. In Alaska the temperature was  $-15^{\circ}\text{F}$  in the morning; by noon the temperature had increased by  $20^{\circ}\text{F}$ ; by 9:00 p.m. the temperature had dropped  $30^{\circ}\text{F}$ . What temperature was it at 9:00 p.m.? \_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

NS 2.4

a. Reduce to lowest common terms:

$$\frac{96}{128} = \underline{\hspace{2cm}}$$

b. What is the least common multiple of 12 and 15? \_\_\_\_\_

## Algebra and Functions

AF 1.1

$y + 4 = 10$ . What is  $y$ ?

AF 1.2

a. Write the following as algebraic expressions

(let  $n$  be some number):

1. a number increased by 33: \_\_\_\_\_
2. The product of a number and  $(-7)$ : \_\_\_\_\_
3. 8 decreased by some number: \_\_\_\_\_
4. Some number squared divided by 7: \_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

[CONTINUED]

AF 1.2

b. If  $n = 2$ , evaluate:

$$(-5)n + n^2 =$$

c.  $x = 3$        $y = 4$        $z = 5$

Evaluate:  $2x + 3y + z^2 =$  \_\_\_\_\_

AF 1.3

a. Evaluate the following expressions, showing each step.

1.  $5(3 + 7) - 2$

2.  $5 + 3 \times 7$

b. Justify each of the following equations using one of: the commutative property of addition, the commutative property of multiplication, the associative property of addition, the associative property of multiplication or the distributive property.

1.  $3(4 \times 5) = (3 \times 4) 5$  \_\_\_\_\_

2.  $3 \times 7 = 7 \times 3$  \_\_\_\_\_

3.  $5 + (2 + 1) = (5 + 2) + 1$  \_\_\_\_\_

4.  $5(6 + 4) = 5 \times 6 + 5 \times 4$  \_\_\_\_\_

5.  $3 + 7 = 7 + 3$  \_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

Evaluate the following expressions, showing each step.

AF 1.4

a.  $\frac{4(12 - 3^2)}{6} =$  \_\_\_\_\_

b.  $2(4 + 8) \times 6(8 - 3) =$  \_\_\_\_\_

AF 2.1

a. How many hours are there in 7 days? \_\_\_\_\_

b. How many centimeters are there in 5 inches? \_\_\_\_\_

[1 inch = 2.54 cm]

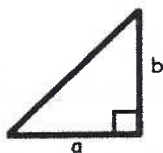
# Assessment for Common Core Mathematics Standards Grade 6

AF 2.2  
2.3

- a. Marcus took a train from San Francisco to San Jose, which is a distance of 54 miles. The train took 45 minutes for the trip. What was the average speed of the train expressed in miles per hour?
- b. At 8:00 a.m. the temperature was  $40^{\circ}\text{F}$ . At 3:00 p.m. the temperature was  $75^{\circ}\text{F}$ . What was the average temperature change per hour?

AF 3.1

What is the area of the triangle below; express the answer algebraically:



AF 3.2

A rectangle has width  $w$ . Its length is one more than 3 times its width. Find the perimeter of the rectangle.  
(Your answer will be expressed in terms of  $w$ .)



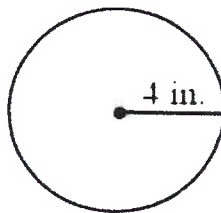
# Assessment for Common Core Mathematics Standards Grade 6

## Measurement and Geometry

Give exact answers to these questions.

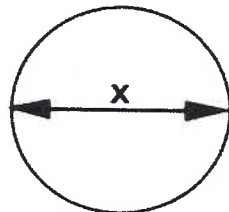
MG 1.1

- a. What is the circumference of this circle? \_\_\_\_\_
- b. What is the area of this circle? \_\_\_\_\_



MG 1.2

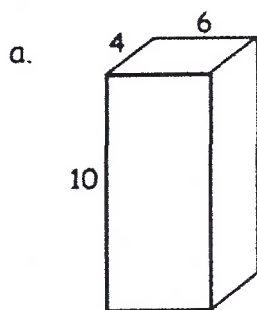
- How many segments "x" will fit on the circumference of this circle?  
Express your answer to the nearest hundredth. \_\_\_\_\_



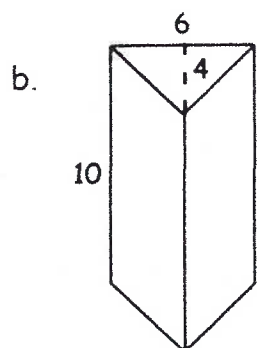
# Assessment for Common Core Mathematics Standards Grade 6

MG 1.3

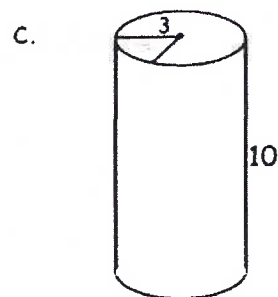
Find the volumes (dimensions are cm):



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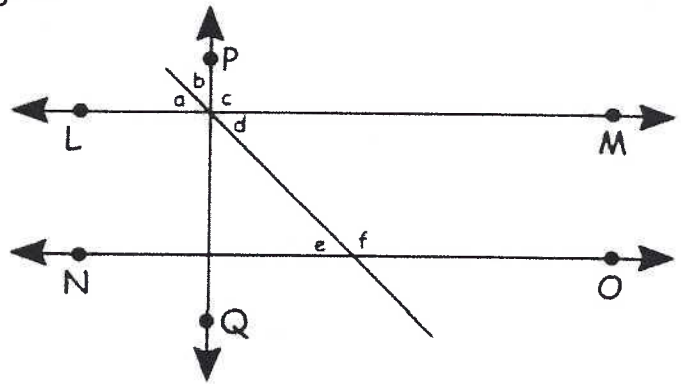
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# Assessment for Common Core Mathematics Standards Grade 6

MG 2.1

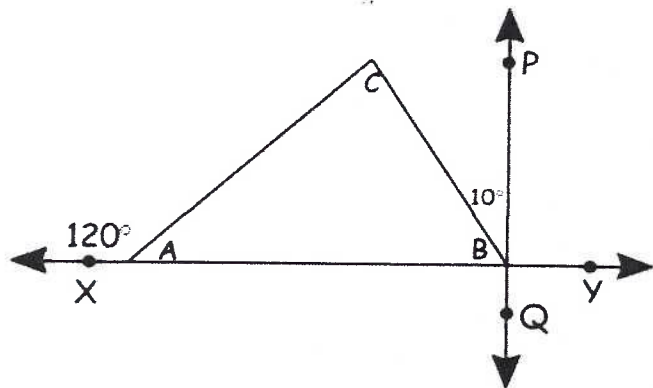
Line LM is parallel to Line NO. Line PQ is perpendicular to line LM and line NO.

- Identify the complimentary angles \_\_\_\_\_
- Identify ONE pair of supplementary angles \_\_\_\_\_
- Identify a pair of vertical angles  
\_\_\_\_\_



MG 2.2

Line PQ is perpendicular to line XY.



- How many degrees in angle A? \_\_\_\_\_
- How many degrees in angle B? \_\_\_\_\_
- How many degrees in angle C? \_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

MG 2.3

a. Draw a quadrilateral that has equal sides and no right angles:

b. Draw an obtuse, scalene triangle:

# Assessment for Common Core Mathematics Standards Grade 6

## Statistics, Data Analysis, and Probability

S 1.1

Below are the test scores of nine students on the science test:

50 50 50 50 51 89 90 90 90

a. What is the mean score? \_\_\_\_\_

b. What is the median score? \_\_\_\_\_

c. What is the mode? \_\_\_\_\_

d. What is the range? \_\_\_\_\_

S 1.2  
1.3

If a tenth student in the class above scored only a 10 on the test, would that increase, decrease, or leave unchanged the mean score? \_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

S 1.4

The annual incomes for employees at Unfair, Inc. are \$20,000, \$30,000, \$32,000 and \$2,525,627. Which of the median or mean income would *best* characterize the income of a typical employee at Unfair, Inc.? \_\_\_\_\_

S 2.1

I have seven friends who are on the football team with me. I'll ask them what kind of music they like. This information will help me find out what kind of music the students in our school like best. What is wrong with the last statement?

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S 2.2

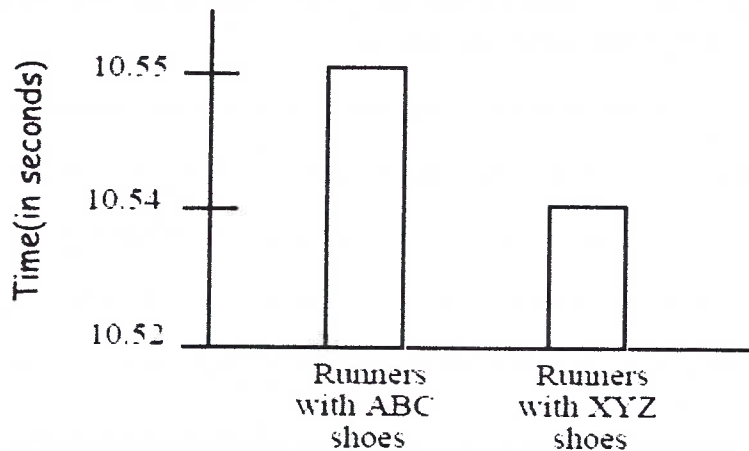
You don't have time to ask all the students in your school about music. Which method of sampling would work best to help you? \_\_\_\_\_

- A) Ask your friends
- B) Ask the best dressed students
- C) Randomly select names from a list of students

# Assessment for Common Core Mathematics Standards Grade 6

S 2.3

Time to run 100 meters:



Explain how a conclusion from these data might be influenced by the way the data are presented.

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S 2.4

A group of people were given a survey about the importance of health care for the elderly. The table below lists the percentages of people surveyed in different age groups. For example, 18% of the people surveyed were between 14 and 23 years of age.

Percent:	18%	30%	30%	18%	2%	2%
Ages:	14-23	24-33	34-43	44-53	54-63	64-73

Why might the sample be biased?

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# Assessment for Common Core Mathematics Standards Grade 6

S 2.5

Refer to the data from the previous question. A survey using that sample found that health care for older people is not very important to the American people. How valid is that claim? Explain your answer.

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3.1

a. Represent all possible outcomes of flipping one coin and rolling one six-sided die. Label your representation clearly.

b. What is the probability of each outcome in item a? Express your answer as both a fraction and a decimal rounded to the nearest thousandth.

Fraction \_\_\_\_\_

Decimal \_\_\_\_\_



# Assessment for Common Core Mathematics Standards Grade 6

S 3.1  
cont.

c. A man has 3 shirts and 2 ties. Make a tree diagram to show all possible ways of choosing a shirt and tie.

d. Assume the man in item c has no preference for specific shirt-and-tie combinations, and all his shirts and ties are available. What is the probability of each possibility in item c?

Express your answer as a fraction. \_\_\_\_\_

e. Make an organized list of all possible outcomes for flipping a penny, a dime, and quarter.

	Penny	Dime	Quarter

# Assessment for Common Core Mathematics Standards Grade 6

S 3.2

A basketball player took 25 shots at the basket. He made 12 of the shots. If he keeps shooting at the same rate, how many shots will he make if he takes 300 shots? \_\_\_\_\_

S 3.3

a. 1. You have two dice. If you throw the dice at the same time, you might have one of many possible combinations. List all those possible combinations:

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2. What chance do you have of getting a total of 7 dots showing for the two dice? Express the answer as a percent: \_\_\_\_\_

b. Use  $p$  to represent your answer to part a. What is the probability that you do NOT get a total of 7 dots showing for the two dice? \_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

S 3.4

An oil prospecting firm plans to drill two exploratory wells. Past data is used to assess the following possible outcomes:

	<u>Probability</u>
• Neither well produces oil or gas.	.80
• Exactly one of the wells produces oil or gas	.18
• Both wells produce oil or gas	.02

a. What is the probability that at least one well will produce oil or gas?

---

b. What is the probability that neither well will produce oil or gas?

---

c. What is the probability that at most one will produce oil or gas?

---

# Assessment for Common Core Mathematics Standards Grade 6

S 3.5

a. What is the probability of tossing a die and observing an even number on the upper face of the die? \_\_\_\_\_

b. A person is blindfolded and asked to draw an object from a bag. In the bag are 2 red balls and 3 green balls. After each draw the chosen ball's color is recorded and it is returned to the bag.

Are subsequent draws dependent or independent of the first draw?

\_\_\_\_\_

c. If a green ball is picked on the first draw (and returned to the bag), what is the probability of picking a red ball on the second draw?

\_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

[CONTINUED]

S 3.5

- e. Consider a situation where the set of objects in the bag is the same (2 red balls, 3 green balls), but after an object is drawn and its color is recorded it is not returned to the bag.

Are results of subsequent draws dependent or independent of the first draw?

\_\_\_\_\_

- f. If a green ball is picked on the first draw (and not returned to the bag), what is the probability of picking a red ball on the second draw?

\_\_\_\_\_

# Assessment for Common Core Mathematics Standards Grade 6

End of Assessment

GRADE SIX

S1.2



# Answer Key For The California Mathematics Standards

## Grade 6

### Introduction: Summary of Goals

#### **GRADE SIX**

By the end of grade six, students have mastered the four arithmetic operations with whole numbers, positive fractions, positive decimals, and positive and negative integers; they accurately compute and solve problems. They apply their knowledge to statistics and probability. Students understand the concepts of mean, median, and mode of data sets and how to calculate the range. They analyze data and sampling processes for possible bias and misleading conclusions they use addition and multiplication of fractions routinely to calculate the probabilities for compound events. Students conceptually understand and work with ratios and proportions; they compute percentages (e.g., tax, tips, and interest). Students know about  $\pi$  and the formulas for the circumference and area of a circle. They use letters for numbers in formulas involving geometric shapes and in ratios to represent an unknown part of an expression. They solve one-step linear equations.

# Answer Key For The California Mathematics Standards Grade 6

**Number Sense 1.0:** Students compare and order positive and negative fractions, decimals, and mixed numbers. Students solve problems involving fractions, ratios, proportions, and percentages.

**NS 1.1:** Students compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line.

- a. After each number, write the letter that corresponds to the place it would be on the number line:

$$\frac{-13}{10} \quad \mathbf{B}$$

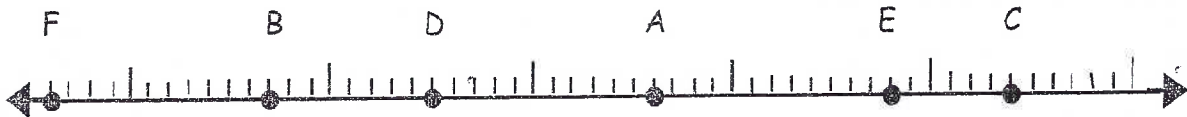
$$1.8 \quad \mathbf{E}$$

$$-0.5 \quad \mathbf{D}$$

$$0.6 \quad \mathbf{A}$$

$$2.40 \quad \mathbf{C}$$

$$-2.4 \quad \mathbf{F}$$



- b. List these values from lowest to highest: 2.3, -1.3, 1.8, -0.2

**-1.3, -0.2, 1.8, 2.3**



# Answer Key For The California Mathematics Standards

## Grade 6

**Number Sense 1.0:** Students compare and order positive and negative fractions, decimals, and mixed numbers. Students solve problems involving fractions, ratios, proportions, and percentages.

**NS 1.2:** Students interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations ( $a/b$ ,  $a$  to  $b$ ,  $a:b$ ).

a. Write the following:

1. The ratio of tricycles to tricycle wheels:

1 to 3, 1:3, or  $\frac{1}{3}$

2. The ratio of hands to fingers: 2:10, 1:5, or  $\frac{1}{5}$

b. If there are 6 tricycle wheels, how many tricycles are there?

2

$$\frac{1}{3} = \frac{n}{6} \quad 3n = 6 \quad n = 2$$

c. If there are 45 fingers, how many hands are there?

9

$$\frac{1}{5} = \frac{n}{45} \quad 5n = 45 \quad n = 9$$

d. If the ratio of boys to girls on the team is 2:3 and there are 12 girls, how many boys are there?

8

$$\frac{2}{3} = \frac{n}{12} \quad 3n = 24 \quad n = 8$$

# Answer Key For The California Mathematics Standards

## Grade 6

**Number Sense 1.0:** Students compare and order positive and negative fractions, decimals, and mixed numbers. Students solve problems involving fractions, ratios, proportions, and percentages.

**NS 1.3:** Students use proportions to solve problems (e.g., determine the value of  $N$  if  $\frac{4}{7} = \frac{N}{21}$ , find the length of a side of a polygon similar to a known polygon). Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse.

a. Solve for  $n$ :  $\frac{8}{12} = \frac{n}{3}$   $n = 2$

$$\begin{aligned} 12n &= 8 \times 3 \\ 12n &= 24 \\ n &= 2 \end{aligned}$$

b. Solve for  $n$ :  $\frac{5}{6} = \frac{n}{12}$   $n = 10$

$$\begin{aligned} 6n &= 5 \times 12 \\ 6n &= 60 \\ n &= 10 \end{aligned}$$

# Answer Key For The California Mathematics Standards Grade 6

**Number Sense 1.0:** Students compare and order positive and negative fractions, decimals, and mixed numbers. Students solve problems involving fractions, ratios, proportions, and percentages.

**NS 1.3:** Students use proportions to solve problems (e.g., determine the value of  $N$  if  $4/7 = N/21$ , find the length of a side of a polygon similar to a known polygon). Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse.

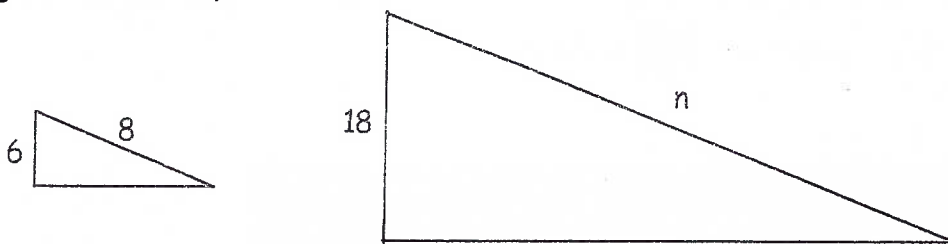
[CONTINUED]

c. Make a proportion and solve for the unknown.

A car went 70 miles in 4 hours. If it continues going the same speed, how long will it take to go 175 miles? **10 hours**

$$\frac{70}{4} = \frac{175}{n} \quad \begin{aligned} 70n &= 4 \times 175 \\ 70n &= 700 \\ n &= 10 \end{aligned}$$

d. Here are two triangles whose corresponding sides are in proportion (i.e., the triangles are similar).



Find  $n$ , the length of the longest side in the larger triangle.  $n =$  **24**

$$\frac{6}{18} = \frac{8}{n} \quad \begin{aligned} 6n &= 18 \times 8 \\ 6n &= 144 \\ n &= 24 \end{aligned}$$

# Answer Key For The California Mathematics Standards Grade 6

**Number Sense 1.0:** Students compare and order positive and negative fractions, decimals, and mixed numbers. Students solve problems involving fractions, ratios, proportions, and percentages.

**NS 1.3:** Students use proportions to solve problems (e.g., determine the value of  $N$  if  $\frac{4}{7} = \frac{N}{21}$ , find the length of a side of a polygon similar to a known polygon). Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse.

[CONTINUED]

- e. Joe can type 11 words in 8 seconds. At this rate, how many words can he type in two minutes? **165**

$$\frac{11}{8} = \frac{n}{2 \times 60} \quad \frac{11}{8} = \frac{n}{120} \quad 8n = 11 \times 120 = 1,320$$
$$8n = 1,320$$
$$n = 165$$

- f. We made a bowl of punch using lemonade and soda pop. The ratio of lemonade to soda pop is 2:3. If there are 25 gallons of punch, how much lemonade is needed? **10** gallons.

$$\frac{2}{2+3} = \frac{n}{25} \quad \frac{2}{5} = \frac{n}{25} \quad 5n = 2 \times 25 = 50$$
$$5n = 10$$
$$n = 10$$

# Answer Key For The California Mathematics Standards

## Grade 6

**Number Sense 1.0:** Students compare and order positive and negative fractions, decimals, and mixed numbers. Students solve problems involving fractions, ratios, proportions, and percentages.

**NS 1.4:** Students calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips.

- a. A coat usually costs \$45. During a sale, its price was reduced 20%.  
What is the price during the sale? **\$36**

$$\begin{aligned} 20\% \text{ of } 45 &= .20 \times 45 \\ &= 9 \end{aligned}$$

Therefore, \$45 reduced by  
20% is \$45 reduced by \$9  
 $\$45 - \$9 = \$36$

- b. A car cost \$12,000. During a sale, it will cost only \$10,920  
What percent was the price reduced?

$$12,000 - 10,920 = 1,080$$

$$\frac{1080}{12000} = \frac{108}{1200} = \frac{36}{400} = \frac{9}{100} = 9\%$$

- c. A meal cost \$15. We gave the waiter \$18 and told him that the  
difference was his tip. What percent of the cost of the meal was the  
tip we gave?

$$\begin{aligned} 18 - 15 &= 3 \\ \frac{3}{15} &= \frac{n}{100} \\ 15n &= 300 \\ n &= 20 \end{aligned}$$

# Answer Key For The California Mathematics Standards

## Grade 6

**Number Sense 2.0:** Students calculate and solve problems involving addition, subtraction, multiplication, and division.

**NS 2.1:** Students solve problems involving addition, subtraction, multiplication, and division of positive fractions, and explain why a particular operation was used for a given situation.

Calculate and reduce to lowest terms:

a.  $3\frac{5}{12} + 2\frac{1}{2} + 3\frac{4}{15} = 9\frac{11}{60}$

$$3\frac{5}{12} + 2\frac{1}{2} + 3\frac{4}{15} = 3\frac{25}{60} + 2\frac{30}{60} + 3\frac{16}{60} = 8\frac{71}{60} = 8 + 1\frac{11}{60} = 9\frac{11}{60}$$

b.  $124 \div 3\frac{1}{2} = 35\frac{3}{7}$

$$124 \div 3\frac{1}{2} = 124 \div \frac{7}{2} = 124 \times \frac{2}{7} = \frac{248}{7} = 35\frac{3}{7}$$

c.  $9\frac{2}{3} - 4\frac{1}{2} = 5\frac{1}{6}$

$$9\frac{4}{6} - 4\frac{3}{6} = 5\frac{1}{6}$$

# Answer Key For The California Mathematics Standards

## Grade 6

**Number Sense 2.0:** Students calculate and solve problems involving addition, subtraction, multiplication, and division.

**NS 2.2:** Students explain the meaning of multiplication and division of positive fractions and perform the calculation (e.g.  $\frac{5}{8} \div \frac{15}{16} = \frac{5}{8} \times \frac{16}{15} = \frac{2}{3}$ ).

- a. Half of the children in our school watch television every night. Three-fourths of those children watch for more than an hour. What fraction of the total children watch for more than an hour a night?

$$\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$$

$$\frac{3}{8}$$

- b. A fraction  $\frac{m}{n}$  satisfies the equation  $\frac{m}{n} \times \frac{3}{5} = \frac{138}{415}$

Find  $\frac{138}{415} \div \frac{m}{n} = \frac{3}{5}$

It is not necessary to solve for  $\frac{m}{n}$ .

# Answer Key For The California Mathematics Standards

## Grade 6

**Number Sense 2.0:** Students calculate and solve problems involving addition, subtraction, multiplication, and division.

**NS 2.3:** Students solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations, that use positive and negative integers and combinations of these operations.

Find integer solutions:

a.  $-16(-8 + 9) = -16$

$$-16 \times 1 = -16$$

b.  $(-8)(-4)(12) = 384$

$$32 \cdot 12 = 384$$

c.  $-20 \div 5 = -4$

d.  $-12 + (3 + 6) = -3$

$$-12 + 9 = -3$$

e. In Alaska the temperature was  $-15^{\circ}\text{F}$  in the morning; by noon the temperature had increased by  $20^{\circ}\text{F}$ ; by 9:00 p.m. the temperature had dropped  $30^{\circ}\text{F}$ . What temperature was it at 9:00 p.m.?  $-25^{\circ}\text{F}$

$$-15 + 20 - 30 = 5 - 30 = -25$$



# Answer Key For The California Mathematics Standards

## Grade 6

**Number Sense 2.0:** Students calculate and solve problems involving addition, subtraction, multiplication, and division.

**NS 2.4:** Students determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions (e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction).

a. Reduce to lowest common terms:

$$\frac{96}{128} = \frac{3}{4}$$

$$\begin{aligned} \text{GCF}(12, 15) &= 3 \\ 12 \times 15 &= 180 \\ 180 \div 3 &= 60 \end{aligned}$$

b. What is the least common multiple of 12 and 15?

60

$$\begin{aligned} \text{GCF}(12, 15) &= 3 \\ 12 \div 3 &= 4 \\ 15 \div 3 &= 5 \\ 3 \times 4 \times 5 &= 60 \end{aligned}$$

# Answer Key For The California Mathematics Standards

## Grade 6

**Algebra and Functions 1.0:** Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results.

**AF 1.1:** Students write and solve one-step linear equations in one variable.

$y + 4 = 10$ . What is  $y$ ?

$$y + 4 = 10$$

$$y = 10 - 4$$

$$y = 6$$

**Algebra and Functions 1.0:** Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results.

**AF 1.2:** Students write and evaluate an algebraic expression for a given situation, using up to three variables.

a. Write the following as algebraic expressions

(let  $n$  be some number):

1. a number increased by 33:

$$n + 33$$

2. The product of a number and  $(-7)$ :

$$-7n$$

3. 8 decreased by some number:

$$8 - n$$

4. Some number squared divided by 7:

$$n^2 \div 7 \text{ or } \frac{n^2}{7}$$

# Answer Key For The California Mathematics Standards Grade 6

**Algebra and Functions 1.0:** Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results.

**AF 1.2:** Students write and evaluate an algebraic expression for a given situation, using up to three variables.

[CONTINUED]

b. If  $n = 2$ , evaluate:

$$(-5)n + n^2 = -6$$

$$\text{When } n = 2, (-5)(2) + 2^2 = -10 + 4 = -6$$

c.  $x = 3$        $y = 4$        $z = 5$

Evaluate:  $2x + 3y + z^2 = 43$

# Answer Key For The California Mathematics Standards Grade 6

**Algebra and Functions 1.0:** Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results.

**AF 1.3:** Students apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions, and justify each step in the process.

a. Evaluate the following expressions, showing each step.

1.  $5(3 + 7) - 2$

$$\begin{aligned} &= 5 \cdot 3 + 5 \cdot 7 - 2 \\ &= 15 + 35 - 2 \\ &= 50 - 2 \\ &= 48 \end{aligned}$$

2.  $5 + 3 \times 7$

$$\begin{aligned} &= 5 + 21 \\ &= 26 \end{aligned}$$

b. Justify each of the following equations using one of: the commutative property of addition, the commutative property of multiplication, the associative property of addition, the associative property of multiplication or the distributive property.

1.  $3(4 \times 5) = (3 \times 4) 5$

2.  $3 \times 7 = 7 \times 3$

3.  $5 + (2 + 1) = (5 + 2) + 1$

4.  $5(6 + 4) = 5 \times 6 + 5 \times 4$

5.  $3 + 7 = 7 + 3$

Associative Property of Multiplication  
Commutative Property of Multiplication  
Associative Property of Addition  
Distributive Property  
Commutative Property of Addition

# Answer Key For The California Mathematics Standards

## Grade 6

**Algebra and Functions 1.0:** Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results.

**AF 1.4:** Students solve problems manually by using the correct order of operations or by using a scientific calculator.

Evaluate the following expressions, showing each step.

a. 
$$\frac{4(12 - 3^2)}{6} = \frac{4(12 - 9)}{6} = \frac{4(3)}{6} = \frac{12}{6} = 2$$

b. 
$$2(4 + 8) \times 6(8 - 3) = 2(12) \times 6(5) = 24 \times 30 = 720$$

**Algebra and Functions 2.0:** Students analyze and use tables, graphs, and rules to solve problems involving rates and proportions.

**AF 2.1:** Students convert one unit of measurement to another (e.g., from feet to miles, from centimeters to inches).

a. How many hours are there in 7 days?

$$24 \times 7 = 168 \text{ hours}$$

b. How many centimeters are there in 5 inches? [1 inch = 2.54 cm]

$$2.54 \times 5 = 12.70 = 12.7 \text{ So, 5 inches} = 12.7 \text{ cm}$$

# Answer Key For The California Mathematics Standards

## Grade 6

**Algebra and Functions 2.0:** Students analyze and use tables, graphs, and rules to solve problems involving rates and proportions.

AF 2.2: Students demonstrate and understanding that *rate* is a measure of one quantity per unit value of another quantity.

AF 2.3: Students solve problems involving rates, average speed, distance, and time.

- a. Marcus took a train from San Francisco to San Jose, which is a distance of 54 miles. The train took 45 minutes for the trip. What was the average speed of the train expressed in miles per hour?

$$\frac{54 \text{ miles}}{45 \text{ min}} \times \frac{n \text{ miles}}{60 \text{ min}} \qquad 45n = 54 \times 60$$
$$45n = 3,240$$
$$n = 3,240 \div 45 = 72 \text{ miles}$$

The average speed was 72 miles per hour

- b. At 8:00 a.m. the temperature was 40°F. At 3:00 p.m. the temperature was 75°F. What was the average temperature change per hour?

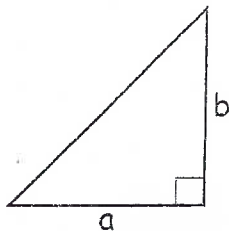
$$75^\circ - 40^\circ = 35^\circ$$
$$15:00 - 8:00 = 7 \text{ hours}$$
$$\frac{35^\circ}{7} = 5 \text{ degrees per hour}$$

# Answer Key For The California Mathematics Standards Grade 6

**Algebra and Functions 3.0:** Students investigate geometric patterns and describe them algebraically.

**AF 3.1:** Students use variables in expressions describing geometric quantities (e.g.,  $P = 2w + 2l$ ,  $A = \frac{1}{2}bh$ ,  $C = \pi d$  — the formulas for the perimeter of a rectangle, the area of a triangle, and the circumference of a circle, respectively).

What is the area of the triangle below; express the answer algebraically:



$$\text{Area} = \frac{1}{2}ab \text{ or } \frac{ab}{2}$$

**Algebra and Functions 3.0:** Students investigate geometric patterns and describe them algebraically.

**AF 3.2:** Students express in symbolic form simple relationships arising from geometry.

A rectangle has width  $w$ . Its length is one more than 3 times its width.

Find the perimeter of the rectangle.

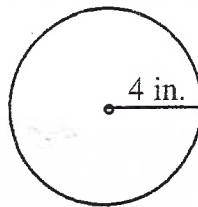
(Your answer will be expressed in terms of  $w$ .)

Let the width be  $w$ . Then the length is  $3w + 1$ . The perimeter  $P$  is given by  $P = 2(w + 3w + 1) = 2(4w + 1) = 8w + 2$

# Answer Key For The California Mathematics Standards Grade 6

**Measurement and Geometry 1.0:** Students deepen their understanding of the measurement of plane and solid shapes and use this understanding to solve problems.

**MG 1.1:** Students understand the concept of a constant such as  $\pi$ ; know the formulas for the circumference and area of a circle.



Give exact answers to these questions.

- a. What is the circumference of this circle?  $8\pi$  in

$$\begin{aligned}C &= d\pi \\ &= (4 \times 2)\pi \\ &= 8\pi\end{aligned}$$

- b. What is the area of this circle?  $16\pi$  in<sup>2</sup>

$$\begin{aligned}A &= \pi r^2 \\ &= \pi \cdot 4^2 \\ &= 16\pi\end{aligned}$$

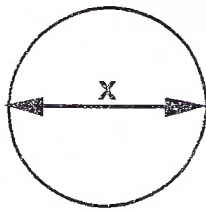


# Answer Key For The California Mathematics Standards Grade 6

**Measurement and Geometry 1.0:** Students deepen their understanding of the measurement of plane and solid shapes and use this understanding to solve problems.

**MG 1.2:** Students know common estimates of  $\pi$  ( $3.14$ ;  $\frac{22}{7}$ ) and use these values to estimate and calculate the circumference and the area of circles; compare with actual measurements.

How many segments "x" will fit on the circumference of this circle?  
Express your answer to the nearest hundredth. **3.14x**



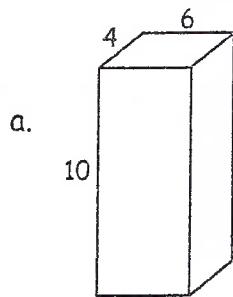
$$\begin{aligned}\pi &= 3.14 \\ C &= d\pi \\ &= x \cdot 3.14 \\ &= 3.14x\end{aligned}$$

# Answer Key For The California Mathematics Standards Grade 6

**Measurement and Geometry:** Students deepen their understanding of the measurement of plane and solid shapes and use this understanding to solve problems.

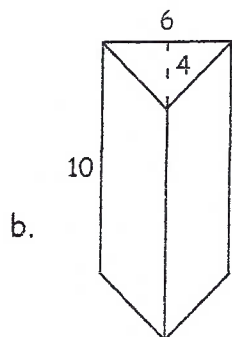
**MG 1.3:** Students know and use the formulas for the volume of triangular prisms and cylinders (area of base  $\times$  height); compare these formulas and explain the similarity between them and the formula for the volume of a rectangular solid.

Find the volumes (dimensions are cm):



$$v = l \times w \times h$$

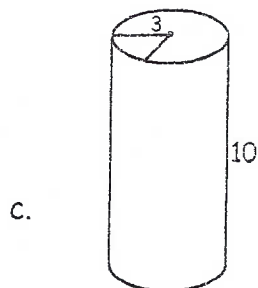
$$v = 6 \times 4 \times 10 = 240 \text{ cm}^3$$



$$v = \text{area of base} \times \text{height}$$

$$v = \frac{1}{2}(4 \times 6)10$$

$$v = 120 \text{ cm}^3$$



$$v = \pi r^2 \cdot h$$

$$= \pi \cdot 3^2 \cdot 10$$

$$= 90\pi$$

$$= 90 \text{ cm}^3$$

# Answer Key For The California Mathematics Standards Grade 6

**Measurement and Geometry 2.0:** Students identify and describe the properties of two-dimensional figures.

**MG 2.1:** Students identify angles as vertical, adjacent, complementary, or supplementary and provide descriptions of these terms.

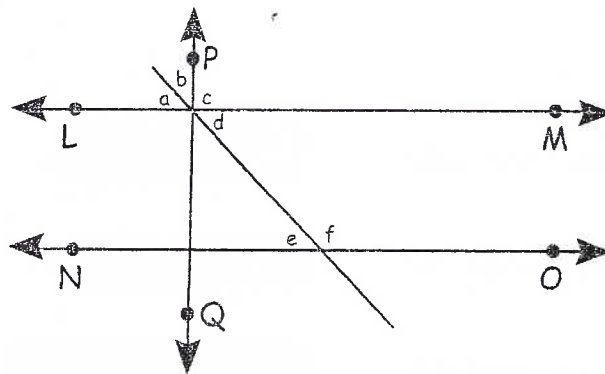
Line LM is parallel to Line NO. Line PQ is perpendicular to line LM and line NO.

- Identify the complimentary angles
- Identify ONE pair of supplementary angles
- Identify a pair of vertical angles

**La & Lb, Lb & Ld, Lb & Le**

**Le & Lf or Ld & Lf**

**La & Ld**

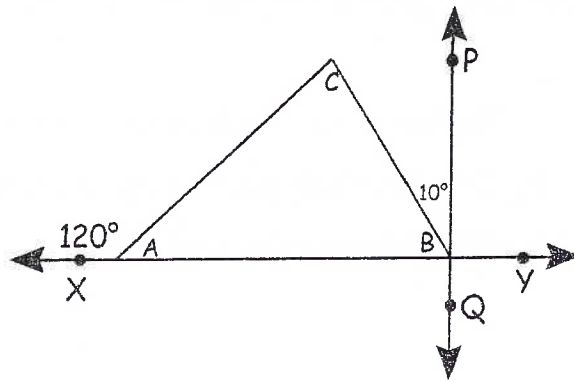


# Answer Key For The California Mathematics Standards Grade 6

**Measurement and Geometry 2.0:** Students identify and describe the properties of two-dimensional figures.

**MG 2.2:** Students use the properties of complementary and supplementary angles and the sum of the angles of a triangle to solve problems involving an unknown angle.

Line PQ is perpendicular to line XY.



a. How many degrees in angle A?

$$180 - 120 = 60^\circ$$

b. How many degrees in angle B?

$$90 - 10 = 80^\circ$$

c. How many degrees in angle C?

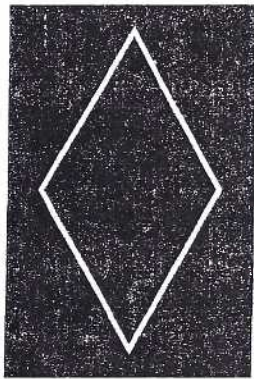
$$180 - 60 - 80 = 40^\circ$$

# Answer Key For The California Mathematics Standards Grade 6

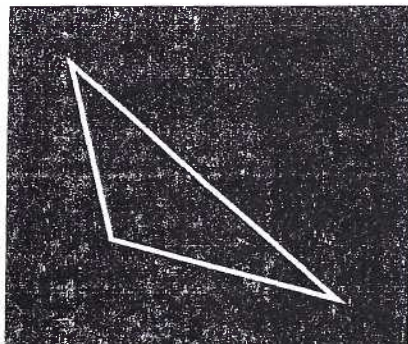
**Measurement and Geometry 2.0:** Students identify and describe the properties of two-dimensional figures.

**MG 2.3:** Students draw quadrilaterals and triangles from given information about them (e.g., a quadrilateral having equal sides but no right angles, a right isosceles triangle).

- a. Draw a quadrilateral that has equal sides and no right angles:



- b. Draw an obtuse, scalene triangle:



# Answer Key For The California Mathematics Standards Grade 6

**Statistics, Data Analysis, and Probability 1.0:** Students compute and analyze statistical measurements for data sets.

**S 1.1:** Students compute the range, mean, median, and mode of data sets.

Below are the test scores of nine students on the science test:

50 50 50 50 51 89 90 90 90

a. What is the mean score?

$67\frac{7}{9}$

$$\begin{aligned}\text{Mean score} &= \frac{50 + 50 + 50 + 50 + 51 + 89 + 90 + 90 + 90}{9} \\ &= \frac{4 \times 50 + 51 + 89 + 3 \times 90}{9} \\ &= \frac{200 + 140 + 270}{9} \\ &= \frac{610}{9} \\ &= 67\frac{7}{9}\end{aligned}$$

b. What is the median score?

51

c. What is the mode?

50

d. What is the range?

40

$$90 - 50 = 40$$

# Answer Key For The California Mathematics Standards Grade 6

**Statistics, Data Analysis, and Probability 1.0:** Students compute and analyze statistical measurements for data sets.

S 1.2: Students understand how additional data added to data sets may affect these computations of measures of central tendency.

S 1.3: Students understand how the inclusion or exclusion of outliers affects measures of central tendency.

If a tenth student in the class in the previous question scored only a 10 on the test, would that increase, decrease, or leave unchanged the mean score?

Decrease

# Answer Key For The California Mathematics Standards Grade 6

**Statistics, Data Analysis, and Probability 1.0:** Students compute and analyze statistical measurements for data sets.

**S 1.4:** Students know why a specific measure of central tendency (mean, median, mode) provides the most useful information in a given context.

The annual incomes for employees at Unfair, Inc. are \$20,000, \$30,000, \$32,000 and \$2,525,627. Which of the median or mean income would *best* characterize the income of a typical employee at Unfair, Inc.?

median

Mean = \$651,906.75

Median = \$31,000

The median in this case better represents a typical annual income.

**Statistics, Data Analysis, and Probability 2.0:** Students use data samples of a population and describe the characteristics and limitations of the samples.

**S 2.1:** Students compare different samples of a population with the data from the entire population and identify a situation in which it makes sense to use a sample.

I have seven friends who are on the football team with me. I'll ask them what kind of music they like. This information will help me find out what kind of music the students in our school like best. What is wrong with the last statement?

The sample is not randomly chosen, it is too small for a typical school, and it is not likely to be representative of the student body.



# Answer Key For The California Mathematics Standards

## Grade 6

**Statistics, Data Analysis, and Probability 2.0:** Students use data samples of a population and describe the characteristics and limitations of the samples.

**S 2.2:** Students identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population.

You don't have time to ask all the students in your school about music.

Which method of sampling would work best to help you?

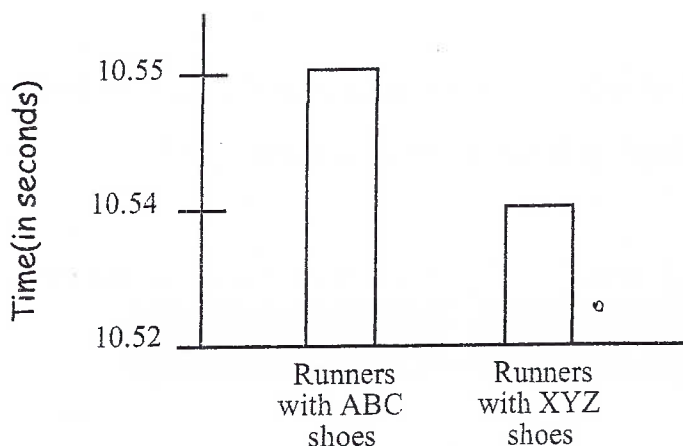
- A) Ask your friends
- B) Ask the best dressed students
- C) Randomly select names from a list of students

# Answer Key For The California Mathematics Standards Grade 6

**Statistics, Data Analysis, and Probability 2.0:** Students use data samples of a population and describe the characteristics and limitations of the samples.

**S 2.3:** Students analyze data displays and explain why the way in which the question was asked might have influenced the results obtained and why the way in which the results were displayed might have influenced the conclusions reached.

Time to run 100 meters:



Explain how a conclusion from these data might be influenced by the way the data are presented.

The scale on the (vertical) time axis makes it appear at first glance that runners with ABC shoes took much longer to run 100 meters than runners with XYZ shoes. However, their times differ by only .01 second.

# Answer Key For The California Mathematics Standards

## Grade 6

**Statistics, Data Analysis, and Probability 2.0:** Students use data samples of a population and describe the characteristics and limitations of the samples.

**S 2.4:** Students identify data that represent sampling errors and explain why the sample (and the display) might be biased.

A group of people were given a survey about the importance of health care for the elderly. The table below lists the percentages of people surveyed in different age groups. For example, 18% of the people surveyed were between 14 and 23 years of age.

Percent:	18%	30%	30%	18%	2%	2%
Ages:	14-23	24-33	34-43	44-53	54-63	64-73

Why might the sample be biased?

The percentage of people over the age of 53 in the sample is only 4%.  
The sample does not represent adequately the opinions of elderly people.

**Statistics, Data Analysis, and Probability 2.0:** Students use data samples of a population and describe the characteristics and limitations of the samples.

**S 2.5:** Students identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.

Refer to the data from the previous question. A survey using that sample found that health care for older people is not very important to the American people. How valid is that claim? Explain your answer.

It's not a valid claim. Only 4% of those people sampled were aged over 53. These people are likely to think that health care for older people is very important.

# Answer Key For The California Mathematics Standards

## Grade 6

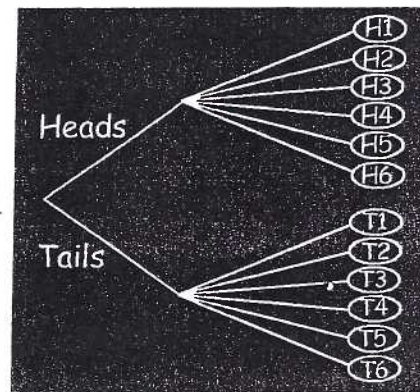
**Statistics, Data Analysis, and Probability 3.0:** Students determine theoretical and experimental probabilities and use these to make predictions about events.

**S 3.1:** Students represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.

- a. Represent all possible outcomes of flipping one coin and rolling one six-sided die. Label your representation clearly.

Coin	Coin
H	1
H	2
H	3
H	4
H	5
H	6

Coin	Coin
T	1
T	2
T	3
T	4
T	5
T	6



- b. What is the probability of each outcome in item a? Express your answer as both a fraction and a decimal rounded to the nearest thousandth.

Fraction  $\frac{1}{12}$

Decimal 0.083

The probability of either outcome of the coin toss is  $\frac{1}{2}$ , and the probability of each particular outcome from rolling a die is  $\frac{1}{6}$ , since these experiments are independent, the probability of any particular outcome from part a is  $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$

# Answer Key For The California Mathematics Standards

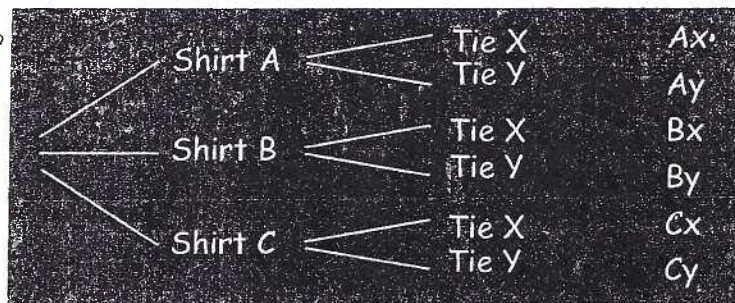
## Grade 6

**Statistics, Data Analysis, and Probability 3.0:** Students determine theoretical and experimental probabilities and use these to make predictions about events.

**S 3.1:** Students represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.

[CONTINUED]

c. A man has 3 shirts and 2 ties. Make a tree diagram to show all possible ways of choosing a shirt and tie.



# Answer Key For The California Mathematics Standards

## Grade 6

**Statistics, Data Analysis, and Probability 3.0:** Students determine theoretical and experimental probabilities and use these to make predictions about events.

**S 3.1:** Students represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.

[CONTINUED]

d. Assume the man in item c has no preference for specific shirt-and-tie combinations, and all his shirts and ties are available. What is the probability of each possibility in item c?

Express your answer as a fraction.

$$\frac{1}{6}$$

e. Make an organized list of all possible outcomes for flipping a penny, a dime, and quarter.

Penny	Dime	Quarter
H	H	H
H	H	T
H	T	H
H	T	T
T	H	H
T	H	T
T	T	H
T	T	T

# Answer Key For The California Mathematics Standards

## Grade 6

**Statistics, Data Analysis, and Probability 3.0:** Students determine theoretical and experimental probabilities and use these to make predictions about events.

**S 3.2:** Students use data to estimate the probability of future events (e.g., batting averages or number of accidents per mile driven).

A basketball player took 25 shots at the basket. He made 12 of the shots.  
If he keeps shooting at the same rate, how many shots will he make if he takes 300 shots? **144**

$$\frac{12}{25} = \frac{n}{300}$$
$$25n = 300 \times 12$$
$$25n = 3,600$$
$$n = 144$$

# Answer Key For The California Mathematics Standards

## Grade 6

**Statistics, Data Analysis, and Probability 3.0:** Students determine theoretical and experimental probabilities and use these to make predictions about events.

**S 3.3:** Students represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if  $P$  is the probability of an event,  $1-P$  is the probability of an event not occurring.

- a. 1. You have two dice. If you throw the dice at the same time, you might have one of many possible combinations. List all those possible combinations:

(1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (2,1), (2,2), (2,3), (2,4), (2,5), (2,6),  
(3,1), (3,2), (3,3), (3,4), (3,5), (3,6), (4,1), (4,2), (4,3), (4,4), (4,5), (4,6),  
(5,1), (5,2), (5,3), (5,4), (5,5), (5,6), (6,1), (6,2), (6,3), (6,4), (6,5), (6,6)

2. What chance do you have of getting a total of 7 dots showing for the two dice? Express the answer as a percent:  $16.66\ldots\%$  or  $1\bar{6}\%$  or  $16\frac{2}{3}\%$

Six of the 36 possible outcomes from tossing two dice result in a sum of 7. They are (1,6), (2,5), (3,4), (4,3), (5,2), (6,1). Therefore the probability of rolling 7 is  $\frac{6}{36}$  is  $\frac{1}{6}$  or  $16\frac{2}{3}\%$

- b. Use  $p$  to represent your answer to part a. What is the probability that you do NOT get a total of 7 dots showing for the two dice?  $1-P$



# Answer Key For The California Mathematics Standards

## Grade 6

**Statistics, Data Analysis, and Probability 3.0:** Students determine theoretical and experimental probabilities and use these to make predictions about events.

**S 3.4:** Students understand that the probability of either of two disjoint events occurring is the sum of the two individual probabilities and that the probability of one event following another, in independent trials, is the product of the two probabilities.

An oil prospecting firm plans to drill two exploratory wells. Past data is used to assess the following possible outcomes:

	<u>Probability</u>
Neither well produces oil or gas.	.80
Exactly one of the wells produces oil or gas	.18
Both wells produce oil or gas	.02

- a. What is the probability that at least one well will produce oil or gas?

$$.02 + .18 = 0.2$$

- b. What is the probability that neither well will produce oil or gas?

$$0.8$$

- c. What is the probability that at most one will produce oil or gas?

$$.18 + .80 = 0.98$$

# Answer Key For The California Mathematics Standards

## Grade 6

**Statistics, Data Analysis, and Probability 3.0:** Students determine theoretical and experimental probabilities and use these to make predictions about events.

**S 3.5:** Students understand the difference between independent and dependent events.

- a. What is the probability of tossing a die and observing an even number on the upper face of the die?  $\frac{1}{2}$

The sample space for this problem is {1, 2, 3, 4, 5, 6}.  
The probability of the even {2,4,6} is  $\frac{3}{6} = \frac{1}{2}$

- b. A person is blindfolded and asked to draw an object from a bag. In the bag are 2 red balls and 3 green balls. After each draw the chosen ball's color is recorded and it is returned to the bag.

Are subsequent draws dependent or independent of the first draw?

Independent

- c. If a green ball is picked on the first draw (and returned to the bag), what is the probability of picking a red ball on the second draw?

$\frac{2}{5}$

# Answer Key For The California Mathematics Standards Grade 6

**Statistics, Data Analysis, and Probability 3.0:** Students determine theoretical and experimental probabilities and use these to make predictions about events.

**S 3.5:** Students understand the difference between independent and dependent events.

[CONTINUED]

- e. Consider a situation where the set of objects in the bag is the same (2 red balls, 3 green balls), but after an object is drawn and its color is recorded it is not returned to the bag.

Are results of subsequent draws dependent or independent of the first draw?

Dependent

- f. If a green ball is picked on the first draw (and not returned to the bag), what is the probability of picking a red ball on the second draw?

$$\frac{2}{4} = \frac{1}{2}$$

