

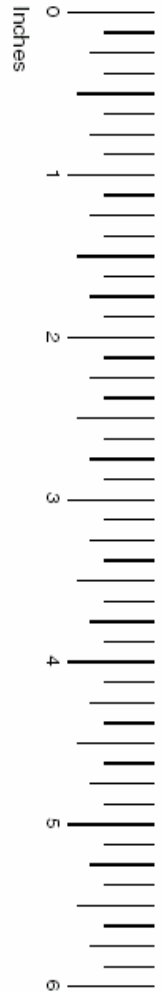
Texas Assessment of Knowledge and Skills

(TAKS)

6th Grade

# Grade 6

## Mathematics Chart



<b>LENGTH</b>	
<b>Metric</b>	<b>Customary</b>
1 kilometer = 1000 meters	1 mile = 1760 yards
1 meter = 100 centimeters	1 mile = 5280 feet
1 centimeter = 10 millimeters	1 yard = 3 feet
	1 foot = 12 inches
<b>CAPACITY AND VOLUME</b>	
<b>Metric</b>	<b>Customary</b>
1 liter = 1000 milliliters	1 gallon = 4 quarts
	1 gallon = 128 ounces
	1 quart = 2 pints
	1 pint = 2 cups
	1 cup = 8 ounces
<b>MASS AND WEIGHT</b>	
<b>Metric</b>	<b>Customary</b>
1 kilogram = 1000 grams	1 ton = 2000 pounds
1 gram = 1000 milligrams	1 pound = 16 ounces
<b>TIME</b>	
1 year = 365 days	
1 year = 12 months	
1 year = 52 weeks	
1 week = 7 days	
1 day = 24 hours	
1 hour = 60 minutes	
1 minute = 60 seconds	

## Grade 6 Mathematics Chart

<b>Perimeter</b>	square	$P = 4s$
	rectangle	$P = 2l + 2w$ or $P = 2(l + w)$
<b>Circumference</b>	circle	$C = 2\pi r$ or $C = \pi d$
<b>Area</b>	square	$A = s^2$
	rectangle	$A = lw$ or $A = bh$
	triangle	$A = \frac{1}{2}bh$ or $A = \frac{bh}{2}$
	trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$ or $A = \frac{(b_1 + b_2)h}{2}$
	circle	$A = \pi r^2$
<b>Volume</b>	cube	$V = s^3$
	rectangular prism	$V = lwh$
<b>Pi</b>	$\pi$	$\pi = 3.14$ or $\pi = \frac{22}{7}$

# Grade 6 Mathematics

## TAKS Objectives and TEKS Student Expectations

### TAKS Objective 1

**The student will demonstrate an understanding of numbers, operations, and quantitative reasoning.**

- (6.1) **Number, operation, and quantitative reasoning.** The student represents and uses rational numbers in a variety of equivalent forms. The student is expected to
- (A) compare and order non-negative rational numbers;
  - (B) generate equivalent forms of rational numbers including whole numbers, fractions, and decimals;
  - (C) use integers to represent real-life situations;
  - (D) write prime factorizations using exponents; and
  - (E) identify factors and multiples including common factors and common multiples.
- (6.2) **Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, and divides to solve problems and justify solutions. The student is expected to
- (A) model addition and subtraction situations involving fractions with [objects,] pictures, words, and numbers;
  - (B) use addition and subtraction to solve problems involving fractions and decimals;
  - (C) use multiplication and division of whole numbers to solve problems including situations involving equivalent ratios and rates; and
  - (D) estimate and round to approximate reasonable results and to solve problems where exact answers are not required

### Objective 1—For Your Information

At sixth grade, students should be able to:

- ◆ Use information given in the form of numbers or ranges of numbers when working problems; and
- ◆ Round numbers before performing any computations when estimating. The use of compatible numbers may be necessary.

### Objective 1 Sample Items

- 1 Mr. Quintana used the elevator to make deliveries on different floors of an office building. He entered the elevator, rode up 4 floors, rode down 2 floors, rode up 6 floors, and then rode down 1 floor, where he made his last delivery. Which expression can be used to find the floor on which Mr. Quintana made his last delivery?

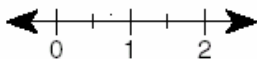
A\*  $4 - 2 + 6 - 1$

B  $4 + 2 - 6 + 1$

C  $1 - 4 - 2 + 6 - 1$

D  $4 + 2 + 6 + 1$

- 2 If Janet correctly marked  $0.13$ ,  $\frac{3}{2}$ ,  $0.032$ , and  $\frac{1}{3}$  on a number line, which number was closest to zero?



A  $0.13$

B\*  $0.032$

C  $\frac{3}{2}$

D  $\frac{1}{3}$

Students should be able to work with numbers given in various forms within the same problem.

- 3 At a bake sale, each pie was cut into 12 equal-sized slices. Mrs. Tumey sold 8 slices, Mr. Ito sold 6 slices, and Ms. D'Angelou sold 10 slices. Which expression can be used to find the total number of pies sold by these 3 people?

A  $12 + 8 + 6 + 10$

B  $12(8 + 6 + 10)$

C\*  $\frac{8}{12} + \frac{6}{12} + \frac{10}{12}$

D  $\frac{8}{12} \times \frac{6}{12} \times \frac{10}{12}$

## TAKS Objective 2

The student will demonstrate an understanding of patterns, relationships, and algebraic reasoning.

(6.3) **Patterns, relationships, and algebraic thinking.** The student solves problems involving proportional relationships. The student is expected to

(A) use ratios to describe proportional situations;

(B) represent ratios and percents with [concrete] models, fractions, and decimals; and

(C) use ratios to make predictions in proportional situations.

20 TAKS Objectives and TEKS Student Expectations Grade 6 Mathematics

(6.4) **Patterns, relationships, and algebraic thinking.** The student uses letters as variables in mathematical expressions to describe how one quantity changes when a related quantity changes. The student is expected to

(A) use tables and symbols to represent and describe proportional and other relationships involving conversions, sequences, perimeter, area, etc.; and

(B) generate formulas to represent relationships involving perimeter, area, volume of a rectangular prism, etc., from a table of data.

(6.5) **Patterns, relationships, and algebraic thinking.** The student uses letters to represent an unknown in an equation. The student is expected to

(A) formulate an equation from a problem situation.

## **Objective 2—For Your Information**

At sixth grade, students should be able to:

- ◆ Match a description of a proportional situation with a ratio, which may or may not be expressed in lowest terms;
- ◆ Identify the method for finding any term of a numerical or geometric sequence;
- ◆ Match a relationship represented by an equation or written description with the same relationship shown in pairs of numbers; and
- ◆ Generate and/or match an equation with a solution strategy for an application situation.

### Objective 2 Sample Items

- 1 Scientists have observed that under certain conditions 0.5 inch of rain is approximately equal to 5 inches of snow. Which fraction best represents the ratio of inches of rain to inches of snow?

- A  $\frac{10}{1}$   
 B  $\frac{10}{5}$   
 C  $\frac{0.5}{1}$   
 D\*  $\frac{1}{10}$

- 2 The table shows Anne's age compared to her father's age at different times.

Anne's Age ( $a$ )	Her Father's Age ( $f$ )
3	28
6	31
10	35
15	40
18	43

Let  $a$  represent Anne's age and let  $f$  represent her father's age. Which equation shows the relationship between their ages?

- A  $a = f + 25$   
 B  $f = a - 28$   
 C  $a = f - 28$   
 D\*  $f = a + 25$

**Students will be required to identify the function rule for a set of data rather than identifying a pattern in a single column/row.**

- 3 The side lengths and areas of some regular polygons are shown in the table below.

### Areas of Regular Polygons

Side Length (units)	Area (square units)
4	16
5	25
7	49
9	81
$n$	

Which expression can be used to find the area in square units, of a similar polygon with a side length of  $n$  units?

- A  $n + n$   
 B\*  $n^2$   
 C  $4n$   
 D  $9 + n$

**Students will need to formulate the correct function rule for a given set of data in terms of a variable. This is a fundamental skill for identifying functional relationships in algebra.**

## TAKS Objective 3

The student will demonstrate an understanding of geometry and spatial reasoning.

- (6.6) **Geometry and spatial reasoning.** The student uses geometric vocabulary to describe angles, polygons, and circles. The student is expected to
- (A) use angle measurements to classify angles as acute, obtuse, or right;
  - (B) identify relationships involving angles in triangles and quadrilaterals; and
  - (C) describe the relationship between radius, diameter, and circumference of a circle.
- (6.7) **Geometry and spatial reasoning.** The student uses coordinate geometry to identify location in two dimensions. The student is expected to
- (A) locate and name points on a coordinate plane using ordered pairs of non-negative rational numbers.

### Objective 3—For Your Information

At sixth grade, students should be able to:

- ◆ Use formal geometric terms correctly;
- ◆ Identify geometric models presented as a simple figure or as apart of a more complex figure; and
- ◆ Graph points on coordinate grids limited to the first quadrant.

### Objective 3 Sample Items

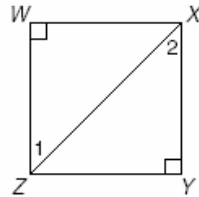
- 1 Look at the map showing some streets in downtown San Antonio.



Look at angle *A*, formed by the intersection of St. Mary's Street and Navarro Street. What type of angle does it appear to be?

- A\*** Acute
- B** Right
- C** Obtuse
- D** Straight

- 2 Find the measure, in degrees, of  $\angle 2$  in square  $WXYZ$ .



Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

		4	5	.		
0	0	0	0		0	0
1	1	1	1		1	1
2	2	2	2		2	2
3	3	3	3		3	3
4	4	●	4		4	4
5	5	5	●		5	5
6	6	6	6		6	6
7	7	7	7		7	7
8	8	8	8		8	8
9	9	9	9		9	9

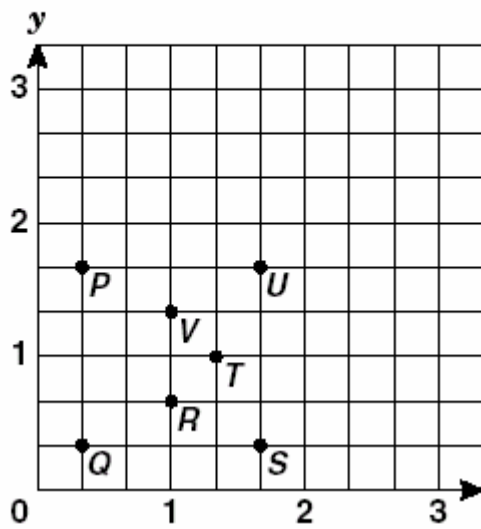
This item specifically requests the measure in *degrees*. On griddable items, students do not grid the units. The correct answer to this test item is 45. It is acceptable, although not necessary, to bubble in the zeros in front of the four and/or after the decimal. These zeros will not affect the value of the correct answer.

- 3 Some theater arts students made a circular railroad-crossing sign for a school play. The diameter of the sign was about 3 feet. How does the diameter compare to the circumference of the sign?

- A\* The diameter is about  $\frac{1}{3}$  the circumference.
- B The diameter is about  $\frac{1}{2}$  the circumference.
- C The diameter is about 2 times the circumference.
- D The diameter is about 3 times the circumference.

Students should have a firm understanding of the relationships among all the components in formulas (for example, radius, diameter, circumference, area, pi).

- 4 Which coordinate pair best represents point  $S$  on the coordinate grid below?



- A (5, 1)
- B  $(1\frac{1}{2}, \frac{1}{2})$
- C  $(1, \frac{2}{3})$
- D\*  $(1\frac{2}{3}, \frac{1}{3})$

**Non-negative rational numbers include fractions, decimals, and whole numbers the first quadrant.**

## TAKS Objective 4

The student will demonstrate an understanding of the concepts and uses of measurement.

- (6.8) **Measurement.** The student solves application problems involving estimation and measurement of length, area, time, temperature, capacity, weight, and angles. The student is expected to
- (A) estimate measurements and evaluate reasonableness of results;
  - (B) select and use appropriate units, tools, or formulas to measure and to solve problems involving length (including perimeter and circumference), area, time, temperature, capacity, and weight;
  - (C) measure angles; and
  - (D) convert measures within the same measurement system (customary and metric) based on relationships between units.

### Objective 4—For Your Information

At sixth grade, students should be able to:

- ◆ Measure with the ruler on the Mathematics Chart **only if** the item specifically instructs students to use the ruler; and
- ◆ Use the given information of a figure to solve problems.

**Objective 4 Sample Items**

- 1 The table shows the approximate surface area, in millions of square miles, of the world's largest oceans. About how many times larger is the surface of the Indian Ocean than the surface of the Arctic Ocean?

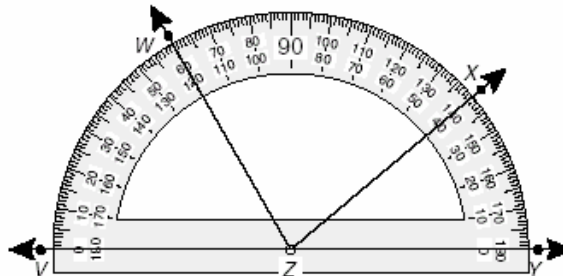
Ocean	Surface Area (millions of square miles)
Arctic	5.4
Atlantic	33.4
Indian	28.3
Pacific	64.0

- A 1 to 2 times larger  
 B\* 5 to 6 times larger  
 C 6 to 7 times larger  
 D 12 to 13 times larger

- 2 The circumference of a circle is 25.12 centimeters. Find the approximate length of the circle's radius.

- A\* 4 cm  
 B 5 cm  
 C 8 cm  
 D 10 cm

- 3 Find the measure of  $\angle WZX$  to the nearest degree.



- A  $20^\circ$   
 B  $40^\circ$   
 C  $60^\circ$   
 D\*  $80^\circ$

**Students should be able to find the measure of an angle that may or may not begin at 0 degrees.**

## TAKS Objective 5

**The student will demonstrate an understanding of probability and statistics.**

- (6.9) **Probability and statistics.** The student uses experimental and theoretical probability to make predictions. The student is expected to
- (A) construct sample spaces using lists, tree diagrams, and combinations; and
  - (B) find the probabilities of a simple event and its complement and describe the relationship between the two.
- (6.10) **Probability and statistics.** The student uses statistical representations to analyze data. The student is expected to
- (A) [draw and] compare different graphical representations of the same data;
  - (B) use median, mode, and range to describe data;
  - (C) sketch circle graphs to display data; and
  - (D) solve problems by collecting, organizing, displaying, and interpreting data.

### **Objective 5—For Your Information**

At sixth grade, students should be able to:

- ◆ Match a situation with a sample space that lists all possible combinations or select the missing portion of a given sample space;
- ◆ Match the median, mode and/or range with its data set, which may be listed in the text of the item or presented in a graphical representation;
- ◆ Given an incomplete data set, identify the piece of missing data that will produce a target median, mode, and/or range for the completed data set; and
- ◆ Match a circle graph with a data set listed in table, chart, graph, or sentence form.

**Objective 5 Sample Items**

- 1 A fair coin is tossed two times in a row.



Heads



Tails

Which shows all possible outcomes for the two tosses?

All Possible Outcomes

**A**

First Toss	Second Toss
Heads	Heads
Tails	Tails

All Possible Outcomes

**C\***

First Toss	Second Toss
Heads	Heads
Tails	Heads
Heads	Tails
Tails	Tails

All Possible Outcomes

**B**

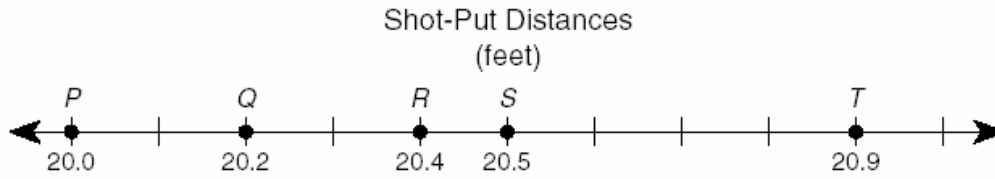
First Toss	Second Toss
Heads	Tails
Tails	Heads
Heads	Tails
Tails	Heads

All Possible Outcomes

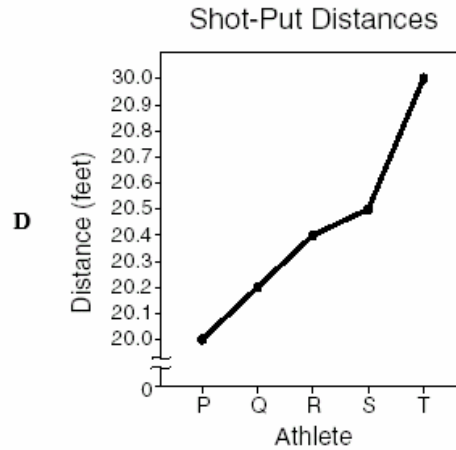
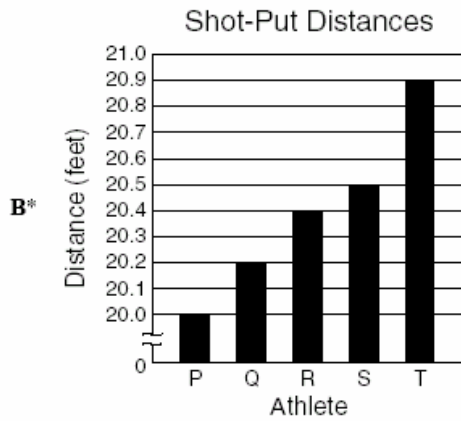
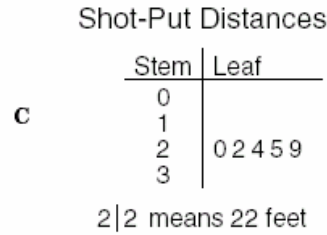
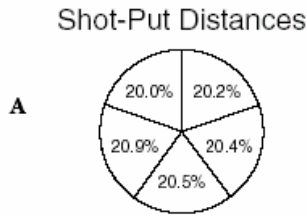
**D**

First Toss	Second Toss
Tails	Tails
Heads	Tails
Tails	Heads

- 2 The number of feet that each of 5 athletes threw the shot put is plotted on the line below.



Which graph best represents the same data?

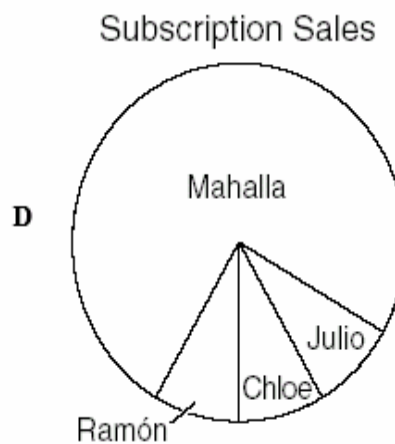
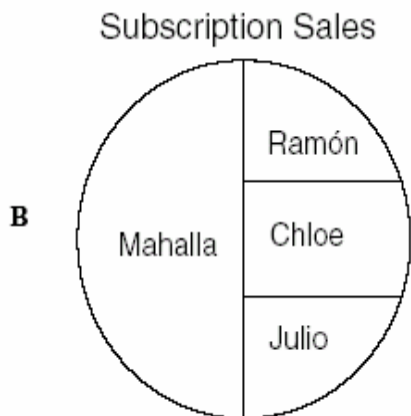
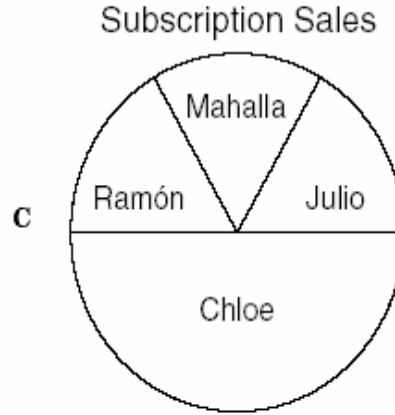
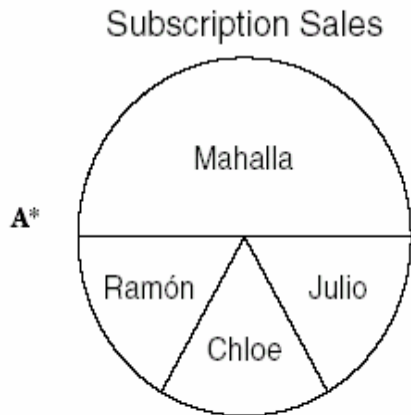


Students need to determine the most appropriate and accurate graphical display of a given set of data.

- 3 Which circle graph best displays the data shown in the table?

Subscription Sales

Name	Number of Subscriptions
Ramón	100
Mahalla	300
Chloe	100
Julio	100



## TAKS Objective 6

**The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.**

- (6.11) **Underlying processes and mathematical tools.** The student applies Grade 6 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to
- (A) identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics;
  - (B) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness; and
  - (C) select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem.
- (6.12) **Underlying processes and mathematical tools.** The student communicates about Grade 6 mathematics through informal and mathematical language, representations, and models. The student is expected to
- (A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models.
- (6.13) **Underlying processes and mathematical tools.** The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to
- (A) make conjectures from patterns or sets of examples and nonexamples; and
  - (B) validate his/her conclusions using mathematical properties and relationships.

**Objective 6—For Your Information**

At sixth grade, students should be able to:

- ◆ Select the description of a mathematical situation when provided a written or pictorial prompt;
- ◆ Identify the information that is needed to solve a problem;
- ◆ Select or describe the next step or a missing step that would be most appropriate in a problem-solving situation;
- ◆ Match informal language to mathematical language and/or symbols;
- ◆ Identify the question that is being asked or answered;
- ◆ Draw a conclusion by investigating patterns and/or sets of examples and non-examples, which can be defined as counterexamples; and
- ◆ Choose the correct supporting information for a given conclusion.

**Objective 6 Sample Items**

- 1 Mindy wants to find the total value of the coins she has.

Look at the problem-solving steps shown below. Arrange the steps in the correct order for Mindy to find the total value of her coins.

Step P: Find the sum of the products for each type of coin.

Step Q: Count and record the number of each type of coin.

Step R: For each type of coin, find the product of the number of coins and the value of that type of coin.

Step S: Separate the coins into groups of the same type of coin.

Which list shows the steps in the correct order?

- A R, S, Q, P
- B\* S, Q, R, P
- C S, R, Q, P
- D P, Q, R, S

**Students should recognize that there are multiple strategies to solve problems. Students should be able to select the most appropriate strategy given for a particular situation.**

- 2** Anita found the measures of the angles of an isosceles triangle. One angle measured  $50^\circ$ , and the other 2 angles were congruent. Which method can be used to find the measure of each of the congruent angles?
- A** Multiply 50 by 2 and then add 180  
**B\*** Subtract 50 from 180 and then divide by 2  
**C** Add 50 to 180 and then divide by 3  
**D** Divide 50 by 2 and then subtract from 180
- 3** Which choice gives the correct order of operations needed to find the value of  $9 + 6(8 - 4) \div 3$ ?
- A** +,  $\times$ , -,  $\div$   
**B**  $\times$ ,  $\div$ , +, -  
**C\*** -,  $\times$ ,  $\div$ , +  
**D**  $\div$ , -, +,  $\times$
- 4** Penny has been hired to paint a large mural on the outside wall of a building. To calculate the amount of surface she needs to paint, she multiplies the length of the base of the mural by its height and then finds  $\frac{1}{2}$  of that product. Based on Penny's calculations, what do we know about the mural?
- A** It is triangular, and she has calculated the perimeter.  
**B\*** It is triangular, and she has calculated the area.  
**C** It is rectangular, and she has calculated the perimeter.  
**D** It is rectangular, and she has calculated the area.