



## 8<sup>th</sup> Grade Math Study Guide Credit by Exam for Credit Recovery or Acceleration

The exam you are interested in taking is designed to test your proficiency in the relevant subject matter. You should be thoroughly familiar with the subject matter before you attempt to take the exam. This EA/CBE Study Guide can help you prepare for the exam by giving you an idea of what you need to review. You can check your familiarity level by reviewing the Texas Essential Knowledge and Skills (TEKS) for this course (see below). To refine your skills, you can refer to any of the state-adopted textbooks.

### Texas Essential Knowledge and Skills (TEKS)

Every question that appears on this exam is derived from the knowledge and skills statements and student expectations within the Texas-mandated standards, the Texas Essential Knowledge and Skills (TEKS). You can view the TEKS for this exam online via the following link: <http://ritter.tea.state.tx.us/rules/tac/chapter111/ch111b.html> - 111.28. Refer to section (b), Knowledge and skills, 1A–12G.

Throughout this guide, you'll see TEKS references. These refer to the numbers listed under (b) Knowledge and skills; for example, 1A or 3B.

### Materials Needed

You will need to bring a scientific calculator. The formula sheets at the end of this study guide will be provided during the exam. You can also bring these formula sheets with you to your exam. If you are taking a print exam, you must bring a #2 pencil to complete the exam. You will receive a computer-graded answer sheet when you arrive at the testing center. The proctor will provide scratch paper.

### Exam Structure

You will be allowed **3 hours** to complete this exam. The exam consists of 63 multiple-choice questions that are equally weighted. You will be allowed one short, monitored break during the exam. The exam covers the following 7 Objectives:

- Objective 1:** Mathematical Process Standards
- Objective 2:** Number and Operations (6 questions)
- Objective 3:** Proportionality (20 questions)
- Objective 4:** Expressions, Equations, and Relationships (17 questions)
- Objective 5:** Two-dimensional Shapes (8 questions)
- Objective 6:** Measurements and Data (6 questions)
- Objective 7:** Personal Financial Literacy (7 questions)

## **Scholastic Honesty**

When you arrive at the testing center, you will be asked to carefully read the exam rules and sign a statement agreeing to take the exam in accordance with the rules. This is called the Examinee's Certification. The following is a copy of these rules:

### **Examinee's Certification**

**This certification must be signed *before* the exam is administered and then returned with the completed examination attached, or credit for the exam will not be given.**

Scholastic dishonesty is a serious academic violation that will not be tolerated. Scholastic dishonesty encompasses, but is not limited to:

- copying from another student's work;
- using an unauthorized testing proctor or taking the exam at an unauthorized testing location;
- using materials not authorized by a testing proctor;
- possessing materials that are not authorized by a testing proctor, such as lessons, books, or notes;
- knowingly using or soliciting, in whole or part, the contents of an unadministered test;
- collaborating with or seeking aid from another student without authorization during the test;
- substituting for another person, or permitting another person to substitute for oneself, in taking a course test or completing any course-related assignment;
- using, buying, stealing, or transporting some or all of the contents of an unadministered test, test rubric, homework answer, or computer program.

**Evidence of scholastic dishonesty will result in a grade of *F* on the examination and an *F* in the course (if applicable).**

*At the testing center, you will be asked to sign a statement that says you have read the above and agree to complete the examination with scholastic honesty.*

## **General Study Tips**

The bulleted lists and sample questions in this study guide can assist you in preparing for the exam. It is a fairly complete guide, but does not cover every item on the test. Ultimately, you should use the TEKS to guide your exam preparation.

## **Additional Study Tips**

The following information provides direction for your studies. For each part, you will find study tips and sample questions to give you a general idea of the types of questions you can expect to see on the exam.

## **Objective 1: Mathematical Process Standards**

This part relates to your knowledge of using mathematical processes to acquire and demonstrate mathematical understanding.

### **Study Tips for Objective 1**

This part relates to TEKS 1A–G\*\*. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Apply mathematics to problems arising in everyday life, society, and the workplace.
- Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.
- Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.
- Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.
- Create and use representations to connect and communicate mathematical ideas.
- Analyze mathematical relationships to connect and communicate mathematical ideas.
- Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written and oral communication.

**\*\*These TEKS are incorporated into other question, therefore there are no sample questions on these TEKS alone.**

## Objective 2: Numbers and Operations

This part relates to your knowledge of how to represent and use real numbers in a variety of forms.

### Study Tips for Objective 2

This part relates to TEKS 2A–2D. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

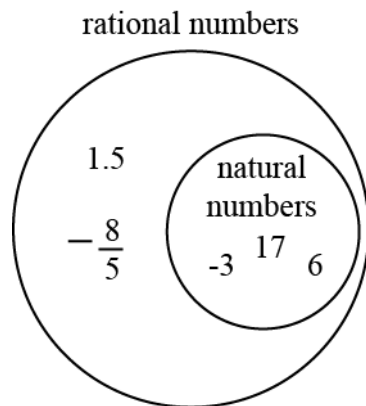
- Extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers.
- Approximate the value of an irrational number, including  $\pi$  and square roots of numbers less than 225, and locate that rational number approximation on a number line.
- Convert between standard decimal notation and scientific notation.
- Order a set of real numbers arising from mathematical and real-world contexts.

### Sample Questions for Objective 2

The following are sample questions. You can find the correct answers listed at the end of this study guide, but try answering the questions without looking at the answers first to check your comprehension.

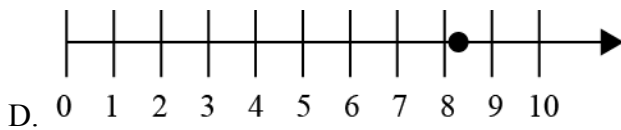
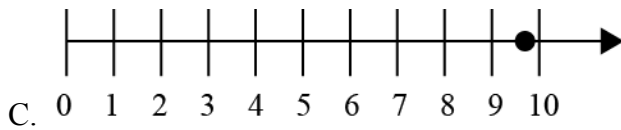
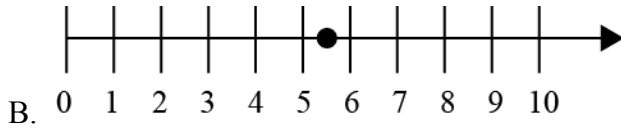
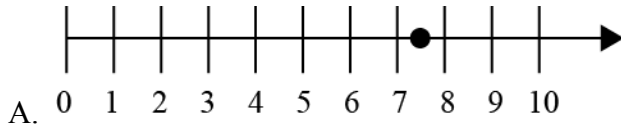
**DIRECTIONS:** Select the BEST response to each of the following questions.

1. Which number is in the incorrect place on the diagram?



- A. 1.5
- B. -3
- C. 17
- D.  $-\frac{8}{5}$

2. Laura was working on finding the hypotenuse of a right triangle for her math class. She discovered that the hypotenuse was  $\sqrt{52}$ . Which number line shows the approximate location of  $\sqrt{52}$ ?



### Objective 3: Proportionality

This part relates to your knowledge of how to represent and solve linear functions using graphs, tables, and equations, and write inequalities.

#### Study Tips for Objective 3

This part relates to TEKS 3A–5I. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

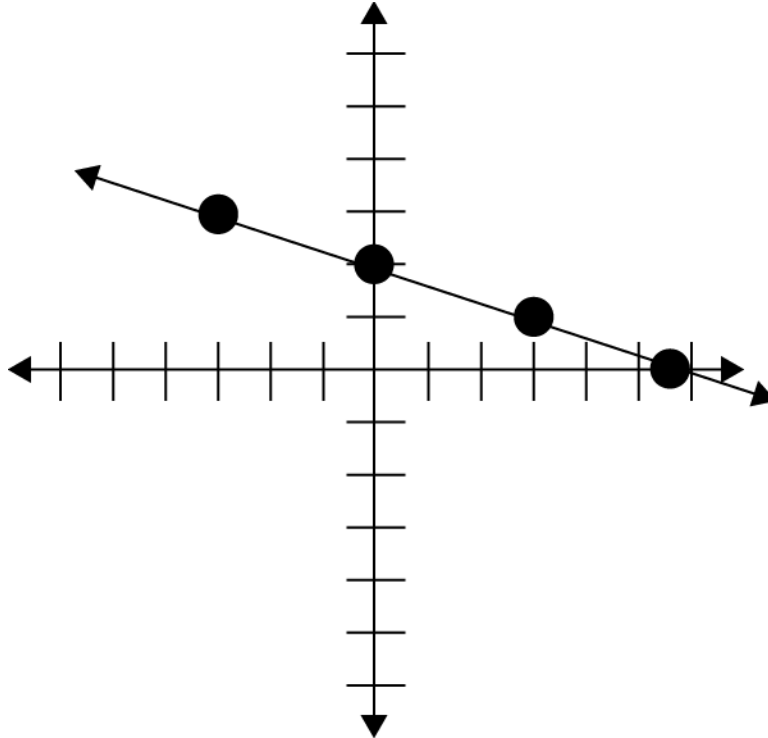
- Generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation.
- Compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane.
- Use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation.
- Use similar right triangles to develop an understanding that slope,  $m$ , given as the rate comparing the change in  $y$ -values to the change in  $x$ -values,  $(y_2 - y_1) / (x_2 - x_1)$ , is the same for any two points  $(x_1, y_1)$  and  $(x_2, y_2)$  on the same line.
- Graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship.
- Use data from a table or graph to determine the rate of change or slope and  $y$ -intercept in mathematical and real-world problems.
- Represent linear proportional situations with tables, graphs, and equations in the form of  $y = kx$ .
- Represent linear non-proportional situations with tables, graphs, and equations in the form of  $y = mx + b$ , where  $b \neq 0$ .
- Contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation.
- Use a trend line that approximates the linear relationship between bivariate sets of data to make predictions.
- Solve problems involving direct variation.
- Distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form  $y = kx$  or  $y = mx + b$ , where  $b \neq 0$ .
- Identify functions using sets of ordered pairs, tables, mappings, and graphs.
- Identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems.
- Write an equation in the form  $y = mx + b$  to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations.

### Sample Questions for Objective 3

The following are sample questions. You can find the correct answers listed at the end of this study guide, but try answering the questions without looking at the answers first to check your comprehension.

**DIRECTIONS:** Select the **BEST** response to each of the following questions.

3. Which linear equation represents the line graphed below?



- A.  $y = 3x + 2$
- B.  $y = -3x - 2$
- C.  $y = \frac{1}{3}x + 2$
- D.  $y = -\frac{1}{3}x + 2$

4. Fran is in a triathlon. She is able to bike 21 miles in 3 hours. Which of the tables and equations below show the relationship between distance and time if her rate stays constant?

t (hours)	0	0.5	1	1.5	2	2.5
d (miles)	0	3	6	9	12	15

A.  $y = 3.5x$

t (hours)	0	1	2	3	4	5
d (miles)	0	3.5	7	10.5	14	17.5

B.  $y = 7x$

t (hours)	0	0.5	1	1.5	2	2.5
d (miles)	0	3.5	7	10.5	14	17.5

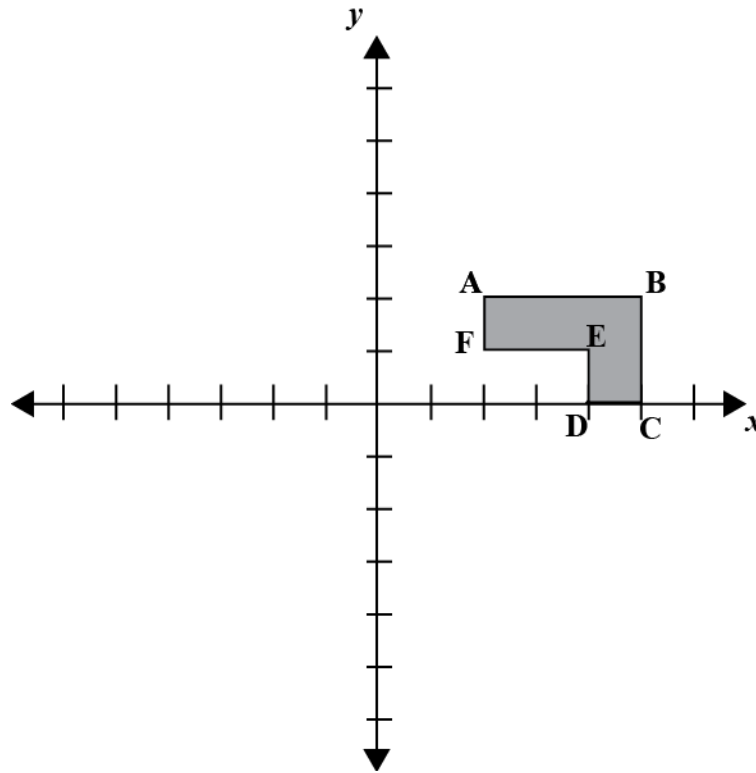
C.  $y = 7x$

t (hours)	0	1	2	3	4	5
d (miles)	3	6	9	12	15	18

D.  $y = 3x$



5. The graph below is a polygon ABCDEF. If the polygon is dilated by a scale of 2 around the origin (0,0), what are the coordinates of E'?



- A  $E' = (2, 0.5)$
- B  $E' = (8, 2)$
- C  $E' = (8, 1)$
- D  $E' = (4, 2)$

#### **Objective 4: Expressions, Equations, and Relationships**

This part relates to your knowledge of how to use proportional relationships to describe dilations and develop transformational geometry concepts.

#### **Study Tips for Objective 4**

This part relates to TEKS 6A–9. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Describe the volume formula  $V = Bh$  of a cylinder in terms of its base area and its height.
- Model the relationship between the volume of a cylinder and a cone having both congruent bases and heights and connect that relationship to the formulas
- Use models and diagrams to explain the Pythagorean Theorem.
- Solve problems involving the volume of cylinders, cones, and spheres.
- Use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders.
- Use the Pythagorean Theorem and its converse to solve problems.
- Determine the distance between two points on a coordinate plane using the Pythagorean Theorem.
- Write one-variable equations or inequalities on both sides that represent problems using rational number coefficients and constants.
- Write a corresponding real-world problem when given a one-variable equation or inequality with variables on both sides of the equal sign using rational number coefficients and constants.
- Model and solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems using rational number coefficients and constants.
- Use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
- Identify and verify the values of  $x$  and  $y$  that simultaneously satisfy two linear equations in the form of  $y = mx + b$  from the intersections of the graphed questions.

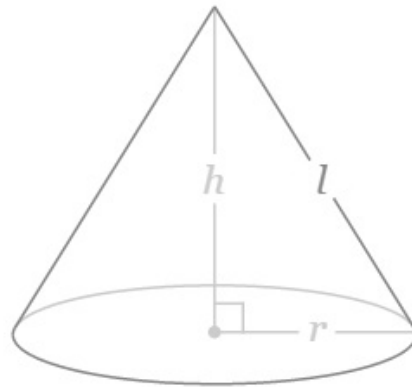
**Sample Questions for Objective 4**

The following are sample questions. You can find the correct answers listed at the end of this study guide, but try answering the questions without looking at the answers first to check your comprehension.

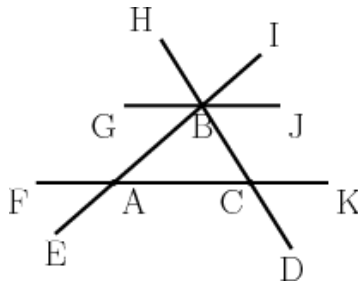
**DIRECTIONS:** Select the **BEST** response to each of the following questions.

6. Matthew is making a model of a mountain shaped like a cone. The model will be 8 inches tall and have a 10-inch diameter. How much clay does Matthew need?

- A.  $209 \text{ in}^2$   
 B.  $838 \text{ in}^2$   
 C.  $628 \text{ in}^2$   
 D.  $314 \text{ in}^2$



7.  $\overline{GJ}$  and  $\overline{FK}$  are parallel. If  $\angle EAC$  measures  $120^\circ$  and  $\angle HBI$  measures  $84^\circ$ , find the measure of  $\angle BCA$ .



- A.  $\angle BCA = 60^\circ$   
 B.  $\angle BCA = 84^\circ$   
 C.  $\angle BCA = 36^\circ$   
 D.  $\angle BCA = 54^\circ$

### **Objective 5: Two-Dimensional Shapes**

This part relates to your knowledge of how to identify and verify the values of  $x$  and  $y$  that simultaneously satisfy two linear equations in the form  $y = mx + b$  from the intersections of the graphed equations.

#### **Study Tips for Objective 5**

This part relates to TEKS 10A–D. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

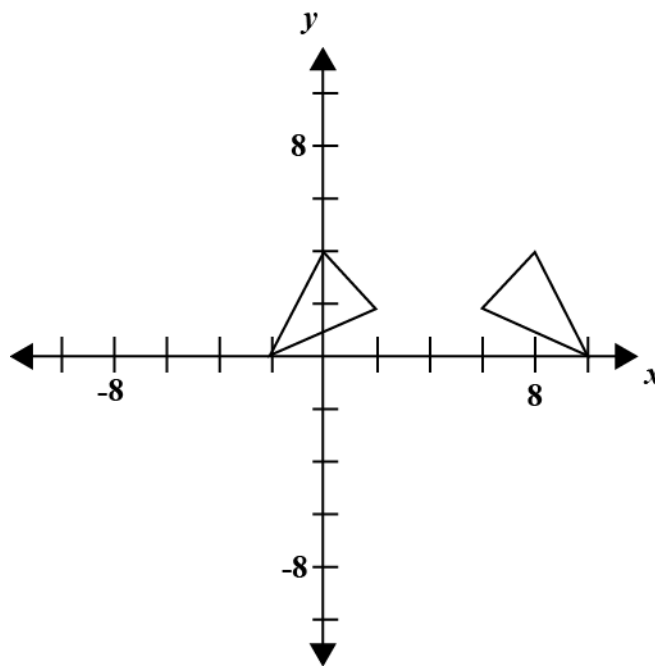
- Generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane.
- Differentiation between transformations that preserve congruence and those that do not.
- Explain the effect of translations, reflections over the  $x$ - or  $y$ -axis, and rotations limited to  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$ , and  $360^\circ$  as applied to two-dimensional shapes on a coordinate plane using an algebraic representation.
- Model the effect on linear and area measurements of dilated two-dimensional shapes.

### Sample Questions for Objective 5

The following are sample questions. You can find the correct answers listed at the end of this study guide, but try answering the questions without looking at the answers first to check your comprehension.

**DIRECTIONS:** Select the **BEST** response to each of the following questions.

8. Triangle ABCE has been transformed to triangle A'B'C'D'. Identify the transformation.



- A. Dilated,  $2x$
- B. Rotated  $180^\circ$
- C. Translated to the right 4
- D. Reflected over the y-axis and translated to the right 8

## **Objective 6: Measurement and Data**

This part relates to your knowledge of mathematical process standards to use statistical procedures to describe data.

### **Study Tips for Objective 6**

This part relates to TEKS 11A–C. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data.
- Determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean using a data set of no more than 10 data points.
- Simulate generating random samples of the same size from a population with known characteristics to develop the notion of a random sample being representative of the population from which it was selected.

**Sample Questions for Objective 6**

The following are sample questions. You can find the correct answers listed at the end of this study guide, but try answering the questions without looking at the answers first to check your comprehension.

**DIRECTIONS:** Select the **BEST** response to each of the following questions.

9. Use the table below to calculate the mean absolute deviation of the values listed.

<b>Value</b>	<b>Distance from the Mean</b>
13	3.5
6	3.5
16	6.5
3	6.5
5	4.5
10	0.5
7	2.5
12	2.5
11	1.5
12	2.5

What is the mean absolute deviation of the values listed and what does it represent?

- A. The mean absolute deviation is 3.4, which represents the average distance data are from the mean.
- B. The mean absolute deviation is 34, which represents the total distance data are from the mean.
- C. The mean absolute deviation is 95, which represents the sum of the values overall.
- D. The mean absolute deviation is 2.5, which represents the mode of the distances from the mean.

## **Objective 7: Personal Financial Literacy**

This part relates to your knowledge of thinking economically and problem solving as both a consumer and an investor.

### **Study Tips for Objective 7**

This part relates to TEKS 12A–G. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Solve real-world problems comparing how interest rate and loan length affect the cost of credit.
- Calculate the total cost of repaying a loan, including credit cards and easy access loans, under various rates of interest and over different periods using an online calculator.
- Explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time.
- Calculate and compare simple interest and compound interest earnings.
- Identify and explain the advantages and disadvantages of different payment methods.
- Analyze situations to determine if they represent financially responsible decisions and identify the benefits of financial responsibility and the costs of financial irresponsibility.
- Estimate the cost of a two-year and four-year college education, including family contribution, and devise a periodic savings plan for accumulating the money needed to contribute to the total cost of attendance for at least the first year of college.



### Sample Questions for Objective 7

The following are sample questions. You can find the correct answers listed at the end of this study guide, but try answering the questions without looking at the answers first to check your comprehension.

**DIRECTIONS: Select the BEST response to each of the following questions.**

10. Akira is in 8<sup>th</sup> grade and is planning to go to a 4-year college. She wants to save enough money in the next 5 years to cover the cost of her first year of college, so she doesn't have to take out any loans in the beginning. She has a few colleges in mind, which cost between \$17,000 and \$35,000 per year. Her parents plan to contribute \$5,000 toward her college savings. If she saves \$200 per month, will she meet her savings goal?
- A. No, she won't meet her goal for any of the schools on her list.
  - B. Yes, she'll meet her goal and can attend any school on her list.
  - C. Yes, she'll meet her goal, but only have enough money to attend the cheapest school on her list.
  - D. No, she won't meet her goal to attend a 4-year college on her list, so she'll have to attend for only 2 years.
11. Darian has \$6000 to invest to save for college. He has two choices laid out in the table below. Will compound interest or simple interest make Darian more money, when time and interest rate are taken into consideration?

	<b>Simple Interest</b>	<b>Compound Interest</b>
Principle	\$6000	\$6000
Time (years)	6 years	9 years
Interest rate	7%	4%

- A. Simple Interest
- B. Compound Interest
- C. The choices will give you the same outcome.
- D. There is not enough information to make a decision.

## Answer Key

Item Number	Correct Answer	TEKS expectation
1	B	1E, 1D, 2A
2	A	1C, 1E, 2B
3	D	4C, 5B
4	C	5A
5	B	1G, 3C
6	A	7A
7	C	8D
8	D	10C
9	A	11B
10	C	12G
11	B	12D

## 8th Grade Mathematics Formula Sheet

### Length

#### Customary

1 mile (mi) = 1,760 yards (yd)

1 yard (yd) = 3 feet (ft)

1 foot (ft) = 12 inches (in)

#### Metric

1 kilometer (km) = 1,000 meters (m)

1 meter (m) = 100 centimeters (cm)

1 centimeters (cm) = 10 millimeters (mm)

### Volume

#### Customary

1 gallon (gal) = 4 quarts (qt)

1 quart (qt) = 2 pints (pt)

1 pint (pt) = 2 cups (c)

1 cup (c) = 8 fluid ounces (fl oz)

#### Metric

1 liter (L) = 1,000 milliliters (mL)

### Weight and Mass

#### Customary

1 ton (T) = 2,000 pounds (lb)

1 pound (lb) = 16 ounces (oz)

#### Metric

1 kilogram (kg) = 1,000 grams (g)

1 gram (g) = 1,000 milligrams (mg)

### Time

1 year = 12 months

1 year = 52 weeks

1 week = 7 days

1 day = 24 hours

1 hour = 60 minutes

1 minute = 60 seconds

## 8th Grade Mathematics Formula Sheet

### Circumference

Circle	$C = 2\pi r$	or	$C = \pi d$
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### Area

Triangle	$A = \frac{1}{2}bh$
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Rectangle or parallelogram	$A = bh$
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Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$
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Circle	$A = \pi r^2$
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### Surface Area

	Lateral	Total
Prism	$S = Ph$	$S = Ph + 2B$
Pyramid	$S = \frac{1}{2}Pl$	$S = \frac{1}{2}Pl + B$
Cylinder	$S = 2\pi rh$	$S = 2\pi rh + 2\pi r^2$

### Volume

Prism or Cylinder	$V = Bh$
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Pyramid or Cone	$V = \frac{1}{3}Bh$
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Sphere	$V = \frac{4}{3}\pi r^3$
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### Additional Information

Pi	$\pi \approx 3.14$	or	$\pi \approx \frac{22}{7}$
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Pythagorean theorem	$a^2 + b^2 = c^2$
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