MATH 8B
Mathematics, Grade 8, Second Semester
#10128 (v.3.0)

To the Student:

After your registration is complete and your proctor has been approved, you may take the Credit by Examination for Mathematics, Grade 8, second semester.

WHAT TO BRING

- several sharpened No.2 pencils
- lined notebook paper
- graph paper
- straight edge
- graphing calculator

ABOUT THE EXAM

The examination for the second semester of Grade 8 mathematics consists of 40 questions, of which 35 are multiple choice and the rest are short answer. The exam is based on the Texas Essential Knowledge and Skills (TEKS) for this subject. The full list of TEKS is included in this document (it is also available online at the Texas Education Agency website, http://www.tea.state.tx.us/). The TEKS outline specific topics covered in the exam, as well as more general areas of knowledge and levels of critical thinking. Use the TEKS to focus your study in preparation for the exam.

The examination will take place under supervision, and the recommended time limit is three hours. A formula chart will be provided for you. **You *will* be allowed to use a graphing calculator.** You may not use any notes or books. A percentage score from the examination will be reported to the official at your school.

In preparation for the examination, review the TEKS for this subject. All TEKS are assessed. A list of review topics is included in this document to focus your studies. It is important to prepare adequately. Since questions are not taken from any one source, you can prepare by reviewing any of the state-adopted textbooks that are used at your school. The textbook used with our MATH 8A course is:

> Randall et al. (2008). *Prentice Hall Texas Mathematics, Course 3.* Boston, MA.: Pearson Prentice Hall. ISBN 0-13-134019-0

The practice exam included in this document will give you a model of the types of questions that will be asked on your examination. It is **not** a duplicate of the actual examination. It is provided to illustrate the format of the exam, not to serve as a complete review sheet.

Good luck on your examination!

MATH 8B Study Topics

For the exam, you must be to work with the following concepts:

- Equations with variables on both sides
- Inequalities with variables on both sides
- Equations and inequalities with rational numbers
- Translations, reflections, and rotations
- Algebraic representations of transformations
- Congruence
- Dilations
- Scatter plots
- Trend lines and predictions
- Mean absolute value deviation
- Random sampling
- Simple interest
- Compound interest
- Saving and investing
- Analyze financial situations
- College costs and payments
- Solve problems connected to everyday experiences, communicate through informal mathematical language and models, and use reasoning to make conjectures and verify conclusions.

Grade 8 Math Formula Chart

LENGTH

Metric	Customary
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

CAPACITY AND VOLUME

Metric	Customary
1 liter = 1000 milliliters	1 gallon = 4 quarts
	1 gallon = 128 fluid ounces
	1 quart = 2 pints
	1 pint = 2 cups
	1 cup = 8 fluid ounces

MASS AND WEIGHT

Metric	Customary
1 kilogram = 1000 grams	1 ton = 2000 pounds
1 gram = 1000 milligrams	1 pound = 16 ounces

TIME

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

continued →

Grade 8 Math Formula Chart

Perimeter	square	$P = 4s$
	rectangle	$P = 2l + 2w$ or $P = 2(l + w)$
Circumference	circle	$C = 2\pi r$ or $C = \pi d$
Area	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	$A = \pi r^2$
P represents the Perimeter of the Base of a three-dimensional figure		
B represents the Area of the Base of a three-dimensional figure.		
Surface Area	cube (total)	$S = 6s^2$
	prism (lateral)	$S = Ph$
	prism (total)	$S = Ph + 2B$
	pyramid (lateral)	$S = \frac{1}{2}Pl$
	pyramid (total)	$S = \frac{1}{2}Pl + B$
	cylinder (lateral)	$S = 2\pi rh$
	cylinder (total)	$S = 2\pi rh + 2\pi r^2$ or $S = 2\pi r(h + r)$
Volume	prism	$V = Bh$
	cylinder	$V = Bh$
	pyramid	$V = \frac{1}{3}Bh$
	cone	$V = \frac{1}{3}Bh$
	sphere	$V = \frac{4}{3}\pi r^3$
Pi	π	$\pi \approx 3.14$ or $\pi \approx \frac{22}{7}$
Pythagoream Theorem		$a^2 + b^2 = c^2$
Direct Variation		$y = kx$, where $x \neq 0$

Distance Formula	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Slope of a Line	$m = \dfrac{y_2 - y_1}{x_2 - x_1}$
Slope-Intercept Form of an Equation	$y = mx + b$
Simple Interest Formula	$I = prt$
Compound Interest Formula	$A = P(1 + r)^t$

MATH 8B Practice Exam

Multiple Choice. Identify the choice that best completes the statement or answers the question.

1. The fees charged by two canoe-rental shops are shown in the table below. There is a certain number of hours rented at which the costs at the two shops are equal. Which equation below could you use to find that number of hours?

Canoe Rentals	Cost
Eastside Rentals	\$10 deposit plus \$20 an hour
Westside Rentals	\$25 deposit plus \$15 an hour

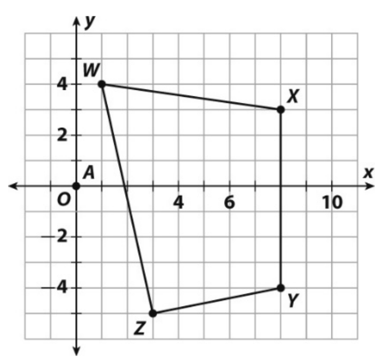
A. $10 - 20x = 25 - 15x$
B. $10x + 20 = 25x + 15$
C. $20x + 10 = 15x + 25$
D. $20x - 10 = 15x - 25$

2. The equation below can be used to solve which of the following word problems?

$$2x + 15 = 4x$$

A. The price of four books is \$15 more than the price of two books. What is the price per book?
B. The price of two books is \$15 more than the price of four books. What is the price per book?
C. The price of four books equals \$15. What is the price per book?
D. John bought a certain number of \$2 books and \$4 books for a total of \$15. How many of each book did he buy?

3. In the graph below, *WXYZ* is dilated by a scale factor of 3.5 with the origin as its center. What are the coordinates of the vertices of *W'X'Y'Z'*?



A. (3, 12), (24, 9), (24, –12), (9, –15)
B. (3.5, 12), (28, 9), (28.5, –12), (10.5, –15)
C. (3.5, 14), (28, 10.5), (28, –14), (10.5, –17.5)
D. (3, 14), (24, 10.5), (24, –14), (9, –17.5)

Short Answer

4. What is the value of x in the equation below?

$$14.3 - 0.4x = 2.6x + 5.6$$

5. Sid and Libby are going to sell pies at a fair. They spend $200 to rent a table at the fair. Their costs for ingredients, other supplies, baking, and packaging are $2.50 per pie. Sid and Libby plan to sell the pies for $8 each. How many pies must they sell at the fair before they start making a profit?

MATH 8B Practice Exam Answer Key

1. C
2. A
3. C
4. 2.9
5. 37

Texas Essential Knowledge and Skills
MATH 8 – Mathematics, Grade 8

(a) Introduction.

(1) The desire to achieve educational excellence is the driving force behind the Texas essential knowledge and skills for mathematics, guided by the college and career readiness standards. By embedding statistics, probability, and finance, while focusing on computational thinking, mathematical fluency, and solid understanding, Texas will lead the way in mathematics education and prepare all Texas students for the challenges they will face in the 21st century.

(2) The process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will 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. Students will select appropriate tools such as real objects, manipulatives, algorithms, paper and pencil, and technology and techniques such as mental math, estimation, number sense, and generalization and abstraction to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, computer programs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

(3) The primary focal areas in Grade 8 are proportionality; expressions, equations, relationships, and foundations of functions; and measurement and data. Students use concepts, algorithms, and properties of real numbers to explore mathematical relationships and to describe increasingly complex situations. Students use concepts of proportionality to explore, develop, and communicate mathematical relationships. Students use algebraic thinking to describe how a change in one quantity in a relationship results in a change in the other. Students connect verbal, numeric, graphic, and symbolic representations of relationships, including equations and inequalities. Students begin to develop an understanding of functional relationships. Students use geometric properties and relationships, as well as spatial reasoning, to model and analyze situations and solve problems. Students communicate information about geometric figures or situations by quantifying attributes, generalize procedures from measurement experiences, and use the procedures to solve problems. Students use appropriate statistics, representations of data, and reasoning to draw conclusions, evaluate arguments, and make recommendations. While the use of all types of technology is important, the emphasis on algebra readiness skills necessitates the implementation of graphing technology.

(4) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(b) Knowledge and skills.

(1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

(A) apply mathematics to problems arising in everyday life, society, and the workplace;

(B) 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;

(C) 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;

(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;

(E) create and use representations to organize, record, and communicate mathematical ideas;

(F) analyze mathematical relationships to connect and communicate mathematical ideas; and

(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

(2) Number and operations. The student applies mathematical process standards to represent and use real numbers in a variety of forms. The student is expected to:

(A) extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers;

(B) approximate the value of an irrational number, including π and square roots of numbers less than 225, and locate that rational number approximation on a number line;

(C) convert between standard decimal notation and scientific notation; and

(D) order a set of real numbers arising from mathematical and real-world contexts.

(3) Proportionality. The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:

(A) generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation;

(B) compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane; and

(C) 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.

(4) Proportionality. The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. The student is expected to:

(A) 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, (y2 - y1)/ (x2 - x1), is the same for any two points (x1, y1) and (x2, y2) on the same line;

(B) graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship; and

(C) use data from a table or graph to determine the rate of change or slope and y-intercept in mathematical and real-world problems.

(5) Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(A) represent linear proportional situations with tables, graphs, and equations in the form of $y = kx$;

(B) represent linear non-proportional situations with tables, graphs, and equations in the form of $y = mx + b$, where $b \neq 0$;

(C) 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;

(D) use a trend line that approximates the linear relationship between bivariate sets of data to make predictions;

(E) solve problems involving direct variation;

(F) distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form $y = kx$ or $y = mx + b$, where $b \neq 0$;

(G) identify functions using sets of ordered pairs, tables, mappings, and graphs;

(H) identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems; and

(I) write an equation in the form $y = mx + b$ to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations.

(6) Expressions, equations, and relationships. The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas. The student is expected to:

(A) describe the volume formula $V = Bh$ of a cylinder in terms of its base area and its height;

(B) 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; and

(C) use models and diagrams to explain the Pythagorean theorem.

(7) Expressions, equations, and relationships. The student applies mathematical process standards to use geometry to solve problems. The student is expected to:

(A) solve problems involving the volume of cylinders, cones, and spheres;

(B) 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;

(C) use the Pythagorean Theorem and its converse to solve problems; and

(D) determine the distance between two points on a coordinate plane using the Pythagorean Theorem.

(8) Expressions, equations, and relationships. The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to:

(A) write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants;

(B) 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;

(C) 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; and

(D) 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.

(9) Expressions, equations, and relationships. The student applies mathematical process standards to use multiple representations to develop foundational concepts of simultaneous linear equations. The student is expected 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.

(10) Two-dimensional shapes. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:

(A) generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane;

(B) differentiate between transformations that preserve congruence and those that do not;

(C) explain the effect of translations, reflections over the x- or y-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation; and

(D) model the effect on linear and area measurements of dilated two-dimensional shapes.

(11) Measurement and data. The student applies mathematical process standards to use statistical procedures to describe data. The student is expected to:

(A) construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data;

(B) 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; and

(C) 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.

(12) Personal financial literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one's life as a knowledgeable consumer and investor. The student is expected to:

(A) solve real-world problems comparing how interest rate and loan length affect the cost of credit;

(B) 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;

(C) explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time;

(D) calculate and compare simple interest and compound interest earnings;

(E) identify and explain the advantages and disadvantages of different payment methods;

(F) analyze situations to determine if they represent financially responsible decisions and identify the benefits of financial responsibility and the costs of financial irresponsibility; and

(G) 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.

Source: The provisions of this §111.28 adopted to be effective September 10, 2012, 37 TexReg 7109.