PRACTICE TEST ALIGNMENT DOCUMENT

Grade 8 Math

Item Number	Standards
1	08.EE.02.06 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation *y = mx + b* for a line intercepting the vertical axis at *b*.
2	08.NS.01.02 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
3	08.F.02.05 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
4	08.F.02.04 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x*, *y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
5	08.G.01.03 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
6	08.SP.01.01 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
7	08.SP.01.02 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
8	08.EE.01.04 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

9*	08.SP.01.03 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*
10	08.G.03.09 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
11	08.SP.01.02 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
12	08.F.01.02 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greatest rate of change.*
13	08.EE.01.01 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.
14	08.NS.01.01 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
15	08.SP.01.04 Explain that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*
16*	08.F.02.04 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
17	08.NS.01.02 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
18	08.EE.03.08 Analyze and solve pairs of simultaneous linear equations.

19	08.EE.01.04 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
20	08.G.02.07 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
21	08.G.03.09 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
22	08.F.01.01 Define a function as a rule that assigns to each input exactly one output. Show that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required for Grade 8.)
23	08.SP.01.03 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*
24	08.G.01.02 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
25	08.G.01.03 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
26	08.EE.02.05 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
27	08.F.02.05 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
28	08.SP.01.01 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
29	08.G.01.03 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
30*	08.G.02.07 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
31	08.EE.03.07 Solve linear equations in one variable.

32	08.EE.03.07 Solve linear equations in one variable.
33	08.SP.01.04 Explain that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*
34	08.NS.01.01 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
35	08.SP.01.02 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
36*	08.EE.03.08.c Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*
37	08.EE.03.07.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
38	08.F.02.04 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
39	08.F.01.01 Define a function as a rule that assigns to each input exactly one output. Show that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required for Grade 8.)
40	08.G.02.07 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
41	08.F.01.03 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*

* Please refer to Rubric below for Scoring Information.

#9

Concepts and Procedures Scoring Rubric

Score	Description
2	The student earns 2 points.
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Concepts and Procedures Training Notes:

Part a 1 point for correct answer, **1 bottle of water is sold for every 1 soft pretzel sold**, or equivalent

Part b 1 point for correct answer, **23**

Mathematical Practices Scoring Rubric

Score	Description
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Mathematical Practices Training Notes:

1 point for interpreting and analyzing models (interpret the data either from the graph or from the equation to extrapolate the predicted value)

Exemplary Response:

a. 1 bottle of water is sold for every 1 soft pretzel sold

b. 23; $y = x + 0.5 = 1(22) + 0.5 = 22.5$ or about 23

#16

Concepts and Procedures Scoring Rubric:

Score	Description
4	The student scores 5 points.
3	The student scores 4 points.
2	The student scores 2 or 3 points.
1	The student scores 1 point.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Scoring Notes:

Part a 1 point for a viable equation, $\boldsymbol{y = 0.50x + 4.50}$ or equivalent

Part b 2 points for viable answer, **the slope represents the cost of each additional bead and the y-intercept represents the cost of the bracelet without any beads**, or a correct answer based on an

incorrect answer in part (a) that shows understanding of interpreting the rate of change and initial value of a linear function in terms of the situation it models

OR

1 point for a viable answer for either the slope or the y-intercept

Part c 2 points for correct answer, ($)**10.50** or a correct answer based on an incorrect answer in part (a), with sufficient work or explanation that shows understanding of using functions to model relationships between quantities

OR

1 point for correct answer or a correct answer based on an incorrect answer in part (a) with insufficient or no work or explanation

OR

for appropriate strategy that shows understanding of using functions to model relationships between quantities with incorrect or no answer

Mathematical Practices Scoring Rubric:

Score	Description
2	The student scores 2 points.
1	The student scores 1 point.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Scoring Notes:

1 point for creating and interpreting a model (creates a viable equation and interprets the slope and y-intercept of the equation)

1 point for using a model to solve a problem (uses the equation for the function to determine the cost of a bracelet with 12 beads)

Exemplary Response:

a. $y = 5.00 + 0.5(x-1) = y = 0.50x + 4.50$

b. The slope is 0.50, which means the cost of the bracelet increases by 50¢ for each additional bead. The *y*-intercept is 4.50, which means the cost of a bracelet without any beads is $4.50.

c. $10.50;

$y = 0.50(12) + 4.50$

$y = 6 + 4.50$

$y = 10.50$

#30

Concepts and Procedures Scoring Rubric

Score	Description
2	The student earns 2 points.

1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response

Concepts and Procedures Training Notes:

Part a 1 point for viable work or explanation on how to find the length of $\overline{PQ}$

Part b 1 point for correct answer, **18.41** (centimeters), or equivalent
Note: also accept correct answer, 18 (centimeters) for estimated length

Mathematical Practices Scoring Rubric

Score	Description
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response

Mathematical Practices Training Notes:

1 point for relying on using models to help conceptualize and solve a problem (using the Pythagorean theorem to calculate the diagonals of the prism in part b)

Exemplary Response:

a. $\sqrt{17^2 + 5^2}$
b. **18.41** (centimeters); first find the length of $\overline{PQ}$,

$$\sqrt{17^2 + 5^2} = \sqrt{289 + 25}$$
$$= \sqrt{314}$$
$$\approx 17.72$$

Using the Pythagorean theorem, $\sqrt{(PQ)^2 + (QR)^2} = PR$, and substituting the values for $PQ = 17.72$, and $QR = 5$,

$$PR = \sqrt{17.72^2 + 5^2}$$
$$= \sqrt{338.9984}$$
$$\approx 18.41$$

#36

Concepts and Procedures Scoring Rubric

Score	Description
4	The student earns 4 points.
3	The student earns 3 points.
2	The student earns 2 points.
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Concepts and Procedures Training Notes:

Part a 1 point for correct answers, $3x + 2y = 180$; $x + 2y = 100$, or equivalent

Part b 2 points for two correct answers, **$40 adult and $30 child**
OR
1 point for one correct answer, **$40 adult or $30 child**

Part c 1 point for correct answer, **$35**

Mathematical Practices Scoring Rubric

Score	Description
2	The student earns 2 points.
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Mathematical Practices Training Notes:

1 point for knowing and flexibly using different properties of operations (uses a process to solve the system of equations for both unknown prices in part (b))

1 point for making sense of quantities and their relationships in problem situations (uses an expression or equation for the total price of tickets for the Gupta family and substitutes the values for the adult and child prices into it to determine the price of the senior citizen ticket in part (c))

Exemplary Response:

a. $3x + 2y = 180$; $x + 2y = 100$
b. **$40** (adult ticket); **$30** (child ticket)

Using the elimination method:

$$3x + 2y = 180$$
$$\underline{-(x + 2y = 100)}$$
$$2x = 80$$
$$\frac{2x}{2} = \frac{80}{2}$$
$$x = 40$$

Substituting back into the equation $x + 2y = 100$ and solving for y,

$$40 + 2y = 100$$
$$2y = 100 - 40$$
$$\frac{2y}{2} = \frac{60}{2}$$
$$y = 30$$

c. **$35** (senior citizen); using the Gupta family equation $2x + 4y + s = 235$ and substituting x for 40 and y for 30,

$$2(40) + 4(30) + s = 235$$
$$80 + 120 + s = 235$$
$$200 + s = 235$$
$$s = 35$$