

# NM-MSSA MATH

## PRACTICE TEST ANSWER KEY

### Grade 8

Item Number	Key	Standards
1	D	8.SP.A.2 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.
2	B	8.NS.A.1 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.
3	D	8.F.B.4 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.
4	B	8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
5	A	8.EE.A.4 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.
6	C,D	8.NS.A.2 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., $\pi^2$ ). <i>For example, by truncating the decimal expansion of <math>\sqrt{2}</math>, show that <math>\sqrt{2}</math> is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</i>
7	D	8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.
8		8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. <i>For example, estimate the population of the United States as <math>3 \times 10^8</math> and the population of the world as <math>7 \times 10^9</math>, and determine that the world population is more than 20 times larger.</i>

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9	C	8.G.A.2 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.
10	C	8.NS.A.2 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., $\pi^2$ ). <i>For example, by truncating the decimal expansion of <math>\sqrt{2}</math>, show that <math>\sqrt{2}</math> is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</i>
11	C	8.SP.A.2 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	A	8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>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 greater rate of change.</i>
13	C	8.EE.A.4 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.
14	A	8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. <i>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.</i>
15	B	8.NS.A.2 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., $\pi^2$ ). <i>For example, by truncating the decimal expansion of <math>\sqrt{2}</math>, show that <math>\sqrt{2}</math> is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</i>
16	D	8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. <sup>1</sup> <sup>1</sup> Function notation is not required in Grade 8.
17	A,C	8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. <i>For example, <math>32 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27</math>.</i>

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Item Number	Key	Standards
18	A	8.EE.C.7 Solve linear equations in one variable. 8.EE.C.7.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
19	C	8.G.B.6 Explain a proof of the Pythagorean Theorem and its converse.
20	C	8.SP.A.1 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.
21	D	8.SP.A.2 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.
22	A	8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. <i>For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</i>
23	D	8.SP.A.4 Understand 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. <i>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?</i>
24	B	8.G.C.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
25	D	8.EE.C.7 Solve linear equations in one variable.
26	A	8.F.B.5 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.
27	B	8.NS.A.1 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.

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Item Number	Key	Standards
28	B	8.SP.A.4 Understand 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. <i>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?</i>
29	D	8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.
30	B	8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
31	C	8.F.B.4 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.
32	D	8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. <i>For example, <math>32 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27</math>.</i>
33	D	8.F.A.3 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. <i>For example, the function <math>A = s^2</math> giving the area of a square as a function of its side length is not linear because its graph contains the points <math>(1,1)</math>, <math>(2,4)</math> and <math>(3,9)</math>, which are not on a straight line.</i>
34		8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
35	D	8.F.B.4 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.
36	B	8.EE.A.4 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.
37	C	8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

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Item Number	Key	Standards
38	A	<p>8.F.A.1</p> <p>Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.<sup>1</sup></p> <p><sup>1</sup> Function notation is not required in Grade 8.</p>
39	A	<p>8.F.B.4</p> <p>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 <math>(x, y)</math> 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.</p>
40	A	<p>8.F.B.4</p> <p>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 <math>(x, y)</math> 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.</p>
41	C	<p>8.EE.B.6</p> <p>Use similar triangles to explain why the slope <math>m</math> is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation <math>y = mx</math> for a line through the origin and the equation <math>y = mx + b</math> for a line intercepting the vertical axis at <math>b</math>.</p>
42	B	<p>8.G.A.3</p> <p>Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.</p>
43	A	<p>8.G.C.9</p> <p>Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p>
44	B	<p>8.SP.A.4</p> <p>Understand 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. <i>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?</i></p>
45	A	<p>8.G.C.9</p> <p>Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p>
46	B	<p>8.F.B.5</p> <p>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.</p>

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Item Number	Key	Standards
47	A,D	<p>8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.</p> <p>8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables. <i>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.</i></p>
48	B	<p>8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.</p> <p>8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables. <i>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.</i></p>
49	C	<p>8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.</p> <p>8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables. <i>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.</i></p>
50	C	<p>8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</p>
51	B	<p>8.SP.A.1 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.</p>

## Practice Test Answer Key • Grade 8 Math

#8

### 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,  $5 \times 10^6$

Part b 1 point for correct answer, **50** (times more)

### 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 making sense of quantities and their relationships in problem situations (manipulates numbers in scientific notation and uses division to determine how many times more one number is than the other in part (b))

### Exemplary Response:

a.  $5 \times 10^6$

b. 50 times more;

Method 1:

$$\frac{2 \times 10^6}{4 \times 10^4} = 0.5 \times 10^2$$

$$= 5 \times 10^1 = 50$$

Method 2:

$4 \times 10^4 = 40,000$  plant species and  $2 \times 10^6 = 2,000,000$  insect species

$$\frac{2,000,000}{40,000} = \frac{200}{4} = 50$$

## Practice Test Answer Key • Grade 8 Math

#34

### 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 Scoring 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  $\overline{PQ}$ .

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

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

$$\begin{aligned}\overline{PR} &= \sqrt{17.72^2 + 5^2} \\ &= \sqrt{338.9984} \\ &\approx 18.41\end{aligned}$$