Grade 9 Mini Form 2

Explanations and

Printable Online Practice Test

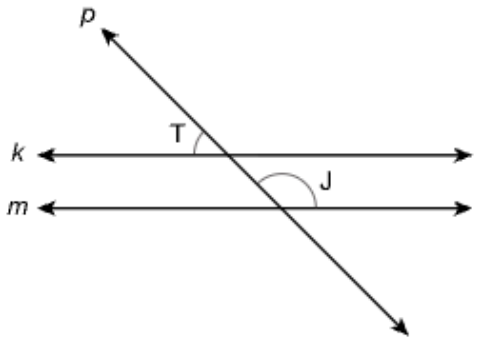
Grade 9 Math Item 1

Which number has a value that is located between 7 and 8 on a number line?

- A. $\sqrt{37}$
- B. $\sqrt{47}$
- C. $\sqrt{57}$
- D. $\sqrt{67}$

(C) 57 is a number located between perfect squares 49 and 64. The value of $\sqrt{49}$ is located at 7 on a number line. The value of $\sqrt{64}$ is located at 8 on a number line. Therefore, the value of $\sqrt{57}$ is located between 7 and 8 on a number line.

Grade 9 Math Item 2



In the figure above, $k \parallel m$. Straight line p intersects both line k and line m. The measure of $\angle \mathrm{T}$ is 47°. What is the measure of $\angle \mathrm{J}$?

- A. 43°
- B. 47°
- C. 133°
- D. 137°

(C) Angle T (47°) and the adjacent angle to its immediate right (x) are supplementary, so the sum of the two angle measures is 180°:

$47^\circ + x = 180^\circ$

$x = 133^\circ$

Because line k and line m are parallel and are both cut by line p, a transversal, corresponding angles are congruent. The 133° angle and angle J are corresponding angles, so the measure of angle J is 133°.

Grade 9 Math Item 3

Which of these numbers is irrational?

- A. $0.\overline{7}$
- B. $\sqrt{9}$
- C. $\frac{9}{7}$
- D. $\sqrt{7}$

(D) $\sqrt{7}$ is an irrational number because it has a value of $\pm 2.645751311\ldots$, which is a non-repeating, non-terminating decimal, and non-repeating, non-terminating decimals are irrational numbers.

Grade 9 Math Item 4

Determine whether each function is linear or non-linear.

Select one answer in each row.

Function	Linear	Non-linear
$y = \frac{x}{4}$	○	○
$y = \frac{2}{x} + 1$	○	○
$y = -5x + 9$	○	○

A linear equation is one that can take the form $y = mx + b$.

$y = \frac{x}{4}$: Linear

This equation is in the form $y = mx + b$, where $m = \frac{1}{4}$ and $b = 0$. It represents a straight line with a constant rate of change (slope).

$y = \frac{2}{x} + 1$: Non-linear

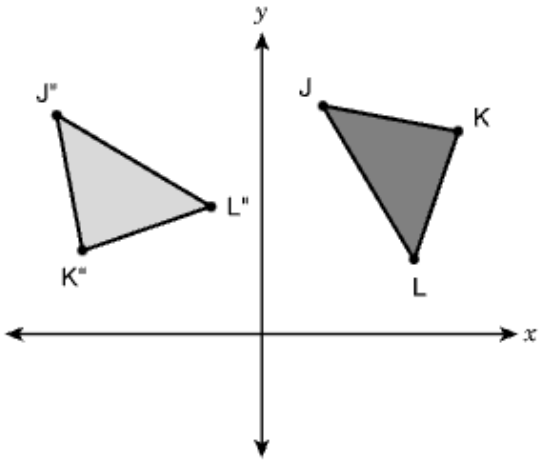
This function includes a variable in the denominator, which means it cannot be written in the form $y = mx + b$. The graph will be a curved shape (a hyperbola), not a straight line.

$y = -5x + 9$: Linear

This equation is in the form $y = mx + b$, with a slope of -5 and a y-intercept of 9. It has a constant rate of change, which means the graph is a line.

Grade 9 Math Item 5

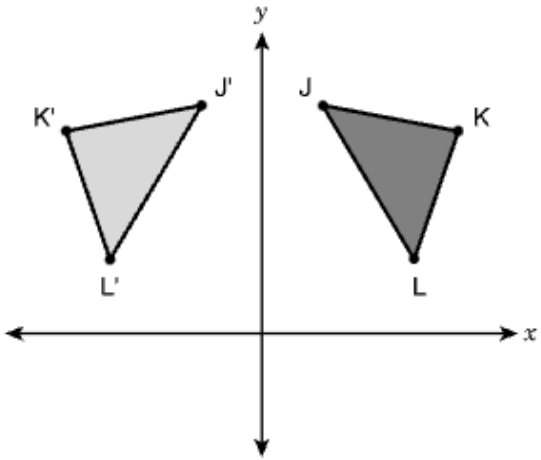
Triangles JKL and $\mathrm{J''K''L''}$ are congruent triangles.



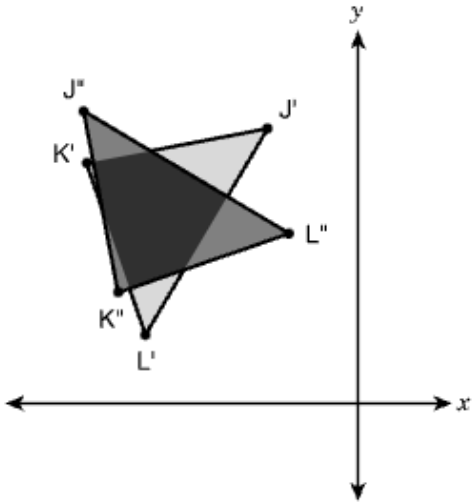
Which two transformations were used to transform JKL to $\mathrm{J''K''L''}$?

- A. A translation to the right, and then a reflection across the *y*-axis
- B. A reflection across the *x*-axis, and then a clockwise rotation of 270°
- C. A rotation of 180° about the origin, and then a translation across the *x*-axis
- D. A reflection across the *y*-axis, and then a counterclockwise rotation of 90° about its center

(D) First, reflect JKL over the *y*-axis to get $\mathrm{J'K'L'}$, as seen by the reversed vertices.



Then, rotate $\mathrm{J'K'L'}$ 90° counterclockwise about the center, since the order of the vertices is still the same but rotated.

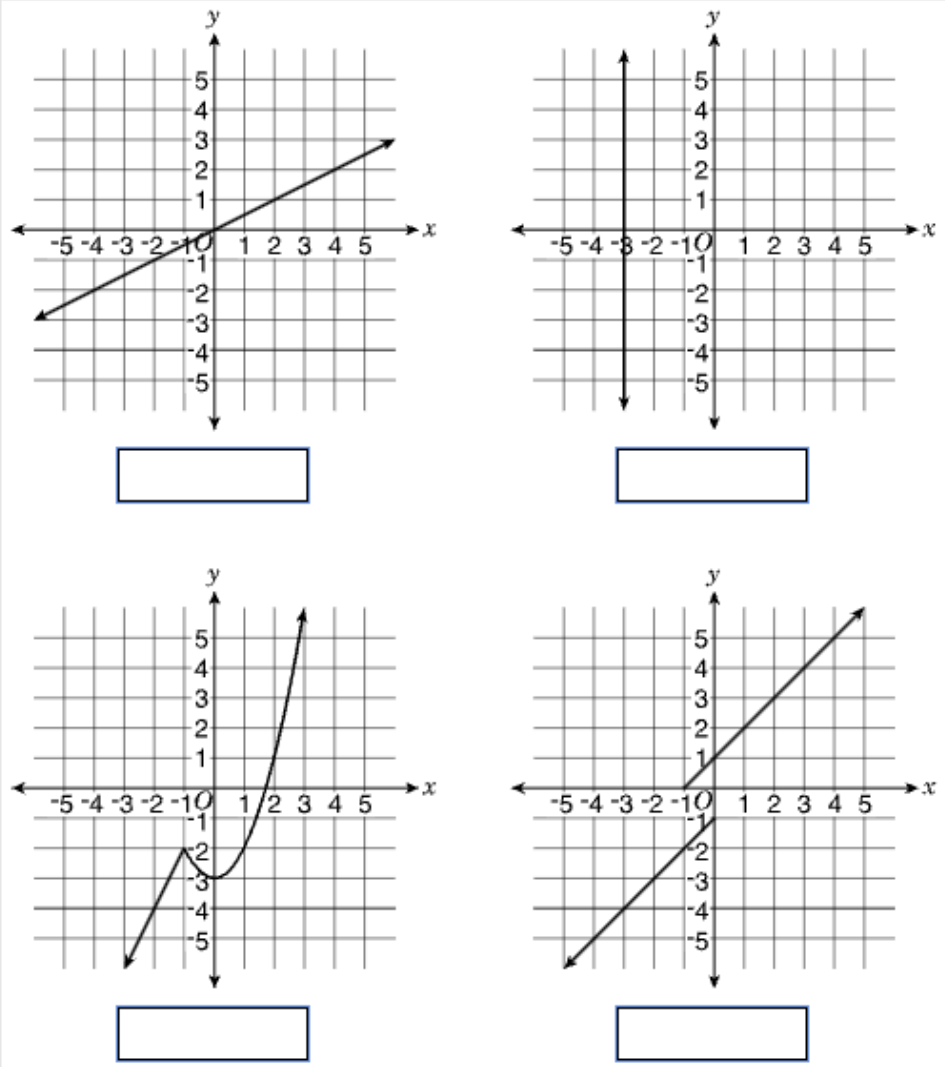


Grade 9 Math Item 6

Determine whether each graph represents a function or not.

Move the correct answer to each box. Each answer may be used more than once.

Function | Not a Function



A function is a rule that assigns each input exactly one output. In other words, for each value of x there is exactly 1 value for y. If any vertical line intersects the graph more than once, then it is not a function. This is called the *vertical line test*.

(Top Left) — Linear Graph

Function. This is a diagonal straight line, which passes the vertical line test.
For every x-value on the graph, there is exactly one y-value.

(Top Right) — Vertical Line

Not a Function. This graph fails the vertical line test.
For one single x-value, there are multiple y-values. In fact, the x-value of -3 has an infinite number of values for y.

(Bottom Left) — Piecewise Graph

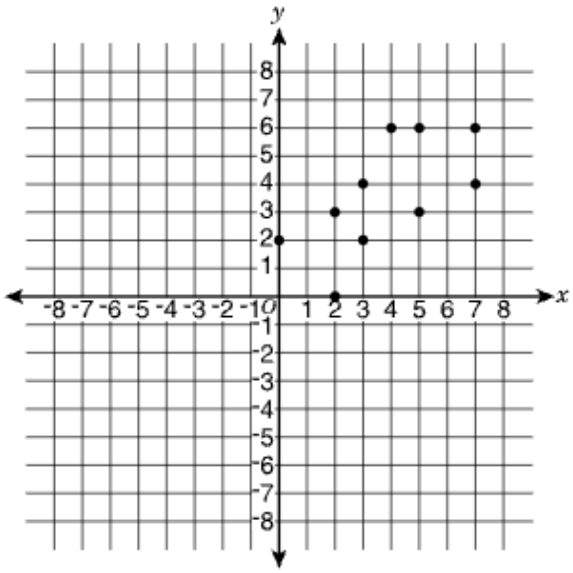
Function. No vertical line touches the graph in more than one spot.
For every x-value on the graph, there is exactly one y-value.

(Bottom Right) — Piecewise Graph

Not a Function. This graph fails the vertical line test.
For each value of x between -1 and 0 there are 2 values for y.

Grade 9 Math Item 7

The scatter plot shows a set of data.



Which equation represents the most accurate line of best fit for the data shown in the scatter plot?

- A. $y = (-x)$
- B. $y = x$
- C. $y = (-x) + 2$
- D. $y = x + 2$

(B) The line $y = x$ has a positive slope. The data points shown on the scatter plot trend in a positive direction, and the location of $y = x$ results in 5 of the data points above the line and 5 of the data points below the line. This is the most accurate line of best fit for this data.

Grade 9 Math Item 8

What is the point of intersection of the graphs of $y = -4x + 3$ and $y = 2x + 5$?

- A. $\left(-\frac{1}{3}, 4\frac{1}{3}\right)$
- B. $\left(-\frac{1}{3}, 5\frac{2}{3}\right)$
- C. $\left(\frac{1}{3}, 1\frac{2}{3}\right)$
- D. $\left(\frac{1}{3}, 5\frac{2}{3}\right)$

(A) To determine the point of intersection of the graphs of the lines, set the equations equal:

$-4x + 3 = 2x + 5$

Solve for *x*:

$-6x = 2$

$x = \frac{2}{-6}$

$x = -\frac{1}{3}$

This is the *x*-coordinate of the point of intersection. Use it to determine the *y*-coordinate by substituting $\left(-\frac{1}{3}\right)$ for *x* in either of the equations:

$y = 2\left(-\frac{1}{3}\right) + 5$ or $y = -4\left(-\frac{1}{3}\right) + 3$

Solve either equation for *y*:

$y = \left(-\frac{2}{3}\right) + 5 = 4\frac{1}{3}$ or $y = \frac{4}{3} + 3 = 4\frac{1}{3}$

The *x*-coordinate of the point of intersection is the value of *x* $\left(-\frac{1}{3}\right)$ and the *y*-coordinate of the point of intersection is the value of *y* $\left(4\frac{1}{3}\right)$, making the point of intersection of the graphs of the two lines $\left(-\frac{1}{3},\ 4\frac{1}{3}\right)$.

Grade 9 Math Item 9

The table below represents a linear function.

x	y
12	30
24	40
36	50

A second linear function is represented by the equation $y = 4x + 3$. Which statement comparing the rates of change of the two functions is true?

- A. The rate of change for $y = 4x + 3$ is less because $3 < 20$.
- B. The rate of change for $y = 4x + 3$ is less because $-\frac{3}{4} > -24$.
- C. The rate of change for $y = 4x + 3$ is greater because $4 > \frac{5}{6}$.
- D. The rate of change for $y = 4x + 3$ is greater because $-\frac{3}{4} < \frac{5}{6}$.

(C) The rate of change is equal to the slope. Determine the rate of change for the linear function represented in the table:

$\frac{y_2-y_1}{x_2-x_1} = \frac{(40-30)}{(24-12)} = \frac{10}{12} = \frac{5}{6}$

The slope of a linear equation in the form $y = mx + b$ is the value of m, so the slope, or rate of change, of $y = 4x + 3$ is 4.

The rate of change of $y = 4x + 3$ is greater because $4 > \frac{5}{6}$.

Grade 9 Math Item 10

The function $y = 2x - 4$ is graphed. The line of the graph travels through point $(0, \ -4)$ and point $(12, \ y)$. What is the value of y in point $(12, \ y)$?

(20) The function $y = 2x - 4$ is linear because it is in the form $y = mx + b$.

Determine the value of *y* using the value of *x* from $(12,\ y)$, 12, in the equation of the function $y = 2x - 4$:

$y = 2(12) - 4$

$y = 24 - 4$

$y = 20$

Grade 9 Math Item 11

How many solutions are there to the equation $|4x + 6| = -2$?

- A. No solutions
- B. One solution
- C. Two solutions
- D. An infinite number of solutions

(A) No solutions are possible because an absolute value can never be negative.

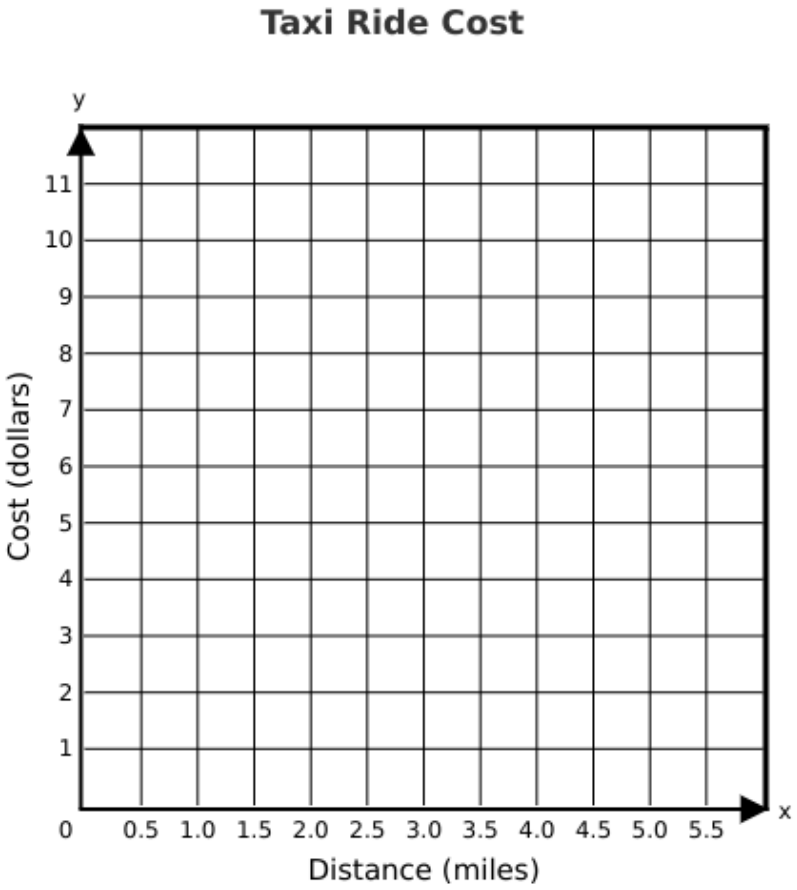
Grade 9 Math Item 12

The metered fare for a taxi in New York City is:

- $\$3.00$ initial charge
- Plus $\$0.70$ per $\frac{1}{5}$ mile
- Plus $\$0.50$ MTA State Surcharge for all trips ending in New York City
- Plus $\$1.00$ Improvement Surcharge
- Plus $\$2.50$ Rush Hour Surcharge from 4 p.m. to 8 p.m. on weekdays

Create the graph of the linear function that models the cost, y, of a taxi ride on a Saturday for x miles that ends in New York City.

Select a location on the coordinate grid to plot each data point. A line will connect the points.



The question asks for the graph of the linear function that models the given scenario. The function, $y = mx + b$, will be plotted on the graph.

First, solve for *b*, the *y*-intercept, by identifying the fixed costs:

$3.00 initial charge
$0.50 MTA State Surcharge
$1.00 Improvement Surcharge
Total Fixed Cost = 3.00 + 0.50 + 1.00 = 4.50
$b = 4.50$

(Since the ride is on a Saturday, the $2.50 weekday rush hour surcharge does not apply.)

Next, solve for *m*, the slope of the line to be graphed:

$0.70 per $\frac{1}{5}$ mile = $3.50 per 1 mile
$m = 3.50$

Given the slope, 3.50, and the *y*-intercept, 4.5, the equation for the line to be graphed can be generated:

Let *x* represent the number of miles, and *y* represent the total cost of the ride.

Therefore, $y = 3.50x + 4.\,50$.

To graph this function, plot at least two points and draw a straight line. For example:

When $x = 0$, $y = 4.50$ → Point: $(0,\ 4.5)$

When $x = 1$, $y = 3.5\,(1) + 4.5 = 8.0$ → Point: $(1,\ 8)$

Grade 9 Math Item 13

$0.44 = \frac{x}{25}$

What is the value of x in the equation?

(11) To determine the value of *x*, isolate *x* on one side of the equation:

$$0.44 = \frac{x}{25}$$

$$25\,(0.44) = \left(\frac{x}{25}\right)25$$

$$11 = x$$