NAEP Released Items Aligned to the Iowa Core

8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27.

8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.

$$1 + 3 = 4$$
$$1 + 3 + 5 = 9$$
$$1 + 3 + 5 + 7 = 16$$
$$1 + 3 + 5 + 7 + 9 = 25$$

According to the pattern suggested by the four examples above, how many consecutive odd integers are required to give a sum of 144?

A. 9
B. 12
C. 15
D. 36
E. 72

2005-8-3-12

Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.

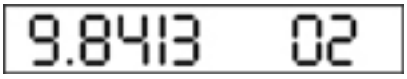
If $n \times n = 729$, what does n equal?

1992-12-7-4

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

8.EE.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. For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.

8.EE.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.



The figure above represents a calculator display showing a number in scientific notation. That number is

A. 0.098413
B. 0.98413
C. 19.6826
D. 98.413
E. 984.13

2007-8-9-15

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

The diameter of a red blood cell, in inches, is 3×10^{-4}. This expression is the same as which of the following numbers?

A. 0.00003
B. 0.0003
C. 0.003
D. 3,000
E. 30,000

2003-8-7-16

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

The figure above shows the display on a scientific calculator. The value of the displayed number is between which of the following pairs of numbers?

A. 0.04 and 0.05
B. 0.4 and 0.5
C. 4.0 and 5.0
D. 40.0 and 50.0
E. 400.0 and 500.0

1990-12-9-3

Source: National Assessment of Educational Progress, 1990, Grade 12 Mathematics Assessment.

$$\frac{6\times10^3}{3\times10^5}=$$

A. 0.5×10^2
B. 2×10^2
C. $2\times10^{0.6}$
D. 0.5×10^{-2}
E. 2×10^{-2}

1992-12-5-6

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

8.EE.5 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.

8.EE.6 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.

8.EE.7 Solve linear equations in one variable.

a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).
b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

If *d* = 110 and *a* = 20 in the formula $d = \frac{a}{2}(2t-1)$, then *t* =

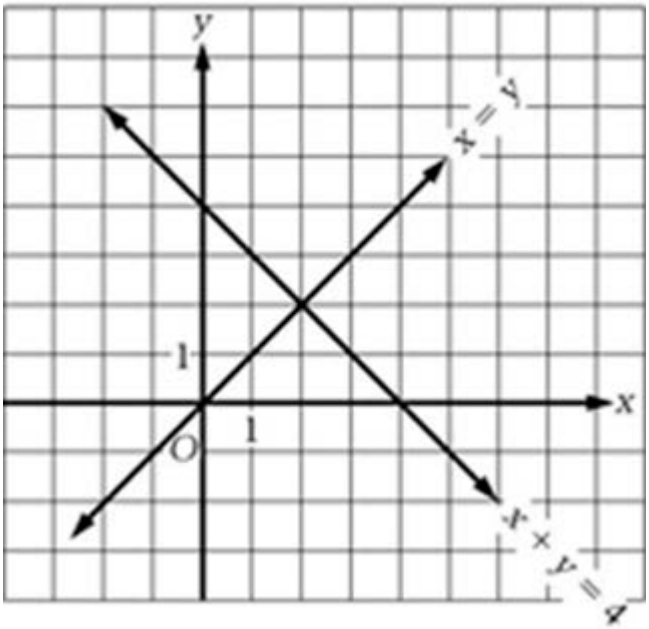
A. $\frac{15}{22}$
B. $\frac{15}{8}$
C. 5
D. $\frac{111}{20}$
E. 6

1990-12-9-12

Source: National Assessment of Educational Progress, 1990, Grade 12 Mathematics Assessment.

8.EE.8 Analyze and solve pairs of simultaneous linear equations.

a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.
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.



Which point is the solution to both equations shown on the graph above?

F. (0, 0)
G. (0, 4)
H. (1, 1)
I. (2, 2)
J. (4, 0)

2009-8-10-7

Source: National Assessment of Educational Progress, 2009, Grade 8 Mathematics Assessment.

At Jorge's local video store, "New Release" video rentals cost $2.50 each and "Movie Classic" video rentals cost $1.00 each (including tax). On Saturday evening, Jorge rented 5 videos and spent a total of $8.00.

How many of the 5 rentals were New Releases and how many were Movie Classics?

New Releases_____ Movie Classics_____

2007-8-11-18

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

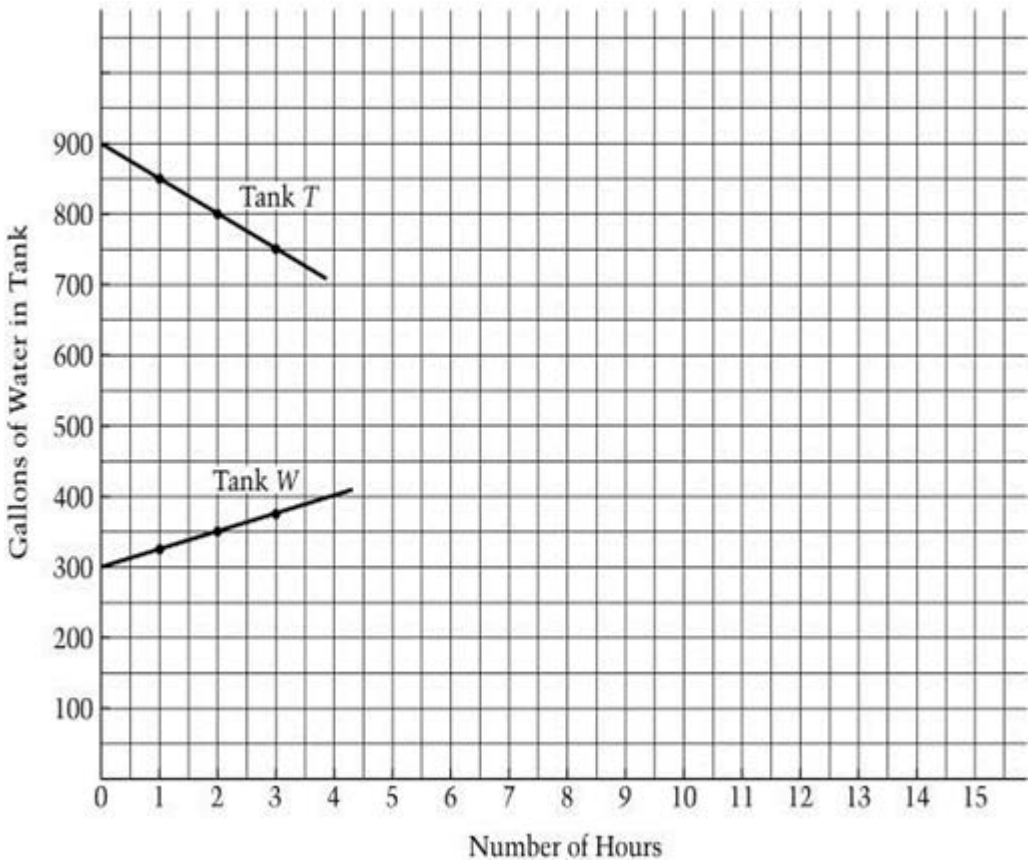
While she was on vacation, Tara sent 14 friends either a letter or a postcard. She spent $3.84 on postage. If it costs $0.20 to mail a postcard and $0.33 to mail a letter, how many letters did Tara send?

Show what you did to get your answer.

2003-8-7-19

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

Two large storage tanks, T and W, contain water. T starts losing water at the same time additional water starts flowing into W. The graph below shows the amount of water in each tank over a period of hours.



Assume that the rates of water loss and water gain continue as shown. At what number of hours will the amount of water in T be equal to the amount of water in W ?

Show or explain how you found your answer.

2003-8-10-13

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

What is the solution to the system of equations $\begin{cases} 3x - 2y = -7 \\ x + y = 11 \end{cases}$?

Answer: x = _____ y = _____

2009-12-2-14

Source: National Assessment of Educational Progress, 2009, Grade 12 Mathematics Assessment.

$$x + 2y = 17$$
$$x - 2y = 3$$

The graphs of the two equations shown above intersect at the point (*x, y*) What is the value of *x* at the point of intersection?

A. $3\frac{1}{2}$
B. 5
C. 7
D. 10
E. 20

2005-12-3-12

Source: National Assessment of Educational Progress, 2005, Grade 12 Mathematics Assessment.

$$\begin{cases} x + 2y = 1 \\ 2x - y = 7 \end{cases}$$

In the solution of the system of equations above, what is the value of *x* ?

A. - 1
B. 2
C. 3
D. 4
E. 5

2005-12-4-11

Source: National Assessment of Educational Progress, 2005, Grade 12 Mathematics Assessment.