

0814ia

1 What is the product of $3a^2b$ and $-2ab^3$?

- 1) a^2b^3
- 2) a^3b^4
- 3) $-6a^2b^3$
- 4) $-6a^3b^4$

2 The value of the expression $|-20| - |6|$ is

- 1) 26
- 2) 14
- 3) -14
- 4) -26

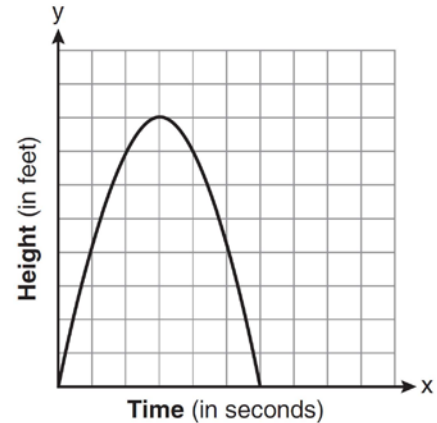
3 When $9x^2 - 100$ is factored, it is equivalent to $(3x - b)(3x + b)$. What is a value for b ?

- 1) 50
- 2) 10
- 3) 3
- 4) 100

4 Which equation represents the line that passes through the points $(1, 1)$ and $(-2, 7)$?

- 1) $y = -2x + 9$
- 2) $y = -2x + 3$
- 3) $y = -\frac{1}{2}x + 8$
- 4) $y = -\frac{1}{2}x + 6$

5 The graph below represents the parabolic path of a ball kicked by a young child. What are the vertex and the axis of symmetry for the parabola?



- 1) vertex: $(3, 8)$; axis of symmetry: $x = 3$
- 2) vertex: $(3, 8)$; axis of symmetry: $y = 3$
- 3) vertex: $(8, 3)$; axis of symmetry: $x = 3$
- 4) vertex: $(8, 3)$; axis of symmetry: $y = 3$

6 Which relationship can best be described as causal?

- 1) The alarm goes off and the sun rises.
- 2) The car is moving slowly and the driver is singing.
- 3) The snow is falling and the stores run out of snow shovels.
- 4) The birds are chirping and the rain is coming down.

7 In a class, which data can be classified as qualitative?

- 1) age of students
- 2) weight of students
- 3) shoe size of students
- 4) hair color of students

8 Given the following:

$$A = \{\text{Charles, Kyle, Nakim, Jade}\}$$

$$B = \{\text{Charles, Jade, Alicia, Kyle}\}$$

$$C = \{\text{Kyle, Nakim, Jade, Dylan}\}$$

What is the intersection of sets A , B , and C ?

- 1) {Kyle, Nakim}
- 2) {Charles, Kyle}
- 3) {Jade, Nakim}
- 4) {Jade, Kyle}

9 The sum of $\frac{3x-4}{x+3}$ and $\frac{2x-5}{x+3}$ is

- 1) $\frac{5x-9}{x+3}$
- 2) $\frac{5x+1}{2x+6}$
- 3) $\frac{5x-9}{x+6}$
- 4) $\frac{5x+1}{x+3}$

10 If Rosa's age is represented by R , which inequality represents the statement "Rosa is at most 29 years old"?

- 1) $R < 29$
- 2) $R > 29$
- 3) $R \leq 29$
- 4) $R \geq 29$

11 What is the slope of a line passing through points $(-7, 5)$ and $(5, -3)$?

- 1) $-\frac{3}{2}$
- 2) $-\frac{2}{3}$
- 3) $\frac{2}{3}$
- 4) $\frac{3}{2}$

12 A positive correlation always exists on a scatter plot when

- 1) y remains unchanged as x increases
- 2) y changes randomly as x increases
- 3) y decreases as x increases
- 4) y increases as x increases

13 A sandwich consists of one type of meat, one type of condiment, and one type of cheese. The possible choices are listed below:

Meat: beef, chicken, turkey

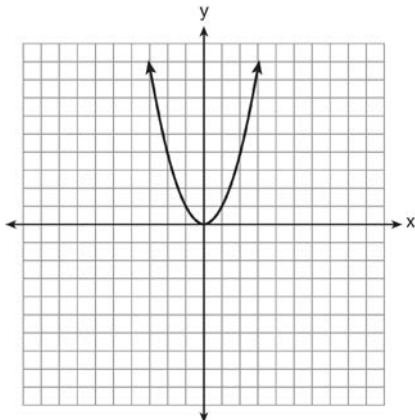
Condiment: ketchup, mustard, mayonnaise

Cheese: American, cheddar, provolone, mozzarella

In the sample space of all the possible different sandwiches consisting of one type of meat, one type of condiment, and one type of cheese, how many sandwiches do *not* include provolone cheese?

- 1) 27
- 2) 9
- 3) 3
- 4) 36

- 14 The graph of the equation $y = x^2$ is shown below.



Which statement best describes the change in this graph when the coefficient of x^2 is multiplied by 4?

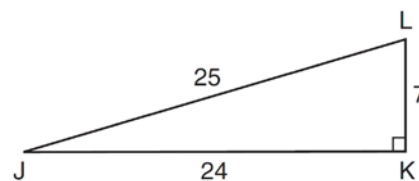
- 1) The parabola becomes wider.
 - 2) The parabola becomes narrower.
 - 3) The parabola will shift up four units.
 - 4) The parabola will shift right four units.
- 15 A parking lot is 100 yards long. What is the length of $\frac{3}{4}$ of the parking lot, in feet?

1 yard = 3 feet

- 1) 300
 - 2) 225
 - 3) 75
 - 4) 25
- 16 What is the solution of the equation $\frac{12}{7x} + \frac{3}{2x} = \frac{15}{14}$?
- 1) 1
 - 2) 5
 - 3) 3
 - 4) 14

- 17 The expression $\frac{2x^2 + 10x - 28}{4x + 28}$ is undefined when x is
- 1) 7, only
 - 2) -7, only
 - 3) 7 or -2
 - 4) -7 or 2

- 18 In right triangle JKL in the diagram below, $KL = 7$, $JK = 24$, $JL = 25$, and $\angle K = 90^\circ$.



Which statement is *not* true?

- 1) $\tan L = \frac{24}{7}$
 - 2) $\cos L = \frac{24}{25}$
 - 3) $\tan J = \frac{7}{24}$
 - 4) $\sin J = \frac{7}{25}$
- 19 A teacher asked the class to solve the equation $3(x + 2) = 21$. Robert wrote $3x + 6 = 21$ as his first step. Which property did he use?
- 1) associative property
 - 2) commutative property
 - 3) distributive property
 - 4) zero property of addition

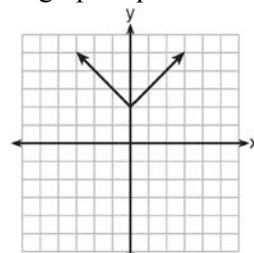
- 20 If the roots of a quadratic equation are -4 and 2 , the equation is equivalent to
- 1) $(x + 4)(x - 2) = 0$
 - 2) $(x - 4)(x + 2) = 0$
 - 3) $(x + 4)(x + 2) = 0$
 - 4) $(x - 4)(x - 2) = 0$
- 21 Kelsey scored the following points in her first six basketball games: 22, 14, 19, 22, 8, and 17. What is the relationship between the measures of central tendency of these data?
- 1) mode $>$ median $>$ mean
 - 2) median $>$ mode $>$ mean
 - 3) mean $>$ median $>$ mode
 - 4) mode $>$ mean $>$ median

- 22 Sheba opened a retirement account with \$36,500. Her account grew at a rate of 7% per year compounded annually. She made no deposits or withdrawals on the account. At the end of 20 years, what was the account worth, to the *nearest dollar*?
- 1) \$87,600
 - 2) \$130,786
 - 3) \$141,243
 - 4) \$1,483,444,463

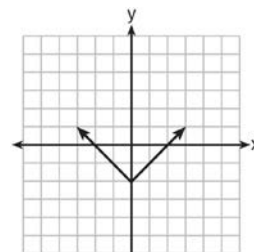
- 23 Which equation represents a vertical line?
- 1) $y = -x$
 - 2) $y = 12$
 - 3) $x = y$
 - 4) $x = 12$

- 24 Byron has 72 coins in his piggy bank. The piggy bank contains only dimes and quarters. If he has \$14.70 in his piggy bank, which equation can be used to determine q , the number of quarters he has?
- 1) $14.70 + 0.25q = 72$
 - 2) $0.10(q - 72) + 0.25q = 14.70$
 - 3) $0.10(72 - q) + 0.25q = 14.70$
 - 4) $0.10q + 0.25(72 - q) = 14.70$

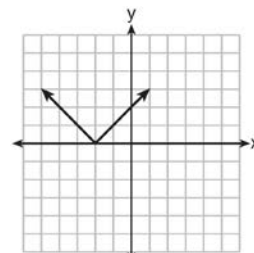
- 25 Which graph represents the equation $y = |x - 2|$?



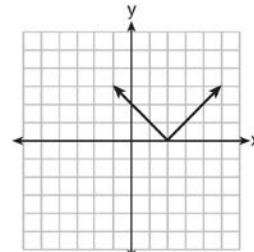
1)



2)



3)



4)

26 If $ax + 3 = 7 - bx$, what is x expressed in terms of a and b ?

- 1) $\frac{4}{ab}$
- 2) $-\frac{4}{ab}$
- 3) $\frac{4}{a+b}$
- 4) $-\frac{4}{a+b}$

27 Which equation represents a line that is parallel to the line whose equation is $y = -3x$?

- 1) $\frac{1}{3}x + y = 4$
- 2) $-\frac{1}{3}x + y = 4$
- 3) $6x + 2y = 4$
- 4) $-6x + 2y = 4$

28 What is the result when $6x^2 - 13x + 12$ is subtracted from $-3x^2 + 6x + 7$?

- 1) $3x^2 - 7x + 19$
- 2) $9x^2 - 19x + 5$
- 3) $9x^2 - 7x + 19$
- 4) $-9x^2 + 19x - 5$

29 What is the solution of the equation $\frac{x}{3} = \frac{8}{x+2}$?

- 1) $\{-6, -4\}$
- 2) $\{-6, 4\}$
- 3) $\{6, -4\}$
- 4) $\{6, 4\}$

30 Which set of integers is included in $(-1, 3]$?

- 1) $\{0, 1, 2, 3\}$
- 2) $\{-1, 0, 1, 2\}$
- 3) $\{-1, 0, 1, 2, 3, 4\}$
- 4) $\{-2, -1, 0, 1, 2, 3\}$

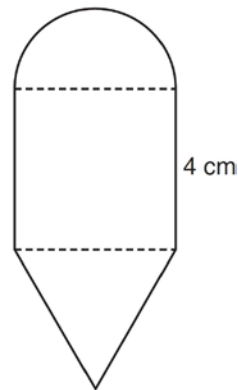
31 Using his data on annual deer population in a forest, Noj found the following information:

- 25th percentile: 12
- 50th percentile: 15
- 75th percentile: 22
- Minimum population: 8
- Maximum population: 27

Using the number line below, construct a box-and-whisker plot to display these data.

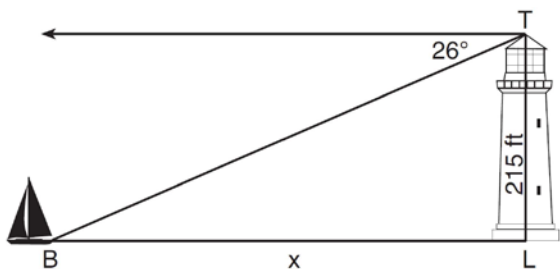


32 The diagram below consists of a square with a side of 4 cm, a semicircle on the top, and an equilateral triangle on the bottom. Find the perimeter of the figure to the *nearest tenth of a centimeter*.



- 33 A thermos in the shape of a cylinder is filled to 1 inch from the top of the cylinder with coffee. The height of the cylinder is 12 inches and its radius is 2.5 inches. State, to the *nearest hundredth of a cubic inch*, the volume of coffee in the thermos.

- 34 The top of a lighthouse, T , is 215 feet above sea level, L , as shown in the diagram below. The angle of depression from the top of the lighthouse to a boat, B , at sea is 26° . Determine, to the *nearest foot*, the horizontal distance, x , from the boat to the base of the lighthouse.



- 35 There are six apples, five oranges, and one pear in John's basket. His friend takes three pieces of fruit at random without replacement. Determine the probability that *all three* fruits taken are apples.

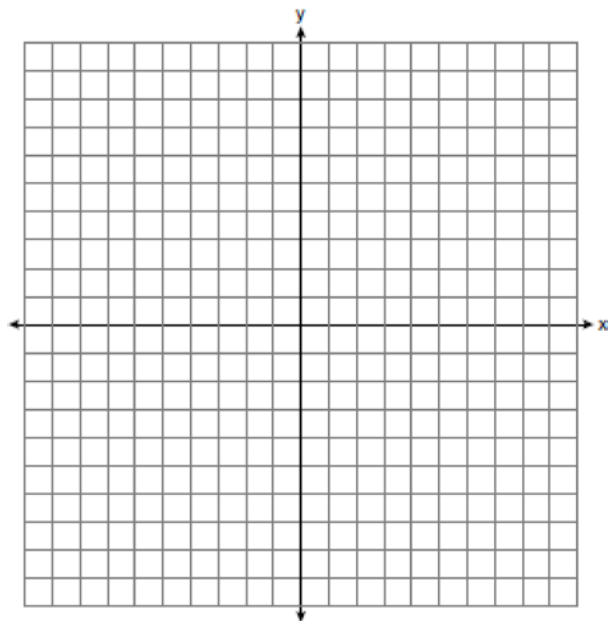
- 36 Express $y\sqrt{3} - (\sqrt{32} + y\sqrt{27})$ in simplest radical form.

- 37 On the set of axes below, solve the following system of inequalities graphically.

$$y + 3 < 2x$$

$$-2y \leq 6x - 10$$

State the coordinates of a point in the solution set.



- 38 The actual side of a square tile is 4 inches. The manufacturers allow a relative error of 0.025 in the area of a tile. Two machines are used to cut the tiles. Machine A produces a square tile with a length of 3.97 inches. Machine B produces a square tile with a length of 4.12 inches. Determine which machine produces a tile whose area falls within the allowed relative error.

- 39 Solve the following system of equations algebraically: $y = x^2 - 6x + 9$

$$y = -9x + 19$$

0814ia

Answer Section

- 1 ANS: 4 PTS: 2 REF: 081401ia STA: A.A.12
TOP: Multiplication of Powers
- 2 ANS: 2 PTS: 2 REF: 081402ia STA: A.N.6
TOP: Evaluating Expressions
- 3 ANS: 2 PTS: 2 REF: 081403ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares
- 4 ANS: 2
$$m = \frac{1-7}{1--2} = \frac{-6}{3} = -2 \quad y = mx + b$$
$$1 = -2(1) + b$$
$$3 = b$$
- PTS: 2 REF: 081404ia STA: A.A.35 TOP: Writing Linear Equations
- 5 ANS: 1 PTS: 2 REF: 081405ia STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph
- 6 ANS: 3 PTS: 2 REF: 081406ia STA: A.S.13
TOP: Analysis of Data
- 7 ANS: 4
The other situations are quantitative.
- PTS: 2 REF: 081407ia STA: A.S.1 TOP: Analysis of Data
- 8 ANS: 4 PTS: 2 REF: 081408ia STA: A.A.31
TOP: Set Theory
- 9 ANS: 1 PTS: 2 REF: 081409ia STA: A.A.17
TOP: Addition and Subtraction of Rationals
- 10 ANS: 3 PTS: 2 REF: 081410ia STA: A.A.4
TOP: Modeling Inequalities
- 11 ANS: 2
$$m = \frac{5--3}{-7-5} = \frac{8}{-12} = -\frac{2}{3}$$
- PTS: 2 REF: 081411ia STA: A.A.33 TOP: Slope
- 12 ANS: 4 PTS: 2 REF: 081412ia STA: A.S.12
TOP: Scatter Plots
- 13 ANS: 1
 $3 \cdot 3 \cdot 3 = 27$
- PTS: 2 REF: 081413ia STA: A.S.19 TOP: Sample Space
- 14 ANS: 2 PTS: 2 REF: 081414ia STA: A.G.5
TOP: Graphing Quadratic Functions

15 ANS: 2

$$100 \text{ yd} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} \cdot \frac{3}{4} = 225$$

PTS: 2 REF: 081415ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

16 ANS: 3

$$\frac{24}{14x} + \frac{21}{14x} = \frac{15x}{14x}$$

$$45 = 15x$$

$$x = 3$$

PTS: 2 REF: 081416ia STA: A.A.26 TOP: Solving Rationals

17 ANS: 2

$$4x + 28 = 0$$

$$4x = -28$$

$$x = -7$$

PTS: 2 REF: 081417ia STA: A.A.15 TOP: Undefined Rationals

18 ANS: 2 PTS: 2 REF: 081418ia STA: A.A.42

TOP: Trigonometric Ratios

19 ANS: 3 PTS: 2 REF: 081419ia STA: A.N.1

TOP: Identifying Properties

20 ANS: 1 PTS: 2 REF: 081420ia STA: A.A.28

TOP: Roots of Quadratics

21 ANS: 1

The mean is 17, the median is 18 and the mode is 22.

PTS: 2 REF: 081421ia STA: A.S.4 TOP: Central Tendency

22 ANS: 3

$$36500(1.07)^{20} \approx 141243$$

PTS: 2 REF: 081422ia STA: A.A.9 TOP: Exponential Functions

23 ANS: 4 PTS: 2 REF: 081423ia STA: A.A.36

TOP: Parallel and Perpendicular Lines

24 ANS: 3 PTS: 2 REF: 081424ia STA: A.A.5

TOP: Modeling Equations

25 ANS: 4 PTS: 2 REF: 081425ia STA: A.G.4

TOP: Graphing Absolute Value Functions

26 ANS: 3

$$ax + 3 = 7 - bx$$

$$ax + bx = 4$$

$$x(a + b) = 4$$

$$x = \frac{4}{a + b}$$

PTS: 2

REF: 081426ia

STA: A.A.23

TOP: Transforming Formulas

27 ANS: 3

$$m = -3 \frac{-A}{B} = \frac{-6}{2} = -3$$

PTS: 2

REF: 081427ia

STA: A.A.38

TOP: Parallel and Perpendicular Lines

28 ANS: 4

PTS: 2

REF: 081428ia

STA: A.A.13

TOP: Addition and Subtraction of Polynomials

KEY: subtraction

29 ANS: 2

$$\frac{x}{3} = \frac{8}{x+2}$$

$$x^2 + 2x = 24$$

$$x^2 + 2x - 24 = 0$$

$$(x + 6)(x - 4) = 0$$

$$x = -6, 4$$

PTS: 2

REF: 081429ia

STA: A.A.26

TOP: Solving Rationals

30 ANS: 1

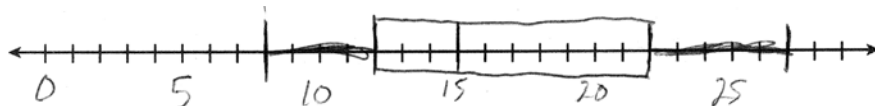
PTS: 2

REF: 081430ia

STA: A.A.29

TOP: Set Theory

31 ANS:



PTS: 2

REF: 081431ia

STA: A.S.5

TOP: Box-and-Whisker Plots

32 ANS:

$$16 + 2\pi \approx 22.3$$

PTS: 2

REF: 081432ia

STA: A.G.1

TOP: Compositions of Polygons and Circles

KEY: perimeter

33 ANS:

$$V = \pi \cdot 2.5^2 \cdot 11 \approx 215.98$$

PTS: 2

REF: 081433ia

STA: A.G.2

TOP: Volume

34 ANS:

$$\tan 26 = \frac{215}{x}$$

$$x = \frac{215}{\tan 26}$$

$$x \approx 441$$

PTS: 3

REF: 081434ia

STA: A.A.44

TOP: Using Trigonometry to Find a Side

35 ANS:

$$\frac{6}{12} \cdot \frac{5}{11} \cdot \frac{4}{10} = \frac{1}{11}$$

PTS: 3

REF: 081435ia

STA: A.S.23

TOP: Theoretical Probability

KEY: dependent events

36 ANS:

$$y\sqrt{3} - 4\sqrt{2} - 3y\sqrt{3} = -2y\sqrt{3} - 4\sqrt{2}$$

PTS: 3

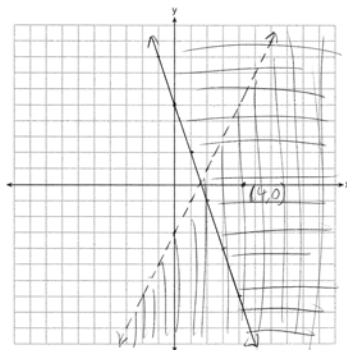
REF: 081436ia

STA: A.N.3

TOP: Operations with Radicals

KEY: subtraction

37 ANS:



PTS: 4

REF: 081437ia

STA: A.G.7

TOP: Systems of Linear Inequalities

38 ANS:

$$\text{Machine A. } A: \frac{4^2 - 3.97^2}{4^2} \approx .0149 \quad B: \frac{4.12^2 - 4^2}{4^2} \approx .0609$$

PTS: 4

REF: 081438ia

STA: A.M.3

TOP: Error

KEY: area

39 ANS:

$$x^2 - 6x + 9 = -9x + 19 \quad y = -9(-5) + 19 = 64 \quad (-5, 64) \text{ and } (2, 1)$$

$$x^2 + 3x - 10 = 0 \quad y = -9(2) + 19 = 1$$

$$(x + 5)(x - 2) = 0$$

$$x = -5, 2$$

PTS: 4

REF: 081439ia

STA: A.A.11

TOP: Quadratic-Linear Systems