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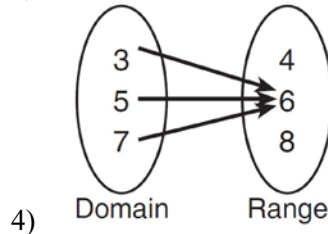
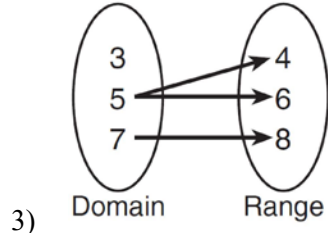
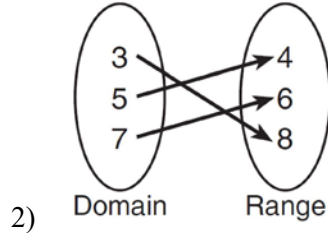
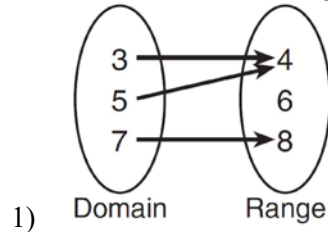
- 1 A survey is to be conducted in a small upstate village to determine whether or not local residents should fund construction of a skateboard park by raising taxes. Which segment of the population would provide the most unbiased responses?
- 1) a club of local skateboard enthusiasts
 - 2) senior citizens living on fixed incomes
 - 3) a group opposed to any increase in taxes
 - 4) every tenth person 18 years of age or older walking down Main St.

- 2 Which angle does *not* terminate in Quadrant IV when drawn on a unit circle in standard position?
- 1) -300°
 - 2) -50°
 - 3) 280°
 - 4) 1030°

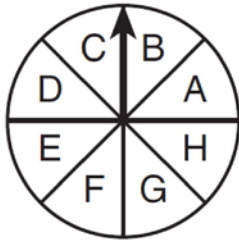
- 3 The expression $\frac{\frac{1}{x} + \frac{3}{y}}{\frac{2}{xy}}$ is equivalent to

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

- 4 Which relation does *not* represent a function?



- 5 In the diagram below, the spinner is divided into eight equal regions.



Which expression represents the probability of the spinner landing on B exactly three times in five spins?

- 1) ${}_8C_3 \left(\frac{1}{5}\right)^3 \left(\frac{4}{5}\right)^5$
 - 2) ${}_8C_3 \left(\frac{1}{5}\right)^5 \left(\frac{4}{5}\right)^3$
 - 3) ${}_5C_3 \left(\frac{1}{8}\right)^2 \left(\frac{7}{8}\right)^3$
 - 4) ${}_5C_3 \left(\frac{1}{8}\right)^3 \left(\frac{7}{8}\right)^2$
- 6 The expression $\sqrt[3]{27a^{-6}b^3c^2}$ is equivalent to

- 1) $\frac{3bc^{\frac{2}{3}}}{a^2}$
- 2) $\frac{3b^9c^6}{a^{18}}$
- 3) $\frac{3b^6c^5}{a^3}$
- 4) $\frac{3b^3\sqrt{3c^2}}{a^2}$

- 7 The amount of money in an account can be determined by the formula $A = Pe^{rt}$, where P is the initial investment, r is the annual interest rate, and t is the number of years the money was invested. What is the value of a \$5000 investment after 18 years, if it was invested at 4% interest compounded continuously?
- 1) \$9367.30
 - 2) \$9869.39
 - 3) \$10,129.08
 - 4) \$10,272.17

- 8 What is $\frac{x}{x-1} - \frac{1}{2-2x}$ expressed as a single fraction?
- 1) $\frac{x+1}{x-1}$
 - 2) $\frac{2x-1}{2-2x}$
 - 3) $\frac{2x+1}{2(x-1)}$
 - 4) $\frac{2x-1}{2(x-1)}$

- 9 What is the total number of points of intersection of the graphs of the equations $2x^2 - y^2 = 8$ and $y = x + 2$?
- 1) 1
 - 2) 2
 - 3) 3
 - 4) 0

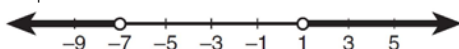
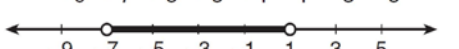
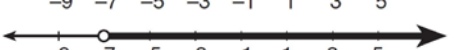
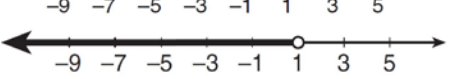
- 10 Given the sequence: $x, (x + y), (x + 2y), \dots$
Which expression can be used to determine the common difference of this sequence?

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

- 11 In a circle with a diameter of 24 cm, a central angle of $\frac{4\pi}{3}$ radians intercepts an arc. The length of the arc, in centimeters, is

- 1) 8π
- 2) 9π
- 3) 16π
- 4) 32π

- 12 Which graph is the solution to the inequality $4|2x + 6| - 5 < 27$?

- 1) 
- 2) 
- 3) 
- 4) 

- 13 What is the sum of the roots of the equation $-3x^2 + 6x - 2 = 0$?

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

- 14 The scores of 1000 students on a standardized test were normally distributed with a mean of 50 and a standard deviation of 5. What is the expected number of students who had scores greater than 60?

- 1) 1.7
- 2) 23
- 3) 46
- 4) 304

- 15 If $T = \frac{10x^2}{y}$, then $\log T$ is equivalent to

- 1) $(1 + 2 \log x) - \log y$
- 2) $\log(1 + 2x) - \log y$
- 3) $(1 - 2 \log x) + \log y$
- 4) $2(1 - \log x) + \log y$

- 16 Which statement regarding correlation is *not* true?

- 1) The closer the absolute value of the correlation coefficient is to one, the closer the data conform to a line.
- 2) A correlation coefficient measures the strength of the linear relationship between two variables.
- 3) A negative correlation coefficient indicates that there is a weak relationship between two variables.
- 4) A relation for which most of the data fall close to a line is considered strong.

- 17 What is the value of $\sum_{n=1}^3 \cos \frac{n\pi}{2}$?

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

- 18 The roots of the equation $4(x^2 - 1) = -3x$ are
- 1) imaginary
 - 2) real, rational, equal
 - 3) real, rational, unequal
 - 4) real, irrational, unequal
- 19 If $f(x) = 2x^2 - 3x + 4$, then $f(x + 3)$ is equal to
- 1) $2x^2 - 3x + 7$
 - 2) $2x^2 - 3x + 13$
 - 3) $2x^2 + 9x + 13$
 - 4) $2x^2 + 9x + 25$
- 20 The expression $x(3i^2)^3 + 2xi^{12}$ is equivalent to
- 1) $2x + 27xi$
 - 2) $-7x$
 - 3) $-25x$
 - 4) $-29x$
- 21 If the terminal side of angle θ passes through point $(-3, -4)$, what is the value of $\sec \theta$?
- 1) $\frac{5}{3}$
 - 2) $-\frac{5}{3}$
 - 3) $\frac{5}{4}$
 - 4) $-\frac{5}{4}$
- 22 When the inverse of $\tan \theta$ is sketched, its domain is
- 1) $-1 \leq \theta \leq 1$
 - 2) $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$
 - 3) $0 \leq \theta \leq \pi$
 - 4) $-\infty < \theta < \infty$
- 23 What is the third term of the recursive sequence below?
- $$a_1 = -6$$
- $$a_n = \frac{1}{2}a_{n-1} - n$$
- 1) $-\frac{11}{2}$
 - 2) $-\frac{5}{2}$
 - 3) $-\frac{1}{2}$
 - 4) -4
- 24 What is the equation of a circle with its center at $(0, -2)$ and passing through the point $(3, -5)$?
- 1) $x^2 + (y + 2)^2 = 9$
 - 2) $(x + 2)^2 + y^2 = 9$
 - 3) $x^2 + (y + 2)^2 = 18$
 - 4) $(x + 2)^2 + y^2 = 18$
- 25 If angles A and B are complementary, then $\sec B$ equals
- 1) $\csc(90^\circ - B)$
 - 2) $\csc(B - 90^\circ)$
 - 3) $\cos(B - 90^\circ)$
 - 4) $\cos(90^\circ - B)$

Algebra 2/Trigonometry Regents Exam 0116

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26 The legs of a right triangle are represented by $x + \sqrt{2}$ and $x - \sqrt{2}$. The length of the hypotenuse of the right triangle is represented by

- 1) $\sqrt{2x^2 + 4}$
- 2) $2x^2 + 4$
- 3) $x\sqrt{2 + 2}$
- 4) $\sqrt{x^2 - 2}$

27 What are the amplitude and the period of the graph represented by the equation $y = -3 \cos \frac{\theta}{3}$?

- 1) amplitude: -3 ; period: $\frac{\pi}{3}$
- 2) amplitude: -3 ; period: 6π
- 3) amplitude: 3 ; period: $\frac{\pi}{3}$
- 4) amplitude: 3 ; period: 6π

28 Solve algebraically for x : $\sqrt{2x + 1} + 4 = 8$

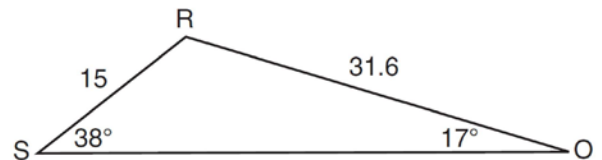
29 Factor completely: $x^3 + 3x^2 + 2x + 6$

30 Solve algebraically for the *exact* value of x :
 $\log_8 16 = x + 1$

31 Determine how many eleven-letter arrangements can be formed from the word "CATTARAUGUS."

32 Express -130° in radian measure, to the *nearest hundredth*.

33 Determine the area, to the *nearest integer*, of $\triangle SRO$ shown below.



34 Prove that the equation shown below is an identity for all values for which the functions are defined:
 $\csc \theta \cdot \sin^2 \theta \cdot \cot \theta = \cos \theta$

35 Find the difference when $\frac{4}{3}x^3 - \frac{5}{8}x^2 + \frac{7}{9}x$ is subtracted from $2x^3 + \frac{3}{4}x^2 - \frac{2}{9}$.

36 Find the exact roots of $x^2 + 10x - 8 = 0$ by completing the square.

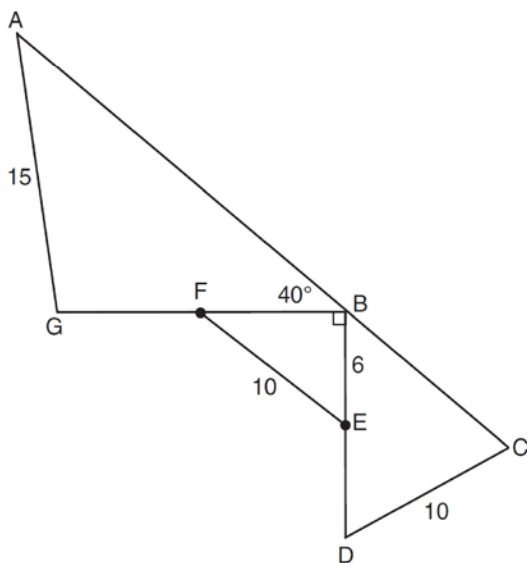
- 37 The table below gives the relationship between x and y .

x	1	2	3	4	5
y	4.2	33.5	113.1	268.1	523.6

Use exponential regression to find an equation for y as a function of x , rounding all values to the *nearest hundredth*. Using this equation, predict the value of x if y is 426.21, rounding to the *nearest tenth*. [Only an algebraic solution can receive full credit.]

- 38 Solve the equation $\cos 2x = \cos x$ algebraically for all values of x in the interval $0^\circ \leq x < 360^\circ$.

- 39 Given: $DC = 10$, $AG = 15$, $BE = 6$, $FE = 10$,
 $m\angle ABG = 40^\circ$, $m\angle GBD = 90^\circ$, $m\angle C < 90^\circ$,
 $\overline{BE} \cong \overline{ED}$, and $\overline{GF} \cong \overline{FB}$



Find $m\angle A$ to the *nearest tenth*. Find BC to the *nearest tenth*.

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Answer Section

1 ANS: 4 PTS: 2 REF: 011601a2 STA: A2.S.2
TOP: Analysis of Data

2 ANS: 1
 $-300^\circ + 360^\circ = 60^\circ$, which terminates in Quadrant I.

PTS: 2 REF: 011602a2 STA: A2.A.60 TOP: Unit Circle

3 ANS: 4

$$\frac{\frac{3x+y}{xy}}{\frac{2}{xy}} = \frac{3x+y}{xy} \cdot \frac{xy}{2} = \frac{3x+y}{2}$$

PTS: 2 REF: 011603a2 STA: A2.A.17 TOP: Complex Fractions

4 ANS: 3 PTS: 2 REF: 011604a2 STA: A2.A.38
TOP: Defining Functions KEY: ordered pairs

5 ANS: 4 PTS: 2 REF: 011605a2 STA: A2.S.15
TOP: Binomial Probability KEY: modeling

6 ANS: 1

$$\sqrt[3]{27a^{-6}b^3c^2} = 3a^{-2}bc^{\frac{2}{3}} = \frac{3bc^{\frac{2}{3}}}{a^2}$$

PTS: 2 REF: 011606a2 STA: A2.A.11 TOP: Radicals as Fractional Exponents

7 ANS: 4

$$A = 5000e^{(.04)(18)} \approx 10272.17$$

PTS: 2 REF: 011607a2 STA: A2.A.12 TOP: Evaluating Exponential Expressions

8 ANS: 3

$$\frac{x}{x-1} + \frac{1}{2x-2} = \frac{2x}{2(x-1)} + \frac{1}{2(x-1)} = \frac{2x+1}{2(x-1)}$$

PTS: 2 REF: 011608a2 STA: A2.A.16 TOP: Addition and Subtraction of Rationals

9 ANS: 2

$$2x^2 - (x+2)^2 = 8$$

$$2x^2 - (x^2 + 4x + 4) - 8 = 0$$

$$x^2 - 4x - 12 = 0$$

$$(x-6)(x+2) = 0$$

$$x = 6, -2$$

PTS: 2 REF: 011609a2 STA: A2.A.3 TOP: Quadratic-Linear Systems

KEY: equations

- 10 ANS: 2 PTS: 2 REF: 011610a2 STA: A2.A.30
TOP: Sequences
- 11 ANS: 3
 $s = \theta r = \frac{4\pi}{3} \cdot \frac{24}{2} = 16\pi$
- PTS: 2 REF: 011611a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length
- 12 ANS: 2
 $4|2x + 6| < 32$ $2x + 6 < 8$ $2x + 6 > -8$
 $|2x + 6| < 8$ $2x < 2$ $2x > -14$
 $x < 1$ $x > -7$
- PTS: 2 REF: 011612a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph
- 13 ANS: 2
 $\frac{-b}{a} = \frac{-6}{-3} = 2$
- PTS: 2 REF: 011613a2 STA: A2.A.20 TOP: Roots of Quadratics
- 14 ANS: 2
 $\frac{60 - 50}{5} = 2$ standards above the mean or 2.3% $2.3\% \cdot 1000 = 23$
- PTS: 2 REF: 011614a2 STA: A2.S.5 TOP: Normal Distributions
KEY: predict
- 15 ANS: 1
 $\log T = \log \frac{10x^2}{y} = \log 10 + \log x^2 - \log y = 1 + 2 \log x - \log y$
- PTS: 2 REF: 011615a2 STA: A2.A.19 TOP: Properties of Logarithms
KEY: splitting logs
- 16 ANS: 3 PTS: 2 REF: 011616a2 STA: A2.S.8
TOP: Correlation Coefficient
- 17 ANS: 2
 $\cos \frac{\pi}{2} + \cos \pi + \cos \frac{3\pi}{2} = 0 + -1 + 0 = -1$
- PTS: 2 REF: 011617a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced
- 18 ANS: 4
 $4x^2 + 3x - 4 = 0$ $b^2 - 4ac = 3^2 - 4(4)(-4) = 9 + 64 = 73$
- PTS: 2 REF: 011618a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine nature of roots given equation

19 ANS: 3

$$f(x+3) = 2(x+3)^2 - 3(x+3) + 4 = 2x^2 + 12x + 18 - 3x - 9 + 4 = 2x^2 + 9x + 13$$

PTS: 2 REF: 011619a2 STA: A2.A.41 TOP: Functional Notation

20 ANS: 3

$$x(27i^6) + x(2i^{12}) = -27x + 2x = -25x$$

PTS: 2 REF: 011620a2 STA: A2.N.7 TOP: Imaginary Numbers

21 ANS: 4

$$\cos \theta = -\frac{3}{5} \quad \sec \theta = -\frac{5}{3}$$

PTS: 2 REF: 011621a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

22 ANS: 4

PTS: 2 TOP: Domain and Range

REF: 011622a2 STA: A2.A.63

23 ANS: 1

$$a_2 = \frac{1}{2}(-6) - 2 = -5$$

$$a_3 = \frac{1}{2}(-5) - 3 = -\frac{11}{2}$$

PTS: 2 REF: 011623a2 STA: A2.A.33 TOP: Sequences

24 ANS: 3

$$r = \sqrt{(3-0)^2 + (-5-(-2))^2} = \sqrt{9+9} = \sqrt{18}$$

PTS: 2 REF: 011624a2 STA: A2.A.48 TOP: Equations of Circles

25 ANS: 3

Cofunctions secant and cosecant are complementary

PTS: 2 REF: 011625a2 STA: A2.A.58 TOP: Cofunction Trigonometric Relationships

26 ANS: 1

$$c = \sqrt{(x + \sqrt{2})^2 + (x - \sqrt{2})^2} = \sqrt{x^2 + 2\sqrt{2}x + 2 + x^2 - 2\sqrt{2}x + 2} = \sqrt{2x^2 + 4}$$

PTS: 2 REF: 011626a2 STA: A2.A.14 TOP: Operations with Radicals

KEY: with variables | index = 2

27 ANS: 4

PTS: 2 REF: 011627a2 TOP: Properties of Graphs of Trigonometric Functions

STA: A2.A.69

KEY: period

28 ANS:

$$\sqrt{2x+1} = 4$$

$$2x+1 = 16$$

$$2x = 15$$

$$x = \frac{15}{2}$$

PTS: 2

REF: 011628a2

STA: A2.A.22

TOP: Solving Radicals

KEY: basic

29 ANS:

$$x^2(x+3) + 2(x+3) = (x^2+2)(x+3)$$

PTS: 2

REF: 011629a2

STA: A2.A.7

TOP: Factoring by Grouping

30 ANS:

$$8^{x+1} = 16$$

$$2^{3(x+1)} = 2^4$$

$$3x+3 = 4$$

$$3x = 1$$

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

PTS: 2

REF: 011630a2

STA: A2.A.28

TOP: Logarithmic Equations

KEY: basic

31 ANS:

$$\frac{11!}{3! \cdot 2! \cdot 2!} = 1,663,200$$

PTS: 2

REF: 011631a2

STA: A2.S.10

TOP: Permutations

32 ANS:

$$-130 \cdot \frac{\pi}{180} \approx -2.27$$

PTS: 2

REF: 011632a2

STA: A2.M.2

TOP: Radian Measure

KEY: radians

33 ANS:

$$\frac{1}{2} \cdot 15 \cdot 31.6 \sin 125 \approx 194$$

PTS: 2

REF: 011633a2

STA: A2.A.74

TOP: Using Trigonometry to Find Area

KEY: advanced

34 ANS:

$$\frac{1}{\sin \theta} \cdot \sin^2 \theta \cdot \frac{\cos \theta}{\sin \theta} = \cos \theta$$

$$\cos \theta = \cos \theta$$

PTS: 2 REF: 011634a2 STA: A2.A.67 TOP: Proving Trigonometric Identities

35 ANS:

$$\frac{2}{3}x^3 + \frac{11}{8}x^2 - \frac{7}{9}x - \frac{2}{9}$$

PTS: 2 REF: 011635a2 STA: A2.N.3 TOP: Operations with Polynomials

KEY: subtraction

36 ANS:

$$x^2 + 10x + 25 = 8 + 25$$

$$(x + 5)^2 = 33$$

$$x + 5 = \pm\sqrt{33}$$

$$x = -5 \pm \sqrt{33}$$

PTS: 4 REF: 011636a2 STA: A2.A.24 TOP: Completing the Square

37 ANS:

$$y = 2.19(3.23)^x \quad 426.21 = 2.19(3.23)^x$$

$$\frac{426.21}{2.19} = (3.23)^x$$

$$\log \frac{426.21}{2.19} = x \log(3.23)$$

$$\frac{\log \frac{426.21}{2.19}}{\log(3.23)} = x$$

$$x \approx 4.5$$

PTS: 4 REF: 011637a2 STA: A2.S.7 TOP: Exponential Regression

38 ANS:

$$2 \cos^2 x - 1 = \cos x$$

$$2 \cos^2 x - \cos x - 1 = 0$$

$$(2 \cos x + 1)(\cos x - 1) = 0$$

$$\cos x = -\frac{1}{2}, 1$$

$$x = 0, 120, 240$$

PTS: 4 REF: 011638a2 STA: A2.A.68 TOP: Trigonometric Equations

KEY: double angle identities

39 ANS:

$$\frac{16}{\sin A} = \frac{15}{\sin 40} \quad \frac{10}{\sin 50} = \frac{12}{\sin C} \quad \frac{d}{\sin 63.2} = \frac{12}{\sin 66.8}$$

$$\sin A = \frac{16 \sin 40}{15} \quad \sin C = \frac{12 \sin 50}{10} \quad d = \frac{12 \sin 63.2}{\sin 66.8}$$

$$A \approx 43.3 \quad C \approx 66.8 \quad d \approx 11.7$$

PTS: 6

REF: 011639a2

STA: A2.A.73

TOP: Law of Sines

KEY: advanced