JEFFERSON MATH PROJECT
REGENTS AT RANDOM

The NY Algebra 2/Trigonometry Regents Exams
Fall 2009-June 2011
(Answer Key)

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Dear Sir

I have to acknolege the reciept of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensible as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.

Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.

Algebra 2/Trigonometry Regents at Random
Answer Section

1 ANS: 4   PTS: 2   REF: fall0925a2   STA: A2.S.10
   TOP: Permutations

2 ANS: 3   PTS: 2   REF: 011110a2   STA: A2.A.30
   TOP: Sequences

3 ANS: 4   PTS: 2   REF: 011127a2   STA: A2.S.1
   TOP: Analysis of Data
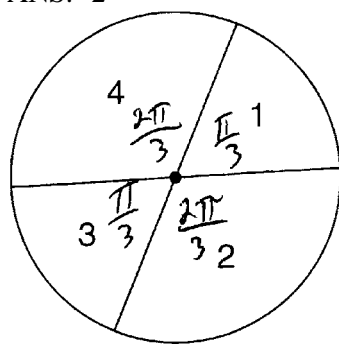
4 ANS: 3   PTS: 2   REF: fall0913a2   STA: A2.A.65
   TOP: Graphing Trigonometric Functions

5 ANS: 3

$$\frac{-7 \pm \sqrt{7^2 - 4(2)(-3)}}{2(2)} = \frac{-7 \pm \sqrt{73}}{4}$$

   PTS: 2   REF: 081009a2   STA: A2.A.25   TOP: Quadratic Formula

6 ANS: 2

$$\frac{\frac{\pi}{3} + \frac{\pi}{3}}{2\pi} = \frac{\frac{2\pi}{3}}{2\pi} = \frac{1}{3}$$

   PTS: 2   REF: 011108a2   STA: A2.S.13   TOP: Geometric Probability

7 ANS:

$$\frac{5(3 + \sqrt{2})}{7}. \quad \frac{5}{3 - \sqrt{2}} \times \frac{3 + \sqrt{2}}{3 + \sqrt{2}} = \frac{5(3 + \sqrt{2})}{9 - 2} = \frac{5(3 + \sqrt{2})}{7}$$

   PTS: 2   REF: fall0928a2   STA: A2.N.5   TOP: Rationalizing Denominators

8 ANS: 4
   (4) fails the horizontal line test. Not every element of the range corresponds to only one element of the domain.

   PTS: 2   REF: fall0906a2   STA: A2.A.43   TOP: Defining Functions

9 ANS:

$$\frac{4}{9}x^2 - \frac{4}{3}x + 1. \quad \left(\frac{2}{3}x - 1\right)^2 = \left(\frac{2}{3}x - 1\right)\left(\frac{2}{3}x - 1\right) = \frac{4}{9}x^2 - \frac{2}{3}x - \frac{2}{3}x + 1 = \frac{4}{9}x^2 - \frac{4}{3}x + 1$$

   PTS: 2   REF: 081034a2   STA: A2.N.3   TOP: Operations with Polynomials

10 ANS: 1

$$-420\left(\frac{\pi}{180}\right) = -\frac{7\pi}{3}$$

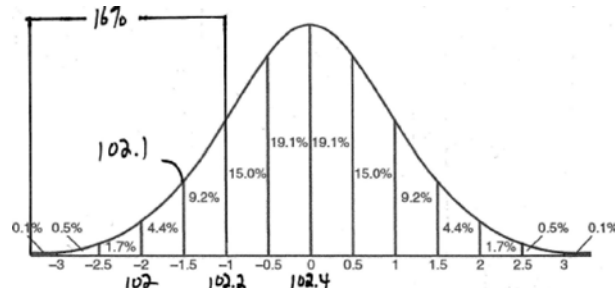PTS: 2   REF: 081002a2   STA: A2.M.2   TOP: Radian Measure
KEY: radians

11 ANS: 1

PTS: 2   REF: fall0915a2   STA: A2.S.5   TOP: Normal Distributions
KEY: interval

12 ANS:

$$\frac{\sqrt{108x^5y^8}}{\sqrt{6xy^5}} = \sqrt{18x^4y^3} = 3x^2y\sqrt{2y}$$

PTS: 2   REF: 011133a2   STA: A2.A.14   TOP: Operations with Radicals
KEY: with variables | index = 2

13 ANS:

197°40'. $3.45 \times \dfrac{180}{\pi} \approx 197°40'.$

PTS: 2   REF: fall0931a2   STA: A2.M.2   TOP: Radian Measure
KEY: degrees

14 ANS:

$$\frac{12x^2}{y^9} \cdot \frac{3x^{-4}y^5}{(2x^3y^{-7})^{-2}} = \frac{3y^5(2x^3y^{-7})^2}{x^4} = \frac{3y^5(4x^6y^{-14})}{x^4} = \frac{12x^6y^{-9}}{x^4} = \frac{12x^2}{y^9}$$

PTS: 2   REF: 061134a2   STA: A2.A.9   TOP: Negative Exponents

15 ANS: 4

$$4ab\sqrt{2b} - 3a\sqrt{9b^2}\sqrt{2b} + 7ab\sqrt{6b} = 4ab\sqrt{2b} - 9ab\sqrt{2b} + 7ab\sqrt{6b} = -5ab\sqrt{2b} + 7ab\sqrt{6b}$$

PTS: 2   REF: fall0918a2   STA: A2.A.14   TOP: Operations with Radicals
KEY: with variables | index = 2

16 ANS: 3   PTS: 2   REF: 061001a2   STA: A2.A.30
TOP: Sequences

17 ANS: 1   PTS: 2   REF: 081022a2   STA: A2.A.46
TOP: Transformations with Functions and Relations

18 ANS:

$$5\sqrt{3x^3} - 2\sqrt{27x^3} = 5\sqrt{x^2}\sqrt{3x} - 2\sqrt{9x^2}\sqrt{3x} = 5x\sqrt{3x} - 6x\sqrt{3x} = -x\sqrt{3x}$$

PTS: 2   REF: 061032a2   STA: A2.N.2   TOP: Operations with Radicals

19 ANS: 3
$68\% \times 50 = 34$

PTS: 2   REF: 081013a2   STA: A2.S.5   TOP: Normal Distributions
KEY: predict

20 ANS: 4
$$(3 + \sqrt{5})(3 - \sqrt{5}) = 9 - \sqrt{25} = 4$$

PTS: 2   REF: 081001a2   STA: A2.N.2   TOP: Operations with Radicals

21 ANS:

$$39{,}916{,}800.\ \frac{{}_{12}P_{12}}{3! \cdot 2!} = \frac{479{,}001{,}600}{12} = 39{,}916{,}800$$

PTS: 2   REF: 081035a2   STA: A2.S.10   TOP: Permutations

22 ANS: 2   PTS: 2   REF: 081010a2   STA: A2.A.55
TOP: Trigonometric Ratios

23 ANS: 3
$$2\pi \cdot \frac{5}{12} = \frac{10\pi}{12} = \frac{5\pi}{6}$$

PTS: 2   REF: 061125a2   STA: A2.M.1   TOP: Radian Measure

24 ANS:

$$\frac{\sqrt{13}}{2}.\ \sin\theta = \frac{y}{\sqrt{x^2+y^2}} = \frac{2}{\sqrt{(-3)^2+2^2}} = \frac{2}{\sqrt{13}}.\ \csc\theta = \frac{\sqrt{13}}{2}.$$

PTS: 2   REF: fall0933a2   STA: A2.A.62   TOP: Determining Trigonometric Functions

25 ANS:
$45, 225\ \ 2\tan C - 3 = 3\tan C - 4$

$$1 = \tan C$$

$$\tan^{-1}1 = C$$

$$C = 45, 225$$

PTS: 2   REF: 081032a2   STA: A2.A.68   TOP: Trigonometric Equations
KEY: basic

26 ANS: 1   PTS: 2   REF: 061025a2   STA: A2.A.34
TOP: Sigma Notation

27 ANS:

No. TENNESSEE: $\dfrac{_9P_9}{4!\cdot 2!\cdot 2!} = \dfrac{362,880}{96} = 3,780.$ VERMONT: $_7P_7 = 5,040$

PTS: 4   REF: 061038a2   STA: A2.S.10   TOP: Permutations

28 ANS: 1

$2i^2 + 3i^3 = 2(-1) + 3(-i) = -2 - 3i$

PTS: 2   REF: 081004a2   STA: A2.N.7   TOP: Imaginary Numbers

29 ANS: 3

n	0	1	2	Σ
$n^2 + 2^n$	$0^2 + 2^0 = 1$	$1^2 + 2^2 = 3$	$2^2 + 2^2 = 8$	12

$2 \times 12 = 24$

PTS: 2   REF: fall0911a2   STA: A2.N.10   TOP: Sigma Notation
KEY: basic

30 ANS: 2   PTS: 2   REF: 081003a2   STA: A2.A.51
TOP: Domain and Range

31 ANS: 3

$\dfrac{59.2}{\sin 74} = \dfrac{60.3}{\sin C}$ $180 - 78.3 = 101.7$

$\quad C \approx 78.3$

PTS: 2   REF: 081006a2   STA: A2.A.75   TOP: Law of Sines - The Ambiguous Case

32 ANS: 3

$\dfrac{3^{-2}}{(-2)^{-3}} = \dfrac{\frac{1}{9}}{-\frac{1}{8}} = -\dfrac{8}{9}$

PTS: 2   REF: 061003a2   STA: A2.A.8   TOP: Negative and Fractional Exponents

33 ANS: 3

$\sqrt{-300} = \sqrt{100}\sqrt{-1}\sqrt{3}$

PTS: 2   REF: 061006a2   STA: A2.N.6   TOP: Square Roots of Negative Numbers

34 ANS:

$0.468.$ $_8C_6\left(\dfrac{2}{3}\right)^6\left(\dfrac{1}{3}\right)^2 \approx 0.27313.$ $_8C_7\left(\dfrac{2}{3}\right)^7\left(\dfrac{1}{3}\right)^1 \approx 0.15607.$ $_8C_8\left(\dfrac{2}{3}\right)^8\left(\dfrac{1}{3}\right)^0 \approx 0.03902.$

PTS: 4   REF: 011138a2   STA: A2.S.15   TOP: Binomial Probability
KEY: at least or at most

35 ANS: 1

$$a_n = -\sqrt{5}(-\sqrt{2})^{n-1}$$

$$a_{15} = -\sqrt{5}(-\sqrt{2})^{15-1} = -\sqrt{5}(-\sqrt{2})^{14} = -\sqrt{5} \cdot 2^7 = -128\sqrt{5}$$

PTS: 2　　　　REF: 061109a2　　STA: A2.A.32　　TOP: Sequences

36 ANS: 2

$$x^3 + x^2 - 2x = 0$$

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

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

$$x = 0, -2, 1$$

PTS: 2　　　　REF: 011103a2　　STA: A2.A.26　　TOP: Solving Polynomial Equations

37 ANS: 1

$$4a + 6 = 4a - 10. \quad 4a + 6 = -4a + 10. \quad \left|4\left(\frac{1}{2}\right) + 6\right| - 4\left(\frac{1}{2}\right) = -10$$
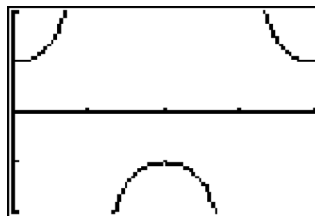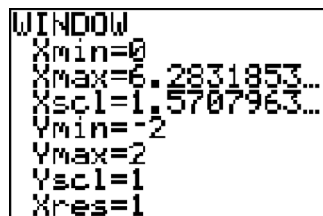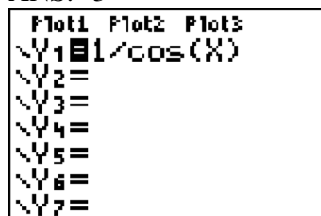
$$6 \ne -10 \qquad\qquad 8a = 4$$

$$8 - 2 \ne -10$$

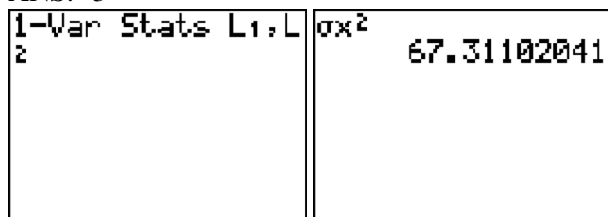$$a = \frac{4}{8} = \frac{1}{2}$$

PTS: 2　　　　REF: 011106a2　　STA: A2.A.1　　TOP: Absolute Value Equations

38 ANS: 3

PTS: 2　　　　REF: 061020a2　　STA: A2.A.71　　TOP: Graphing Trigonometric Functions

39 ANS: 3

PTS: 2　　　　REF: fall0924a2　　STA: A2.S.4　　TOP: Dispersion
KEY: variance

40 ANS: 4　　　　PTS: 2　　　　REF: 011111a2　　STA: A2.N.8
TOP: Conjugates of Complex Numbers

41 ANS:

$$\sum_{n=1}^{15} 7n$$

PTS: 2 REF: 081029a2 STA: A2.A.34 TOP: Sigma Notation

42 ANS: 1

$y \geq x^2 - x - 6$

$y \geq (x-3)(x+2)$

PTS: 2 REF: 061017a2 STA: A2.A.4 TOP: Quadratic Inequalities
KEY: two variables

43 ANS: 3

$75000 = 25000e^{.0475t}$

$3 = e^{.0475t}$

$\ln 3 = \ln e^{.0475t}$

$\dfrac{\ln 3}{.0475} = \dfrac{.0475t \cdot \ln e}{.0475}$

$23.1 \approx t$

PTS: 2 REF: 061117a2 STA: A2.A.6 TOP: Exponential Growth

44 ANS:

$\dfrac{23}{2}$ $\cos^2 B + \sin^2 B = 1$ $\tan B = \dfrac{\sin B}{\cos B} = \dfrac{\frac{5}{\sqrt{41}}}{\frac{4}{\sqrt{41}}} = \dfrac{5}{4}$ $\tan(A+B) = \dfrac{\frac{2}{3} + \frac{5}{4}}{1 - \left(\frac{2}{3}\right)\left(\frac{5}{4}\right)} = \dfrac{\frac{8+15}{12}}{\frac{12}{12} - \frac{10}{12}} = \dfrac{\frac{23}{12}}{\frac{2}{12}} = \dfrac{23}{2}$

$\cos^2 B + \left(\dfrac{5}{\sqrt{41}}\right)^2 = 1$

$\cos^2 B + \dfrac{25}{41} = \dfrac{41}{41}$

$\cos^2 B = \dfrac{16}{41}$

$\cos B = \dfrac{4}{\sqrt{41}}$

PTS: 4 REF: 081037a2 STA: A2.A.76 TOP: Angle Sum and Difference Identities
KEY: evaluating

45 ANS: 3

$S = \dfrac{-b}{a} = \dfrac{-(-3)}{4} = \dfrac{3}{4}.$ $P = \dfrac{c}{a} = \dfrac{-8}{4} = -2$

PTS: 2 REF: fall0912a2 STA: A2.A.21 TOP: Roots of Quadratics
KEY: basic

46 ANS: 1
common difference is 2. $b_n = x + 2n$

$$10 = x + 2(1)$$

$$8 = x$$

PTS: 2   REF: 081014a2   STA: A2.A.29   TOP: Sequences

47 ANS: 3

$$\text{period} = \frac{2\pi}{b} = \frac{2\pi}{3\pi} = \frac{2}{3}$$

PTS: 2   REF: 081026a2   STA: A2.A.70   TOP: Graphing Trigonometric Functions
KEY: recognize

48 ANS:

0.167. ${}_{10}C_8 \cdot 0.6^8 \cdot 0.4^2 + {}_{10}C_9 \cdot 0.6^9 \cdot 0.4^1 + {}_{10}C_{10} \cdot 0.6^{10} \cdot 0.4^0 \approx 0.167$

PTS: 4   REF: 061036a2   STA: A2.S.15   TOP: Binomial Probability
KEY: at least or at most

49 ANS: 4   PTS: 2   REF: 061026a2   STA: A2.A.29
TOP: Sequences

50 ANS:

$y = 2.001x^{2.298}$, 1,009. $y = 2.001(15)^{2.298} \approx 1009$

PTS: 4   REF: fall0938a2   STA: A2.S.7   TOP: Power Regression

51 ANS:

26.2%. ${}_{10}C_8 \cdot 0.65^8 \cdot 0.35^2 + {}_{10}C_9 \cdot 0.65^9 \cdot 0.35^1 + {}_{10}C_{10} \cdot 0.65^{10} \cdot 0.35^0 \approx 0.262$

PTS: 4   REF: 081038a2   STA: A2.S.15   TOP: Binomial Probability
KEY: at least or at most

52 ANS: 4   PTS: 2   REF: 081005a2   STA: A2.A.60
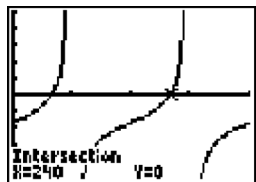TOP: Unit Circle

53 ANS: 3   PTS: 2   REF: 081007a2   STA: A2.A.64
TOP: Using Inverse Trigonometric Functions   KEY: basic

54 ANS: 1

$\tan \theta - \sqrt{3} = 0$.

$$\tan \theta = \sqrt{3}$$

$$\theta = \tan^{-1} \sqrt{3}$$

$$\theta = 60, 240$$

PTS: 2   REF: fall0903a2   STA: A2.A.68   TOP: Trigonometric Equations
KEY: basic

55 ANS:

$\left(-\dfrac{9}{2}, \dfrac{1}{2}\right)$ and $\left(\dfrac{1}{2}, \dfrac{11}{2}\right)$. $\quad y = x + 5 \qquad . \quad 4x^2 + 17x - 4 = x + 5$

$$y = 4x^2 + 17x - 4 \quad 4x^2 + 16x - 9 = 0$$

$$(2x + 9)(2x - 1) = 0$$

$$x = -\dfrac{9}{2} \text{ and } x = \dfrac{1}{2}$$

$$y = -\dfrac{9}{2} + 5 = \dfrac{1}{2} \text{ and } y = \dfrac{1}{2} + 5 = \dfrac{11}{2}$$

PTS: 6　　　　REF: 061139a2　　STA: A2.A.3　　　　TOP: Quadratic-Linear Systems
KEY: equations

56 ANS: 4　　　　　PTS: 2　　　　REF: 061124a2　　STA: A2.S.3
TOP: Central Tendency
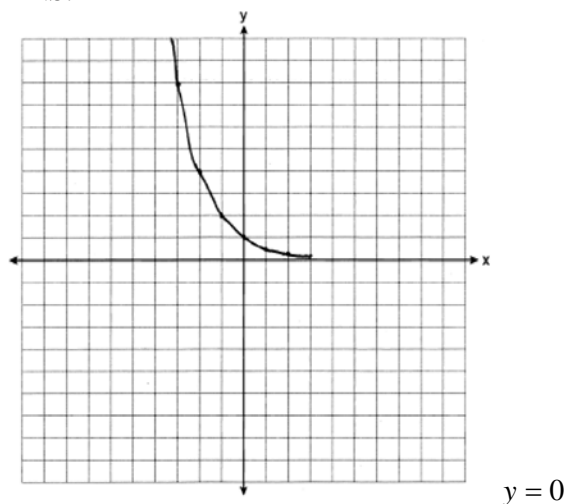
57 ANS: 3
$K = (10)(18) \sin 46 \approx 129$

PTS: 2　　　　REF: 081021a2　　STA: A2.A.74　　TOP: Using Trigonometry to Find Area
KEY: parallelograms

58 ANS:

$y = 0$

PTS: 2　　　　REF: 061031a2　　STA: A2.A.53　　TOP: Graphing Exponential Functions

59 ANS:

0, 60, 180, 300.

$$\sin 2\theta = \sin \theta$$

$$\sin 2\theta - \sin \theta = 0$$

$$2\sin\theta\cos\theta - \sin\theta = 0$$

$$\sin\theta(2\cos\theta - 1) = 0$$

$$\sin\theta = 0 \quad 2\cos\theta - 1 = 0$$

$$\theta = 0,180 \quad \cos\theta = \frac{1}{2}$$

$$\theta = 60,300$$

PTS: 4   REF: 061037a2   STA: A2.A.68   TOP: Trigonometric Equations
KEY: double angle identities

60 ANS:

$$b^2 - 4ac = 0$$

$$k^2 - 4(1)(4) = 0$$

$$k^2 - 16 = 0$$

$$(k+4)(k-4) = 0$$

$$k = \pm 4$$

PTS: 2   REF: 061028a2   STA: A2.A.2   TOP: Using the Discriminant
KEY: determine equation given nature of roots

61 ANS: 1

$$\sqrt{12^2 - 6^2} = \sqrt{108} = \sqrt{36}\sqrt{3} = 6\sqrt{3}. \quad \cot J = \frac{A}{O} = \frac{6}{6\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

PTS: 2   REF: 011120a2   STA: A2.A.55   TOP: Trigonometric Ratios

62 ANS: 4   PTS: 2   REF: 061101a2   STA: A2.S.1
TOP: Analysis of Data

63 ANS:

$$16^{2x+3} = 64^{x+2}$$

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

$$4x + 6 = 3x + 6$$

$$x = 0$$

PTS: 2   REF: 011128a2   STA: A2.A.27   TOP: Exponential Equations
KEY: common base not shown

64 ANS:
$10ax^2 - 23ax - 5a = a(10x^2 - 23x - 5) = a(5x + 1)(2x - 5)$

PTS: 2   REF: 081028a2   STA: A2.A.7   TOP: Factoring Polynomials
KEY: multiple variables

65 ANS: 4
$12x^4 + 10x^3 - 12x^2 = 2x^2(6x^2 + 5x - 6) = 2x^2(2x + 3)(3x - 2)$

PTS: 2   REF: 061008a2   STA: A2.A.7   TOP: Factoring Polynomials
KEY: single variable

66 ANS:
$\sin(45 + 30) = \sin 45 \cos 30 + \cos 45 \sin 30$

$$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \frac{\sqrt{6} + \sqrt{2}}{4}$$

PTS: 4   REF: 061136a2   STA: A2.A.76   TOP: Angle Sum and Difference Identities
KEY: evaluating

67 ANS: 3   PTS: 2   REF: 061022a2   STA: A2.A.63
TOP: Domain and Range

68 ANS: 2
The roots are $-1, 2, 3$.

PTS: 2   REF: 081023a2   STA: A2.A.50   TOP: Solving Polynomial Equations

69 ANS:

$x = -\dfrac{1}{3}, -1$ $\log_{x+3} \dfrac{x^3 + x - 2}{x} = 2$

$$\frac{x^3 + x - 2}{x} = (x + 3)^2$$

$$\frac{x^3 + x - 2}{x} = x^2 + 6x + 9$$

$$x^3 + x - 2 = x^3 + 6x^2 + 9x$$

$$0 = 6x^2 + 8x + 2$$

$$0 = 3x^2 + 4x + 1$$

$$0 = (3x + 1)(x + 1)$$

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

PTS: 6   REF: 081039a2   STA: A2.A.28   TOP: Logarithmic Equations
KEY: basic

70 ANS: 2

$$\frac{x^{-1}-1}{x-1}=\frac{\frac{1}{x}-1}{x-1}=\frac{\frac{1-x}{x}}{x-1}=\frac{\frac{-(x-1)}{x}}{x-1}=-\frac{1}{x}$$

PTS: 2   REF: 081018a2   STA: A2.A.9   TOP: Negative Exponents

71 ANS: 3

$x^2-3x-10>0$ $\qquad$ or

$(x-5)(x+2)>0$ $\quad$ $x-5<0$ and $x+2<0$

$x-5>0$ and $x+2>0$ $\quad$ $x<5$ and $x<-2$

$\quad$ $x>5$ and $x>-2$ $\qquad$ $x<-2$

$\qquad$ $x>5$

PTS: 2   REF: 011115a2   STA: A2.A.4   TOP: Quadratic Inequalities
KEY: one variable

72 ANS: 2   PTS: 2   REF: 061108a2   STA: A2.A.52
TOP: Identifying the Equation of a Graph

73 ANS: 2

$x^2-2x+y^2+6y=-3$

$x^2-2x+1+y^2+6y+9=-3+1+9$

$(x-1)^2+(y+3)^2=7$

PTS: 2   REF: 061016a2   STA: A2.A.47   TOP: Equations of Circles

74 ANS: 1   PTS: 2   REF: 011117a2   STA: A2.S.9
TOP: Differentiating Permutations and Combinations

75 ANS: 2   PTS: 2   REF: 061011a2   STA: A2.A.10
TOP: Fractional Exponents as Radicals

76 ANS:

$$\frac{\sin^2 A}{\cos^2 A}+\frac{\cos^2 A}{\cos^2 A}=\frac{1}{\cos^2 A}$$

$$\tan^2 A+1=\sec^2 A$$

PTS: 2   REF: 011135a2   STA: A2.A.67   TOP: Proving Trigonometric Identities

77 ANS: 2

$f^{-1}(x)=\log_4 x$

PTS: 2   REF: fall0916a2   STA: A2.A.54   TOP: Graphing Logarithmic Functions

78 ANS: 4   PTS: 2   REF: 061120a2   STA: A2.A.19
TOP: Properties of Logarithms   KEY: splitting logs

79 ANS: 1   PTS: 2   REF: 011112a2   STA: A2.A.64
TOP: Using Inverse Trigonometric Functions   KEY: advanced

80 ANS:

7. $f(-3) = (-3)^2 - 6 = 3$. $g(x) = 2^3 - 1 = 7$.

PTS: 2 REF: 061135a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: numbers

81 ANS:

$2.5 \cdot \dfrac{180}{\pi} \approx 143.2°$

PTS: 2 REF: 011129a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

82 ANS: 1

$_9C_3 a^6 (-4b)^3 = -5376 a^6 b^3$

PTS: 2 REF: 061126a2 STA: A2.A.36 TOP: Binomial Expansions

83 ANS: 4 PTS: 2 REF: 011124a2 STA: A2.A.18
TOP: Evaluating Logarithmic Expressions

84 ANS: 2

$8^2 = 64$

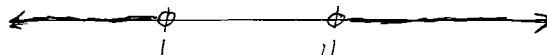PTS: 2 REF: fall0909a2 STA: A2.A.18 TOP: Evaluating Logarithmic Expressions

85 ANS:

$-3|6 - x| < -15$.

$|6 - x| > 5$

$6 - x > 5$ or $6 - x < -5$

$1 > x$ or $11 < x$

PTS: 2 REF: 061137a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph

86 ANS: 1

$6x - 7 \le 5 \quad 6x - 7 \ge -5$

$6x \le 12 \qquad 6x \ge 2$

$x \le 2 \qquad x \ge \dfrac{1}{3}$

PTS: 2 REF: fall0905a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph

87 ANS: 3 PTS: 2 REF: 061007a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

88 ANS: 2

$$\frac{10}{\sin 35} = \frac{13}{\sin B} \qquad 35 + 48 < 180$$
$$B \approx 48, 132 \qquad 35 + 132 < 180$$

PTS: 2 REF: 011113a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

89 ANS: 3

$$\left(\frac{2}{3}\right)^2 + \cos^2 A = 1 \qquad\qquad \sin 2A = 2\sin A \cos A$$

$$\cos^2 A = \frac{5}{9} \qquad\qquad\qquad = 2\left(\frac{2}{3}\right)\left(\frac{\sqrt{5}}{3}\right)$$

$$\cos A = +\frac{\sqrt{5}}{3}, \sin A \text{ is acute.} \qquad = \frac{4\sqrt{5}}{9}$$

PTS: 2 REF: 011107a2 STA: A2.A.77 TOP: Double Angle Identities
KEY: evaluating

90 ANS: 1

$$_5C_3(3x)^2(-2)^3 = 10 \cdot 9x^2 \cdot -8 = -720x^2$$

PTS: 2 REF: fall0919a2 STA: A2.A.36 TOP: Binomial Expansions

91 ANS:
7.4

PTS: 2 REF: 061029a2 STA: A2.S.4 TOP: Dispersion
KEY: basic, group frequency distributions

92 ANS:

101.43, 12.

$$r^2 = 25^2 + 85^2 - 2(25)(85)\cos 125.$$
$$r^2 \approx 10287.7$$
$$r \approx 101.43$$

$$\frac{2.5}{\sin x} = \frac{101.43}{\sin 125}$$
$$x \approx 12$$

PTS: 6 REF: fall0939a2 STA: A2.A.73 TOP: Vectors

93 ANS:

$$\frac{12}{\sin 32} = \frac{10}{\sin B} \qquad . \; C \approx 180 - (32 + 26.2) \approx 121.8. \quad \frac{12}{\sin 32} = \frac{c}{\sin 121.8}$$

$$B = \sin^{-1} \frac{10 \sin 32}{12} \approx 26.2 \qquad\qquad\qquad c = \frac{12 \sin 121.8}{\sin 32} \approx 19.2$$

PTS: 4   REF: 011137a2   STA: A2.A.73   TOP: Law of Sines
KEY: basic

94 ANS: 4

$$\frac{2\pi}{b} = \frac{2\pi}{\frac{1}{3}} = 6\pi$$

PTS: 2   REF: 061027a2   STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions   KEY: period

95 ANS: 2

$$f(10) = \frac{-10}{(-10)^2 - 16} = \frac{-10}{84} = -\frac{5}{42}$$

PTS: 2   REF: 061102a2   STA: A2.A.41   TOP: Functional Notation

96 ANS: 4

$$s = \theta \, r = 2 \cdot 4 = 8$$

PTS: 2   REF: fall0922a2   STA: A2.A.61   TOP: Arc Length
KEY: arc length

97 ANS: 4

$$2 \log_4(5x) = 3$$

$$\log_4(5x) = \frac{3}{2}$$

$$5x = 4^{\frac{3}{2}}$$

$$5x = 8$$

$$x = \frac{8}{5}$$

PTS: 2   REF: fall0921a2   STA: A2.A.28   TOP: Logarithmic Equations
KEY: advanced

98 ANS: 2   PTS: 2   REF: fall0926a2   STA: A2.A.46
TOP: Transformations with Functions and Relations

99 ANS: 2   PTS: 2   REF: 011126a2   STA: A2.A.49
TOP: Equations of Circles

100 ANS: 3
$x = 5^4 = 625$

PTS: 2 REF: 061106a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

101 ANS: 1
$8 \times 8 \times 7 \times 1 = 448$. The first digit cannot be 0 or 5. The second digit cannot be 5 or the same as the first digit. The third digit cannot be 5 or the same as the first or second digit.

PTS: 2 REF: 011125a2 STA: A2.S.10 TOP: Permutations

102 ANS: 3
$27r^{4-1} = 64$

$$r^3 = \frac{64}{27}$$

$$r = \frac{4}{3}$$

PTS: 2 REF: 081025a2 STA: A2.A.31 TOP: Conjugates of Complex Numbers

103 ANS: 3
$$\frac{4}{5 - \sqrt{13}} \cdot \frac{5 + \sqrt{13}}{5 + \sqrt{13}} = \frac{4(5 + \sqrt{13})}{25 - 13} = \frac{5 + \sqrt{13}}{3}$$

PTS: 2 REF: 061116a2 STA: A2.N.5 TOP: Rationalizing Denominators

104 ANS: 1
$_{10}C_4 = 210$

PTS: 2 REF: 061113a2 STA: A2.S.11 TOP: Combinations

105 ANS: 4 PTS: 2 REF: fall0908a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs

106 ANS: 1 PTS: 2 REF: 061019a2 STA: A2.N.7
TOP: Imaginary Numbers

107 ANS: 2
$$\frac{11\pi}{12} \cdot \frac{180}{\pi} = 165$$

PTS: 2 REF: 061002a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

108 ANS: 3
$a_n = 5(-2)^{n-1}$

$a_{15} = 5(-2)^{15-1} = 81,920$

PTS: 2 REF: 011105a2 STA: A2.A.32 TOP: Sequences

109 ANS: 3

(1) and (4) fail the horizontal line test and are not one-to-one. Not every element of the range corresponds to only one element of the domain. (2) fails the vertical line test and is not a function. Not every element of the domain corresponds to only one element of the range.

PTS: 2   REF: 081020a2   STA: A2.A.43   TOP: Defining Functions

110 ANS: 2

$6(x^2 - 5) = 6x^2 - 30$

PTS: 2   REF: 011109a2   STA: A2.A.42   TOP: Compositions of Functions
KEY: variables

111 ANS:

$\frac{1}{3}$ $\frac{1}{x+3} - \frac{2}{3-x} = \frac{4}{x^2 - 9}$

$\frac{1}{x+3} + \frac{2}{x-3} = \frac{4}{x^2 - 9}$

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

$x - 3 + 2x + 6 = 4$

$3x = 1$

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

PTS: 4   REF: 081036a2   STA: A2.A.23   TOP: Solving Rationals
KEY: rational solutions

112 ANS: 2   PTS: 2   REF: 011114a2   STA: A2.N.3
TOP: Operations with Polynomials

113 ANS: 4

$S_n = \frac{n}{2}[2a + (n-1)d] = \frac{21}{2}[2(18) + (21-1)2] = 798$

PTS: 2   REF: 061103a2   STA: A2.A.35   TOP: Summations
KEY: arithmetic

114 ANS:

no solution. $\dfrac{4x}{x-3} = 2 + \dfrac{12}{x-3}$

$\dfrac{4x-12}{x-3} = 2$

$\dfrac{4(x-3)}{x-3} = 2$

$4 \neq 2$

PTS: 2 REF: fall0930a2 STA: A2.A.23 TOP: Solving Rationals
KEY: rational solutions

115 ANS: 4

$x^{-\frac{2}{5}} = \dfrac{1}{x^{\frac{2}{5}}} = \dfrac{1}{\sqrt[5]{x^2}}$

PTS: 2 REF: 011118a2 STA: A2.A.10 TOP: Fractional Exponents as Radicals

116 ANS:

$32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1$. $_5C_0(2x)^5(-1)^0 = 32x^5$. $_5C_1(2x)^4(-1)^1 = -80x^4$. $_5C_2(2x)^3(-1)^2 = 80x^3$. $_5C_3(2x)^2(-1)^3 = -40x^2$. $_5C_4(2x)^1(-1)^4 = 10x$. $_5C_5(2x)^0(-1)^5 = -1$

PTS: 4 REF: 011136a2 STA: A2.A.36 TOP: Binomial Expansions

117 ANS: 1

$13^2 = 15^2 + 14^2 - 2(15)(14)\cos C$

$169 = 421 - 420\cos C$

$-252 = -420\cos C$

$\dfrac{252}{420} = \cos C$

$53 \approx C$

PTS: 2 REF: 061110a2 STA: A2.A.73 TOP: Law of Cosines
KEY: find angle

118 ANS: 3 PTS: 2 REF: 061119a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

119 ANS:

$y = 10.596(1.586)^x$

PTS: 2 REF: 081031a2 STA: A2.S.7 TOP: Exponential Regression

120 ANS: 2

$$\frac{\dfrac{x}{4} - \dfrac{1}{x}}{\dfrac{1}{2x} + \dfrac{1}{4}} = \frac{\dfrac{x^2 - 4}{4x}}{\dfrac{2x + 4}{8x}} = \frac{(x+2)(x-2)}{4x} \times \frac{8x}{2(x+2)} = x - 2$$

PTS: 2 REF: fall0920a2 STA: A2.A.17 TOP: Complex Fractions

121 ANS:

$$6y^3 - \frac{37}{10}y^2 - \frac{1}{5}y. \quad \left(\frac{1}{2}y^2 - \frac{1}{3}y\right)\left(12y + \frac{3}{5}\right) = 6y^3 + \frac{3}{10}y^2 - 4y^2 - \frac{1}{5}y = 6y^3 - \frac{37}{10}y^2 - \frac{1}{5}y$$

PTS: 2 REF: 061128a2 STA: A2.N.3 TOP: Operations with Polynomials

122 ANS: 3 PTS: 2 REF: 011119a2 STA: A2.A.52
TOP: Families of Functions

123 ANS: 2

$$(3 - 7i)(3 - 7i) = 9 - 21i - 21i + 49i^2 = 9 - 42i - 49 = -40 - 42i$$

PTS: 2 REF: fall0901a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

124 ANS: 3

$$\frac{-b}{a} = \frac{-6}{2} = -3. \quad \frac{c}{a} = \frac{4}{2} = 2$$

PTS: 2 REF: 011121a2 STA: A2.A.21 TOP: Roots of Quadratics
KEY: basic

125 ANS: 1

$$\cos^2\theta - \cos 2\theta = \cos^2\theta - (\cos^2\theta - \sin^2\theta) = \sin^2\theta$$

PTS: 2 REF: 061024a2 STA: A2.A.77 TOP: Double Angle Identities
KEY: simplifying

126 ANS: 2

$$4^{2x+5} = 8^{3x} \quad .$$

$$\left(2^2\right)^{2x+5} = \left(2^3\right)^{3x}$$

$$2^{4x+10} = 2^{9x}$$

$$4x + 10 = 9x$$

$$10 = 5x$$

$$2 = x$$

PTS: 2 REF: 061105a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base not shown

127 ANS: 3

$$4^{x^2+4x} = 2^{-6}. \qquad 2x^2 + 8x = -6$$

$$(2^2)^{x^2+4x} = 2^{-6} \qquad 2x^2 + 8x + 6 = 0$$

$$2^{2x^2+8x} = 2^{-6} \qquad x^2 + 4x + 3 = 0$$

$$(x+3)(x+1) = 0$$

$$x = -3 \ x = -1$$

PTS: 2   REF: 061015a2   STA: A2.A.27   TOP: Exponential Equations
KEY: common base shown

128 ANS:
$$12 \cdot 6 = 9w$$
$$8 = w$$

PTS: 2   REF: 011130a2   STA: A2.A.5   TOP: Inverse Variation

129 ANS: 3

$$3x + 16 = (x+2)^2 \qquad . \ -4 \text{ is an extraneous solution.}$$

$$3x + 16 = x^2 + 4x + 4$$

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

$$0 = (x+4)(x-3)$$

$$x = -4 \ x = 3$$

PTS: 2   REF: 061121a2   STA: A2.A.22   TOP: Solving Radicals
KEY: extraneous solutions

130 ANS: 2   PTS: 2   REF: 081024a2   STA: A2.N.8
TOP: Conjugates of Complex Numbers

131 ANS:
D: $-5 \le x \le 8$. R: $-3 \le y \le 2$

PTS: 2   REF: 011132a2   STA: A2.A.51   TOP: Domain and Range

132 ANS: 3

$$f(4) = \frac{1}{2}(4) - 3 = -1. \ g(-1) = 2(-1) + 5 = 3$$

PTS: 2   REF: fall0902a2   STA: A2.A.42   TOP: Compositions of Functions
KEY: numbers

133 ANS:
$$K = ab\sin C = 24 \cdot 30 \sin 57 \approx 604$$

PTS: 2   REF: 061034a2   STA: A2.A.74   TOP: Using Trigonometry to Find Area
KEY: parallelograms

134 ANS:
$$12t^8 - 75t^4 = 3t^4(4t^4 - 25) = 3t^4(2t^2 + 5)(2t^2 - 5)$$

PTS: 2   REF: 061133a2   STA: A2.A.7
TOP: Factoring the Difference of Perfect Squares   KEY: binomial

135 ANS:
$$(x + 5)^2 + (y - 3)^2 = 32$$

PTS: 2   REF: 081033a2   STA: A2.A.49   TOP: Writing Equations of Circles

136 ANS:
$$x^2 - 6x - 27 = 0, \quad \frac{-b}{a} = 6. \quad \frac{c}{a} = -27. \text{ If } a = 1 \text{ then } b = -6 \text{ and } c = -27$$

PTS: 4   REF: 061130a2   STA: A2.A.21   TOP: Roots of Quadratics
KEY: basic

137 ANS:
Controlled experiment because Howard is comparing the results obtained from an experimental sample against a control sample.

PTS: 2   REF: 081030a2   STA: A2.S.1   TOP: Analysis of Data

138 ANS: 4
Students entering the library are more likely to spend more time studying, creating bias.

PTS: 2   REF: fall0904a2   STA: A2.S.2   TOP: Analysis of Data

139 ANS:
230. $10 + (1^3 - 1) + (2^3 - 1) + (3^3 - 1) + (4^3 - 1) + (5^3 - 1) = 10 + 0 + 7 + 26 + 63 + 124 = 230$

PTS: 2   REF: 011131a2   STA: A2.N.10   TOP: Sigma Notation
KEY: basic

140 ANS: 2
$$x^2 - x - 6 = 3x - 6$$
$$x^2 - 4x = 0$$
$$x(x - 4) = 0$$
$$x = 0, 4$$

PTS: 2   REF: 081015a2   STA: A2.A.3   TOP: Quadratic-Linear Systems
KEY: equations

141 ANS: 3   PTS: 2   REF: 081027a2   STA: A2.A.44
TOP: Inverse of Functions   KEY: equations

142 ANS: 4
$$\frac{2x + 4}{\sqrt{x + 2}} \cdot \frac{\sqrt{x + 2}}{\sqrt{x + 2}} = \frac{2(x + 2)\sqrt{x + 2}}{x + 2} = 2\sqrt{x + 2}$$

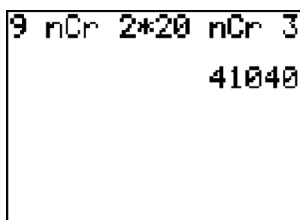PTS: 2   REF: 011122a2   STA: A2.A.15   TOP: Rationalizing Denominators
KEY: index = 2

143 ANS: 2   PTS: 2   REF: 061021a2   STA: A2.S.8
     TOP: Correlation Coefficient

144 ANS: 4

$$7^2 = 3^2 + 5^2 - 2(3)(5)\cos A$$

$$49 = 34 - 30\cos A$$

$$15 = -30\cos A$$

$$-\frac{1}{2} = \cos A$$

$$120 = \cos A$$

     PTS: 2   REF: 081017a2   STA: A2.A.73   TOP: Law of Cosines
     KEY: angle, without calculator

145 ANS: 1

$$\frac{\sqrt{3}+5}{\sqrt{3}-5} \cdot \frac{\sqrt{3}+5}{\sqrt{3}+5} = \frac{3+5\sqrt{3}+5\sqrt{3}+25}{3-25} = \frac{28+10\sqrt{3}}{-22} = -\frac{14+5\sqrt{3}}{11}$$

     PTS: 2   REF: 061012a2   STA: A2.N.5   TOP: Rationalizing Denominators

146 ANS: 2

$$x^2 + 2 = 6x$$

$$x^2 - 6x = -2$$

$$x^2 - 6x + 9 = -2 + 9$$

$$(x-3)^2 = 7$$

     PTS: 2   REF: 011116a2   STA: A2.A.24   TOP: Completing the Square

147 ANS: 3

$$b^2 - 4ac = (-10)^2 - 4(1)(25) = 100 - 100 = 0$$

     PTS: 2   REF: 011102a2   STA: A2.A.2   TOP: Using the Discriminant
     KEY: determine nature of roots given equation

148 ANS: 2

$$\cos(-305° + 360°) = \cos(55°)$$

     PTS: 2   REF: 061104a2   STA: A2.A.57   TOP: Reference Angles

149 ANS: 1   PTS: 2   REF: 061013a2   STA: A2.A.38
     TOP: Defining Functions

150 ANS:

```
9 nCr 2*20 nCr 3
            41040
```

41,040.

PTS: 2   REF: fall0935a2   STA: A2.S.12   TOP: Sample Space

151 ANS:

$\ln(T - T_0) = -kt + 4.718$. $\ln(T - 68) = -0.104(10) + 4.718$.

$\ln(150 - 68) = -k(3) + 4.718$ $\ln(T - 68) = 3.678$

$\quad\quad 4.407 \approx -3k + 4.718$ $\quad T - 68 \approx 39.6$

$\quad\quad\quad k \approx 0.104$ $\quad\quad\quad T \approx 108$

PTS: 6   REF: 011139a2   STA: A2.A.28   TOP: Logarithmic Equations
KEY: advanced

152 ANS:

33. $a = \sqrt{10^2 + 6^2 - 2(10)(6)\cos 80} \approx 10.7$. $\angle C$ is opposite the shortest side. $\dfrac{6}{\sin C} = \dfrac{10.7}{\sin 80}$

$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad C \approx 33$

PTS: 6   REF: 061039a2   STA: A2.A.73   TOP: Law of Cosines
KEY: advanced

153 ANS: 3   PTS: 2   REF: 061114a2   STA: A2.A.38
TOP: Defining Functions   KEY: graphs

154 ANS:
68% of the students are within one standard deviation of the mean. 16% of the students are more than one standard deviation above the mean.

PTS: 2   REF: 011134a2   STA: A2.S.5   TOP: Normal Distributions
KEY: percent

155 ANS: 1

$2\log x - (3\log y + \log z) = \log x^2 - \log y^3 - \log z = \log \dfrac{x^2}{y^3 z}$

PTS: 2   REF: 061010a2   STA: A2.A.19   TOP: Properties of Logarithms

156 ANS: 1   PTS: 2   REF: 061018a2   STA: A2.A.22
TOP: Solving Radicals   KEY: extraneous solutions

157 ANS: 4

$6x - x^3 - x^2 = -x(x^2 + x - 6) = -x(x + 3)(x - 2)$

PTS: 2   REF: fall0917a2   STA: A2.A.7   TOP: Factoring Polynomials
KEY: single variable

158 ANS: 3

$$\frac{3}{\sqrt{3a^2b}} = \frac{3}{a\sqrt{3b}} \cdot \frac{\sqrt{3b}}{\sqrt{3b}} = \frac{3\sqrt{3b}}{3ab} = \frac{\sqrt{3b}}{ab}$$

PTS: 2 REF: 081019a2 STA: A2.A.15 TOP: Rationalizing Denominators
KEY: index = 2

159 ANS:

$y = x^2 - 6.$ $f^{-1}(x)$ is not a function.

$x = y^2 - 6$

$x + 6 = y^2$

$\pm\sqrt{x+6} = y$

PTS: 2 REF: 061132a2 STA: A2.A.44 TOP: Inverse of Functions
KEY: equations

160 ANS: 2 PTS: 2 REF: 061122a2 STA: A2.A.24
TOP: Completing the Square

161 ANS:

$$\frac{\frac{1}{2} - \frac{4}{d}}{\frac{1}{d} + \frac{3}{2d}} = \frac{\frac{d-8}{2d}}{\frac{2d+3d}{2d^2}} = \frac{d-8}{2d} \times \frac{2d^2}{5d} = \frac{d-8}{5}$$

PTS: 2 REF: 061035a2 STA: A2.A.17 TOP: Complex Fractions

162 ANS: 4
$y - 2\sin\theta = 3$

$y = 2\sin\theta + 3$

$f(\theta) = 2\sin\theta + 3$

PTS: 2 REF: fall0927a2 STA: A2.A.40 TOP: Functional Notation

163 ANS: 1

$$\sqrt[4]{16x^2y^7} = 16^{\frac{1}{4}} x^{\frac{2}{4}} y^{\frac{7}{4}} = 2x^{\frac{1}{2}} y^{\frac{7}{4}}$$

PTS: 2 REF: 061107a2 STA: A2.A.11 TOP: Radicals as Fractional Exponents

164 ANS:

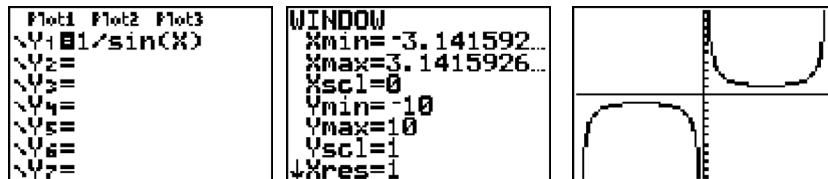Sum $\frac{-b}{a} = -\frac{11}{5}$. Product $\frac{c}{a} = -\frac{3}{5}$

PTS: 2 REF: 061030a2 STA: A2.A.20 TOP: Roots of Quadratics

165 ANS: 3

$$\frac{\sin^2 \theta + \cos^2 \theta}{1 - \sin^2 \theta} = \frac{1}{\cos^2 \theta} = \sec^2 \theta$$

PTS: 2   REF: 061123a2   STA: A2.A.58   TOP: Reciprocal Trigonometric Relationships

166 ANS: 1

PTS: 2   REF: 011123a2   STA: A2.A.71   TOP: Graphing Trigonometric Functions

167 ANS: 1   PTS: 2   REF: fall0914a2   STA: A2.A.8
TOP: Negative and Fractional Exponents

168 ANS: 4   PTS: 2   REF: 011101a2   STA: A2.A.38
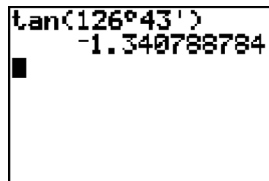TOP: Defining Functions   KEY: graphs

169 ANS: 2

$$\frac{2\pi}{b} = \frac{2\pi}{3}$$

PTS: 2   REF: 061111a2   STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions   KEY: period

170 ANS: 2

PTS: 2   REF: 061115a2   STA: A2.A.66   TOP: Determining Trigonometric Functions

171 ANS:
no. over 20 is more than 1 standard deviation above the mean. $0.159 \cdot 82 \approx 13.038$

PTS: 2   REF: 061129a2   STA: A2.S.5   TOP: Normal Distributions
KEY: predict

172 ANS: 4

$b^2 - 4ac = 3^2 - 4(9)(-4) = 9 + 144 = 153$

PTS: 2   REF: 081016a2   STA: A2.A.2   TOP: Using the Discriminant
KEY: determine nature of roots given equation

173 ANS: 1   PTS: 2   REF: 061004a2   STA: A2.A.52
TOP: Identifying the Equation of a Graph

174 ANS: 3   PTS: 2   REF: 061127a2   STA: A2.S.6
TOP: Regression

175 ANS:

$\pm\dfrac{3}{2}, -\dfrac{1}{2}.$ $8x^3 + 4x^2 - 18x - 9 = 0$

$4x^2(2x + 1) - 9(2x + 1) = 0$

$(4x^2 - 9)(2x + 1) = 0$

$4x^2 - 9 = 0 \text{ or } 2x + 1 = 0$

$(2x + 3)(2x - 3) = 0 \quad x = -\dfrac{1}{2}$

$x = \pm\dfrac{3}{2}$

PTS: 4   REF: fall0937a2   STA: A2.A.26   TOP: Solving Polynomial Equations

176 ANS: 4   PTS: 2   REF: 061112a2   STA: A2.A.39
TOP: Domain and Range   KEY: real domain

177 ANS:
$-3, -5, -8, -12$

PTS: 2   REF: fall0934a2   STA: A2.A.33   TOP: Recursive Sequences

178 ANS: 3   PTS: 2   REF: fall0923a2   STA: A2.A.39
TOP: Domain and Range   KEY: real domain

179 ANS: 1

n	3	4	5	Σ
$-r^2 + r$	$-3^2 + 3 = -6$	$-4^2 + 4 = -12$	$-5^2 + 5 = -20$	-38

PTS: 2   REF: 061118a2   STA: A2.N.10   TOP: Sigma Notation
KEY: basic

180 ANS: 3   PTS: 2   REF: fall0910a2   STA: A2.A.76
TOP: Angle Sum and Difference Identities   KEY: simplifying

181 ANS:

$3 \pm \sqrt{7}.$ $2x^2 - 12x + 4 = 0$

$x^2 - 6x + 2 = 0$

$x^2 - 6x = -2$

$x^2 - 6x + 9 = -2 + 9$

$(x - 3)^2 = 7$

$x - 3 = \pm\sqrt{7}$

$x = 3 \pm \sqrt{7}$

PTS: 4   REF: fall0936a2   STA: A2.A.24   TOP: Completing the Square

182 ANS:
$(x + 3)^2 + (y - 4)^2 = 25$

PTS: 2   REF: fall0929a2   STA: A2.A.49   TOP: Writing Equations of Circles

183 ANS: 2

$$\left(\frac{w^{-5}}{w^{-9}} \right)^{\frac{1}{2}} = (w^4)^{\frac{1}{2}} = w^2$$

PTS: 2   REF: 081011a2   STA: A2.A.8   TOP: Negative and Fractional Exponents

184 ANS: 2
$_{15}C_8 = 6,435$

PTS: 2   REF: 081012a2   STA: A2.S.11   TOP: Combinations
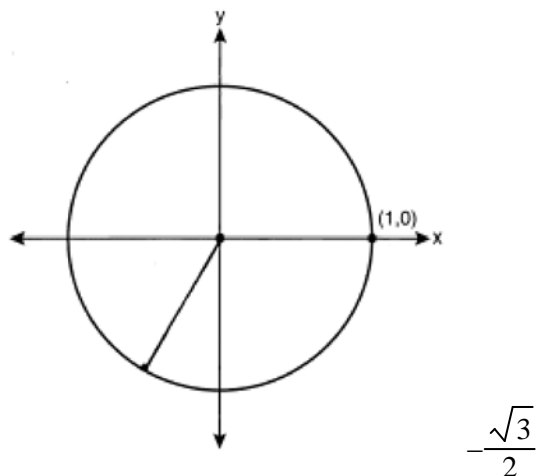
185 ANS:

$$e^{3\ln 2} = e^{\ln 2^3} = e^{\ln 8} = 8$$

PTS: 2   REF: 061131a2   STA: A2.A.12   TOP: Evaluating Exponential Expressions

186 ANS:

$$-\frac{\sqrt{3}}{2}$$

PTS: 2   REF: 061033a2   STA: A2.A.60   TOP: Unit Circle

187 ANS: 3
Cofunctions tangent and cotangent are complementary

PTS: 2   REF: 061014a2   STA: A2.A.58   TOP: Cofunction Trigonometric Relationships

188 ANS:

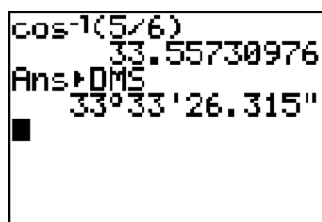$$\frac{51}{243}. \quad {}_5C_3\left(\frac{1}{3}\right)^3\left(\frac{2}{3}\right)^2 = \frac{40}{243}$$

$$_5C_4\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^1 = \frac{10}{243}$$

$$_5C_3\left(\frac{1}{3}\right)^5\left(\frac{2}{3}\right)^0 = \frac{1}{243}$$

PTS: 4　　　　REF: 061138a2　　STA: A2.S.15　　TOP: Binomial Probability
KEY: at least or at most

189 ANS: 1

$$\cos K = \frac{5}{6}$$

$$K = \cos^{-1}\frac{5}{6}$$

$$K \approx 33°33'$$

PTS: 2　　　　REF: 061023a2　　STA: A2.A.55　　TOP: Trigonometric Ratios

190 ANS: 2

$$K = \frac{1}{2}(10)(18)\sin 120 = 45\sqrt{3} \approx 78$$

PTS: 2　　　　REF: fall0907a2　　STA: A2.A.74　　TOP: Using Trigonometry to Find Area
KEY: basic

191 ANS: 4　　　　PTS: 2　　　　REF: 061005a2　　STA: A2.A.50
TOP: Solving Polynomial Equations

192 ANS: 4

$$9^{3x+1} = 27^{x+2} \quad .$$

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

$$3^{6x+2} = 3^{3x+6}$$

$$6x + 2 = 3x + 6$$

$$3x = 4$$

$$x = \frac{4}{3}$$

PTS: 2　　　　REF: 081008a2　　STA: A2.A.27　　TOP: Exponential Equations
KEY: common base not shown

193 ANS:

1200e^(.065*10)
         2298.648995
■

2,298.65.

PTS: 2   REF: fall0932a2   STA: A2.A.12   TOP: Evaluating Exponential Expressions

194 ANS: 3   PTS: 2   REF: 011104a2   STA: A2.A.64

TOP: Using Inverse Trigonometric Functions   KEY: unit circle

195 ANS: 4

$$\frac{3 \pm \sqrt{(-3)^2 - 4(1)(-9)}}{2(1)} = \frac{3 \pm \sqrt{45}}{2} = \frac{3 \pm 3\sqrt{5}}{2}$$

PTS: 2   REF: 061009a2   STA: A2.A.25   TOP: Quadratic Formula