

# JEFFERSON MATH PROJECT

## REGENTS BY DATE

The NY Algebra 2/Trigonometry Regents Exams  
Fall, 2009-August, 2010  
(Answer Key)

[www.jmap.org](http://www.jmap.org)

*Dear Sir*

*I have to acknowledge the receipt 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 indispensable 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.

## fall09a2

## Answer Section

1 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

2 ANS: 3

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

PTS: 2

REF: fall0902a2 STA: A2.A.42

TOP: Compositions of Functions

KEY: numbers

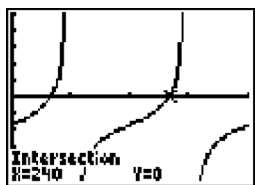
3 ANS: 1

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

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

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

$$\theta = 60, 240$$



PTS: 2

REF: fall0903a2 STA: A2.A.68

TOP: Trigonometric Equations

KEY: basic

4 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

5 ANS: 1

$$6x - 7 \leq 5 \quad 6x - 7 \geq -5$$

$$6x \leq 12 \quad 6x \geq 2$$

$$x \leq 2 \quad x \geq \frac{1}{3}$$

PTS: 2

REF: fall0905a2 STA: A2.A.1

TOP: Absolute Value Inequalities

KEY: graph

6 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

7 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

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

9 ANS: 2  
 $8^2 = 64$

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

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

11 ANS: 3

$n$	0	1	2	$\Sigma$
$n^2 + 2^n$	$0^2 + 2^0 = 1$	$1^2 + 2^1 = 3$	$2^2 + 2^2 = 8$	12

$$2 \times 12 = 24$$

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

12 ANS: 3

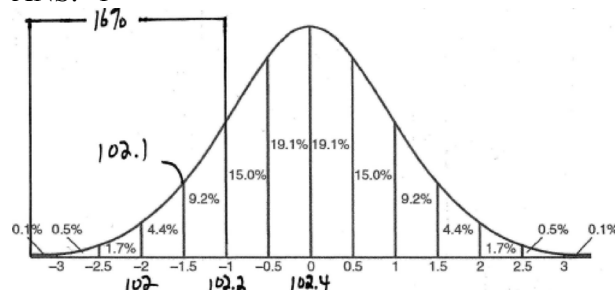
$$S = \frac{-b}{a} = \frac{-(-3)}{4} = \frac{3}{4}; P = \frac{c}{a} = \frac{-8}{4} = -2$$

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

13 ANS: 3 PTS: 2 REF: fall0913a2 STA: A2.A.65  
TOP: Graphing Trigonometric Functions

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

15 ANS: 1



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

16 ANS: 2

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

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

17 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

18 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

19 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

20 ANS: 2

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

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

21 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

22 ANS: 4

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

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

23 ANS: 3

TOP: Domain and Range

PTS: 2

REF: fall0923a2  
KEY: real domain

STA: A2.A.39

24 ANS: 3

1-Var Stats L1, L2	$\sigma x^2$
	67.31102041

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

KEY: variance

25 ANS: 4 PTS: 2 REF: fall0925a2 STA: A2.S.10

TOP: Permutations

26 ANS: 2 PTS: 2 REF: fall0926a2 STA: A2.A.46

TOP: Transformations with Functions and Relations

27 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

28 ANS:

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

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

29 ANS:

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

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

30 ANS:

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

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

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

$$4 \neq 2$$

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

KEY: rational solutions

31 ANS:

$$197^{\circ}40'. \quad 3.45 \times \frac{180}{\pi} \approx 197^{\circ}40'.$$

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

KEY: degrees

32 ANS:

2,298.65.

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

33 ANS:

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

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

34 ANS:

-3, -5, -8, -12

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

35 ANS:

41,040.

PTS: 2 REF: fall0935a2 STA: A2.S.12 TOP: Combinations

36 ANS:

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

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

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

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

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

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

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

PTS: 4

REF: fall0936a2

STA: A2.A.24

TOP: Completing the Square

37 ANS:

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

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

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

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

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

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

PTS: 4

REF: fall0937a2

STA: A2.A.26

TOP: Solving Polynomial Equations

38 ANS:

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

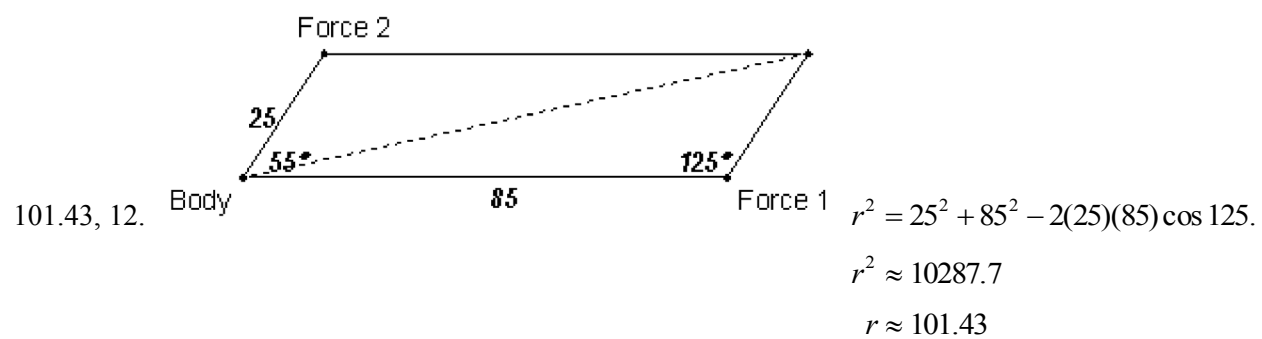
PTS: 4

REF: fall0938a2

STA: A2.S.7

TOP: Power Regression

39 ANS:



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

$$x \approx 12$$

PTS: 6

REF: fall0939a2

STA: A2.A.73

TOP: Vectors



## 0610a2

## Answer Section

- 1 ANS: 3                      PTS: 2                      REF: 061001a2                      STA: A2.A.30  
TOP: Sequences
- 2 ANS: 2  
$$\frac{11\pi}{12} \cdot \frac{180}{\pi} = 165$$
- PTS: 2                      REF: 061002a2                      STA: A2.M.2                      TOP: Radian Measure  
KEY: degrees
- 3 ANS: 3  
$$\frac{3^{-2}}{(-2)^{-3}} = \frac{\frac{1}{9}}{-\frac{1}{8}} = -\frac{8}{9}$$
- PTS: 2                      REF: 061003a2                      STA: A2.A.8                      TOP: Negative and Fractional Exponents
- 4 ANS: 1                      PTS: 2                      REF: 061004a2                      STA: A2.A.52  
TOP: Identifying the Equation of a Graph
- 5 ANS: 4                      PTS: 2                      REF: 061005a2                      STA: A2.A.50  
TOP: Solving Polynomial Equations
- 6 ANS: 3  
$$\sqrt{-300} = \sqrt{100} \sqrt{-1} \sqrt{3}$$
- PTS: 2                      REF: 061006a2                      STA: A2.N.6                      TOP: Square Roots of Negative Numbers
- 7 ANS: 3                      PTS: 2                      REF: 061007a2                      STA: A2.S.9  
TOP: Differentiating Permutations and Combinations
- 8 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
- 9 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
- 10 ANS: 1  
$$2 \log x - (3 \log y + \log z) = \log x^2 - \log y^3 - \log z = \log \frac{x^2}{y^3 z}$$
- PTS: 2                      REF: 061010a2                      STA: A2.A.19                      TOP: Properties of Logarithms
- 11 ANS: 2                      PTS: 2                      REF: 061011a2                      STA: A2.A.10  
TOP: Fractional Exponents as Radicals

12 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

13 ANS: 1 PTS: 2 REF: 061013a2 STA: A2.A.38

TOP: Defining Functions

14 ANS: 3

Cofunctions tangent and cotangent are complementary

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

15 ANS: 3

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

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

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

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

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

PTS: 2 REF: 061015a2 STA: A2.A.27 TOP: Exponential Equations

KEY: common base shown

16 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

17 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

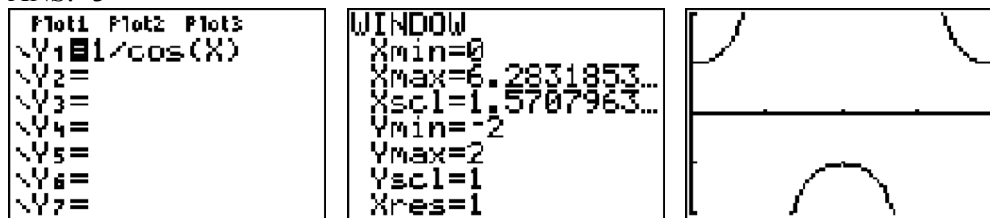
18 ANS: 1 PTS: 2 REF: 061018a2 STA: A2.A.22

TOP: Solving Radicals KEY: extraneous solutions

19 ANS: 1 PTS: 2 REF: 061019a2 STA: A2.N.7

TOP: Imaginary Numbers

20 ANS: 3



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

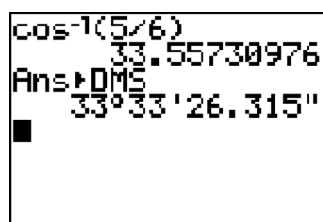
21 ANS: 2 PTS: 2 REF: 061021a2 STA: A2.S.8

TOP: Correlation Coefficient

22 ANS: 3 PTS: 2 REF: 061022a2 STA: A2.A.63

TOP: Domain and Range

23 ANS: 1



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

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

$$K \approx 33^\circ 33'$$

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

24 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

25 ANS: 1 PTS: 2 REF: 061025a2 STA: A2.A.34

TOP: Sigma Notation

26 ANS: 4 PTS: 2 REF: 061026a2 STA: A2.A.29

TOP: Sequences

27 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

28 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

29 ANS:

7.4

PTS: 2

REF: 061029a2

STA: A2.S.4

TOP: Dispersion

KEY: basic, group frequency distributions

30 ANS:

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

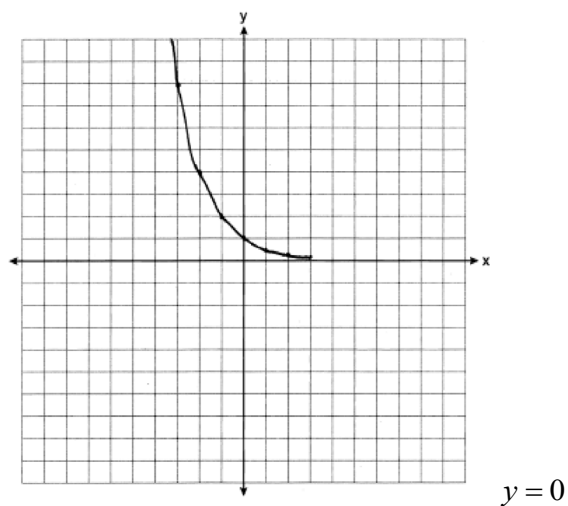
PTS: 2

REF: 061030a2

STA: A2.A.20

TOP: Roots of Quadratics

31 ANS:



PTS: 2

REF: 061031a2

STA: A2.A.53

TOP: Graphing Exponential Functions

32 ANS:

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

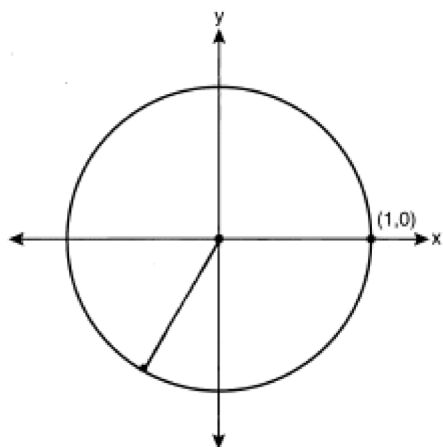
PTS: 2

REF: 061032a2

STA: A2.N.2

TOP: Operations with Radicals

33 ANS:



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

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

34 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

35 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

36 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: 2 REF: 061036a2 STA: A2.S.15 TOP: Binomial Probability  
KEY: at least or at most

37 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: 2

REF: 061037a2

STA: A2.A.68

TOP: Trigonometric Equations

KEY: double angle identities

38 ANS:

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

PTS: 2

REF: 061038a2

STA: A2.S.10

TOP: Permutations

39 ANS:

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

$$C \approx 33$$

PTS: 2

REF: 061039a2

STA: A2.A.73

TOP: Law of Cosines

KEY: advanced

## 0810a2

## Answer Section

1 ANS: 4

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

PTS: 2

REF: 081001a2

STA: A2.N.2

TOP: Operations with Radicals

2 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

3 ANS: 2

PTS: 2

REF: 081003a2

STA: A2.A.51

TOP: Domain and Range

4 ANS: 1

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

PTS: 2

REF: 081004a2

STA: A2.N.7

TOP: Imaginary Numbers

5 ANS: 4

PTS: 2

REF: 081005a2

STA: A2.A.60

TOP: Unit Circle

6 ANS: 3

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

$$C \approx 78.3$$

PTS: 2

REF: 081006a2

STA: A2.A.75

TOP: Law of Sines - The Ambiguous Case

7 ANS: 3

PTS: 2

REF: 081007a2

STA: A2.A.64

TOP: Using Inverse Trigonometric Functions

KEY: basic

8 ANS: 4

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

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

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

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

$$3x = 4$$

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

PTS: 2

REF: 081008a2

STA: A2.A.27

TOP: Exponential Equations

KEY: common base not shown

9 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

10 ANS: 2

PTS: 2

REF: 081010a2

STA: A2.A.55

TOP: Trigonometric Ratios

11 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

12 ANS: 2

$${}_{15}C_8 = 6,435$$

PTS: 2

REF: 081012a2

STA: A2.S.11

TOP: Combinations

13 ANS: 3

$$68\% \times 50 = 34$$

PTS: 2

REF: 081013a2

STA: A2.S.5

TOP: Normal Distributions

KEY: predict

14 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

15 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

16 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



17 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 Sines

KEY: angle, without calculator

18 ANS: 2

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

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

19 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

20 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

21 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

22 ANS: 1

PTS: 2

REF: 081022a2

STA: A2.A.46

TOP: Transformations with Functions and Relations

23 ANS: 2

The roots are  $-1, 2, 3$ .

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

24 ANS: 2

PTS: 2

REF: 081024a2

STA: A2.N.8

TOP: Conjugates of Complex Numbers

25 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

26 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

27 ANS: 3

PTS: 2

REF: 081027a2

STA: A2.A.44

TOP: Inverse of Functions

KEY: equations

28 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

29 ANS:

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

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

30 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

31 ANS:

$$y = 10.596(1.586)^x$$

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

32 ANS:

$$45,225 \quad 2 \tan C - 3 = 3 \tan C - 4$$

$$1 = \tan C$$

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

$$C = 45,225$$

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

KEY: basic

33 ANS:

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

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

34 ANS:

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

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

35 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

36 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

37 ANS:

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

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

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

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

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

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

KEY: evaluating

38 ANS:

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

PTS: 4 REF: 081038a2 STA: A2.S.15 TOP: Binomial Probability

KEY: at least or at most

39 ANS:

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

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

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

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

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

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

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

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

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

KEY: basic