JEFFERSON MATH PROJECT REGENTS BY DATE

The NY Algebra 2/Trigonometry Regents Exams
Fall, 2009-August, 2010

www.jmap.org

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 Exam Test Sampler fall09
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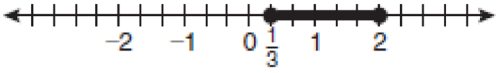
fall09a2

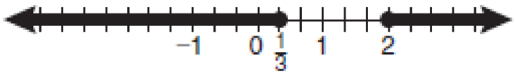
1 The expression $(3-7i)^2$ is equivalent to
1) $-40+0i$
2) $-40-42i$
3) $58+0i$
4) $58-42i$

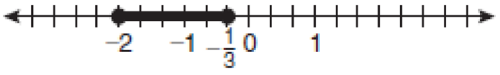
2 If $f(x)=\frac{1}{2}x-3$ and $g(x)=2x+5$, what is the value of $(g\circ f)(4)$?
1) -13
2) 3.5
3) 3
4) 6

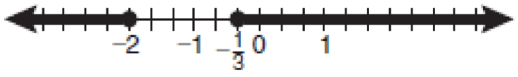
3 What are the values of θ in the interval $0°\le\theta<360°$ that satisfy the equation $\tan\theta-\sqrt{3}=0$?
1) 60º, 240º
2) 72º, 252º
3) 72º, 108º, 252º, 288º
4) 60º, 120º, 240º, 300º

4 A survey completed at a large university asked 2,000 students to estimate the average number of hours they spend studying each week. Every tenth student entering the library was surveyed. The data showed that the mean number of hours that students spend studying was 15.7 per week. Which characteristic of the survey could create a bias in the results?
1) the size of the sample
2) the size of the population
3) the method of analyzing the data
4) the method of choosing the students who were surveyed

5 Which graph represents the solution set of $|6x-7|\le 5$?
1) 

2) 

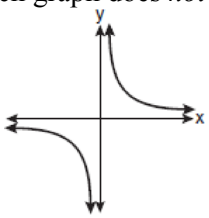
3) 

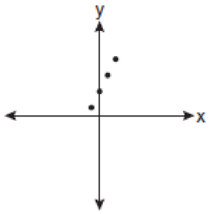
4) 

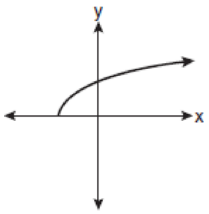
6 Which function is *not* one-to-one?
1) $\{(0,1),(1,2),(2,3),(3,4)\}$
2) $\{(0,0),(1,1),(2,2),(3,3)\}$
3) $\{(0,1),(1,0),(2,3),(3,2)\}$
4) $\{(0,1),(1,0),(2,0),(3,2)\}$

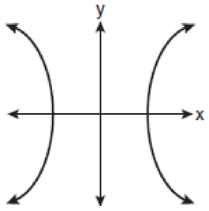
7 In $\triangle ABC$, $m\angle A=120$, $b=10$, and $c=18$. What is the area of $\triangle ABC$ to the *nearest square inch*?
1) 52
2) 78
3) 90
4) 156

8 Which graph does *not* represent a function?

1) 

2) 

3) 

4) 

9 The expression $\log_8 64$ is equivalent to

1) 8
2) 2
3) $\frac{1}{2}$
4) $\frac{1}{8}$

10 The expression $\cos 4x \cos 3x + \sin 4x \sin 3x$ is equivalent to

1) $\sin x$
2) $\sin 7x$
3) $\cos x$
4) $\cos 7x$

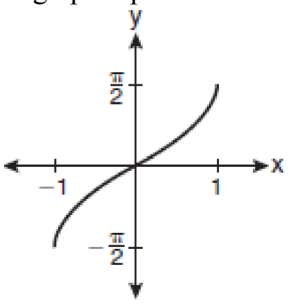
11 The value of the expression $2\sum_{n=0}^{2}(n^2 + 2^n)$ is

1) 12
2) 22
3) 24
4) 26

12 For which equation does the sum of the roots equal $\frac{3}{4}$ and the product of the roots equal –2?

1) $4x^2 - 8x + 3 = 0$
2) $4x^2 + 8x + 3 = 0$
3) $4x^2 - 3x - 8 = 0$
4) $4x^2 + 3x - 2 = 0$

13 Which graph represents the equation $y = \cos^{-1} x$?

1)


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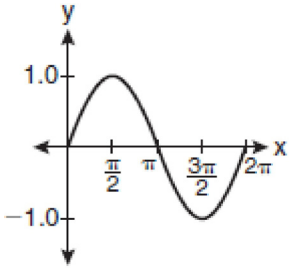

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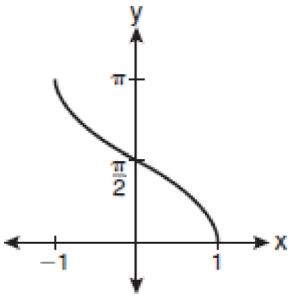

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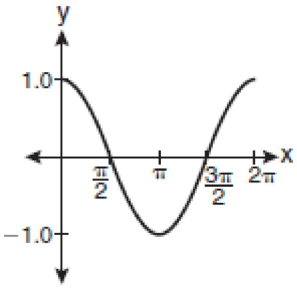


14 The expression $\frac{a^2 b^{-3}}{a^{-4} b^2}$ is equivalent to

1) $\frac{a^6}{b^5}$

2) $\frac{b^5}{a^6}$

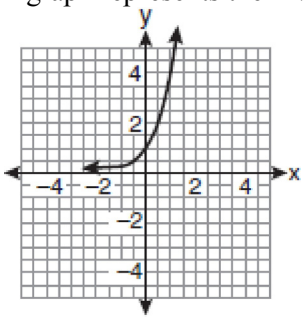
3) $\frac{a^2}{b}$

4) $a^{-2} b^{-1}$

15 The lengths of 100 pipes have a normal distribution with a mean of 102.4 inches and a standard deviation of 0.2 inch. If one of the pipes measures exactly 102.1 inches, its length lies

1) below the 16th percentile
2) between the 50th and 84th percentiles
3) between the 16th and 50th percentiles
4) above the 84th percentile

16 If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?

1)


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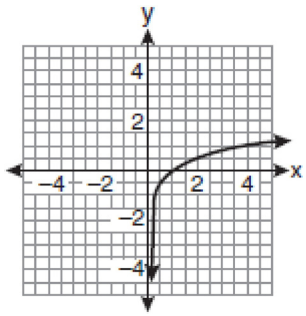

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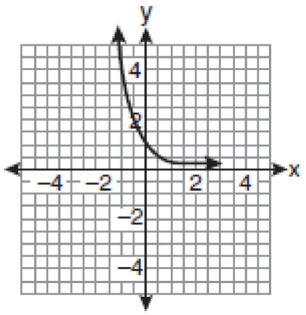

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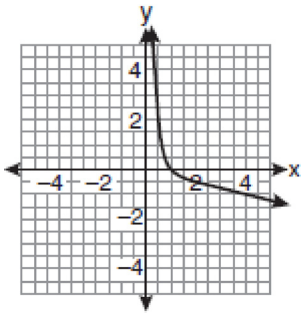


17 Factored completely, the expression $6x - x^3 - x^2$ is equivalent to
1) $x(x+3)(x-2)$
2) $x(x-3)(x+2)$
3) $-x(x-3)(x+2)$
4) $-x(x+3)(x-2)$

18 The expression $4ab\sqrt{2b} - 3a\sqrt{18b^3} + 7ab\sqrt{6b}$ is equivalent to
1) $2ab\sqrt{6b}$
2) $16ab\sqrt{2b}$
3) $-5ab + 7ab\sqrt{6b}$
4) $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

19 What is the fourth term in the expansion of $(3x-2)^5$?
1) $-720x^2$
2) $-240x$
3) $720x^2$
4) $1,080x^3$

20 Written in simplest form, the expression $\dfrac{\frac{x}{4} - \frac{1}{x}}{\frac{1}{2x} + \frac{1}{4}}$ is equivalent to
1) $x-1$
2) $x-2$
3) $\dfrac{x-2}{2}$
4) $\dfrac{x^2-4}{x+2}$

21 What is the solution of the equation $2\log_4(5x) = 3$?
1) 6.4
2) 2.56
3) $\frac{9}{5}$
4) $\frac{8}{5}$

22 A circle has a radius of 4 inches. In inches, what is the length of the arc intercepted by a central angle of 2 radians?
1) 2π
2) 2
3) 8π
4) 8

23 What is the domain of the function $f(x) = \sqrt{x-2} + 3$?
1) $(-\infty, \infty)$
2) $(2, \infty)$
3) $[2, \infty)$
4) $[3, \infty)$

24 The table below shows the first-quarter averages for Mr. Harper's statistics class.

Statistics Class Averages

Quarter Averages	Frequency
99	1
97	5
95	4
92	4
90	7
87	2
84	6
81	2
75	1
70	2
65	1

What is the population variance for this set of data?
1) 8.2
2) 8.3
3) 67.3
4) 69.3

25 Which formula can be used to determine the total number of different eight-letter arrangements that can be formed using the letters in the word *DEADLINE*?

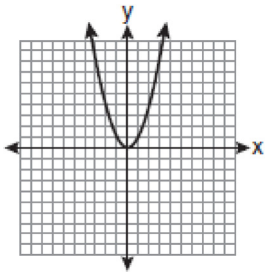
1) $8!$

2) $\frac{8!}{4!}$

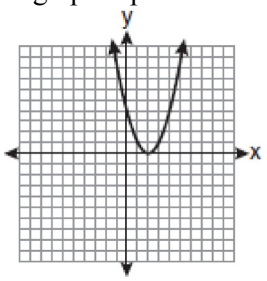
3) $\frac{8!}{2!+2!}$

4) $\frac{8!}{2!\cdot 2!}$

26 The graph below shows the function f(x).



Which graph represents the function f($x+2$)?

1)


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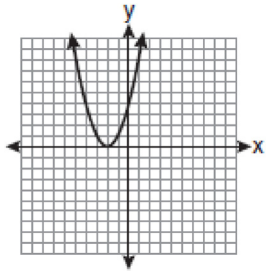

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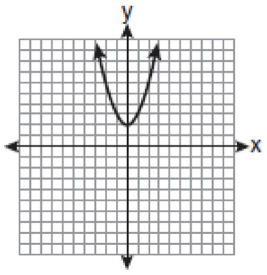

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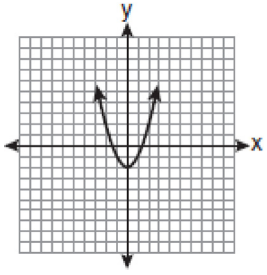
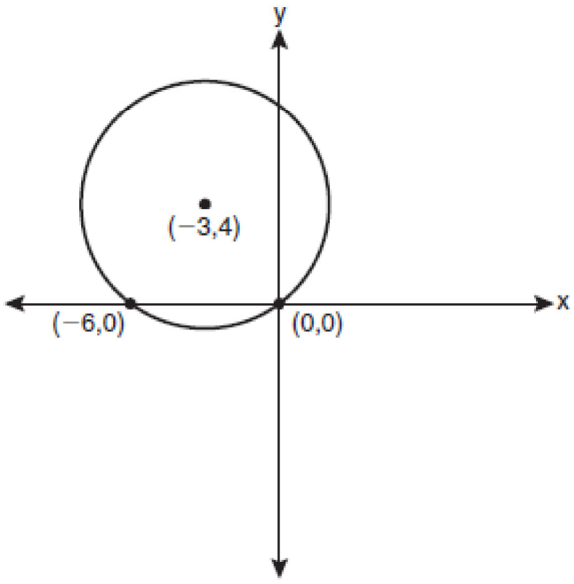


27 The equation $y - 2\sin\theta = 3$ may be rewritten as
1) $f(y) = 2\sin x + 3$
2) $f(y) = 2\sin\theta + 3$
3) $f(x) = 2\sin\theta + 3$
4) $f(\theta) = 2\sin\theta + 3$

28 Express $\frac{5}{3-\sqrt{2}}$ with a rational denominator, in simplest radical form.

29 Write an equation of the circle shown in the graph below.



30 Solve for x: $\frac{4x}{x-3} = 2 + \frac{12}{x-3}$

31 Find, to the *nearest minute*, the angle whose measure is 3.45 radians.

32 Matt places $1,200 in an investment account earning an annual rate of 6.5%, compounded continuously. Using the formula $V = Pe^{rt}$, where V is the value of the account in t years, P is the principal initially invested, e is the base of a natural logarithm, and r is the rate of interest, determine the amount of money, to the *nearest cent*, that Matt will have in the account after 10 years.

33 If θ is an angle in standard position and its terminal side passes through the point (–3,2), find the exact value of $\csc\theta$.

34 Find the first four terms of the recursive sequence defined below.

$$a_1 = -3$$

$$a_n = a_{(n-1)} - n$$

35 A committee of 5 members is to be randomly selected from a group of 9 teachers and 20 students. Determine how many different committees can be formed if 2 members must be teachers and 3 members must be students.

36 Solve $2x^2 - 12x + 4 = 0$ by completing the square, expressing the result in simplest radical form.

37 Solve the equation $8x^3 + 4x^2 - 18x - 9 = 0$ algebraically for all values of x.

38 The table below shows the results of an experiment involving the growth of bacteria.

Time (x) (in minutes)	1	3	5	7	9	11
Number of Bacteria (y)	2	25	81	175	310	497

Write a power regression equation for this set of data, rounding all values to *three decimal places*. Using this equation, predict the bacteria's growth, to the *nearest integer*, after 15 minutes.

39 Two forces of 25 newtons and 85 newtons acting on a body form an angle of 55°. Find the magnitude of the resultant force, to the *nearest hundredth of a newton*. Find the measure, to the *nearest degree*, of the angle formed between the resultant and the larger force.

Algebra 2/Trigonometry Regents Exam 0610
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0610a2

1 What is the common difference of the arithmetic sequence $5, 8, 11, 14$?

1) $\frac{8}{5}$
2) -3
3) 3
4) 9

2 What is the number of degrees in an angle whose radian measure is $\frac{11\pi}{12}$?

1) 150
2) 165
3) 330
4) 518

3 If $a = 3$ and $b = -2$, what is the value of the expression $\frac{a^{-2}}{b^{-3}}$?

1) $-\frac{9}{8}$
2) -1
3) $-\frac{8}{9}$
4) $\frac{8}{9}$

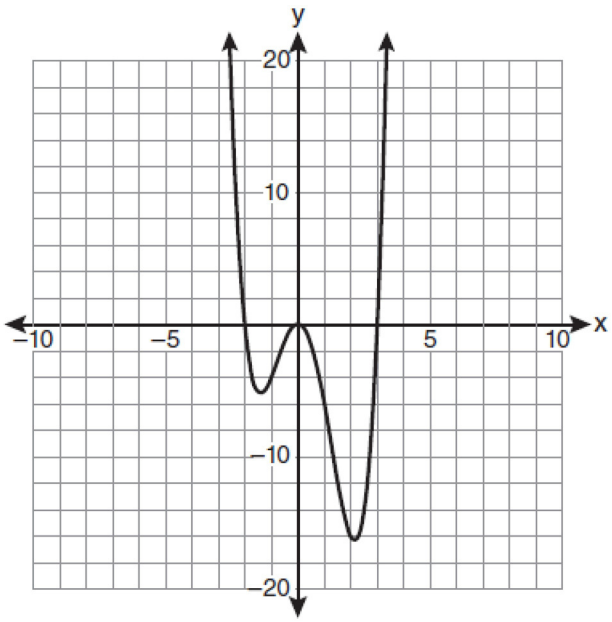
4 Four points on the graph of the function f(x) are shown below.

$$\{(0,1),(1,2),(2,4),(3,8)\}$$

Which equation represents f(x)?

1) $f(x) = 2^x$
2) $f(x) = 2x$
3) $f(x) = x + 1$
4) $f(x) = \log_2 x$

5 The graph of $y = f(x)$ is shown below.



Which set lists all the real solutions of $f(x) = 0$?

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

6 In simplest form, $\sqrt{-300}$ is equivalent to

1) $3i\sqrt{10}$
2) $5i\sqrt{12}$
3) $10i\sqrt{3}$
4) $12i\sqrt{5}$

7 Twenty different cameras will be assigned to several boxes. Three cameras will be randomly selected and assigned to box A. Which expression can be used to calculate the number of ways that three cameras can be assigned to box A?

1) $20!$
2) $\frac{20!}{3!}$
3) ${}_{20}C_3$
4) ${}_{20}P_3$

8 Factored completely, the expression $12x^4 + 10x^3 - 12x^2$ is equivalent to

1) $x^2(4x+6)(3x-2)$
2) $2(2x^2+3x)(3x^2-2x)$
3) $2x^2(2x-3)(3x+2)$
4) $2x^2(2x+3)(3x-2)$

9 The solutions of the equation $y^2 - 3y = 9$ are

1) $\frac{3 \pm 3i\sqrt{3}}{2}$
2) $\frac{3 \pm 3i\sqrt{5}}{2}$
3) $\frac{-3 \pm 3\sqrt{5}}{2}$
4) $\frac{3 \pm 3\sqrt{5}}{2}$

10 The expression $2\log x - (3\log y + \log z)$ is equivalent to

1) $\log\frac{x^2}{y^3 z}$
2) $\log\frac{x^2 z}{y^3}$
3) $\log\frac{2x}{3yz}$
4) $\log\frac{2xz}{3y}$

11 The expression $(x^2-1)^{-\frac{2}{3}}$ is equivalent to

1) $\sqrt[3]{(x^2-1)^2}$
2) $\frac{1}{\sqrt[3]{(x^2-1)^2}}$
3) $\sqrt{(x^2-1)^3}$
4) $\frac{1}{\sqrt{(x^2-1)^3}}$

12 Which expression is equivalent to $\frac{\sqrt{3}+5}{\sqrt{3}-5}$?

1) $-\frac{14+5\sqrt{3}}{11}$
2) $-\frac{17+5\sqrt{3}}{11}$
3) $\frac{14+5\sqrt{3}}{14}$
4) $\frac{17+5\sqrt{3}}{14}$

13 Which relation is *not* a function?

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

14 If $\angle A$ is acute and $\tan A = \frac{2}{3}$, then

1) $\cot A = \frac{2}{3}$
2) $\cot A = \frac{1}{3}$
3) $\cot(90° - A) = \frac{2}{3}$
4) $\cot(90° - A) = \frac{1}{3}$

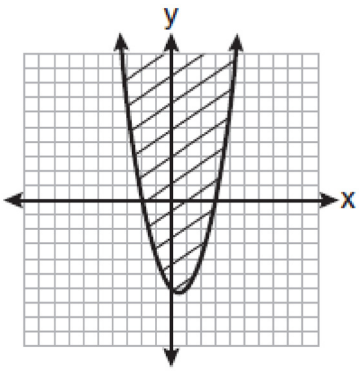
15 The solution set of $4^{x^2+4x} = 2^{-6}$ is

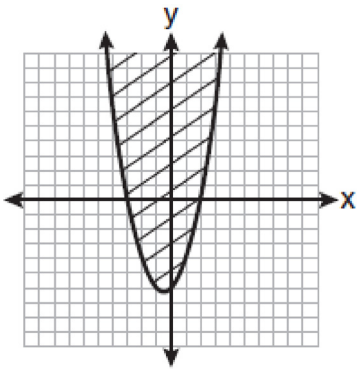
1) $\{1,3\}$
2) $\{-1,3\}$
3) $\{-1,-3\}$
4) $\{1,-3\}$

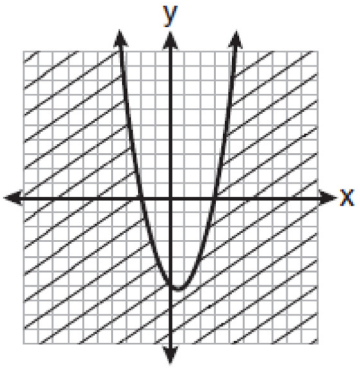
16 The equation $x^2 + y^2 - 2x + 6y + 3 = 0$ is equivalent to

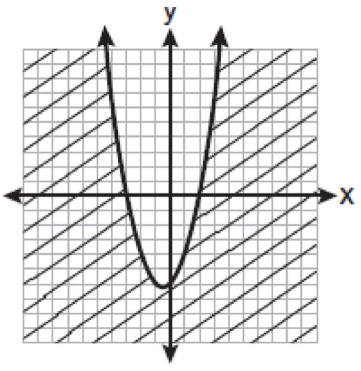
1) $(x-1)^2 + (y+3)^2 = -3$
2) $(x-1)^2 + (y+3)^2 = 7$
3) $(x+1)^2 + (y+3)^2 = 7$
4) $(x+1)^2 + (y+3)^2 = 10$

17 Which graph best represents the inequality $y+6 \geq x^2 - x$?

1) 

2) 

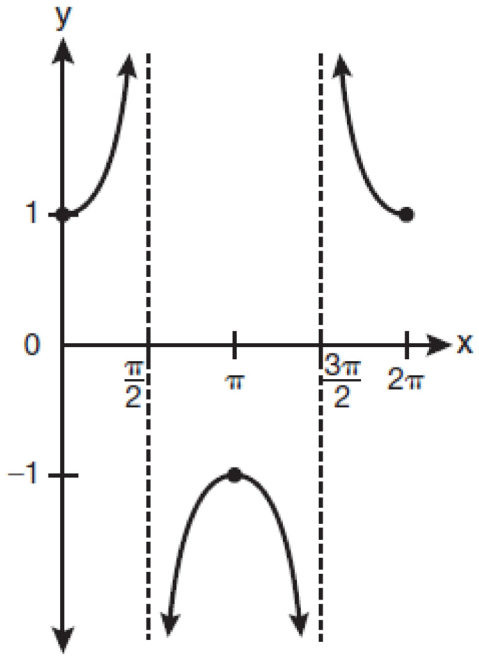
3) 

4) 

18 The solution set of the equation $\sqrt{x+3} = 3 - x$ is
1) $\{1\}$
2) $\{0\}$
3) $\{1,6\}$
4) $\{2,3\}$

19 The product of i^7 and i^5 is equivalent to
1) 1
2) –1
3) i
4) $-i$

20 Which equation is represented by the graph below?



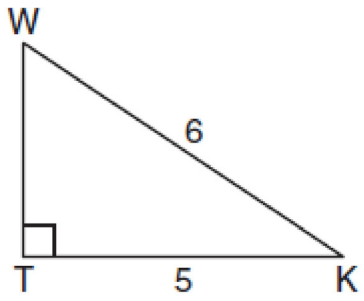
1) $y = \cot x$
2) $y = \csc x$
3) $y = \sec x$
4) $y = \tan x$

21 Which value of r represents data with a strong negative linear correlation between two variables?
1) –1.07
2) –0.89
3) –0.14
4) 0.92

22 The function $f(x) = \tan x$ is defined in such a way that $f^{-1}(x)$ is a function. What can be the domain of $f(x)$?

1) $\{x \mid 0 \le x \le \pi\}$
2) $\{x \mid 0 \le x \le 2\pi\}$
3) $\left\{x \mid -\frac{\pi}{2} < x < \frac{\pi}{2}\right\}$
4) $\left\{x \mid -\frac{\pi}{2} < x < \frac{3\pi}{2}\right\}$

23 In the diagram below of right triangle KTW, $KW = 6$, $KT = 5$, and $m\angle KTW = 90$.



What is the measure of $\angle K$, to the *nearest minute*?

1) 33°33'
2) 33°34'
3) 33°55'
4) 33°56'

24 The expression $\cos^2\theta - \cos 2\theta$ is equivalent to

1) $\sin^2\theta$
2) $-\sin^2\theta$
3) $\cos^2\theta + 1$
4) $-\cos^2\theta - 1$

25 Mrs. Hill asked her students to express the sum $1+3+5+7+9+\ldots+39$ using sigma notation. Four different student answers were given. Which student answer is correct?

1) $\sum_{k=1}^{20}(2k-1)$
2) $\sum_{k=2}^{40}(k-1)$
3) $\sum_{k=-1}^{37}(k+2)$
4) $\sum_{k=1}^{39}(2k-1)$

26 What is the formula for the nth term of the sequence $54, 18, 6, \ldots$?

1) $a_n = 6\left(\frac{1}{3}\right)^n$
2) $a_n = 6\left(\frac{1}{3}\right)^{n-1}$
3) $a_n = 54\left(\frac{1}{3}\right)^n$
4) $a_n = 54\left(\frac{1}{3}\right)^{n-1}$

27 What is the period of the function $y = \frac{1}{2}\sin\left(\frac{x}{3} - \pi\right)$?

1) $\frac{1}{2}$
2) $\frac{1}{3}$
3) $\frac{2}{3}\pi$
4) 6π

28 Use the discriminant to determine all value of k that would result in the equation $x^2 - kx + 4 = 0$ having equal roots.

29 The scores of one class on the Unit 2 mathematics test are shown in the table below.

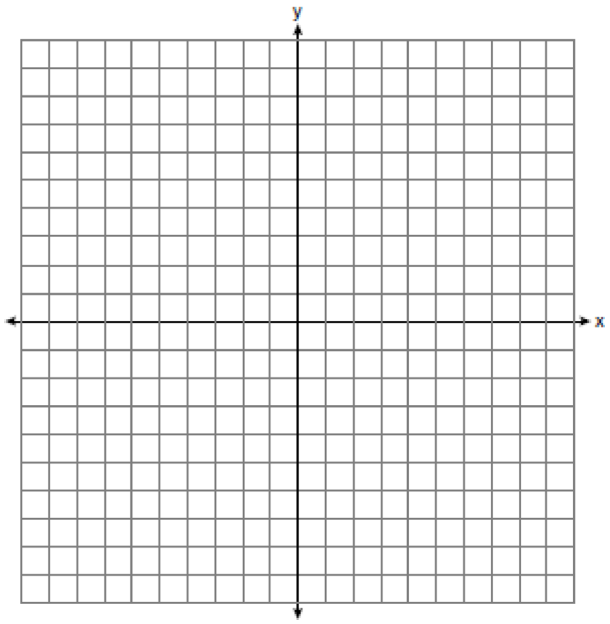
Unit 2 Mathematics Test

Test Score	Frequency
96	1
92	2
84	5
80	3
76	6
72	3
68	2

Find the population standard deviation of these scores, to the *nearest tenth*.

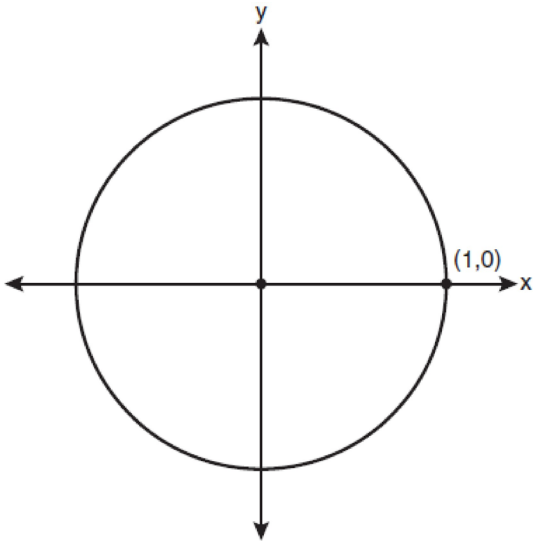
30 Find the sum and product of the roots of the equation $5x^2 + 11x - 3 = 0$.

31 The graph of the equation $y = \left(\frac{1}{2}\right)^x$ has an asymptote. On the grid below, sketch the graph of $y = \left(\frac{1}{2}\right)^x$ and write the equation of this asymptote.



32 Express $5\sqrt{3x^3} - 2\sqrt{27x^3}$ in simplest radical form.

33 On the unit circle shown in the diagram below, sketch an angle, in standard position, whose degree measure is 240 and find the exact value of $\sin 240°$.



34 Two sides of a parallelogram are 24 feet and 30 feet. The measure of the angle between these sides is 57°. Find the area of the parallelogram, to the *nearest square foot*.

35 Express in simplest form: $\dfrac{\frac{1}{2} - \frac{4}{d}}{\frac{1}{d} + \frac{3}{2d}}$

36 The members of a men's club have a choice of wearing black or red vests to their club meetings. A study done over a period of many years determined that the percentage of black vests worn is 60%. If there are 10 men at a club meeting on a given night, what is the probability, to the *nearest thousandth*, that *at least* 8 of the vests worn will be black?

37 Find all values of θ in the interval $0° \leq \theta < 360°$ that satisfy the equation $\sin 2\theta = \sin \theta$.

38 The letters of any word can be rearranged. Carol believes that the number of different 9-letter arrangements of the word "TENNESSEE" is greater than the number of different 7-letter arrangements of the word "VERMONT." Is she correct? Justify your answer.

39 In a triangle, two sides that measure 6 cm and 10 cm form an angle that measures 80°. Find, to the *nearest degree*, the measure of the smallest angle in the triangle.

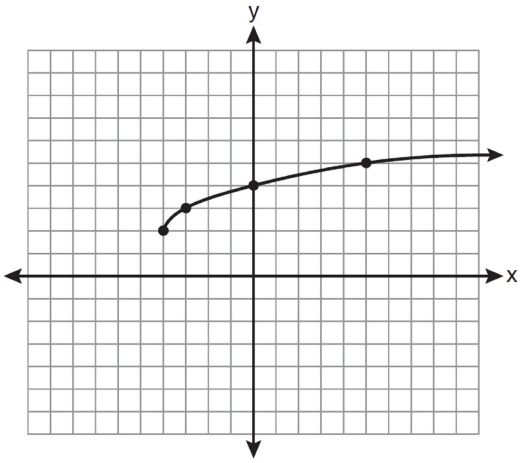
Algebra 2/Trigonometry Regents Exam 0810
www.jmap.org

0810a2

1 The product of $(3+\sqrt{5})$ and $(3-\sqrt{5})$ is
1) $4-6\sqrt{5}$
2) $14-6\sqrt{5}$
3) 14
4) 4

2 What is the radian measure of an angle whose measure is –420°?
1) $-\frac{7\pi}{3}$
2) $-\frac{7\pi}{6}$
3) $\frac{7\pi}{6}$
4) $\frac{7\pi}{3}$

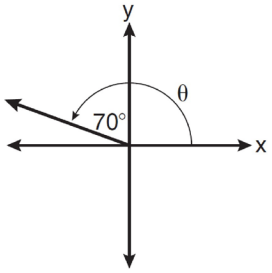
3 What are the domain and the range of the function shown in the graph below?

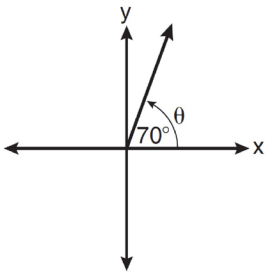


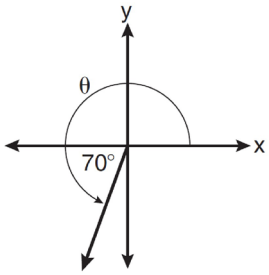
1) $\{x \mid x > -4\};\ \{y \mid y > 2\}$
2) $\{x \mid x \geq -4\};\ \{y \mid y \geq 2\}$
3) $\{x \mid x > 2\};\ \{y \mid y > -4\}$
4) $\{x \mid x \geq 2\};\ \{y \mid y \geq -4\}$

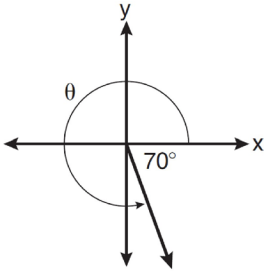
4 The expression $2i^2 + 3i^3$ is equivalent to
1) $-2-3i$
2) $2-3i$
3) $-2+3i$
4) $2+3i$

5 In which graph is θ coterminal with an angle of –70°?

1)


2)


3)


4)


6 In $\triangle ABC$, $m\angle A = 74$, $a = 59.2$, and $c = 60.3$. What are the two possible values for $m\angle C$, to the *nearest tenth*?

1) 73.7 and 106.3
2) 73.7 and 163.7
3) 78.3 and 101.7
4) 78.3 and 168.3

7 What is the principal value of $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$?

1) –30°
2) 60°
3) 150°
4) 240°

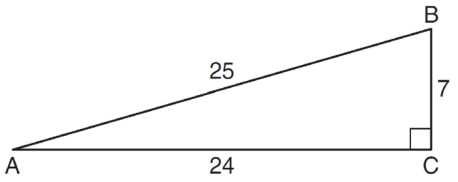
8 What is the value of x in the equation $9^{3x+1} = 27^{x+2}$?

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

9 The roots of the equation $2x^2 + 7x - 3 = 0$ are

1) $-\frac{1}{2}$ and –3
2) $\frac{1}{2}$ and 3
3) $\frac{-7 \pm \sqrt{73}}{4}$
4) $\frac{7 \pm \sqrt{73}}{4}$

10 Which ratio represents $\csc A$ in the diagram below?



1) $\frac{25}{24}$
2) $\frac{25}{7}$
3) $\frac{24}{7}$
4) $\frac{7}{24}$

11 When simplified, the expression $\left(\frac{w^{-5}}{w^{-9}}\right)^{\frac{1}{2}}$ is equivalent to

1) w^{-7}
2) w^2
3) w^7
4) w^{14}

12 The principal would like to assemble a committee of 8 students from the 15-member student council. How many different committees can be chosen?

1) 120
2) 6,435
3) 32,432,400
4) 259,459,200

13 An amateur bowler calculated his bowling average for the season. If the data are normally distributed, about how many of his 50 games were within one standard deviation of the mean?

1) 14
2) 17
3) 34
4) 48

14 What is a formula for the nth term of sequence B shown below?

$$B = 10, 12, 14, 16, \ldots$$

1) $b_n = 8 + 2n$
2) $b_n = 10 + 2n$
3) $b_n = 10(2)^n$
4) $b_n = 10(2)^{n-1}$

15 Which values of x are in the solution set of the following system of equations?

$$y = 3x - 6$$

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

1) $0, -4$
2) $0, 4$
3) $6, -2$
4) $-6, 2$

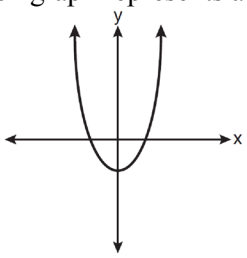
16 The roots of the equation $9x^2 + 3x - 4 = 0$ are
1) imaginary
2) real, rational, and equal
3) real, rational, and unequal
4) real, irrational, and unequal

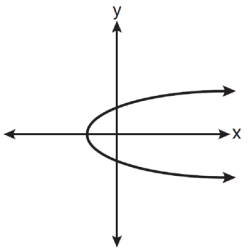
17 In $\triangle ABC$, $a = 3$, $b = 5$, and $c = 7$. What is $m\angle C$?
1) 22
2) 38
3) 60
4) 120

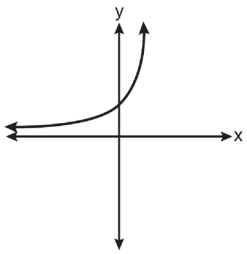
18 When $x^{-1} - 1$ is divided by $x - 1$, the quotient is
1) -1
2) $-\frac{1}{x}$
3) $\frac{1}{x^2}$
4) $\frac{1}{(x-1)^2}$

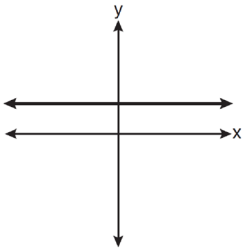
19 The fraction $\frac{3}{\sqrt{3a^2b}}$ is equivalent to
1) $\frac{1}{a\sqrt{b}}$
2) $\frac{\sqrt{b}}{ab}$
3) $\frac{\sqrt{3b}}{ab}$
4) $\frac{\sqrt{3}}{a}$

20 Which graph represents a one-to-one function?

1) 

2) 

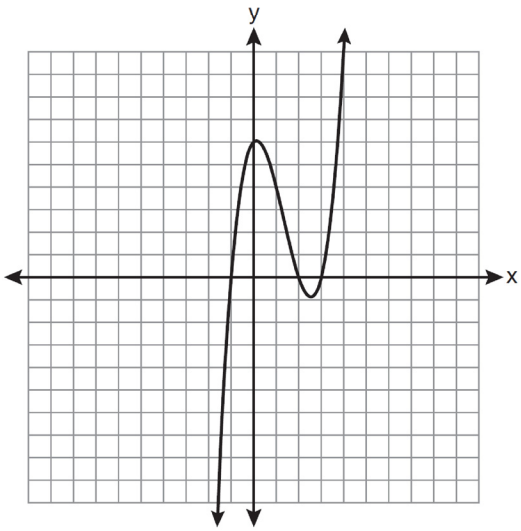
3) 

4) 

21 The sides of a parallelogram measure 10 cm and 18 cm. One angle of the parallelogram measures 46 degrees. What is the area of the parallelogram, to the *nearest square centimeter*?
1) 65
2) 125
3) 129
4) 162

22 The minimum point on the graph of the equation $y = f(x)$ is $(-1,-3)$. What is the minimum point on the graph of the equation $y = f(x) + 5$?
1) $(-1,2)$
2) $(-1,-8)$
3) $(4,-3)$
4) $(-6,-3)$

23 The graph of $y = x^3 - 4x^2 + x + 6$ is shown below.

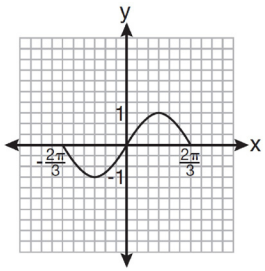


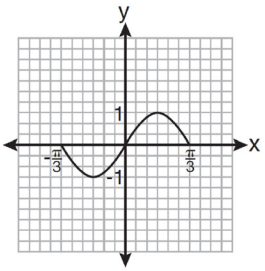
What is the product of the roots of the equation $x^3 - 4x^2 + x + 6 = 0$?
1) –36
2) –6
3) 6
4) 4

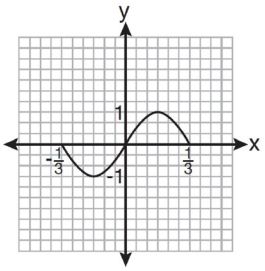
24 What is the conjugate of $-2 + 3i$?
1) $-3 + 2i$
2) $-2 - 3i$
3) $2 - 3i$
4) $3 + 2i$

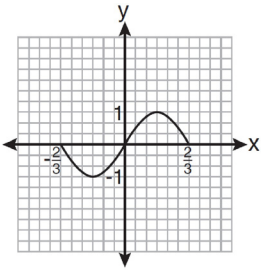
25 What is the common ratio of the geometric sequence whose first term is 27 and fourth term is 64?
1) $\frac{3}{4}$
2) $\frac{64}{81}$
3) $\frac{4}{3}$
4) $\frac{37}{3}$

26 Which graph represents one complete cycle of the equation $y = \sin 3\pi x$?

1)


2)


3)


4)


27 Which two functions are inverse functions of each other?

1) $f(x) = \sin x$ and $g(x) = \cos(x)$
2) $f(x) = 3 + 8x$ and $g(x) = 3 - 8x$
3) $f(x) = e^x$ and $g(x) = \ln x$
4) $f(x) = 2x - 4$ and $g(x) = -\frac{1}{2}x + 4$

28 Factor completely: $10ax^2 - 23ax - 5a$

29 Express the sum $7 + 14 + 21 + 28 + \ldots + 105$ using sigma notation.

30 Howard collected fish eggs from a pond behind his house so he could determine whether sunlight had an effect on how many of the eggs hatched. After he collected the eggs, he divided them into two tanks. He put both tanks outside near the pond, and he covered one of the tanks with a box to block out all sunlight. State whether Howard's investigation was an example of a controlled experiment, an observation, or a survey. Justify your response.

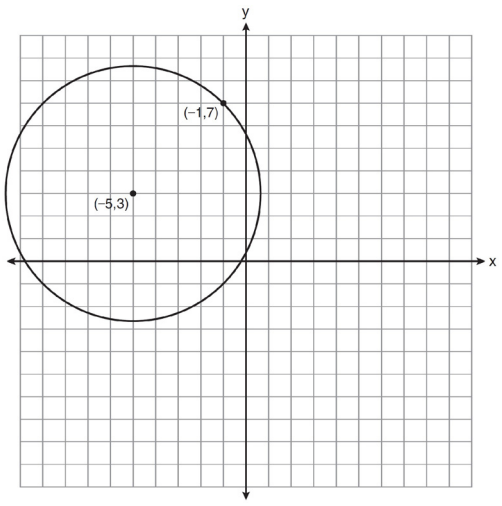
31 The table below shows the number of new stores in a coffee shop chain that opened during the years 1986 through 1994.

Year	Number of New Stores
1986	14
1987	27
1988	48
1989	80
1990	110
1991	153
1992	261
1993	403
1994	681

Using $x = 1$ to represent the year 1986 and y to represent the number of new stores, write the exponential regression equation for these data. Round all values to the *nearest thousandth.*

32 Solve the equation $2\tan C - 3 = 3\tan C - 4$ algebraically for all values of C in the interval $0° \le C < 360°$.

33 A circle shown in the diagram below has a center of $(-5,3)$ and passes through point $(-1,7)$.



Write an equation that represents the circle.

34 Express $\left(\frac{2}{3}x-1\right)^2$ as a trinomial.

35 Find the total number of different twelve-letter arrangements that can be formed using the letters in the word *PENNSYLVANIA*.

36 Solve algebraically for x: $\frac{1}{x+3}-\frac{2}{3-x}=\frac{4}{x^2-9}$

37 If $\tan A=\frac{2}{3}$ and $\sin B=\frac{5}{\sqrt{41}}$ and angles A and B are in Quadrant I, find the value of $\tan(A+B)$.

38 A study shows that 35% of the fish caught in a local lake had high levels of mercury. Suppose that 10 fish were caught from this lake. Find, to the *nearest tenth of a percent,* the probability that *at least* 8 of the 10 fish caught did *not* contain high levels of mercury.

39 Solve algebraically for x: $\log_{x+3}\frac{x^3+x-2}{x}=2$