Name: _____ Date: _____

ALGEBRA II LIVE REVIEW PROBLEMS - 2018
eMATHinstruction

POLYNOMIALS

January 2017

3 When factored completely, $m^5 + m^3 - 6m$ is equivalent to

(1) $(m + 3)(m - 2)$

(2) $(m^3 + 3m)(m^2 - 2)$

(3) $m(m^4 + m^2 - 6)$

(4) $m(m^2 + 3)(m^2 - 2)$

August 2016

15 The completely factored form of $2d^4 + 6d^3 - 18d^2 - 54d$ is

(1) $2d(d^2 - 9)(d + 3)$

(2) $2d(d^2 + 9)(d + 3)$

(3) $2d(d + 3)^2(d - 3)$

(4) $2d(d - 3)^2(d + 3)$

August 2016

6 The zeros for $f(x) = x^4 - 4x^3 - 9x^2 + 36x$ are

(1) $\{0,\pm 3,4\}$

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

(3) $\{0,\pm 3,-4\}$

(4) $\{0,3,-4\}$

June 2016

27 Determine if $x - 5$ is a factor of $2x^3 - 4x^2 - 7x - 10$. Explain your answer.

June 2016

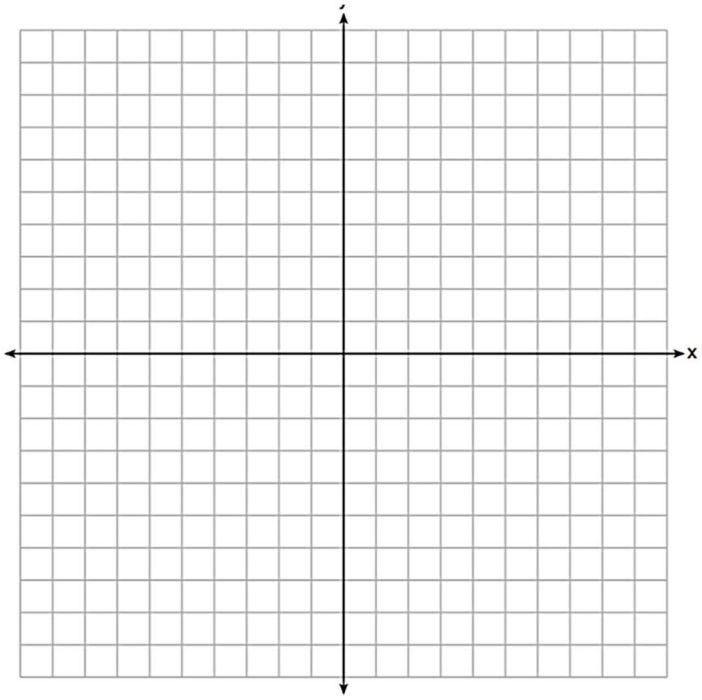
33 Solve the system of equations shown below algebraically.

$$(x - 3)^2 + (y + 2)^2 = 16$$
$$2x + 2y = 10$$

August 2016

33 Find algebraically the zeros for $p(x) = x^3 + x^2 - 4x - 4$.

On the set of axes below, graph $y = p(x)$.



August 2016

35 Solve the equation $\sqrt{2x-7} + x = 5$ algebraically, and justify the solution set.

January 2017

33 Algebraically determine the values of h and k to correctly complete the identity stated below.

$$2x^3 - 10x^2 + 11x - 7 = (x - 4)(2x^2 + hx + 3) + k$$

RATIONAL EXPRESSIONS

January 2017

32 Given $f(x) = 3x^2 + 7x - 20$ and $g(x) = x - 2$, state the quotient and remainder of $\frac{f(x)}{g(x)}$, in the form $q(x) + \frac{r(x)}{g(x)}$.

June 2016

14 The expression $\frac{4x^3 + 5x + 10}{2x + 3}$ is equivalent to

(1) $2x^2 + 3x - 7 + \frac{31}{2x + 3}$

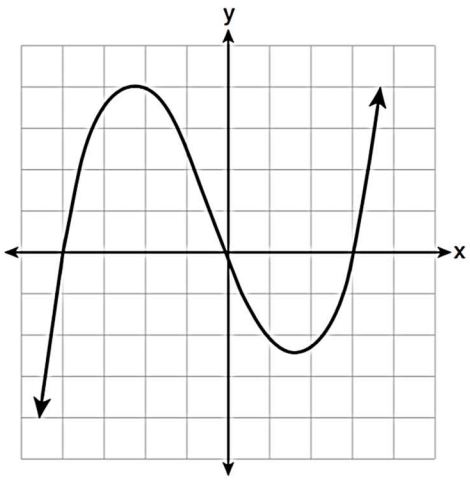
(2) $2x^2 - 3x + 7 - \frac{11}{2x + 3}$

(3) $2x^2 + 2.5x + 5 + \frac{15}{2x + 3}$

(4) $2x^2 - 2.5x - 5 - \frac{20}{2x + 3}$

August 2016

21 The graph of $p(x)$ is shown below.



What is the remainder when $p(x)$ is divided by $x + 4$?

(1) $x - 4$

(2) -4

(3) 0

(4) 4

June 2017

23 The expression $\frac{-3x^2 - 5x + 2}{x^3 + 2x^2}$ can be rewritten as

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

(2) $\frac{-3x - 1}{x^2}$

(3) $-3x^{-1} + 1$

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

June 2016

25 Solve for x: $\frac{1}{x} - \frac{1}{3} = -\frac{1}{3x}$

June 2017

19 To solve $\frac{2x}{x-2} - \frac{11}{x} = \frac{8}{x^2-2x}$, Ren multiplied both sides by the least common denominator. Which statement is true?

(1) 2 is an extraneous solution.

(2) $\frac{7}{2}$ is an extraneous solution.

(3) 0 and 2 are extraneous solutions.

(4) This equation does not contain any extraneous solutions.

EXPONENTS AND RADICALS

August 2016

26 Explain how $\left(3^{\frac{1}{5}}\right)^2$ can be written as the equivalent radical expression $\sqrt[5]{9}$.

June 2017

16 For $x \neq 0$, which expressions are equivalent to one divided by the sixth root of x?

$$\text{I. } \frac{\sqrt[6]{x}}{\sqrt[3]{x}} \qquad \text{II. } \frac{x^{\frac{1}{6}}}{x^{\frac{1}{3}}} \qquad \text{III. } x^{-\frac{1}{6}}$$

(1) I and II, only

(2) I and III, only

(3) II and III, only

(4) I, II, and III

January 2017

7 The expression $\left(\frac{m^2}{m^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$ is equivalent to

(1) $-\sqrt[6]{m^5}$

(2) $\frac{1}{\sqrt[6]{m^5}}$

(3) $-m\sqrt[5]{m}$

(4) $\frac{1}{m\sqrt[5]{m}}$

January 2017

30 Given the equal terms $\sqrt[3]{x^5}$ and $y^{\frac{5}{6}}$, determine and state y, in terms of x.

EXPONENTIAL AND LOGARITHMIC FUNCTIONS

June 2016

15 Which function represents exponential decay?

(1) $y = 2^{0.3t}$

(2) $y = 1.2^{3t}$

(3) $y = \left(\frac{1}{2}\right)^{-t}$

(4) $y = 5^{-t}$

June 2016

32 A house purchased 5 years ago for \$100,000 was just sold for \$135,000. Assuming exponential growth, approximate the annual growth rate, to the *nearest percent*.

June 2016

21 Last year, the total revenue for Home Style, a national restaurant chain, increased 5.25% over the previous year. If this trend were to continue, which expression could the company's chief financial officer use to approximate their monthly percent increase in revenue? [Let m represent months.]

(1) $(1.0525)^m$

(2) $(1.0525)^{\frac{12}{m}}$

(3) $(1.00427)^m$

(4) $(1.00427)^{\frac{m}{12}}$

January 2017

8 What is the inverse of the function $y = \log_3 x$?

(1) $y = x^3$

(2) $y = \log_x 3$

(3) $y = 3^x$

(4) $x = 3^y$

June 2016

18 Which statement about the graph of $c(x) = \log_6 x$ is *false*?

(1) The asymptote has equation $y = 0$.

(2) The graph has no y-intercept.

(3) The domain is the set of positive reals.

(4) The range is the set of all real numbers.

August 2016

30 The x-value of which function's x-intercept is larger, f or h? Justify your answer.

$f(x) = \log(x - 4)$

x	h(x)
−1	6
0	4
1	2
2	0
3	−2

August 2016

34 One of the medical uses of Iodine–131 (I–131), a radioactive isotope of iodine, is to enhance x-ray images. The half-life of I–131 is approximately 8.02 days. A patient is injected with 20 milligrams of I–131. Determine, to the *nearest day*, the amount of time needed before the amount of I–131 in the patient's body is approximately 7 milligrams.

August 2016

37 Seth's parents gave him \$5000 to invest for his 16th birthday. He is considering two investment options. Option *A* will pay him 4.5% interest compounded annually. Option *B* will pay him 4.6% compounded quarterly.

Write a function of option *A* and option *B* that calculates the value of each account after *n* years.

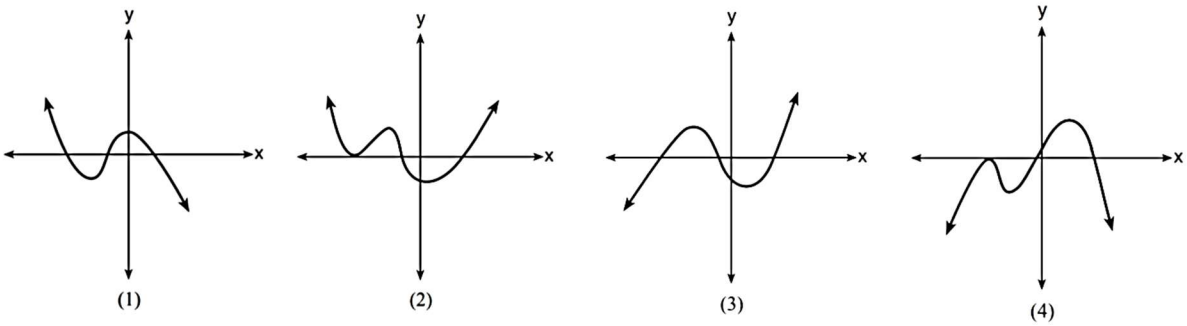
Seth plans to use the money after he graduates from college in 6 years. Determine how much more money option *B* will earn than option *A* to the *nearest cent*.

Algebraically determine, to the *nearest tenth of a year*, how long it would take for option *B* to double Seth's initial investment.

June 2016

4 Which graph has the following characteristics?

- three real zeros
- as $x \to -\infty$, $f(x) \to -\infty$
- as $x \to \infty$, $f(x) \to \infty$



June 2016

16 Given $f^{-1}(x) = -\frac{3}{4}x + 2$, which equation represents $f(x)$?

(1) $f(x) = \frac{4}{3}x - \frac{8}{3}$

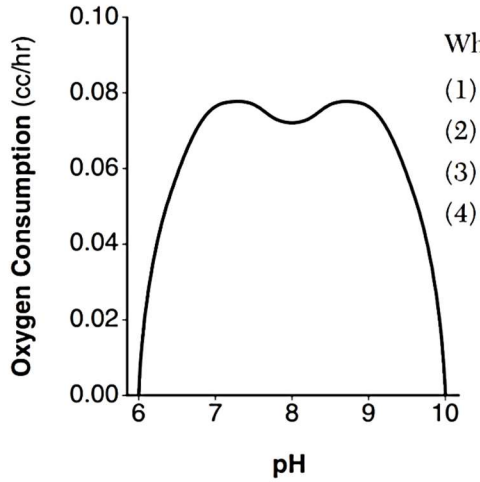
(2) $f(x) = -\frac{4}{3}x + \frac{8}{3}$

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

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

June 2016

20 There was a study done on oxygen consumption of snails as a function of pH, and the result was a degree 4 polynomial function whose graph is shown below.



Which statement about this function is *incorrect*?

(1) The degree of the polynomial is even.

(2) There is a positive leading coefficient.

(3) At two pH values, there is a relative maximum value.

(4) There are two intervals where the function is decreasing.

June 2016

36 Which function shown below has a greater average rate of change on the interval $[-2, 4]$? Justify your answer.

x	f(x)
−4	0.3125
−3	0.625
−2	1.25
−1	2.5
0	5
1	10
2	20
3	40
4	80
5	160
6	320

$g(x) = 4x^3 - 5x^2 + 3$

August 2017

31 Algebraically determine whether the function $j(x) = x^4 - 3x^2 - 4$ is odd, even, or neither.

August 2016

31 The distance needed to stop a car after applying the brakes varies directly with the square of the car's speed. The table below shows stopping distances for various speeds.

Speed (mph)	10	20	30	40	50	60	70
Distance (ft)	6.25	25	56.25	100	156.25	225	306.25

Determine the average rate of change in braking distance, in ft/mph, between one car traveling at 50 mph and one traveling at 70 mph.

Explain what this rate of change means as it relates to braking distance.

PROBABILITY

August 2016

7 The set of data in the table below shows the results of a survey on the number of messages that people of different ages text on their cell phones each month.

Age Group	Text Messages per Month		
	0–10	11–50	Over 50
15–18	4	37	68
19–22	6	25	87
23–60	25	47	157

If a person from this survey is selected at random, what is the probability that the person texts over 50 messages per month given that the person is between the ages of 23 and 60?

(1) $\frac{157}{229}$

(2) $\frac{157}{312}$

(3) $\frac{157}{384}$

(4) $\frac{157}{456}$

June 2016

11 Sean's team has a baseball game tomorrow. He pitches 50% of the games. There is a 40% chance of rain during the game tomorrow. If the probability that it rains given that Sean pitches is 40%, it can be concluded that these two events are

(1) independent

(2) dependent

(3) mutually exclusive

(4) complements

January 2017

31 The results of a survey of the student body at Central High School about television viewing preferences are shown below.

	Comedy Series	Drama Series	Reality Series	Total
Males	95	65	70	230
Females	80	70	110	260
Total	175	135	180	490

Are the events "student is a male" and "student prefers reality series" independent of each other? Justify your answer.

January 2017

35 The guidance department has reported that of the senior class, 2.3% are members of key club, K, 8.6% are enrolled in AP Physics, P, and 1.9% are in both.

Determine the probability of P given K, to the *nearest tenth of a percent*.

The principal would like a basic interpretation of these results. Write a statement relating your calculated probabilities to student enrollment in the given situation.

January 2018

34 A student is chosen at random from the student body at a given high school. The probability that the student selects Math as the favorite subject is $\frac{1}{4}$. The probability that the student chosen is a junior is $\frac{116}{459}$. If the probability that the student selected is a junior or that the student chooses Math as the favorite subject is $\frac{47}{108}$, what is the exact probability that the student selected is a junior whose favorite subject is Math?

Are the events "the student is a junior" and "the student's favorite subject is Math" independent of each other? Explain your answer.

STATISTICS

June 2016

9 The heights of women in the United States are normally distributed with a mean of 64 inches and a standard deviation of 2.75 inches. The percent of women whose heights are between 64 and 69.5 inches, to the *nearest whole percent,* is

(1) 6
(2) 48
(3) 68
(4) 95

January 2017

18 In 2013, approximately 1.6 million students took the Critical Reading portion of the SAT exam. The mean score, the modal score, and the standard deviation were calculated to be 496, 430, and 115, respectively. Which interval reflects 95% of the Critical Reading scores?

(1) 430 ± 115
(2) 430 ± 230
(3) 496 ± 115
(4) 496 ± 230

August 2016

29 Elizabeth waited for 6 minutes at the drive thru at her favorite fast-food restaurant the last time she visited. She was upset about having to wait that long and notified the manager. The manager assured her that her experience was very unusual and that it would not happen again.

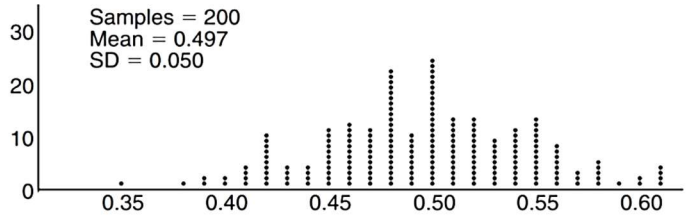
A study of customers commissioned by this restaurant found an approximately normal distribution of results. The mean wait time was 226 seconds and the standard deviation was 38 seconds. Given these data, and using a 95% level of confidence, was Elizabeth's wait time unusual? Justify your answer.

June 2016

26 Describe how a controlled experiment can be created to examine the effect of ingredient X in a toothpaste.

January 2016

7 Anne has a coin. She does not know if it is a fair coin. She flipped the coin 100 times and obtained 73 heads and 27 tails. She ran a computer simulation of 200 samples of 100 fair coin flips. The output of the proportion of heads is shown below.



Given the results of her coin flips and of her computer simulation, which statement is most accurate?

(1) 73 of the computer's next 100 coin flips will be heads.

(2) 50 of her next 100 coin flips will be heads.

(3) Her coin is not fair.

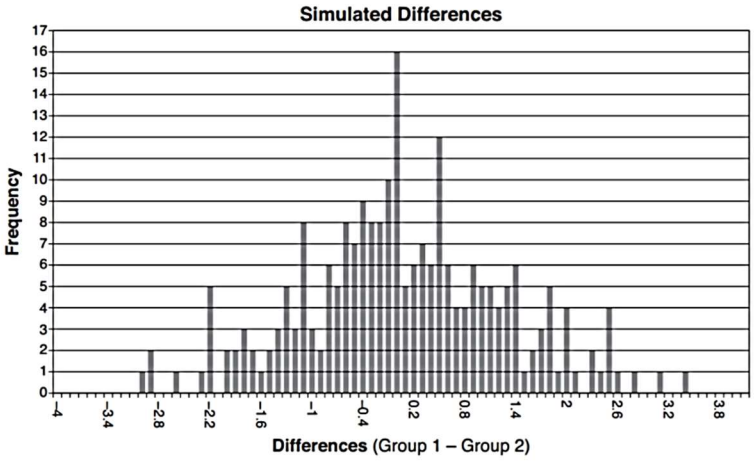
(4) Her coin is fair.

August 2016

36 Ayva designed an experiment to determine the effect of a new energy drink on a group of 20 volunteer students. Ten students were randomly selected to form group 1 while the remaining 10 made up group 2. Each student in group 1 drank one energy drink, and each student in group 2 drank one cola drink. Ten minutes later, their times were recorded for reading the same paragraph of a novel. The results of the experiment are shown below.

a) Ayva thinks drinking energy drinks makes students read faster. Using information from the experimental design or the results, explain why Ayva's hypothesis may be *incorrect*.

Using the given results, Ayva randomly mixes the 20 reading times, splits them into two groups of 10, and simulates the difference of the means 232 times.

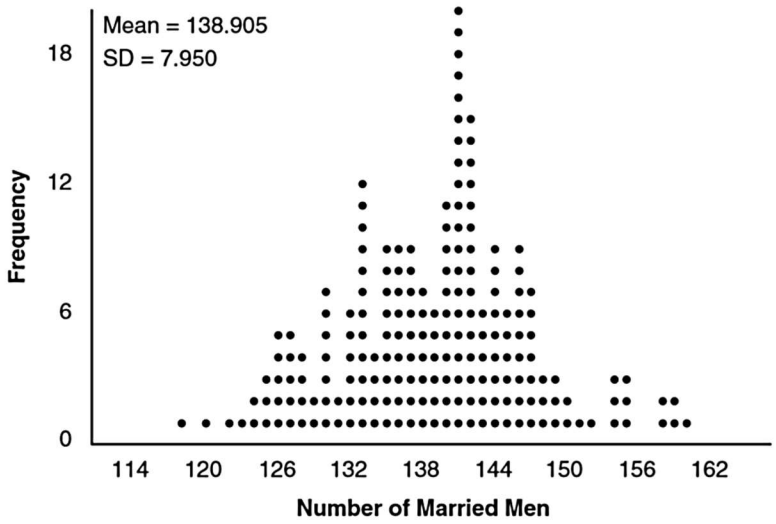


Group 1 (seconds)	Group 2 (seconds)
17.4	23.3
18.1	18.8
18.2	22.1
19.6	12.7
18.6	16.9
16.2	24.4
16.1	21.2
15.3	21.2
17.8	16.3
19.7	14.5
Mean = 17.7	Mean = 19.1

b) Ayva has decided that the difference in mean reading times is *not* an unusual occurence. Support her decision using the results of the simulation. Explain your reasoning.

January 2018

35 In a random sample of 250 men in the United States, age 21 or older, 139 are married. The graph below simulated samples of 250 men, 200 times, assuming that 139 of the men are married.



a) Based on the simulation, create an interval in which the middle 95% of the number of married men may fall. Round your answer to the *nearest integer*.

b) A study claims "50 percent of men 21 and older in the United States are married." Do your results from part *a* contradict this claim? Explain.

TRIGONOMETRY

June 2016

17 A circle centered at the origin has a radius of 10 units. The terminal side of an angle, θ, intercepts the circle in Quadrant II at point C. The y-coordinate of point C is 8. What is the value of $\cos\theta$?

(1) $-\frac{3}{5}$

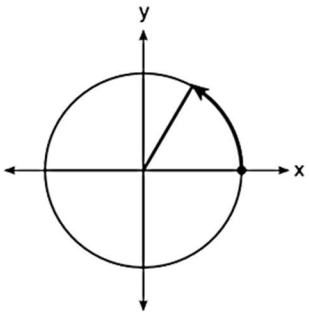
(2) $-\frac{3}{4}$

(3) $\frac{3}{5}$

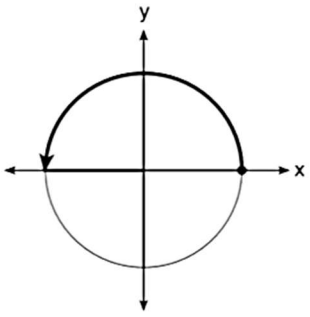
(4) $\frac{4}{5}$

August 2016

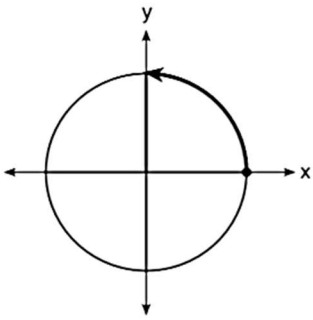
16 Which diagram shows an angle rotation of 1 radian on the unit circle?



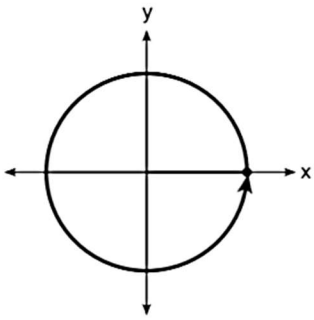
(1)



(3)



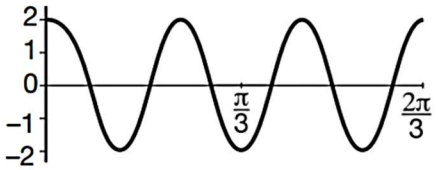
(2)



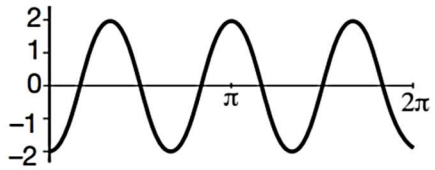
(4)

January 2017

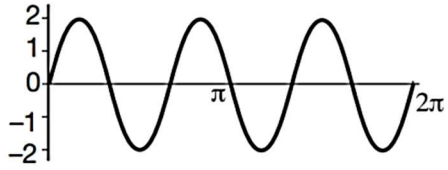
22 Which graph represents a cosine function with no horizontal shift, an amplitude of 2, and a period of $\frac{2\pi}{3}$?



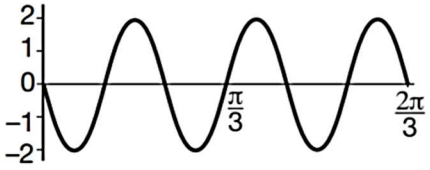
(1)



(3)



(2)



(4)

June 2016

13 The Ferris wheel at the landmark Navy Pier in Chicago takes 7 minutes to make one full rotation. The height, H, in feet, above the ground of one of the six-person cars can be modeled by $H(t) = 70 \sin\left(\frac{2\pi}{7}(t-1.75)\right) + 80$, where t is time, in minutes. Using $H(t)$ for one full rotation, this car's minimum height, in feet, is

(1) 150
(2) 70
(3) 10
(4) 0

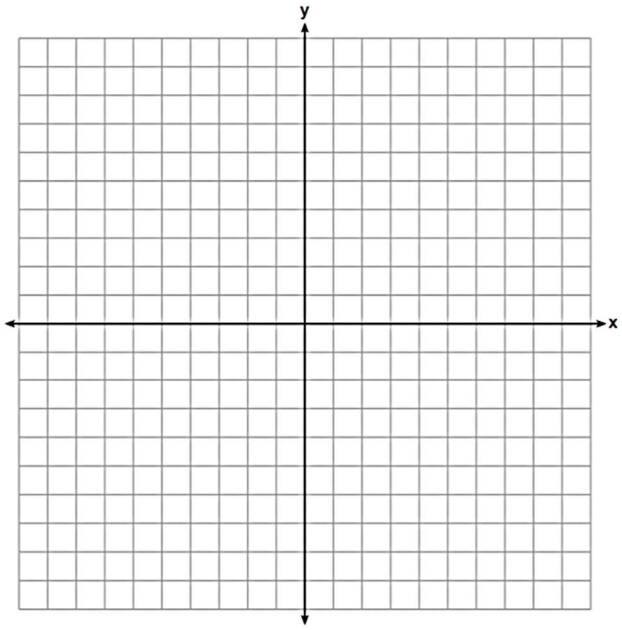
August 2016

10 A sine function increasing through the origin can be used to model light waves. Violet light has a wavelength of 400 nanometers. Over which interval is the height of the wave *decreasing*, only?

(1) (0, 200)
(2) (100, 300)
(3) (200, 400)
(4) (300, 400)

June 2016

28 On the axes below, graph *one* cycle of a cosine function with amplitude 3, period $\frac{\pi}{2}$, midline $y = -1$, and passing through the point (0,2).

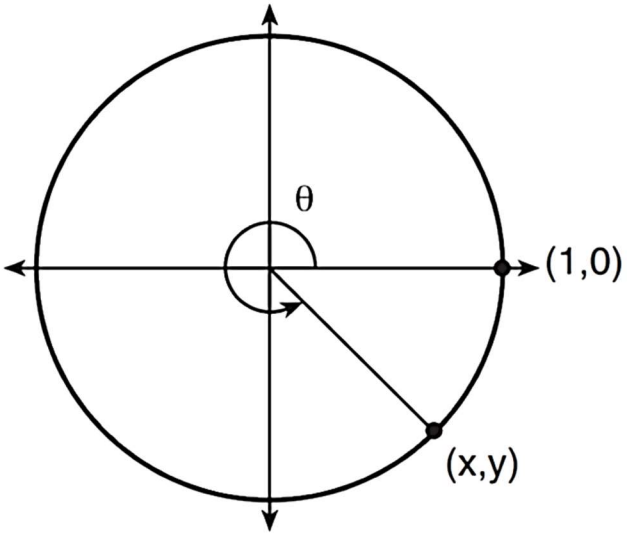


August 2016

28 Using the identity $\sin^2\theta + \cos^2\theta = 1$, find the value of $\tan\theta$, to the *nearest hundredth*, if $\cos\theta$ is -0.7 and θ is in Quadrant II.

January 2017

27 Using the unit circle below, explain why $\csc\theta = \frac{1}{y}$.



SEQUENCES AND SERIES

August 2016

8 A recursive formula for the sequence 18, 9, 4.5, ... is

(1) $g_1 = 18$
$g_n = \frac{1}{2}g_{n-1}$

(2) $g_n = 18\left(\frac{1}{2}\right)^{n-1}$

(3) $g_1 = 18$
$g_n = 2g_{n-1}$

(4) $g_n = 18(2)^{n-1}$

January 2017

14 The eighth and tenth terms of a sequence are 64 and 100. If the sequence is either arithmetic or geometric, the ninth term can *not* be

(1) -82
(2) -80
(3) 80
(4) 82

June 2016

10 The formula below can be used to model which scenario?

$$a_1 = 3000$$
$$a_n = 0.80a_{n-1}$$

(1) The first row of a stadium has 3000 seats, and each row thereafter has 80 more seats than the row in front of it.
(2) The last row of a stadium has 3000 seats, and each row before it has 80 fewer seats than the row behind it.
(3) A bank account starts with a deposit of \$3000, and each year it grows by 80%.
(4) The initial value of a specialty toy is \$3000, and its value each of the following years is 20% less.

June 2016

34 Alexa earns \$33,000 in her first year of teaching and earns a 4% increase in each successive year.

Write a geometric series formula, S_n, for Alexa's total earnings over n years.

Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	1 radian $= \frac{180}{\pi}$ degrees

Use this formula to find Alexa's total earnings for her first 15 years of teaching, to the *nearest cent*.

RANDOM TOPICS

Complex Numbers

January 2017

11 The solution to the equation $18x^2 - 24x + 87 = 0$ is

(1) $-\frac{2}{3} \pm 6i\sqrt{158}$

(2) $-\frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$

(3) $\frac{2}{3} \pm 6i\sqrt{158}$

(4) $\frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$

August 2016

27 Simplify $xi(i - 7i)^2$, where i is the imaginary unit.

Focus/Directrix Form of a Parabola

June 2016

30 The directrix of the parabola $12(y + 3) = (x - 4)^2$ has the equation $y = -6$. Find the coordinates of the focus of the parabola.

June 2017

17 A parabola has its focus at (1,2) and its directrix is $y = -2$. The equation of this parabola could be

(1) $y = 8(x + 1)^2$

(2) $y = \frac{1}{8}(x + 1)^2$

(3) $y = 8(x - 1)^2$

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