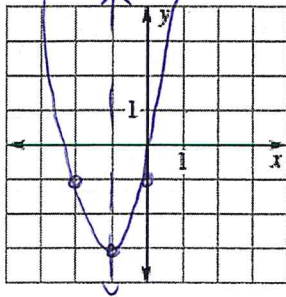


# End-of-Course Test

1. Graph  $y = 2(x + 1)^2 - 3$ . Identify the vertex.



$v: (-1, -3)$

$x$	$y$	
0	-1	$2(1)^2 - 3$
		$2 - 3$
		$-1$
1	5	$2(2)^2 - 3$
		$8 - 3$
		$5$

## Answers

1. See left.

2. 1, 4

3.  $13 + 26i$

4.  $-\frac{3}{2} \pm \sqrt{3}$

5.  $\frac{1 \pm 2\sqrt{3}}{2}$

6.  $x = 2, -2, \frac{1}{2}, -3$

7.  $y = \frac{x+4}{7}$

8. 47

9.  $2\sqrt{6}$

10. 6

11. 4.087

12. 2.623

13. See left.

$D: (-\infty, -1) \cup (-1, \infty)$

$R: (-\infty, 2) \cup (2, \infty)$

2. Solve the equation  $x^2 - 5x + 4 = 0$ .  $(x-1)(x-4) = 0$   $x-1=0$   $x-4=0$   
 $x=1, 4$

3. Write the product  $(4 - 7i)(-2 + 3i)$  as a complex number in standard form.  $-8 + 12i + 14i - 21i^2$   $13 + 26i$

4. Solve  $2x^2 + 6x + 3 = 0$  by completing the square.  $2(x^2 + 3x + \frac{9}{2}) = -3 + 9$   
 $2(x + \frac{3}{2})^2 = \frac{6}{2}$

5. Use the quadratic formula to solve the equation  $4x^2 - 4x - 11 = 0$ .  $x = \frac{1 \pm 2\sqrt{3}}{2}$

6. Find all the real zeros of  $f(x) = 2x^4 + 5x^3 - 11x^2 - 20x + 12$ .

7. Find an equation for the inverse of the relation  $y = 7x - 4$ .

8. Given  $f(x) = 2x - 3$  and  $g(x) = x^2 - 2$ , find  $g(f(5))$ .

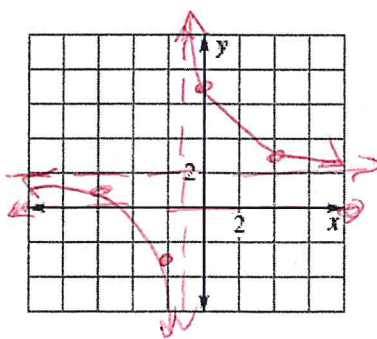
9. Solve the equation  $\sqrt[4]{x^2 - 8} = 2$ .  $x^2 - 8 = 16$   $x = 2\sqrt{6}$   
 $x^2 = 24$

10. Evaluate  $\log_2 64$ .

11. Use the change-of-base formula to evaluate  $\log_2 17$ .  $\frac{\log 17}{\log 2}$

12. Solve the equation  $4^{2x-1} = 360$ .  $2x-1 = \log_4 360$   
 $x = \frac{\log_4 360 + 1}{2}$

13. Graph  $y = \frac{5}{x+1} + 2$ . State the domain and range.



$x$	$y$
0	7
-2	-3
4	3
-6	1

5.  $x = \frac{4 \pm \sqrt{16 - 4 \cdot 4 \cdot (-11)}}{8} = \frac{4 \pm \sqrt{192}}{8}$

$\frac{4 \pm 8\sqrt{3}}{8} = \frac{1 \pm 2\sqrt{3}}{2}$

6.  $2 \mid 2 \ 5 \ -11 \ -20 \ 12$   
 $\quad 4 \ 18 \ 14 \ -12$   
 $\hline -2 \mid 2 \ 9 \ 7 \ -6 \ 0$   
 $\quad -4 \ -10 \ 6$   
 $\hline 2 \ 5 \ -3 \ 0$   
 $x = \frac{1}{2}, -3$

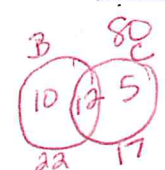
14. Determine whether the function  $g(x) = 2x^3 - 3x$  is even, odd, or neither.

14. odd

15. Out of the 80 students in the freshman class at a small school, 27 students are either in the band or in the choir. There are 22 freshmen who are in the band and 17 freshmen who are in the choir. What is the probability that a randomly selected freshman is both in the band and in the choir?

15. 12

$$P(\text{band and choir}) = \frac{P(\text{band}) \cdot P(\text{choir})}{P(\text{band or choir})}$$



16. A normal distribution has a mean of 28 and a standard deviation of 1.5. What is the z-score for a data value of 25.75?

17. The results of a survey were reported on a television news program. The reporter stated that the margin of error for the survey was  $\pm 3.5\%$ . To the nearest whole number, how many people were surveyed?

18. Find the sum of the series  $\sum_{n=40}^{43} (8-n)$ .  $(8-40) + (8-41) + (8-42) + (8-43)$

$S_n = \frac{a_1(1-r^n)}{1-r}$

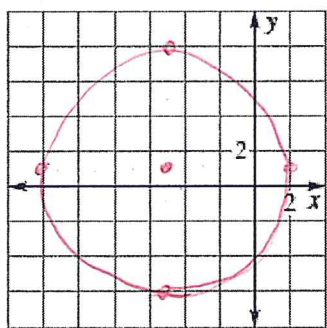
19. Find the sum of the series  $\sum_{k=1}^6 2^k$ .  $2^1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6$   
 $2 + 4 + 8 + 16 + 32 + 64$

20. Find the 9th term of the geometric sequence 10, -20, 40, -80, ...  
 $10(-2)^{8} = 1280$

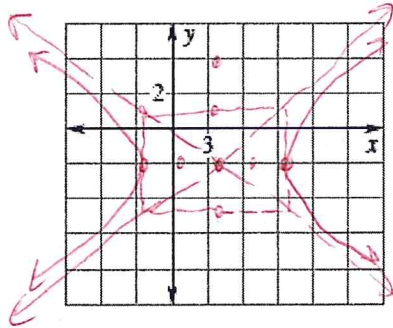
21. Find the distance between and the midpoint of the line segment joining the two points (-3, 5) and (4, 1).  
 Distance:  $\sqrt{7^2 + 4^2} = \sqrt{65}$   
 Midpoint:  $(\frac{-3+4}{2}, \frac{5+1}{2}) = (\frac{1}{2}, 3)$

22. Write an equation of the line tangent to the circle  $x^2 + y^2 = 34$  at the point (-5, -3).  
 $y + 3 = -\frac{5}{3}(x + 5)$   
 $y + 3 = -\frac{5}{3}x - \frac{25}{3}$

23. Graph the circle  $(x + 5)^2 + (y - 1)^2 = 49$ .



24. Graph the hyperbola  $\frac{(x-4)^2}{36} - \frac{(y+2)^2}{9} = 1$ .



25. Write the equation of the circle with center (3, -4) and radius 5.

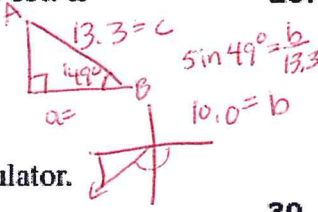
26. Write the equation of the parabola with vertex (-2, 3) and focus (-2, 1).  
 $p = -2$   
 $(x+2)^2 = -8(y-3)$

27. Convert  $\frac{7\pi}{6}$  to degrees.  $\frac{7\pi}{6} \cdot \frac{180}{\pi} = 210^\circ$

S/A  
T/C

28. Find the values of the other 5 trigonometric functions of x if  $\tan x = -\frac{5}{12}$  and  $\cos x < 0$ .  
 hyp: 13  
 opp: 5  
 adj: -12  
 $\cos 49^\circ = \frac{9}{13.3}$   
 $\sin 49^\circ = \frac{6}{13.3}$

29. Solve  $\triangle ABC$  with  $B = 49^\circ$ ,  $C = 90^\circ$ , and  $c = 13.3$ .



30. Evaluate the function  $\cos(-150^\circ)$  without using calculator.

31. Write an equation of the graph of  $y = \sin 3\pi x$  translated down 2 units and right 3 units, and then reflected in the x-axis.

Answers

16. See left.

0.0668

17. 816

18. -134

19. 126

20. 2560

21. See left.

$\sqrt{65}$

$(\frac{1}{2}, 3)$

22.  $y = -\frac{5}{3}x - \frac{34}{3}$

23. See left.

24. See left.

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

26.  $(x+2)^2 = -8(y-3)$

27.  $210^\circ$

28.  $\sin \theta = \frac{5}{13}$

$\cos \theta = -\frac{12}{13}$

$\csc \theta = \frac{13}{5}$

$\sec \theta = -\frac{13}{12}$

$\cot \theta = -\frac{12}{5}$

29.  $A = 41^\circ$

$b = 10.0$

$a = 8.73$

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

31.  $y = -\sin 3\pi(x-3) - 2$

# Study Island

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Generation Date: 05/27/2015

Generated By: Dawn Nolan

Title: Final Test Review

32. Given the following, use a Pythagorean identity to find  $\sin(\theta)$  if  $\theta$  is in quadrant II.

$$\cos(\theta) = -\frac{3}{7}$$

S/A  
+/-

A.  $-\frac{2\sqrt{10}}{7}$

$$\sin^2 \theta + \frac{9}{49} = \frac{49}{49}$$

B.  $\frac{40}{49}$

$$\sin^2 \theta = \frac{40}{49}$$

C.  $\frac{2\sqrt{10}}{7}$

$$\sin \theta = \frac{2\sqrt{10}}{7}$$

D.  $-\frac{40}{49}$

33. Use the remainder theorem to determine if  $x = -18$  is a zero of the following polynomial, and find the quotient and the remainder.

$$p(x) = x^3 + 15x^2 + 71x + 105$$

No,  $x = -18$  is not a zero of the polynomial.

A. The quotient is  $x^2 + 33x + 665$ , and the remainder is 12,075.

Yes,  $x = -18$  is a zero of the polynomial.

B. The quotient is  $x^2 + 33x + 665$ , and the remainder is 0.

Yes,  $x = -18$  is a zero of the polynomial.

C. The quotient is  $x^2 - 3x + 125$ , and the remainder is -2,145.

$$\begin{array}{r} -18 \overline{) 1 \ 15 \ 71 \ 105} \\ \underline{-18 \ 54 \ -237} \\ 1 \ -3 \ 125 \ -2145 \end{array}$$

No,  $x = -18$  is not a zero of the polynomial.

D. The quotient is  $x^2 - 3x + 125$ , and the remainder is -2,145.

34. The number of trees in a forest is decreasing due to deforestation. At the beginning of 1995, there were 9,286 trees in the forest. The following function represents the number of trees remaining in the forest after  $m$  months.

$$T(m) = 9,286 \cdot e^{(-0.11m)}$$

Approximately how many months will it take for there to only be 5,979 trees remaining in the forest?

A. 79

$$5979 = 9286 \cdot e^{-0.11m}$$

B. 4.05

$$\ln \frac{5979}{9286} = -0.11m = -\frac{1}{9}m$$

C. 73.62

D. 4.95

$$-9 \ln \left( \frac{5979}{9286} \right) = m$$

35. Elisa took a quiz that had 20 multiple choice questions. Since each question had four answer choices, she decided to roll a four-sided die to determine her answer. If the die landed on 1, Elisa chose A, if the die landed on 2, she chose B, and so on. Elisa's answers are shown in the chart below.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20  
DAACBCADAB B A B A C A D B A D

$\frac{16}{20}$

If Elisa got all of the D answers wrong and she got all of the A, B, and C answers correct, what is the probability that a randomly selected question from the quiz would have a correct answer?

A.  $\frac{4}{5}$

B.  $\frac{17}{20}$

C.  $\frac{9}{10}$

D.  $\frac{3}{4}$

36. Which of the following is the inverse of

$$f(x) = (x + 5)^5 - 4?$$

A.  $f^{-1}(x) = \sqrt[5]{x - 5} + 4$

B.  $f^{-1}(x) = \sqrt[5]{x - 4} + 5$

C.  $f^{-1}(x) = -\sqrt[5]{x + 5} - 4$

D.  $f^{-1}(x) = \sqrt[5]{x + 4} - 5$

37. On average, high school students study 37 minutes per night, with a standard deviation of 7 minutes. What percentage of high school students study more than 44 minutes per night?

*Note: Assume that a Normal model is appropriate for the distribution of study times.*

About 68% of high school students study  
 A. more than 44 minutes per night.

About 16% of high school students study  
 B. more than 44 minutes per night.

About 32% of high school students study  
 C. more than 44 minutes per night.

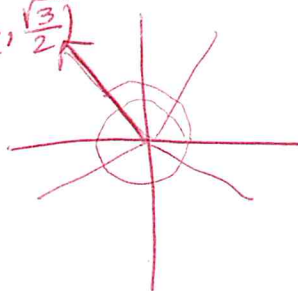
About 34% of high school students study  
 D. more than 44 minutes per night.

38. Find the corresponding point on the unit circle for the radian measure given below.

$$\theta = \frac{8\pi}{3}$$

A.  $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

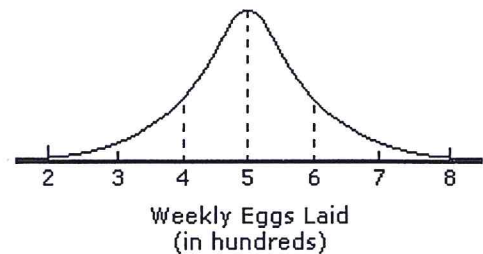
B.  $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$



C.  $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

D.  $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

39. The average number of eggs laid on a weekly basis at all the Mullroy Farms locations are normally distributed with a mean of 500 eggs and a standard deviation of 100 eggs as shown below.



Out of the 2,000 locations, how many average between 300 eggs and 500 eggs laid per week?

A. 974

B. 668

C. 1,004

D. 950

40. Jeff wants to register his five-year-old son, Maddox, for one sports program this year. He can choose between soccer, baseball, lacrosse, basketball, or football. Jeff is having trouble deciding which sport to choose. Which of the following best describes a method of assuring that each sport has a fair chance of being chosen?

Flip a fair coin four times. If the coin lands on heads exactly four times, choose soccer. If the coin lands on heads exactly three times, choose baseball. If the coin lands on heads exactly two times, choose lacrosse. If the coin lands on heads exactly one time, choose basketball. If the coin lands on heads exactly zero times, choose football.

A. exactly two times, choose lacrosse. If the coin lands on heads exactly one time, choose basketball. If the coin lands on heads exactly zero times, choose football.

Create a spinner with five regions that are equal in size. Color each region a different color: red, green, blue, orange, and yellow. If the spinner lands on red, choose soccer. If the

B.

spinner lands on green, choose baseball. If the spinner lands on blue, choose lacrosse. If the spinner lands on orange, choose basketball. If the spinner lands on yellow, choose football.

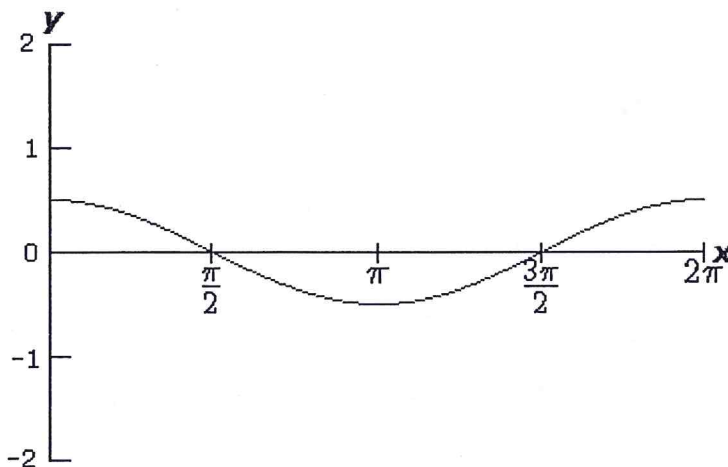
Roll an ordinary die. If the die lands on one, choose soccer. If the die lands on two, choose baseball. If the die lands on three, choose lacrosse. If the die lands on four, choose basketball. If the die lands on five, choose football. If the die lands on six, choose soccer.

C.

Using a random number generator, assign each sport a number, eliminating any duplicate numbers. Choose the sport associated with the even number.

D.

41.



The graph given above shows the following function.

$$y = \frac{1}{2} \cos(x)$$

What is the amplitude of the function?

- A. 2
- B. 1
- C.  $\frac{1}{2}$
- D. 4

$$x^2 - 2x + 29 = 0$$

42. What are the solutions to  $x^2 - 2x + 29$ ?

- A.  $-1 - 5i, 1 - 5i$
- B.  $-1 + 5i, 1 + 5i$
- C.  $1 - 5i, 1 + 5i$
- D.  $-1 - 5i, -1 + 5i$

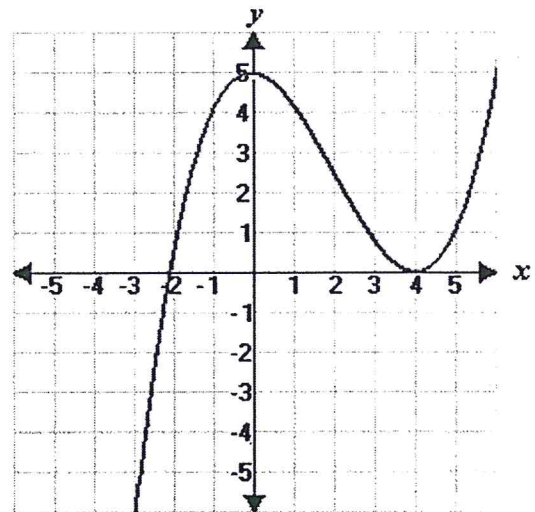
$$(x-1)^2 + 29 - 1$$

$$(x-1)^2 + 28 = 0$$

$$x-1 = \pm\sqrt{28}$$

$$x = 1 \pm 5i$$

43. What are the properties of the point (0, 5) in this graphed function?



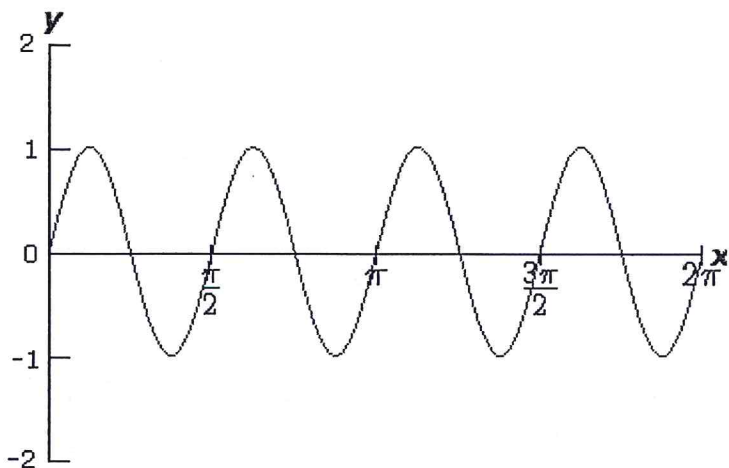
- A. It is a relative maximum and a y-intercept.
- B. It is a relative minimum and an x-intercept.
- C. It is a relative maximum and an x-intercept.
- D. It is a relative minimum and a y-intercept.

44. Two flowers are planted in separate pots. Each flower receives equivalent amounts of soil, water, and fertilization. One pot is then placed so that it can receive normal sunlight, and one pot is placed in a dark room. Then the growth of each plant is observed.

Which of the following methods is being applied?

- A. survey
- B. observational study
- C. separation study
- D. controlled experiment

45.



The graph given above shows the following function.

$$y = \sin(4x)$$

What is the period of the function?

- A.  $\pi$
- B.  $\frac{\pi}{2}$
- C.  $\frac{\pi}{4}$
- D.  $2\pi$

46. Use sigma notation to represent the following series for 9 terms.

$$6 + \frac{6}{3} + \frac{6}{9} + \frac{6}{27} \dots$$

- A.  $\sum_{k=0}^8 \left(\frac{6}{3}\right)^{k-1}$
- B.  $\sum_{k=1}^9 \left(\frac{6}{3}\right)^{k-1}$
- C.  $\sum_{k=0}^8 6\left(\frac{1}{3}\right)^{k-1}$
- D.  $\sum_{k=1}^9 6\left(\frac{1}{3}\right)^{k-1}$

47. Functions  $f(x)$  and  $g(x)$  are defined below.

$$f(x) = \sqrt{2-x} - 13$$

$$g(x) = \sqrt{x} - 13$$

Determine where  $f(x) = g(x)$  by constructing a table of values.

- A.  $x = 2$
- B. no solution
- C.  $x = 1$
- D.  $x = 0$

48.

Which of the following is the inverse of  $f(x) = \frac{2-x}{5}$ ?

- A.  $f^{-1}(x) = \frac{5+x}{2}$
- B.  $f^{-1}(x) = 5x - 2$
- C.  $f^{-1}(x) = 2 - 5x$
- D.  $f^{-1}(x) = 2 - \frac{x}{5}$

49. Consider the function  $f(x) = 9^x$  and the function  $g(x)$ , which is given below.

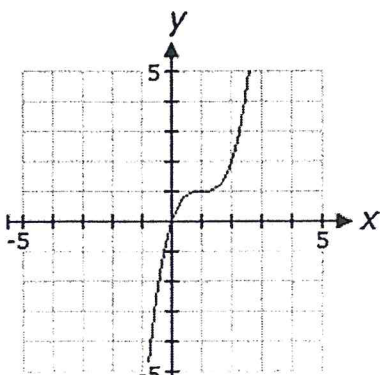
$$g(x) = 2 \cdot f(x + 2) + 9 = 2 \cdot 9^{(x+2)} + 9$$

How will the graph of  $g(x)$  differ from the graph of  $f(x)$ ?

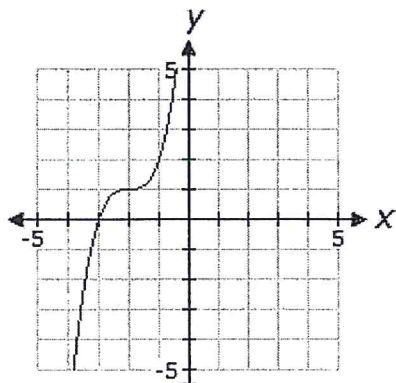
- A. The graph of  $g(x)$  is the graph of  $f(x)$  shifted left two units, up nine units, and vertically stretched by a factor of two.
- B. The graph of  $g(x)$  is the graph of  $f(x)$  shifted left two units, up nine units, and vertically compressed by a factor of two.
- C. The graph of  $g(x)$  is the graph of  $f(x)$  shifted right two units, up nine units, and vertically stretched by a factor of two.
- D. The graph of  $g(x)$  is the graph of  $f(x)$  shifted left two units, down nine units, and vertically stretched by a factor of two.

50. Using a table of values, find the graph of the function below.

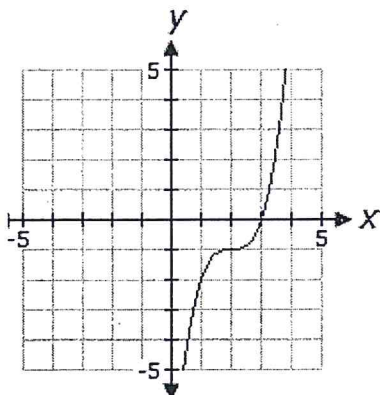
$$f(x) = x^3 + 6x^2 + 12x + 9$$



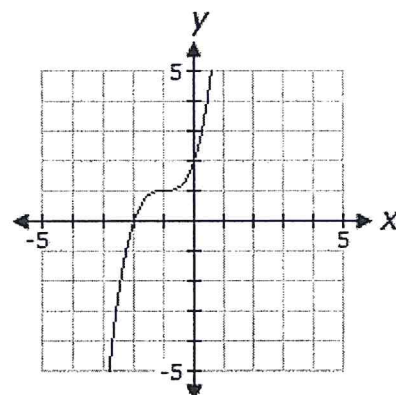
W.



X.



Y.



Z.

- A. X
- B. Z
- C. W
- D. Y

51. Multiply.

$$(-3 + 2i) \times (-1 - 5i)$$

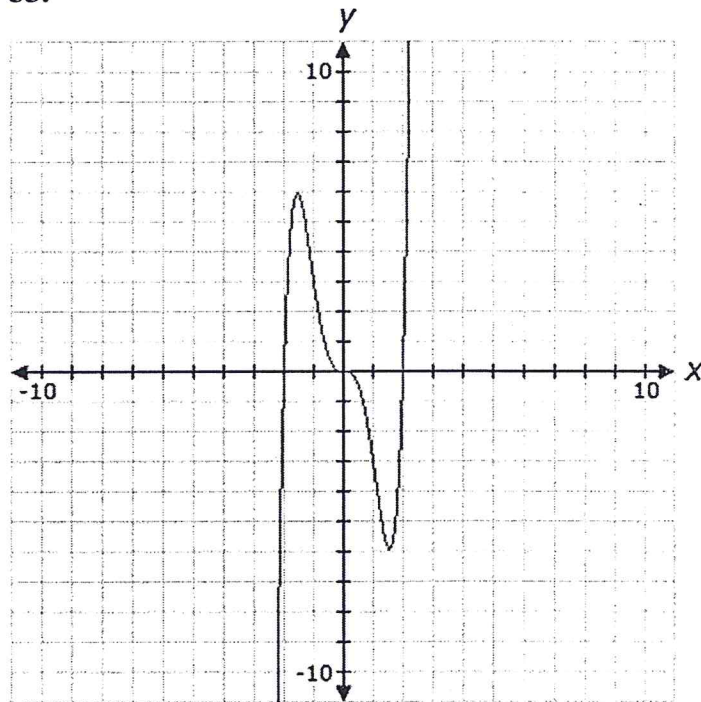
- A.  $13 + 13i$
- B.  $13 - 13i$
- C.  $-7 - 13i$
- D.  $-7 + 13i$

$$3 + 15i - 2i + 10$$

52. On average, adult males consume 2,486 calories per day, with a standard deviation of 74 calories. What percentage of adult males consume between 2,338 calories and 2,634 calories?  
*Note: Assume that a Normal model is appropriate for the distribution of calories.*

- A. About 2.5% of adult males consume between 2,338 calories and 2,634 calories per day.
- B. About 47.5% of adult males consume between 2,338 calories and 2,634 calories per day.
- C. About 5% of adult males consume between 2,338 calories and 2,634 calories per day.
- D. About 95% of adult males consume between 2,338 calories and 2,634 calories per day.

53.



Which of the following describes the end behavior of the function graphed above?

- A. As  $x$  decreases in value,  $f(x)$  decreases in value.  
 As  $x$  increases in value,  $f(x)$  decreases in value.

- B. As  $x$  decreases in value,  $f(x)$  increases in value.  
As  $x$  increases in value,  $f(x)$  increases in value.
- C. As  $x$  decreases in value,  $f(x)$  decreases in value.  
As  $x$  increases in value,  $f(x)$  increases in value.
- D. As  $x$  decreases in value,  $f(x)$  increases in value.  
As  $x$  increases in value,  $f(x)$  decreases in value.
-