Name_____ Date _____

Algebra 2 Post-Course Test

1. Find $\left(\dfrac{f}{g}\right)(2)$ given that $f(x) = -10x$ and $g(x) = x + 3$.

2. Solve $2\sqrt[3]{5x + 2} = 4$.

$x =$

3. Which of the following correctly orders $e^{\ln 4}$, $\log_2 2^6$, $\log_2 33$, and $\log_3 26$ from least value to greatest value?

Ⓐ $e^{\ln 4}$, $\log_2 2^6$, $\log_2 33$, $\log_3 26$

Ⓑ $\log_2 33$, $e^{\ln 4}$, $\log_2 2^6$, $\log_3 26$

Ⓒ $\log_3 26$, $e^{\ln 4}$, $\log_2 33$, $\log_2 2^6$

Ⓓ $\log_2 2^6$, $\log_3 26$, $e^{\ln 4}$, $\log_2 33$, $e^{\ln 4}$

4. The product of two binomials is $x^2 + 12x - 13$. What is the sum of the two binomials?
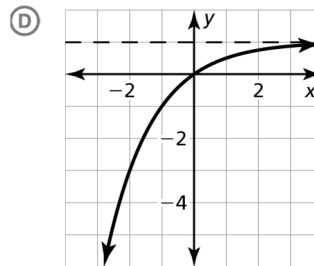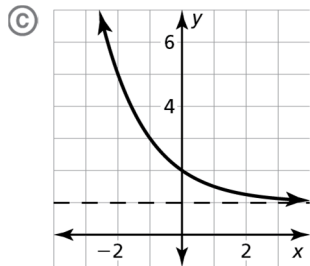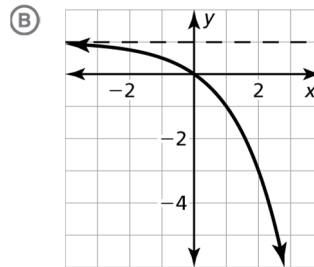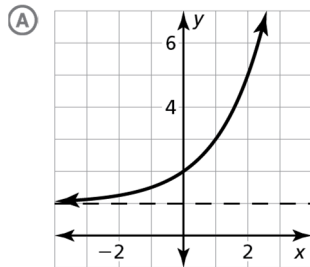
Ⓐ $2x - 12$

Ⓑ $2x + 12$

Ⓒ $2x + 2\sqrt{13}$

Ⓓ $2x - 14$

5. What is the LCD of the rational expressions in $\dfrac{6}{x} + \dfrac{1}{x + 2} = \dfrac{3}{x}$?

Ⓐ x

Ⓑ $x + 2$

Ⓒ $x(x + 2)$

Ⓓ $x^2(x + 2)$

Algebra 2 **Post-Course Test** (continued)

6. Which graph represents the function $f(x) = 1 - \left(\dfrac{1}{2}\right)^x$?

Ⓐ

Ⓑ

Ⓒ

Ⓓ

7. Write an equation of the parabola in vertex form that passes through $(-2, 4)$ and has a vertex of $(0, 8)$.

_____

8. What is the vertex of

$f(x) = 2(x - 3)^2 + 7?$

Ⓐ $(-3, -7)$

Ⓑ $(-3, 7)$

Ⓒ $(3, -7)$

Ⓓ $(3, 7)$

**9.** Which degree measure is equivalent to $\dfrac{3\pi}{8}$?

Ⓐ $22.5°$

Ⓑ $67.5°$

Ⓒ $135°$

Ⓓ $225°$

Algebra 2

Post-Course Test (continued)

10. At a school, 16% of students participate in a regional competition, 5% of students participate in a state competition, and 2% of students participate in both a regional and a state competition. What is the probability that a student who participates in a regional competition also participates in a state competition?

Ⓐ 0.8%

Ⓑ 3.2%

Ⓒ 12.5%

Ⓓ 40%

11. Which graph represents the function $f(x) = \dfrac{1}{x-2} + 2?$

Ⓐ

Ⓑ

Ⓒ

Ⓓ
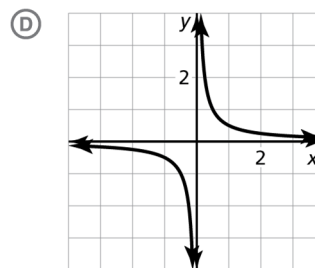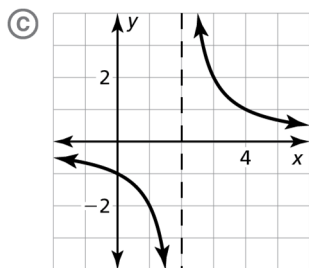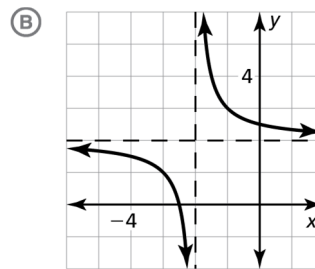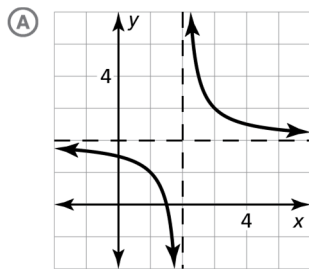
12. What is the greatest number of real zeros for a polynomial function of degree 4?

Ⓐ 1

Ⓑ 2

Ⓒ 3

Ⓓ 4

13. Which of the following represents $3x^3 - 12xy^2$ factored completely?

Ⓐ $3x(x^2 - 4y^2)$

Ⓑ $3x(x + 2y)(x - 2y)$

Ⓒ $3x(2y + x)(2y - x)$

Ⓓ $3(x + 4y)(x - 4y)$

Algebra 2

Post-Course Test (continued)

14. Solve $1 = \sqrt{2}\sin(x + 90°)$ for $0 \le x \le 90°$.

$x = $ [grid answer boxes] °

15. Write the expression $\sqrt{2} \bullet \sqrt{49} \bullet \sqrt{2}$ in simplest form.

[grid answer boxes]

16. Which statement is true about the inverse of $f(x) = 2x - 4$?

Ⓐ The inverse of f is a function; $f^{-1}(x) = \dfrac{1}{2}x + 2$.

Ⓑ The inverse of f is a function; $f^{-1}(x) = 2x + 4$.

Ⓒ The inverse of f is not a function; $f^{-1}(x) = \dfrac{1}{2}x + 2$.

Ⓓ The inverse of f is not a function; $f^{-1}(x) = 2x + 4$.

17. Which statement about the graph of the function g is true?

Ⓐ The degree is even and the leading coefficient is positive.

Ⓑ The degree is odd and the leading coefficient is positive.

Ⓒ The degree is even and the leading coefficient is negative.

Ⓓ The degree is odd and the leading coefficient is negative.
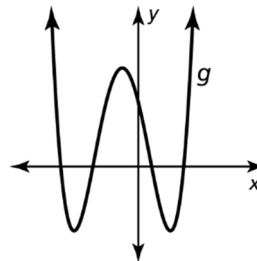
Algebra 2 Post-Course Test (continued)

18. For which sequence is the sum of the first three terms equal to 60?

Ⓐ $a_n = 10 + 6n$

Ⓑ $a_n = 18 + n$

Ⓒ $a_n = 8^n - 4$

Ⓓ $a_n = \frac{1}{2}(4)^n$

19. Which equation represents a line through the points $(0, 4)$ and $(2, 0)$?

Ⓐ $y = x - 2$

Ⓑ $y = 2x + 4$

Ⓒ $y = 4x - 2$

Ⓓ $y = -2x + 4$

20. What is the range of $y = -2x^2$?

Ⓐ All real numbers

Ⓑ $y < 0$

Ⓒ $y \leq 0$

Ⓓ $y \leq -2$

21. Which point is a solution of $y < x^2 + 6x + 8$?

Ⓐ $(-3, 10)$

Ⓑ $(-3, 5)$

Ⓒ $(-3, -1)$

Ⓓ $(-3, -5)$

22. Nine students are competing in an art show. In how many ways can the students finish first and second?

Ⓐ 18

Ⓑ 36

Ⓒ 72

Ⓓ 181,440

23. You want to determine whether students in your school like the new vending machines. You randomly select 20 students from each grade. Which type of sample did you use?

Ⓐ systematic sample

Ⓑ stratified sample

Ⓒ cluster sample

Ⓓ convenience sample

Algebra 2   Post-Course Test (continued)

24. What is the ratio of the perimeter to the area of the rectangle shown?

(A) $\dfrac{3x + 7}{x^2 + 5x + 6}$

(B) $\dfrac{2x^2 + 10x + 12}{6x + 14}$

(C) $\dfrac{3x + 7}{2x^2 + 10x + 12}$

(D) $\dfrac{1}{x + 3}$

x + 3

2x + 4
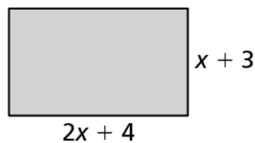
25. What are the zeros of
$f(x) = 3x^2 + 21$?

(A) $x = -\sqrt{7}$ and $x = \sqrt{7}$

(B) $x = -\sqrt{3}$ and $x = \sqrt{3}$

(C) $x = -i\sqrt{7}$ and $x = i\sqrt{7}$

(D) $x = -i\sqrt{3}$ and $x = i\sqrt{3}$

26. Select all the equations such that x and y show direct variation.

(A) $-xy = 4$

(B) $x = -y$

(C) $x + 2 = y$

(D) $3x = y$

27. Evaluate $\sin\dfrac{\pi}{2} - 5\cos\dfrac{\pi}{3}$.
Write your answer as a decimal.

28. Which matrix has the same determinant

as $\begin{bmatrix} 2 & k \\ 3 & -2 \end{bmatrix}$?

(A) $\begin{bmatrix} -4 & k \\ 3 & 0 \end{bmatrix}$

(B) $\begin{bmatrix} k & -2 \\ 2 & -3 \end{bmatrix}$

(C) $\begin{bmatrix} k & 1 \\ 4 & -3 \end{bmatrix}$

(D) $\begin{bmatrix} -3 & -2 \\ 2 & -k \end{bmatrix}$

Algebra 2 **Post-Course Test** (continued)

29. A journalist surveys urban residents and rural residents at random about their opinion of a bill. The two-way table shows the results. Select all the true statements about the two-way table.

		Opinion	
		Positive	Negative
Type of Resident	**Rural**	20	5
	Urban	12	13

(A) Fifty residents were surveyed.

(B) Of urban residents, 48% have a negative opinion.

(C) Of those who have a positive opinion, 12 are urban residents.

(D) Of those who have a positive opinion, 80% are rural residents.

(E) 80% of the rural residents have a positive opinion.

30. The graph of a function is shown. Select all the equations that represent the graph.
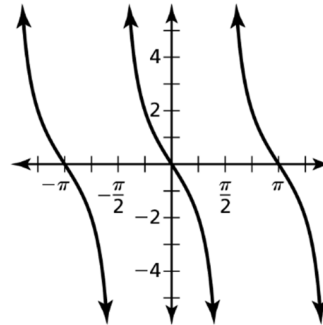
(A) $f(x) = -2\tan(x + \pi)$

(B) $f(x) = 2\tan(x - \pi)$

(C) $f(x) = \tan(x + 2\pi)$

(D) $f(x) = 2\cot\left(x - \dfrac{\pi}{2}\right)$

(E) $f(x) = \cot(x - 2\pi)$

(F) $f(x) = -2\cot(x + \pi)$

31. The lengths of lip-synching videos on a website are normally distributed with a mean of 20 seconds and a standard deviation of 5 seconds. What percent of videos on the website are between 15 and 25 seconds long?

(A) about 16%

(B) about 34%

(C) about 68%

(D) about 95%

Algebra 2

Post-Course Test (continued)

32. Select all the expressions equivalent to $\left(\sqrt[4]{16}\right)^3$.

- Ⓐ 6
- Ⓑ $16^{3/4}$
- Ⓒ 8
- Ⓓ $16^{4/3}$

33. What is the first term of a geometric sequence with a common ratio of -2 and $a_5 = -80$?

- Ⓐ -1280
- Ⓑ -5
- Ⓒ 5
- Ⓓ 1280

34. Write the series $5 + 9 + 13 + 17 + 21$ using summation notation.

_____

35. Simplify $e^x \bullet e^{-3} \bullet e^{x+6}$.

_____

36. Solve $4^{x+1} = 16^{x-4}$.

$x =$

37. The numbers of apps of 20 tablet owners are shown in the table. Find the sample mean $\bar{x}$.

$\bar{x} =$

Number of Apps	
10	12
13	9
14	14
12	10
8	15
14	14
12	16
17	20
25	26
18	21

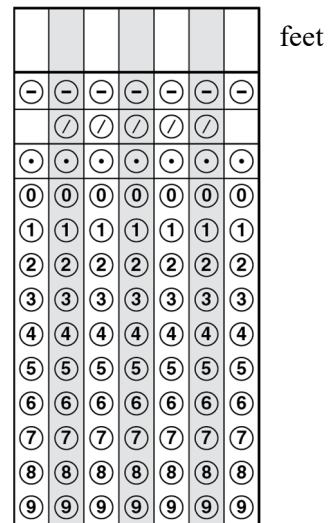**Algebra 2** **Post-Course Test** (continued)

38. What is the amplitude of the function $y = a \sin bx$?

_____

39. Which of the following describes the transformation of $f(x) = e^x$ represented by $g(x) = e^{-x+1}$?

Ⓐ The graph of g is a horizontal translation 1 unit left of the graph of f.

Ⓑ The graph of g is a reflection in the y-axis followed by a horizontal translation 1 unit right of the graph of f.

Ⓒ The graph of g is a reflection in the x-axis followed by a horizontal translation 1 unit right of the graph of f.

Ⓓ The graph of g is a reflection in the line $y = -x + 1$ of the graph of f.

40. A cornhole bag is tossed from 3 feet above the ground, and its height h (in feet) can be modeled by $h(t) = -16t^2 + 16t + 3$, where t is the time (in seconds) after the bag is tossed. What is the maximum height of the bag?

feet

41. Select all the factors of $2x^3 + 7x^2 + 2x - 3$.

Ⓐ $x - 1$

Ⓑ $x + 1$

Ⓒ $x - 3$

Ⓓ $x + 3$

Ⓔ $2x + 1$

Ⓕ $2x - 1$

Algebra 2

Post-Course Test (continued)

42. Which function represents exponential growth?

Ⓐ $y = 2(0.75)^x$

Ⓑ $y = (1.25)^x$

Ⓒ $y = 0.25(0.05)^x$

Ⓓ $y = -\left(\frac{e}{4}\right)^x$

43. What is $f(g(x))$ given that $f(x) = -2x$ and $g(x) = 3|x|$?

Ⓐ $f(g(x)) = 6|x|$

Ⓑ $f(g(x)) = -6|x|$

Ⓒ $f(g(x)) = 6x^2$

Ⓓ $f(g(x)) = -6x^2$

44. The probability of the *complement* of an event is 25%. Describe the probability of the event.

Ⓐ The probability of the event is 75%. So, the event is likely to happen.

Ⓑ The probability of the event is 25%. So, the event is unlikely to happen.

Ⓒ The probability of the event is 75%. So, the event is unlikely to happen.

Ⓓ The probability of the event is 25%. So, the event is likely to happen.

45. The function $V(x) = \frac{4}{3}\pi x^3$ represents the volume (in cubic feet) of the sphere. The function $W(x) = V(3x)$ represents the volume (in cubic feet) of the sphere when x is measured in yards. Find $W(2)$. Use 3.14 for π.

cubic feet