1. $(x + y) + z = x + (y + z)$ is an example of the _____ property of addition.

A. commutative
B. associative
C. distributive
D. identity

2. What is the value of $x^2 + 3x - 9$ when $x = -3$?

A. -27
B. -9
C. -6
D. 9

3. Given: $a\Delta b = | a - b |$, what is the value of $2\Delta\pi$?
A. $2 - \pi$
B. $-2 - \pi$
C. $2 + \pi$
D. $\pi - 2$

4. If a positive number is increased by 70 percent, and then the result is decreased by 50 percent, which of the following accurately describes the net change?

A. a 20 percent decrease
B. a 15 percent decrease
C. a 12 percent increase
D. a 20 percent increase

5. In a hockey league, 87 players play on seven different teams. Each team has at least 12 players. What is the largest possible number of players on any one team?
A. 13
B. 14
C. 15
D. 21

6. The expression $\sqrt{27} + \sqrt{12}$ is equivalent to
A. $5\sqrt{3}$
B. $13\sqrt{3}$
C. $5\sqrt{6}$
D. $\sqrt{39}$

7. The expression $\dfrac{14\sqrt{150}}{7\sqrt{2}}$ is equivalent to

A. $7\sqrt{3}$

B. $10\sqrt{2}$

C. $\sqrt{150}$

D. $10\sqrt{3}$

8. $(\sqrt{7} - 3)^2$ is equivalent to

A. $16 - 6\sqrt{7}$

B. $7 - 6\sqrt{7}$

C. $9 - 6\sqrt{7}$

D. $-2 - 6\sqrt{7}$

9. If a is an odd integer and b is an even integer, which of the following must be odd?

A. $2a+b$

B. $a +2b$

C. a^2b

D. ab^2

10. Which of the following is equivalent to $7^{77} - 7^{76}$?

A. 7

B. 7^{77-76}

C. $7^{77 \div 76}$

D. $7^{76}(6)$

11. Find the slope of a line perpendicular to the line whose equation is $3y + 2x = 6$.

A. 2

B. -2

C. $-\frac{3}{2}$

D. $\frac{3}{2}$

12. Write an equation for the line passing through the points (1,2) and (-2,5)?

A. $y = x + 3$
B. $y = -x + 3$
C. $y = \frac{7}{3}x + 1$
D. $y = 3x + 3$

13. Write an equation for the line passing through the points (c,2b) and (c, 3b).

A. $y = cx - b$
B. $y = -cx + b$
C. $x = 2b$
D. $x = c$

14. Which point is a solution to the system $y = x^2 + 4x + 3$ and $y = 2x + 6$?

A. (-3,0)
B. (1,-8)
C. (3,0)
D. (0,-3)

15. Solve for x: $\dfrac{5}{15} = \dfrac{x}{x+8}$

A. 3
B. 4
C. 5
D. 7

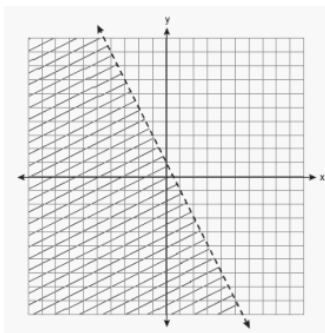16. $\dfrac{1}{x+1} + \dfrac{1}{x}$, where $x \neq 0, -1$, simplifies to

A. $\dfrac{2x+3}{x^2 + x}$

B. $\dfrac{2x+1}{x^2 + x}$

C. $\dfrac{2}{2x+1}$

D. $\dfrac{3}{x^2}$

17. If $3x^2 - 7y + 6$ is subtracted from $4x^2 - 3y + 4$, the result is

A. $7x^2 - 10y + 10$
B. $x^2 - 10y - 2$
C. $x^2 + 4y - 2$
D. $-x^2 - 4y + 2$
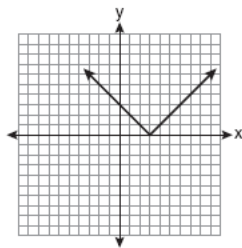
18. Which inequality is represented by the graph below?

A. $y < 2x + 1$
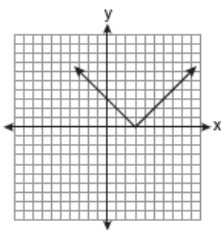B. $y \leq -2x + 1$
C. $y < -2x + 1$
D. $y > -2x + 1$

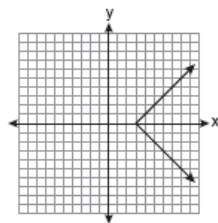19. The diagram below shows the graph of $y = f(x)$.
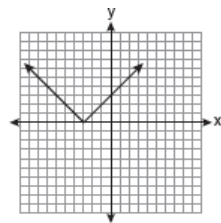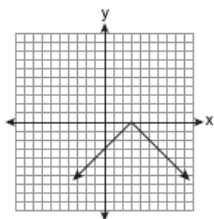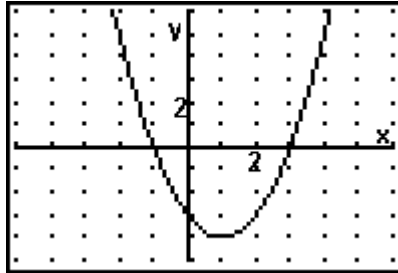Which answer shows the graph of $y = -f(x)$?

 [A]   [B]

 [C]   [D]

20. If $x \neq 0$, and $x^2 - 3x = 6x$, then $x = $?

A. -3
B. 3
C. -9
D. 9

21. What are the roots of this parabola?

A. 3 and 1

B. 1 and 0

C. 3 and -1

D. -4 and 0

22. What is the equation of the axis of symmetry of the graph $y = 3x^2 + 12x - 2$?

A. $x = -2$
B. $x = 2$
C. $y = -2$
D. $y = 2$

23. There are about 200 calories in 50 grams of Swiss cheese. Tom ate 70 grams of this cheese. About how many calories were in the cheese that he ate if the number of calories varies directly as the weight of the cheese.

A. 210
B. 240
C. 280
D. 290

24. If n - 5 is an even integer, what is the next larger consecutive even integer?

A. $n - 7$
B. $n - 3$
C. $n - 4$
D. $n + 2$

25. If $\dfrac{x}{2} - \dfrac{x}{6}$ is an integer, which of the following statements must be true?

A. x is positive.
B. x is odd.
C. x is a multiple of 3
D. x is a multiple of 6

26. What is the value of $f(3)$ if $f(x) = (8 - 3x)(x^2 - 2x - 15)$?

A. -30
B. -18
C. 12
D. 24

27. In the following system, what does $y = ?$

$$x + 3y - z = -6$$
$$2x + 3y + 2z = 11$$
$$-3x + 4y - 2z = -20$$

A. -1
B. -2
C. 2
D. 5

28. If y varies indirectly as the cube of x, and k is the constant of variation, find the equation to describe this relationship.

A. $y = \dfrac{x^3}{k}$

B. $y = \dfrac{k}{x^3}$

C. $y = \dfrac{k}{\sqrt[3]{x}}$

D. $x^3 = ky$

29. Daniel's Print Shop purchased a new printer for $35,000. Each year it depreciates (loses value) at a rate of 5%. What will its approximate value be at the end of the fourth year?
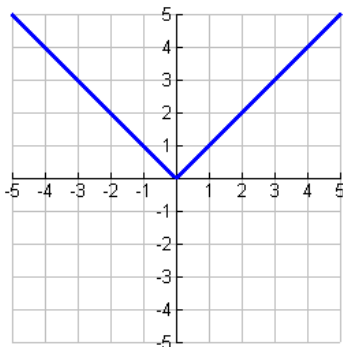
A. $33,250.00
B. $30,008.13
C. $28,507.72
D. $27,082.33

30. Which equation below could depict exponential decay?

A. $y = 3^x$

B. $y = 1.4^x$

C. $y = 0.5^x$

D. $y = 2^x$

31. What type of function is graphed here?

A. quadratic
B. absolute value
C. linear
D. exponential

32. Factor: $25x^6 - 121y^4$

A. $55(x^3 - y^2)(x^3 + y^2)$
B. $(5x^3 - 11y^2)(5x^3 + 11y^2)$
C. $(5x^3 - 11y^2)(5x^3 - 11y^2)$
D. $(5x^3 + 11y^2)(5x^3 + 11y^2)$

33. Factor: $16x^2 + 114x - 45$

A. $(4x - 9)(4x + 5)$
B. $(8x - 3)(2x + 15)$
C. $(4x + 9)(4x - 5)$
D. $(4x + 15)(4x - 3)$

34. Factor: $24ax - 16bx - 18ay + 12by$

A. $2(3a - 2b)(4x - 3y)$
B. $(8x - 6y)(3a - 2b)$
C. $2(3ax - 4by)^2$
D. $2(4ax - 3by)^2$

35. Solve: $-3(2x-5) \ge 2-x$

A. $x \ge \frac{5}{2}$
B. $x \le \frac{13}{5}$
C. $x \ge \frac{13}{5}$
D. $x \le \frac{5}{13}$

36. Solve: $12x^2 - 37x - 10 \le 0$

A. $\left[\frac{4}{3}, 5\right]$
B. $\left[-\frac{1}{3}, \frac{5}{2}\right]$
C. $\left(-\infty, -\frac{1}{4}\right] \cup \left[\frac{10}{3}, \infty\right)$
D. $\left[-\frac{1}{4}, \frac{10}{3}\right]$

37. Find the midpoint of the line segment with endpoints (-2, 3) and (-4,-5).

A. $(1,-9)$
B. $(-1,-4)$
C. $(1,4)$
D. $(-3,-1)$

38. Determine the length of the line segment with endpoints (-3,-5) and (7,-11).

A. 12
B. $2\sqrt{34}$
C. $2\sqrt{13}$
D. $\sqrt{356}$

39. The following problem has how many real solutions: $\sqrt{5x-4} - 1 = \sqrt{3x-3}$?

A. 3
B. 2
C. 1
D. 0

40. Simplify: i^{243}

A. 1
B. i
C. -1
D. $-i$