1. $(5x - 3)^2 =$
    a. $25x^2 - 30x + 9$
    b. $25x^2 + 9$
    c. $25x^2 - 9$
    d. $25x^2 - 15x + 9$
    e. $25x^2 - 15x - 9$

2. When $12x^3 + 8x^2 - x + 6$ is divided by $3x^2 + 5x$, the remainder is
    a. 20
    b. 20x
    c. $x - 6$
    d. $9x + 3$
    e. $19x + 6$

3. The domain of $f(x) = \frac{x-2}{x\sqrt{x+4}}$ is
    a. All real numbers
    b. $x > 0$
    c. $x > -4$
    d. $x > -4$ and $x \neq 0$
    e. $x > -4$ and $x \neq 0,2$

4. If s is the length of the side of a cube, the cube's surface area is
    a. $6s^2$
    b. $8s^2$
    c. $6s^3$
    d. $8s^3$
    e. s^3

5. Copier A takes 4 minutes to do a job and copier B takes 6 minutes to do the same job. Running both copiers at the same time, how many minutes does the job take?
    a. 2.0
    b. 2.2
    c. 2.4
    d. 2.6
    e. 2.7

6. Given two circles, x is the larger circle's radius and $\frac{x}{3}$ is the smaller circle's radius. The area of the larger circle is _____ times the area of the smaller circle.

    a. 3

    b. π

    c. $\frac{8}{9}$

    d. 9

    e. $\frac{1}{9}$

7. For $x \neq -2$, $\frac{x^2-3x-10}{x^2+9x+14}$ simplifies to

    a. $\frac{-3x-10}{9x+14}$

    b. $\frac{x-5}{x+7}$

    c. $\frac{x-3}{x+3}$

    d. $\frac{x-13}{24}$

    e. $\frac{-5}{7}$

8. Graphing the solution of the following system of inequalities gives a region bounded by what figure?

$$x \leq 3$$

$$0 \leq y \leq 2$$

$$y \leq x$$

    a. rectangle

    b. rhombus

    c. trapezoid

    d. triangle

    e. parallelogram

9. If $\left(\frac{1}{3}\right)^{4x+10} = 81$, then $5^{2x+4} =$

    a. 1

    b. 25

    c. 125

    d. $\frac{1}{25}$

    e. $\frac{1}{125}$

10. The horizontal asymptote of $f(x) = \frac{5x^2}{x^2-4}$ is

    a. $x = 5$

    b. $y = \frac{5}{4}$

    c. $y = 5$

    d. $x = -2$

    e. $x = 2$

11. The graph of $h(x) = f(x+4) + 5$ is obtained by shifting the graph of $f(x)$

    a. left 4 units and up 5 units
    b. right 4 units and up 5 units
    c. left 5 units and up 4 units
    d. right 5 units and down 4 units
    e. left 5 units and down 4 units

12. Sue is 6 years older than her sister. Thirty years from now the sum of their ages will be 80. What is the sum of their ages now?

    a. 14
    b. 16
    c. 18
    d. 20
    e. 22

13. $\left(\frac{x^{-6}x^2}{x^4}\right)^{60}$ simplifies to

    a. x^{480}
    b. x^{-480}
    c. x^{60}
    d. x^{-60}
    e. 1

14. Which of the following lines is perpendicular to the line $9x + 8y = 1$?

    a. $y = \frac{8}{9}x$

    b. $y = \frac{9}{8}x$

    c. $y = -\frac{8}{9}x$

    d. $y = -\frac{9}{8}x$

    e. $y = \frac{1}{8}x$

15. Given the function f(x) = 3x – 4, its inverse is

     a. $f^{-1}(x) = -3x - \frac{4}{3}$

     b. $f^{-1}(x) = \frac{1}{3}x + \frac{4}{3}$

     c. $f^{-1}(x) = \frac{1}{3}x + 4$

     d. $f^{-1}(x) = -3x + 4$

     e. $f^{-1}(x) = -3x - 4$

16. To be in a light-weight competition an athlete's weight, w, must be within 6 pounds of 138 pounds. This can be expressed as

     a. $|w - 6| \geq 138$

     b. $|w - 138| \geq 6$

     c. $|w - 6| \leq 138$

     d. $|w - 138| \leq 6$

     e. $|w| \leq 144$

17. $i^{203} =$

     a. i

     b. – 1

     c. – i

     d. 1

     e. 0

18. As x increases from $-\infty$ to ∞, $f(x) = |x|$ is

     a. always increasing

     b. always decreasing

     c. decreasing then increasing

     d. increasing then decreasing

     e. constant

19. The <u>sum</u> of the solutions of $x^2 + x + 1 = 0$ is

     a. -2

     b. -1

     c. 0

     d. 1

     e. 2

20. In how many ways can 6 people be seated in 6 chairs?
    a. 36
    b. 216
    c. 720
    d. 1024
    e. 1296

21. Solve $\frac{2x+3}{5} = x - 1$. The solution is between which consecutive integers?
    a. -4 and -3
    b. -2 and -1
    c. -1 and 0
    d. 1 and 2
    e. 2 and 3

22. For x ≠ ±3, $\dfrac{\frac{x}{x+3}+1}{\frac{5}{x^2-9}+1} =$
    a. $\dfrac{x(x-3)}{5}$
    b. $\dfrac{3x^2+4x-18}{x-8}$
    c. $\dfrac{(2x+3)(x^2-9)}{x}$
    d. $\dfrac{x^2+8x+9}{x+4}$
    e. $\dfrac{2x^2-3x-9}{x^2-4}$

23. One hundred balls numbered 1 through 100 are in a spinning drum. A ball is drawn out at random. What is the probability the number on the ball is a multiple of 6?
    a. 0.16
    b. 0.24
    c. 0.25
    d. 0.30
    e. 0.33

24. $\dfrac{x}{x^2+x-6} + \dfrac{4}{x^2-4} =$

    a. $\dfrac{x+4}{2x^2+x-10}$

    b. $\dfrac{x+1}{x^2+x-1}$

    c. $\dfrac{x^2+2x+10}{2x^2+x-10}$

    d. $\dfrac{x^2+6x+12}{(x+3)(x-2)(x+2)}$

    e. $\dfrac{x^2+4x+14}{(x+3)(x-2)(x+2)}$

25. Find the point of intersection of the lines $3x - 2y = 7$ and $5x + 3y = 1$. What is the sum of the x-coordinate and the y-coordinate?

    a. $-\dfrac{79}{167}$

    b. $-\dfrac{11}{23}$

    c. $-\dfrac{10}{23}$

    d. $-\dfrac{9}{19}$

    e. $-\dfrac{10}{19}$

26. Solve $\log_2 x + \log_2(x + 10) = 4$. The solution is between which consecutive integers?

    a. 0 and 1

    b. 1 and 2

    c. 2 and 3

    d. 3 and 4

    e. there is no solution

27. Solve $\sqrt{26 - 11x} = 4 - x$. The <u>sum</u> of the solutions is

    a. -4

    b. -3

    c. -1

    d. 0

    e. 1

28. You run a trail at 7 mph and walk back at 3 mph. If your total time is 1.5 hours, your round-trip distance is how many miles?
    a. 5.0
    b. 5.5
    c. 5.9
    d. 6.3
    e. 6.7

29. Among the zeros of a polynomial function with rational coefficients are $3, 4, 7 + \sqrt{3}$, and $5 + 8i$. The least degree the polynomial function can have is
    a. 3
    b. 4
    c. 5
    d. 6
    e. 7

30. Consider the graphs of $\frac{x^2}{5} + \frac{y^2}{4} = 1$ and $x^2 + y^2 = 5$. The graphs
    a. intersect at 4 points
    b. intersect at 3 points
    c. intersect at 2 points
    d. intersect at 1 point
    e. do not intersect

31. Let d be a non-zero real number. The quadratic equation $dx^2 + dx + d = 0$ has complex conjugate roots for what values of d?
    a. all real numbers except 0
    b. only positive real numbers
    c. only negative real numbers
    d. only real numbers greater than 4
    e. only real numbers less than – 4

32. Express 0.34797979... as a reduced fraction. The sum of the numerator and the denominator is
    a. 2669
    b. 3480
    c. 4635
    d. 5870
    e. 8759

33. Find the value of b such that the parabola $y = ax^2 + bx + c$ passes through the points
    (0, -38), (1, -17), and (2, -2)
    a. 4
    b. 10
    c. 18
    d. 24
    e. 36

34. Which of the following <u>cannot</u> be factored by grouping?
    a. $x^5 + 2x^4 + x + 2$
    b. $x^3 + 4x^2 - 9x - 36$
    c. $x^3 + 2x^2 - x - 2$
    d. $x^3 - 2x^2 - x + 2$
    e. all of the above can be factored by grouping

35. Which of the following is an equation of the circle with center (4,6) and passing
    through the point (8,3)?
    a. $x^2 - 8x + y^2 - 12y + 20 = 0$
    b. $x^2 - 8x + y^2 - 12y + 27 = 0$
    c. $(x - 8)^2 + (y - 3)^2 = 0$
    d. $x^2 - 4x + y^2 - 6y - 30 = 0$
    e. $x^2 - 4x + y^2 - 6y - 23 = 0$

36. $1001 + 1002 + 1003 + \ldots + 2000 =$
    a. 1,100,500
    b. 1,200,500
    c. 1,300,500
    d. 1,400,500
    e. 1,500,500

37. Find a value of k such that x + 4 is a factor of $5x^2 + kx - 32$.
    a. 4
    b. 5
    c. 8
    d. 9
    e. 12

38. Solve $\dfrac{8x+1}{x-2} + 4 = \dfrac{7x+3}{x-2}$

    a. no solution

    b. 0

    c. $\dfrac{7}{8}$

    d. $\dfrac{13}{15}$

    e. 2

39. Solve the following inequality: $-x^2 + 10\,x - 23 \leq 0$. The solution set is

    a. $(-\infty, \infty)$

    b. $(-\infty, 5 - \sqrt{2}] \cup [5 + \sqrt{2}, \infty)$

    c. $[5 - \sqrt{2}, 5 + \sqrt{2}]$

    d. $(-\infty, 2] \cup [5, \infty)$

    e. $[2,5]$

40. A mixture of 70% pure solution and 40% pure solution produces 10 liters of 65% pure solution. How many liters of the 70% pure solution were used?

    a. $8\dfrac{1}{3}$

    b. $7\dfrac{5}{6}$

    c. $7\dfrac{3}{4}$

    d. $7\dfrac{1}{6}$

    e. $6\dfrac{2}{7}$