Name: _____   Date: _____
Grade & Section: _____   Score: _____

Mathematics 10
First Diagnostic Test
S.Y. 2018–2019

> Write the letter corresponding to the correct answer in the blank.
> You may use the back of the paper for your computations.

_____ 1. Find the sum of the zeros of the function $f(x) = 3x^2 + 9x - 12$.

    A. -3 B. 3 C. -5 D. 5

_____ 2. At what values of x will the graph of $y = x^2 - x - 20$ intersect the x-axis?

    A. $(-5, 4)$ B. $(-4, 5)$ C. $(-5, -4)$ D. $(4, 5)$

_____ 3. The binomial $(x - 1)$ is a factor of $2x^2 - 5x + 3$. What is the other factor?

    A. $(3x - 2)$ B. $(3x + 2)$ C. $(2x - 3)$ D. $(2x + 3)$

_____ 4. What is the degree of the polynomial function $P(x) = 3x - 9x^3 + 5x^4 - 5$?

    A. 1 B. 2 C. 3 D. 4

_____ 5. Given the polynomial function $P(x) = 121x^2 - 5x^{11} + x^8 + 2x^5 - 50$, find its leading term.

    A. $121x^2$ B. $2x^5$ C. $-5x^{11}$ D. x^8

_____ 6. Which of the following is a quadratic function?

    A. $y = (3x^2 + 1)(x - 2)$ C. $y = \sqrt{x^2 - 49}$

    B. $y = 5(2x - 3)^2$ D. $y = \dfrac{x^2 + 5x + 6}{x - 2}$

_____ 7. Which of the following is a polynomial of three terms?

    A. Binomial   B. Monomial   C. Multinomial   D. Trinomial

_____ 8. The polynomial function $P(x) = 4x^4 - 17x^2 + 4$ has how many possible rational zeros?

    A. 4 B. 3 C. 2 D. 1

_____ 9. What is the next term in the geometric sequence 4, 12, 36?

    A. 42 B. 54 C. 72 D. 108

_____ 10. Find the common difference in the arithmetic sequence $3, \dfrac{13}{4}, \dfrac{7}{2}, \dfrac{15}{4}$.

    A. 4 B. $\dfrac{5}{2}$ C. $\dfrac{1}{4}$ D. $\dfrac{3}{4}$

_____ 11. When factored, what is the solution set of $3x^2 - 12x - 15 = 0$?

    A. $\{1, 5\}$ B. $\{-1, 5\}$ C. $\{-1, -5\}$ D. $\{1, -5\}$

_____ 12. If $(x - 1)$ is a factor of the polynomial $x^2 - 2x + 1$, which one is the other factor?

A. $(x+2)$ B. $(x-2)$ C. $(x+1)$ D. $(x-1)$

_____ 13. Find the equation of a quadratic function whose zeros are 5 and -3.

A. $x^2 + 2x + 15 = 0$ B. $x^2 + 2x - 15 = 0$ C. $x^2 - 2x + 15 = 0$ D. $x^2 - 2x - 15 = 0$

_____ 14. Find the remainder of $P(x) = 3x^{100} - 4x^{50} + 8$ divided by $(x+1)$.

A. 1   B. 5   C. 7   D. 15

_____ 15. Which of the following will determine if $x+1$ is a factor of $f(x) = x^3 - 15x^2 + 9x + 5$?

A. $f(-1) = (-1)^3 - 15(-1)^2 + 9(-1) + 5$ C. $f(-1) = (-1)^3 - 15(-1)^2 + 9(1)$
B. $f(1) = (1)^3 - 15(1)^2 + 9(1) + 5$ D. $f(1) = (1)^3 - 15(1)^2 + 9(1)$

_____ 16. Find the leading coefficient of the polynomial function $f(x) = 3 - 2x^2 + 5x^4 + 7x^6$.

A. -2   B. 3   C. 5   D. 7

_____ 17. Choose the polynomial equation whose zeros are -7, 3 and 4.

A. $x^3 - 37x - 84 = 0$ C. $x^3 + 84x^2 - 14x + 14 = 0$
B. $x^3 - 37x + 84 = 0$ D. $x^3 + 84x^2 + 14x - 14 = 0$

_____ 18. Which of the following defines a polynomial function?

A. $P(x) = x^{-5} + x^2 + 3x + 6$ C. $G(x) = 3x^3 - 4x + 7$
B. $Q(x) = 3x^2 + \dfrac{5}{x^2} - 2x + 8$ D. $F(x) = 4\sqrt{x} - 11$

_____ 19. Which theorem states that "If the polynomial $P(x)$ is divided by $(x-c)$, then the remainder is $P(c)$"?

A. Factor Theorem   C. Rational Root Theorem
B. Integral Zero Theorem   D. Remainder Theorem

_____ 20. According to Descartes' rule of signs, how many positive zeros does the polynomial function $f(x) = 4x^5 - 6x^3 + 2x^2 - 6x - 9$ have?

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

_____ 21. What are the x-intercepts of $f(x) = x^2(x+3)(x-2)$?

A. -3 and 2   B. 3 and -2   C. -3 and -2   D. 3 and 2

_____ 22. What are the zeros of the polynomial function $h(x) = (x-2)(x+1)(x-3)$?

A. $-2, 1, -3$ B. $2, 1, -3$ C. $2, 1, 3$ D. $2, -1, 3$

_____ 23. To find the quotient of $(x^4 - 8x^3 - x^2 + 62x - 34) \div (x-7)$, which of the following solutions of synthetic division will be obtained?

A.
$$\begin{array}{r|rrrrr} -7 & 1 & -8 & -1 & 62 & -34 \\ & & -7 & 105 & -728 & 4662 \\ \hline & 1 & -15 & 104 & -666 & 4628 \end{array}$$

C.
$$\begin{array}{r|rrrrr} 7 & 1 & -8 & -1 & 62 & -34 \\ & & 7 & -7 & -56 & 42 \\ \hline & 1 & -1 & -8 & 6 & 8 \end{array}$$

B.
$$\begin{array}{r|rrrrr} -7 & 1 & -8 & -1 & 62 & -34 \\ & & -7 & -105 & 742 & -5628 \\ \hline & 1 & -15 & -106 & 804 & -5662 \end{array}$$

D.
$$\begin{array}{r|rrrrr} 7 & 1 & -8 & -1 & 62 & -34 \\ & & 7 & 7 & -42 & 140 \\ \hline & 1 & -1 & 6 & 20 & 108 \end{array}$$

_____ 24. Which set of numbers is an example of a harmonic sequence?

A. $\dfrac{1}{2}, -\dfrac{1}{2}, \dfrac{1}{2}, -\dfrac{1}{2}$ B. $2, \dfrac{2}{3}, \dfrac{2}{5}, \dfrac{2}{7}$ C. $\dfrac{1}{3}, \dfrac{1}{9}, \dfrac{1}{27}, \dfrac{1}{81}$ D. $\dfrac{1}{2}, -1, 2, -4$

_____ 25. What is the sum of all the odd integers between 8 and 26?

A. 155   B. 153   C. 151   D. 149

_____ 26. If three geometric means are inserted between 1 and 256, find the third geometric mean.

A. 128   B. 64   C. 16   D. 4

_____ 27. What is the next term in the harmonic sequence $\dfrac{1}{11}, \dfrac{1}{15}, \dfrac{1}{19}, \dfrac{1}{23}, \ldots$?

A. 25   B. 27   C. $\dfrac{1}{25}$ D. $\dfrac{1}{27}$

_____ 28. What is the next term in the Fibonacci sequence 1, 1, 2, 3, 5, 8, ...?

A. 11   B. 13   C. 15   D. 17

_____ 29. Find the sum of the first six terms of the geometric sequence where the first term is $\dfrac{1}{2}$ and the common ratio is 4.

A. $\dfrac{1365}{2}$ B. $\dfrac{365}{2}$ C. $1,365$ D. 365

_____ 30. What is the sum of the infinite geometric series $1 + (-\dfrac{1}{2}) + \dfrac{1}{4} + (-\dfrac{1}{8}) \ldots$?

A. 1   B. $-\dfrac{1}{32}$ C. $\dfrac{2}{3}$ D. $-\dfrac{3}{2}$

Life is the most difficult exam. Many people fail because they try to copy others, not realizing that everyone has a different question paper!