MTAP Elimination Round Grade 8

Instruction: Write your answer on the space provided before each item. Give all fractions in lowest terms and if applicable, write all expressions in expanded form.

_____1. Find the next two elements of the sequence
1, 6, 13, 24, 37, ...

_____2. Factor completely: $25a^2 - 9b^2$

_____3. Simplify: $3^n + 3^n + 3^n$

_____4. Write in lowest terms without zero or negative exponents: $\frac{a^{3p+1}b^{p+2}}{a^{3p-1}b^{p}}$

_____5. Reduce to lowest terms: $\frac{(2x+7)x+3}{(2x+7)(x+3)}$

_____6. Perform the indicated operation and simplify:

$$\frac{x^3}{x^2-4x+3} \cdot \frac{x^2+2x-15}{x^2+5x}$$

_____7. Solve the equation for F: $C = \frac{5}{9}(F - 32)$

_____8. Factor completely: $x^3 + 64y^3$

_____9. Write in lowest terms without zero or negative exponents:

$$\left(\frac{x^3y^{-2}z^{-7}}{x^{-3}y^{-5}z^{2}}\right)^{-1/3}$$

_____10. What is the perimeter of a square if its area is $16x^2 + 56x + 49$, where $x > 0$?

_____11. As part of a school's coastal clean-up drive, a trip to visit a marine station has been organized. Eight teachers and staff, together with 210 students, signed up for the trip to pick up garbage that has been washed up on shore. How many buses are needed for the trip, if each bus can accommodate 40 people?

_____12. How many solutions does the system of equations have?

$$\begin{cases} 5x - 4y = 20 \\ \frac{x}{4} - \frac{y}{5} = 1 \end{cases}$$

_____13. If $f(x) = \frac{|x|}{x}$, what is f(a) if $a < 0$?

_____14. Perform the indicated operations and simplify:

$$\frac{4}{1+y} + \frac{6y}{1-y^2} + \frac{3}{y-1}$$

_____15. Factor completely: $ay^3 - 2ay^2 - 9ay + 18a$

_____16. Solve the equation: $\frac{3x+2}{2} + 3x - 2 = \frac{2x-3}{5}$

_____17. Solve the inequality: $3x + 6 < 5x - 12$

_____18. Let m be an integer. Give the contrapositive of the statement "If m^2 is even then m is even."

_____19. The denominator of a fraction is 3 less than twice the numerator. If 2 is added to the numerator and subtracted from the denominator, the resulting fraction is equal to 2. Find the original fraction.

_____20. What is the domain of the function $g(x) = \sqrt{4-x}$?

_____21. If $f(x) = \frac{1}{1-x}$ and $g(x) = \frac{1+x}{x}$, what is $(f \circ g)(2)$?

_____22. What is the slope of the line through the points (7, –3) and (–11, 9)?

_____23. In ΔPQR, $m\angle Q = 49°$ and $m\angle R = 77°$. Arrange the sides of the triangle in order of increasing length.

_____24. Solve the equation for b: $\frac{a}{b} = \frac{a-x-y}{b-x}$

_____25. Simplify the complex fraction: $1 + \frac{x}{1 - \frac{1}{1-x}}$

_____26. A line with slope $\frac{2}{3}$ passes through the point (8, –5). Write an equation of the line in slope-intercept form.

_____27. Line ℓ has x-intercept 4 and passes through the point (2, –5). What is the y-intercept of ℓ?

_____28. What are the domain and range of the function $h(x) = \frac{3}{x-2}$?

_____29. Write an equation of the line through the point (5,-3) and whose graph has no y-intercept.

_____30. Write an equation of the perpendicular bisector of the line segment joining (–5, –2) and (–9,4).

_____31. A rectangular lot has length in meters equal to 5 less than twice its width. One of the longer sides is against the wall so that only the three remaining sides needed fencing material. Find the dimensions of the lot if 39 meters of fencing material were used.

_____32. The length of a large size balikbayan box is 8 inches longer than its width, and its height is 1 inch shorter than its width. If the height of the box is x – 5, what is the volume of the box in terms of x?

_____33. A man has x pesos. If he spends y centavos, how many pesos has he left?

_____34. Find the maximum value of x such that 13! is divisible by 2^x.

_____35. Claudine is participating in a cosplay contest. If she can choose from 5 different outfits, 4 wigs, and 8 props, how many different cosplay costumes can she make?

_____36. Find the solution set of the linear system:

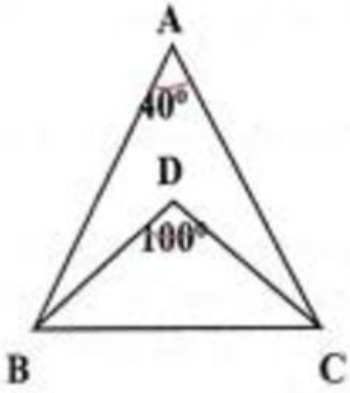
$$\begin{cases} 2x + 3y = 5 \\ 3x - 2y = 14 \end{cases}$$

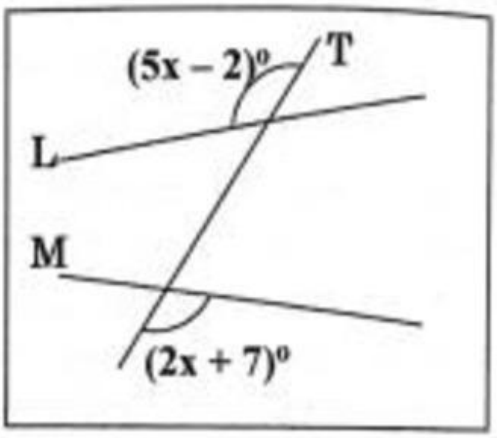
_____37. Write in lowest terms without zero or negative exponents:

$$\frac{x^{-2} - y^{-2}}{x^{-2}y^{-1} - x^{-1}y^{-2}}$$

_____38. Find two integers whose sum is 8 and whose difference is 12.

_____39. In the figure below, A, B, C, D are coplanar points with AB = AC and BD = CD. If m∠A = 40° and m∠D = 100°, what is m∠ACD?





_____40. Lines L and M are cut by a transversal T forming angles with measure $(5x - 2)^\circ$ and $(2x + 7)^\circ$ as shown in the figure above. Find x that will make line L ∥ M.

_____41. Find the area of the region on the first quadrant of the xy-plane bounded by the x-axis, the y-axis and the line $4x + 3y = 24$.

_____42. The Philippine transport agency LTFRB recently approved a new formula to compute tax fares based on flagdown or fixed rate, total distance travelled, and total running time (computed whether the taxi is moving or stationary). For Metro Manila, the flagdown rate is Php40, distance rate is Php13.50 per km, and running rate is Php2 per minute. Compute the taxi fare of a 10 km trip in Metro Manila, if the taxi was moving for 10minutes and caught in a traffic jam for 20minutes.

_____43. The mean of a set of 40 numbers is 60, and the mean of another set of 35numbers is 30. What is the mean when the two sets are combined?

_____44. Hannah typed her term paper at the rate of 36 words per minute. After typing for 12 minutes, she had 648 words left to type. Let f(t) be the number of words Hannah would be left to type after typing for t minutes. Write a formula for f(t).

_____45. Senior citizens get a 20% discount for admission tickets in a movie house priced at Php250 per adult. If 1,000 tickets were sold and total receipts were Php231,000, how many senior citizens watched the movie?

_____46. In right triangle ΔABC, the length of the hypotenuse $\overline{AB}$ is 15cm. If $m\angle A = 2m\angle B$, what is the length of $\overline{AC}$?

_____47. Von can do a carpentry job in 45 minutes while his brother JR can do the same job in 36 minutes. How long will it take them to finish the job if Von and JR work together?

_____48. The measure of two consecutive angles of a parallelogram are in the ratio 2 : 3. What are the measures of all angles of the parallelogram?

_____49. In a plane, the sides of $\angle x$ are parallel to the sides of $\angle y$. Determine all possible relationships between the two angles.

_____50. Two 6-sided dice are rolled simultaneously. If the dice are fair, what is the probability that the sum of the numbers on the dice is divisible by 3?