

Metrobank-MTAP-DepEd Math Challenge 2016  
Elimination Stage, Grade 8

Name: \_\_\_\_\_ School: \_\_\_\_\_ Score: \_\_\_\_\_

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

- \_\_\_\_\_ 1. Simplify:  $(a - b)^2(a + b)^2 + 2a^2b^2$ .
- \_\_\_\_\_ 2. Simplify:  $\left(\frac{125x^4y^3}{27x^{-2}y^6}\right)^{1/3}$ .
- \_\_\_\_\_ 3. Solve for  $x$  in the equation  $x^4 - 5x^2 + 4 = 0$ .
- \_\_\_\_\_ 4. In the arithmetic sequence  $10 + 10\sqrt{3}, 11 + 9\sqrt{3}, 12 + 8\sqrt{3}, \dots$ , what term has no  $\sqrt{3}$ ?
- \_\_\_\_\_ 5. If  $x + y = 12$  and  $xy = 50$ , what is  $x^2 + y^2$ ?
- \_\_\_\_\_ 6. What is the sum of the first ten terms of the geometric sequence  $4, 8, 16, \dots$ ?
- \_\_\_\_\_ 7. If the product of two consecutive odd integers is 783, what is the sum of their squares?
- \_\_\_\_\_ 8. If  $r$  and  $s$  are the roots of the equation  $2x^2 - 3x + 4 = 0$ , what is  $4r^2 + 7rs + 4s^2$ ?
- \_\_\_\_\_ 9. A long wire is cut into three smaller pieces in the ratio of  $7 : 3 : 2$ . If the shortest piece is 16 cm, what is the area of the largest rectangle that can be created using the longest piece?
- \_\_\_\_\_ 10. A boat takes  $\frac{2}{3}$  as much time to travel downstream as to its return. If the rate of the river's current is 8 kph, what is the rate of the boat in still water?
- \_\_\_\_\_ 11. How many prime numbers between 40 and 240 ends with 4?
- \_\_\_\_\_ 12. Simplify:  $x(1 - 6x) - (1 - 2x)(3x - 2)$ .
- \_\_\_\_\_ 13. What is the last digit of  $7^{2016}$ ?
- \_\_\_\_\_ 14. If  $a = 3$  and  $b = 7$ , what is  $4a^3b + 6a^2b^2 + 4ab^3$ ?
- \_\_\_\_\_ 15. What is the median of the numbers  $a + 1, a + 3, a - 2, a + 5$  and  $a - 4$ ?
- \_\_\_\_\_ 16. A rectangle is formed by putting two squares side by side. If each square has perimeter 28 cm, what is the perimeter of the rectangle?
- \_\_\_\_\_ 17. Solve for  $x$ :  $4(1 - 3x) - 2x(1 - 3x) + 5(1 - 3x) + 3x(1 - 3x) = 0$ .
- \_\_\_\_\_ 18. A jacket was worth Php 1,200. Hoping to gain more profit, the shop owner increased its price by 10%, but was later forced to reduce it by 15% since there were no takers. What was the final price of the jacket?
- \_\_\_\_\_ 19. Let  $\{a_n\}$  be an arithmetic sequence. If  $a_4 = 27$  and  $a_9 = 67$ , what is  $a_1$ ?
- \_\_\_\_\_ 20. Triangle ABC is isosceles with  $AB = AC$ . Let D be the foot of the altitude from A on BC, and let E be the point on side AC such that DE bisects  $\angle ADC$ . If  $\angle DEC = 67^\circ$ , what is  $\angle BAC$ ?
- \_\_\_\_\_ 21. What is the greatest integer less than or equal to  $(2 + \sqrt{3})^2$ ?
- \_\_\_\_\_ 22. Each week, a pet owner buys  $m$  kilograms of bananas for its monkeys. If each monkey eats  $n$  kilograms of bananas each day, how many monkeys does the pet owner have? Express your answer in terms of  $m$  and  $n$ .
- \_\_\_\_\_ 23. If  $8.07^3 = 525.557943$ , what is  $0.807^3$ ?
- \_\_\_\_\_ 24. Solve for  $x$ :  $3 < |1 + 2x|$ .
- \_\_\_\_\_ 25. What is the value of  $\frac{1}{3} + \frac{1}{15} + \frac{1}{35} + \frac{1}{63} + \frac{1}{99}$ ?
- \_\_\_\_\_ 26. Liza ran 200 meters in only 45 seconds. What was Lisa's speed in kilometers per hour?