

Metrobank-MTAP-DepEd Math Challenge 2016  
Elimination Stage, Grade 10

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

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

- \_\_\_\_\_ 1. Find the value of  $\sqrt{x + \sqrt{14 - x}}$  when  $x = -2$ .
- \_\_\_\_\_ 2. Find the area of the triangle formed by the coordinate axes and the line  $3x + 2y = 6$ .
- \_\_\_\_\_ 3. A sequence is defined by  $a_n = 3(a_{n-1} + 2)$  for  $n \geq 2$ , where  $a_1 = 1$ . What is  $a_4$ ?
- \_\_\_\_\_ 4. Christa leaves Town A. After traveling 12 km, she reaches Town B at 2:00 P.M. Then she drives at a constant speed and passes Town C, 40 km from Town B, at 2:50 P.M. Find the function  $d(t)$  that models the distance (in km) she has traveled from Town A  $t$  minutes after 2:00 P.M.
- \_\_\_\_\_ 5. What is the largest negative integer that satisfies the inequality  $|3x + 2| > 4$ ?
- \_\_\_\_\_ 6. A person has two parents, four grandparents, eight great-grandparents, and so on. How many ancestors does a person have 10 generations back?
- \_\_\_\_\_ 7. In  $\triangle ABC$ ,  $\angle B$  is twice  $\angle A$ , and  $\angle C$  is three times as large as  $\angle B$ . Find  $\angle C$ .
- \_\_\_\_\_ 8. If  $-3 \leq x \leq 0$ , find the minimum value of  $f(x) = x^2 + 4x$ .
- \_\_\_\_\_ 9. The 9th and the 11th terms of an arithmetic sequence are 28 and 45, respectively. What is its 12th term?
- \_\_\_\_\_ 10. Perform the indicated operations, and simplify:  $\frac{2}{x} + \frac{3}{x-1} - \frac{4}{x^2-x}$ .
- \_\_\_\_\_ 11. Find the range of the function  $f(x) = |2x + 1|$ .
- \_\_\_\_\_ 12. Find the value of  $[x - (x - x^{-1})^{-1}]^{-1}$  when  $x = 2$ .
- \_\_\_\_\_ 13. Find the equation (in the form  $ax + by = c$ ) of the line through the point (5, 2) that is parallel to the line  $4x + 6y + 5 = 0$ .
- \_\_\_\_\_ 14. In  $\triangle ABC$ ,  $\angle B = 90^\circ$ ,  $\angle ACB = 28^\circ$ , and  $D$  is the midpoint of  $AC$ . What is  $\angle BDC$ ?
- \_\_\_\_\_ 15. Find all solutions of the system: 
$$\begin{cases} 2x + y = 1 \\ 3x + 4y = 14. \end{cases}$$
- \_\_\_\_\_ 16. If  $f(2x - 1) = x$ , what is  $f(2)$ ?
- \_\_\_\_\_ 17. What is the quotient when  $3x^5 + 5x^4 - 4x^3 + 7x + 3$  is divided by  $x + 2$ ?
- \_\_\_\_\_ 18. A man is walking away from a lamppost with a light source 6 meters above the ground. The man is 2 meters tall. How long is his shadow when he is 10 meters from the lamppost?
- \_\_\_\_\_ 19. Find the length of the shorter segment made on side  $AB$  of  $\triangle ABC$  by the bisector of  $\angle C$ , if  $AB = 20$ ,  $AC = 12$ , and  $BC = 18$  cm.
- \_\_\_\_\_ 20. How many different three-digit numbers less than 300 can be formed with the digits 1, 2, 3, and 5 if repetition of digits is not allowed?
- \_\_\_\_\_ 21. Factor completely the expression  $x^3 - 7x + 6$ .
- \_\_\_\_\_ 22. An integer between 1 and 10 000 inclusive is selected at random. What is the probability that it is a perfect square?
- \_\_\_\_\_ 23. If a chord 24 cm long is 5 cm from the center of a circle, how long is a chord 10 cm from the center?
- \_\_\_\_\_ 24. Pipes are being stored in a pile with 25 pipes in the first layer, 24 in the second, and so on. If there are 12 layers, how many pipes does the pile contain?
- \_\_\_\_\_ 25. Find the solution set of the inequality  $x^2 < 5x - 6$ .