

2019 Metrobank-MTAP-DepEd Math Challenge Division Finals – Team Oral Competition – Grade 10

15-Second Questions [2 points each]

1. Find the solution set of the inequality $x(x + 1) < x$. [\emptyset]
2. A circle, centered at the origin, passes through the points $(-2, 3)$ and $(3, k)$, what is k ? [± 2]
3. The 4th and 10th terms of an arithmetic sequence are 48 and 68. What is its 1st term? [38]
4. If -1 is a root of the equation $2x^4 + 2x^3 = 3x^2 + kx + 2$, what is k ? [5]
5. A 3-cm chord is 3 cm away from the center of a circle. What is the exact area of the circle? [$\frac{45}{4}\pi$ cm²]
6. In an ordinary deck of playing cards, how many five-card hands of consecutive ranks in one suit are possible? [36]
7. A square is inscribed in a right triangle with two of its sides lying on the legs of the triangle. If the legs of the triangle are 6 and 12 cm long, what is the area of the square? [16 cm²]
8. In rolling two dice at random, what is the probability of obtaining a sum that is a perfect square? [$\frac{7}{36}$]
9. The sides of an isosceles triangle are 5, 5, and 6 cm long. How long is the altitude from one base vertex to the opposite leg? [$\frac{12}{5}$ cm]
10. Find the sum of all even positive integers less than 1000. [249 500]
11. What is the minimum value of the function $f(x) = 2x^2 - 4x + 5$? [3]

30-Second Questions [3 points each]

1. How many different codewords can be formed from the letters of the word DIVISION such that S and N are next to each other? [1 680]
2. In the sequence $25, a, b, c, \frac{25}{49}$, the 1st, 3rd and 5th terms form a harmonic sequence and the last 3 terms form a geometric sequence. What is c ? [$\pm \frac{5}{7}$]
3. Solve for x in $3x^4 + 4x^3 = 5x^2 + 2x$. [$-2, -\frac{1}{3}, 0, 1$]
4. The dimensions of a wooden rectangular prism are 5, 7, and 8 units. Its faces are painted blue, and then the prism is cut into unit cubes. If two cubes are selected at random, what is the probability that one has exactly one blue face and the other has exactly two blue faces? [$\frac{28}{155}$]
5. A circle passes through the points $(1, 3)$, $(2, -2)$, and $(6, 4)$. What is its radius? [$\sqrt{13}$ units]
6. The point $(k, 7)$ lies on the perpendicular bisector of the segment with endpoints $(-1, 2)$ and $(2, 9)$. What is k ? [-3]

1-Minute Questions [5 points each]

1. The numbers $3, a, b, c, d, 23\ 328$ form a geometric sequence. What is $\sqrt[4]{abcd}$? [$108\sqrt{6}$]
2. If $23 + 7x - 5x^2 - 2x^3 = a + b(x + 2) + c(x + 2)^2 + d(x + 2)^3$ is an identity, what is c ? [7]
3. The lines $3y = 2x + 3$ and $2x = 3y + 3$ are parallel. Find the distance between these lines. [$\frac{6\sqrt{13}}{13}$ units]
4. An arithmetic sequence $\{a_n\}$ has $a_4 = 6$ and $a_7 = 4$. What is n so that $a_1 + a_2 + \dots + a_n = 42$? [7, 18]
5. The hypotenuse AC of a right triangle ABC is trisected at P and Q . If $BP^2 + BQ^2 = 10$ cm², how long is AC ? [$3\sqrt{2}$ cm]
6. The lengths (in cm) of the sides of a triangle are roots of the equation $x^3 + 84x = 16x^2 + 144$. Find the area of the triangle. [$8\sqrt{2}$ cm²]

Clincher Questions

- C.1. If \sqrt{x} is between 6 and 7, between what two consecutive integers is $\sqrt[3]{x}$? [3 and 4]
- C.2. How many sides does a convex polygon have if it has 10 times as many diagonals as sides? [23]
- C.3. Find all points with integral coordinates that are 5 units away from the point $(-3, -2)$.
[$(2, -2), (1, 1), (0, 2), (-3, 3), (-6, 2), (-7, 1), (-8, -2), (-7, -5), (-6, -6), (-3, -7), (0, -6), (1, -5)$]

Do-or-Die Question

- DoD. The zeros of the polynomial $P(x) = ax^4 + bx^3 + cx^2 + dx + e$ are $-\frac{3}{5}, \frac{1}{2}, 2$, and 3 . If $P(1) = 32$, what is c ? [104]