2015 Grade 9 MTAP Math Challenge – Division Orals
Posted on January 6, 2016 by admin

Below are the 2015 Grade 9 MTAP MathChallenge Division Oral Competition questions with answers.
15-second question (2 points each)
1.) Determine all positive number x that satisfy $5x^2 = 10x$.
Answer: x = 2
2.) What is the fourth power of $\sqrt{2+\sqrt{2}}$?
Answer: $6+4\sqrt{2}$
3.) Simplify $4^{\frac{-k}{2}} + 8^{-\frac{k-1}{3}}$
Answer: $\frac{3}{2}^k$
4.) If a ♠ b = $\sqrt{a^2+b^2}$, what is the value of (3 ♠ 4) ♠ 12?
Answer: 13
5.) Suppose that x, y and z are positive integers such that xy = 6, xz = 10 and yz = 15. What is the value of xyz?
Answer: 30
6.) The yearly changes in population of a certain town for two consecutive years are 20% increase on the first year and 20% decrease on the second year. What is the net change in percent over the two year period?
Answer: 4% decrease
7.) What is the slope of the line parallel to 2x + 5y + 2 = 0.
Answer: -2/5
8.) The area of a triangle is 100 sq. cm. What will be its area if its altitude is increased by 10% and its base is decreased by 10%?
Answer: 99 sq. cm.
9.) The sum of two numbers is 2015. If 9 is added to each of the numbers and then each of the resulting numbers is doubled, what is the sum of the final two numbers?
Answer: 4066
10.) A square and a triangle have the same perimeter. If the square has area 144 sq. cm., what is the area of the triangle?
Answer: $64\sqrt{3}$ sq cm.
11.) Let r and s be the solutions of $x^2 - 3x + 1 = 0$. What is the value of $(r+1)(s+1)$?
Answer: 5
30-second question (3 points each)
1.) If $f(x) = x^2 = x + 1$, find the sum of all numbers y that satisfies $f(2y) = 2$.
Answer: 1/2
2.) A man walks 1 km east then 1 km northwest. How far is he from his starting point?
Answer: 2-√2 km
3.) Four men working for four days can paint 4 cars. How many cars can 6 men working for 6 days paint?
Answer: 9 cars
4.) The longer base of a trapezoid measures 10 cm and the line segment joining the midpoint of the
diagonals measures 3 cm. What is the length of the shorter base?
Answer: 4 cm

5.) What is the least possible value of $x^2 + 3x + 2 if x^2 - 3x - 2 \leq 0$?
Answer: 6, -1/4
6.) The point D is the midpoint of the side BC of equilateral triangle ABC and E is the midpoint of AD. How long is BE if a side of ΔABC measures 8 cm?
Answer: 2√7 cm
1-minute question (5 points each)
1.) If the roots of $x^2 + nx + m = 0$ are twice those $x^2 + mx + 1 = 0$, what is the value of n?
Answer: 8
2.) The lengths of the sides of a triangle are 10, 17 and 21 cm. How long is the altitude of the triangle to longest side?
Answer: $\frac{4\sqrt{70}}{5}$
3.) Triangle ABC is isosceles. If ∠A = 50°, what are the possible measures of ∠B?
Answer: 50°, 80°
4.) The medians AD and BE of ΔABC are perpendicular. Find the length of AB if BC = 3 cm and AC = 4 cm.
Answer: √5 cm
5.) The product of three consecutive positive integers is 16 times their sum. What is the sum of the three numbers?
Answer: 21
6.) Point E is on the side AC of ΔABC and points D and F are chosen on the side AB such that DE || BC and EF || CD. Find the length of BD if AF = FD = 3 cm.
Answer: 6 cm
Clincher Question
1.) In ΔABC, ∠C = 30°. If D is the foot of the altitude from A to BC and E is the midpoint of AC, find the measure of ∠EDC.
Answer: 30°
2.) One candle will burn completely at a uniform rate in 4 hours while another in 3 hours. At what time should the two candles be simultaneously lighted so that one will be half the length of the other at 6:00 PM?
Answer: 3:36 PM
3.) Points P and Q are drawn on the sides BC and AC of triangle ABC such that ∠AQB and ∠APB measures 110° and 80° respectively. If point R is chosen inside ΔABC such that AR and BR bisects ∠CAP and ∠CAQ respectively, what is the measure if ∠ARB?
Answer: 95°
Do or Die Question
Point E is the midpoint of the side BC of ΔABC and F is the midpoint of AE. The line thru BF intersects AC at D. Find the area of ΔAFD if the area of the triangle is 48 cm^2.
Answer: 4 cm^2

2015 Grade 10 MTAP Math Challenge – Division Orals

Posted on January 7, 2016 by admin

Below are the 2015 Grade 10 MTAPMath Challenge Division Oral Competition questions with answers.

Note: I will fix the latex equations later.

15-second question (2 points each)

1.) What is the y-intercept of $2x + 3y = 5$?

Answer: 5/3

2.) How many degrees is $1\frac{1}{5}$ of a revolution?

Answer: 432°

3.) What is the vertex of the parabola with equation $y = x^2 + 2x + 3$?

Answer: (-1, 2)

4.) Find the value of $\log_{\sqrt{2}} \sqrt[3]{2}$

Answer: 2/3

5.) What's the exact value of sin (29π/4)?

Answer: $\frac{-\sqrt{2}}{2}$

6.) Find the value of a so that $8^3 + 1$ is divisible by $x - a$.

Answer: -1/2

7.) What is the domain of $\ln(x - x^2)$?

Answer: (0, 1)

8.) If the sequence 1, 2/3, x is harmonic, find the value of x.

Answer: 1/2

9.) What is the x-intercept of f(x) = log(x-1)

Answer: 2

10.) The system $2x + 2y = 1$ and $3x + 3y = a$ has infinitely many solutions for which value of a?

Answer: 3/2

11.) What is the range of $y = 2x - 7x^2$?

Answer: (-∞, 1/7)

30-second question (3 points each)

1.) Find the area of the triangle in the first quadrant bounded by the line $x/3 + y/4 = 1$.

Answer: 6

2.) Find the value of a if the line $ax + 2y = 1$ is perpendicular to $3x - 6y = 7$.

Answer: 4

3.) Find the value of a so that the domain and range of $f(x) = \frac{ax+1}{2x-3}$ are identical sets.

Answer: 3

4.) If sec θ = -13/5 and sin θ < 0, find the value of tan θ.

Answer: 12/5

5.) Assuming that p and q are the roots of $3x^2 - 2x + 4 = 0$, what is $p^2 + q^2$?

Answer: -20/9

6.) Find the solutions of $(\log_2 x)^2 - \log_2 x^3 = 4$.
Answer: 16, 1/2

1-minute question (5 points each)

1.) How many multiples of 3 are there between 5 and 200?
Answer: 65
2.) Given that tan θ = -2, find the value of sin 2θ.
Answer: -4/5
3.) Solve: $4^{x-x^2} = \sqrt{2}$
Answer: 1/2
4.) Find the perimeter of the region in Quadrant I that is bounded by the circle $x^2 + y^2 = 1$ and the line $x + y = 1$.
Answer: √2+ π/2
5.) Find the remainder when $y = 1 + 3x^2 + 5x^5 + \cdots + 11x^{11} + 13x^{13}$ is divided by $x - 1$?
Answer: 49
6.) Find the real roots of $x^4 - 2x^3 + x^2 - 8x - 12 = 0$ given that $2i$ is one root.
Answer: -1, 3

Clincher Question

1.) If secθ = 5, find the value of cos(π – θ).
Answer: -1/5
2.) What is the inverse of f(x) = (2x + 3)/(5x-1)?
Answer: y = (x + 3)/(5x – 2)
3.) x is directly proportional to y and inversely proportional to the square of z. What happens to x if y and z are both doubled?
Answer: halved or divided by 2

Do or Die Question

What is the next term in the arithmetic sequence x + 1, 2x – 3, x + 5?
Answer: 13

Below is the first part of the Grade 8 MTAP 2015 Elimination Questions with Solutions and answers. If you find any errors, please comment on the box below.

1.) Find the average of the numbers -1, 3/2, and 1/2.

Solution

(- 1 + 3/2 + 1/2)/3 = 1/3

Answer: 1/3

2.) How much larger is 2/3 than 1/6?

Solution

2/3 – 1/6 = 4/6 – 1/6 = 3/6 = 1/2

Answer: 1/2

3.) If one ream contains 500 sheets of paper and a sheet of paper is 0.3 mm thick, how thick is one ream in meters?

Solution

500 × 0.3mm = 150 mm = 0.15m

Answer: 0.15m

4.) What is the second largest number among numbers $\sqrt{2}$, 3/2 , 1.4, $\sqrt{3}$ and 1.6?

Solution

$\sqrt{2}$ is around 1.41 and $\sqrt{3}$ is around 1.7.

Answer: 1.6

5.) If an inch is about 2.54 cm, what is 1 cm to the nearest hundredth of an inch?

Solution

$\frac{1}{100}(2.54) = 0.0254$

Rounding off to the nearest hundredths, we have 0.03.

Answer: 0.03

6.) If U = {1, a, 2, b, 3, c, 4, d} and A = {1, 2, c, d}, what is A^c ?

Solution

A^c is the complement of A, or the elements of the set that is not in A but in U. So, A^c = {a, b, 3, 4 }

Answer: A^c = {a, b, 3, 4 }

7.) Using the same sets in Item 6 and B = {1, 2, 3, 4}, how many subsets does A ∩ B^c have?

Solution

A = {1, 2, c, d} and B = {1, 2, 3, 4}. The complement of B denoted by B^c are the elements of U not in B. So, B^c = {a, b, c, d}. Now, A ∩ B^c are the elements that are common to A and B^c. Therefore, A ∩ B^c = {c, d}. Now, the number of subsets of a set with n elements is 2^n (this includes the empty set), so there are 2^2 = 4 subsets.

Answer: 4

8.) If |P| = 10, |Q| = 12, and |P Q| = 15, what is |P ∩ Q |?

Solution 1

We know that the cardinality of the union of two sets is equal to the sum of the cardinality of these sets less the cardinality of their intersection. That is, if we have sets P and Q, |P ∪ Q| = |P| + |Q| – |P ∩ Q|.

Substituting, we have
15 = 10 + 22 – |P ∩ Q|
|P ∩ Q| = 7
Answer: 7
Solution 2
x + y + z = 15 ()
x + y = 12 ()
y + z = 10 ()
Adding the (**) and (***), we have x + 2y + z = 22 (#)
Subtracting (*) from (#),
x + 2y + z – (x + y + z) = 22 – 15
y = 7
Answer: 7
9.) If |M ∩ N| = 24 and |M ∪ N| = 26, what is |M| + |N|?
Solution
From number 8, we know that |M ∪ N| = |M| + |N| – |M ∩ N|. Substituting, we have,
26 = |M| + |N| – 24
|M| + |N| = 50.
Answer: 50
10.) There were 59 participants during the recent math camp. Among them, 37 liked doing projects, 30 liked solving problems, and 13 liked both. How many of the participants did not like at least one of these two activities?
Solution
Solution will be discussed in a separate post.
Answer: 5

here. If you found any errors in the solution, please comment in the box below.

11.) If $x = 4$ and $y = -3$, what is $x^2y + xy^2$?

Solution

$$x^2y + xy^2 = (4^2)(-3) + (4)(-3)^2 = (16)(-3) + 4(9)$$
$$= (-48) + 36 = -12$$

Answer: -12

12.) Simplify $x(1 + y) - 2y(x - 2) + xy$.

Solution

$$x(1 + y) - 2y(x - 2) + xy$$
$$= x + xy - 2xy + 4y + xy$$
$$= x + 2xy - 2xy + 4y$$
$$= x + 4y$$

Answer: $x + 4y$

13.) If a and b are positive constants, simplify $\frac{ab\sqrt{ab}}{\sqrt[3]{a^4}\sqrt[4]{b^3}}$.

Solution

Note that $\sqrt{ab} = (ab)^{1/2}$, $\sqrt[3]{a^4} = a^{4/3}$ and $\sqrt[4]{b^3} = b^{3/4}$

Now $\frac{(ab)(ab)^{1/2}}{a^{4/3}b^{3/4}}$

$= \frac{(ab)(a^{1/2})(b^{1/2})}{a^{4/3}b^{3/4}}$

$= \frac{a^{3/2}b^{3/2}}{a^{4/3}b^{3/4}}$

$= a^{(3/2-4/3)}b^{(3/2-3/4)}$

$= a^{(9/6-8/6)}b^{(6/4-3/4)}$

$= a^{1/6}b^{3/4}$

This is already correct, but if you want your answer in radical form, the previous expression can be converted to

$$a^{2/12}b^{9/12} = \sqrt[12]{a^2b^9}$$

Answer: $a^{1/6}b^{3/4}$ or $\sqrt[12]{a^2b^9}$

14.) What is the quotient when $6x^4 + x^3 + 4x^2 + x + 2$ is divided by $3x^2 - x + 1$?

Solution

$$
\begin{array}{r}
2x^2 + x + 1 \\
3x^2 - x + 1 \overline{)\,6x^4 + x^3 + 4x^2 + x + 2} \\
\underline{6x^4 - 2x^3 + 2x^2} \\
3x^3 + 2x^2 + x \\
\underline{3x^3 - x^2 + x} \\
3x^2 + 0x + 2 \\
\underline{3x^2 - x + 1} \\
x + 1
\end{array}
$$

Answer: $2x^2 + x + 1$ remainder $x + 1$.

15.) In Item 14, what is the remainder?

Answer: $x + 1$

16.) If $A + B = x - 2y$, what is $A^2 + 2AB + B^2 + 4xy$?

Solution

$(A+B)^2 = (x-2y)^2$

$A^2 + 2AB + B^2 = x^2 - 4xy + 4y^2$

$A^2 + 2AB + B^2 + 4xy = x^2 - 4xy + 4xy + 4y^2$

$A^2 + 2AB + B^2 + 4xy = x^2 + 4y^2$

Answer: $x^2 + 4y^2$

17.) If $x + y = 7$ and $xy = 5$, what is $x^3 + y^3$?

Solution

$x + y = 7$ and $xy = 5$

$(x+y)^3 = 7^3$

$x^3 + 3x^2y + 3xy^2 + y^3 = 343$

$x^3 + 3xy(x+y) + y^3 = 343$

Substituting the given values above,

$x^3 + 3(5)(7) + y^3 = 343$

$x^3 + 105 + y^3 = 343$

$x^3 + y^3 = 238$.

Answer: 238

18.) If the length, width, and height of an open-top rectangular box are $(x+3)$ cm, x cm, and $(x-3)$ cm, what is its surface area?

Solution

The formula for finding the surface area S of a rectangular prism with length l, width w and height h is $S = 12lh + 2lw + 2wh$. Since the box is open, we subtract lw, which is the top face. So, the surface areaof the open box is $S = 2lh + lw + 2wh$.

Substituting, we have

$S = 2(x+3)(x-3) + x(x+3) + 2x(x-3)$

$= 2(x^2 - 9) + x^2 + 3x + 2x^2 - 6x$

$= 2x^2 - 18 + x^2 + 3x + 2x^2 - 6x$

$= 15x^2 - 3x - 18$

Answer: $15x^2 - 3x - 18$

19.) A man walked x km for 2.5 hrs, then jogged $(2x + 3)$ km for 3.5 hrs, and finally walked again $(5x - 3)$km for 4 hrs. If his average speed for the entire exercise was 4 kph, what is x?

Solution

$$\frac{2.5x + 3.5(2x + 3) + 4(5x - 3)}{x + 2x + 5x} = 4$$

$$\frac{29.5x - 1.5}{8x} = 4$$

$$29.5x - 1.5 = 32x$$

$$2.5x = 1.5$$

$$x = 3/5 = 0.6$$

Answer: 3/5 or 0.6

20.) Simplify $(a - 3)(a + 3)(a^2 + 3a + 9)(a^2 - 3a + 9)$.

Solution

We can group the expressions as sum and difference of two cubes.

$$[(a - 3)(a^2 + 3a + 9)][(a + 3)(a^2 - 3a + 9)]$$
$$= (a^3 - 3^3)(a^3 + 3^3)$$

$$= (a^3 - 27)(a^3 + 27)$$

Now, this is in the form of the difference of two squares $(x + y)(x - y) = x^2 - y^2$.

So, $(a^3 - 27)(a^3 + 27) = (a^3)^2 - 27^2 = a^6 - 729$

Answer: $a^6 - 729$

Below are the 2015 MTAP MathChallenge Division Orals for Grade 2 with answers.

Part 1 (15 seconds) 2 pts each

1.) One hundred fifteen is how many more than 95?
Answer: 20

2.) What number is 14 less than 1,000?
Answer: 986

3.) When 2, 028 is divided by 5, what is the remainder?
Answer: 3

4.)What is the next number in this pattern: 245, 254, 263, 272, ____ ?
Answer: 281

5.) How much is 2 twenty-peso bills and 3 ten-peso coins?
Answer: Php 70

6.) There are 9 rows of chairs in the audio-visual room. Each row had 8 chairs. There are also 8 chairs set up on the stage. How many chairs are there in all?
Answer: 80

7.) Buboy and Girlie made 18 paper planes. Girlie made half as many paper planes as Buboy. How many planes did Buboy make?
Answer: 12

8.) There are 42 roses in the flower arrangement. Beside every 6 roses there is 1 candle. How many candles are there?
Answer: 7

9.) How many days are there between January 1, 2015 and April 30, 2015?
Answer: 118

10.) The product of two numbers is 24 and their difference is 5. What is the sum of the two numbers?
Answer: 11

11.) Ella found ¾ of a pie in the refrigerator. She ate one-half of it. What fraction of the whole pie was left?
Answer: 3/8

Part 2 (30 seconds) 3 pts each

1.) Chris and Mona each had 20 pieces of marshmallows. Chris ate 1/5 of his marshmallows. Mona ate ¼ of her marshmallows. Who had more marshmallows left? By how many?
Answer: Chris by 1.

2.) Annie played chess with her sister. She won 3 times as many games as she lost. Annie won 6 games. There were no ties. How many games did Annie play?
Answer: 8

3.) Mark bought a toy for Php200, sold it for Php300, bought it back for Php400 and finally sold it for Php500. How much money did Mark make or lose?
Answer: Php 200 gain

4.) The length of a rectangular field is 80 meters. Its width is 20 meters. Rony ran around this rectangular field 5 times. How many meters did he run?
Answer: 1, 000

5.) It takes 10 minutes for the pupils to plant 5 flower plants in the school garden. If the pupils start planting at 9:00 in the morning, what time will they finish planting the 25 flower plants?
Answer: 9:50 am

6.) In a math contest of 10 problems, 5 pints was given for each correct answer and 2 points was deducted for each incorrect answer. If Nancy did all 10 problems and scored 29 points, how many correct answers did she have?
Answer: 7

Part 3 (60 seconds) 5 pts each

1.) Juan has 3 pieces of wood with a total length of 36 decimeters. Two of the pieces have the same length while the other piece is 8 decimeters long. How long is each of the other pieces?
Answer: 14dm

2.) Anna had 36 candies. She gave Ben 1/3 of her candies. Then she gave ¼ of the remaining candies to Carlos. How many candies were left with Anna?
Answer: 18

3.)What number multiplied by itself is equal to the product of 6 and 24?
Answer: 12

4.) If 20 is added to one-third of a number, the result is double the number. What is the number?
Answer: 12

5.) Using the digits 2, 3, 4 and 5, form two-2 digit numbers that will give the greatest product. What are these two-digit numbers?
Answer: 52 and 43

6.) Two owners of a pet shop, Rico and Roger, agree to divide the fish in an aquarium. Rico took 12 of the fish. Roger took 22 of the fish and paid Rico Php 1, 500. How much is one fish?
Answer: Php 150

Clincher

1. I am a 4-digit number. One of my digits is 5 and the rest are zeroes. Write the number word representing me.
   Answer: five thousand.
2. Mother bought a dozen eggs. She cooked 3 eggs for breakfast. What parts of a dozen eggs are left?
   Answer: 3/4
3. Gino has 63 marbles while Gary has 27. How many marbles should Gino give Gary so that they will have equal number of marbles?
   Answer: 18

Do or Die

A team is made up of Grades 1, 2 and 3 pupils only. Seven students are grade 1, five students are grade 3, and one-third of the entire team are grade 2. How many pupils are on the team?
Answer: 18