

**5<sup>th</sup> – 6<sup>th</sup> Grade**  
**Regional Math Meet Tests**  
**2020**

- **Individual Problems**
  - Event 1: Problem Solving (No Calculator)
  - Event 2: Problem Solving (With Calculator)
  - Event 3: Mathematical Reasoning
  - Event 4: Mental Math
  
- **Team Problems**
  - Event 5: Team Problems
  
- **Tie Breaker Question**

Name: \_\_\_\_\_

School Team: \_\_\_\_\_

Circle your final  
answer!**Event 1: Computations Without Calculator- 20 points total**

Part I (2 points each)

**Remember to simplify all fractions if able!**

$$1. 6\frac{2}{3} - 4\frac{2}{5} \div 1\frac{1}{3} = 6\frac{2}{3} - \frac{22}{5} \cdot \frac{3}{4} = 6\frac{2}{3} - \frac{33}{10}$$

$$1\frac{1}{3} = \frac{4}{3}$$

$$= \frac{20}{3} - \frac{33}{10} = \frac{200}{30} - \frac{99}{30} = \frac{101}{30} \text{ or } 3\frac{11}{30}$$

$$2. (8.42 - 10.034) \times 1.8$$

$$8.420 - 10.034 = -(0.034 + 1.58)$$

$$= -1.614$$

$$-2.9052$$

$$-1.614 \times 1.8 = -2.9052$$

$$3. \text{ If } x = -2 \text{ and } y = -4, \text{ find the value of } -2x - 3y$$

$$-2x - 3y = -2(-2) - 3(-4) = 4 + 12 = 16$$

$$4. \text{ Find the Least Common Multiple of 8, 20, and 30}$$

$$8 = 2^3$$

$$20 = 2^2 \times 5$$

$$30 = 2 \times 3 \times 5$$

$$\text{Then } 2^3 \times 3 \times 5 = 8 \times 15 = 80 + 40 = 120$$

$$5. -5\frac{3}{5} \times 3\frac{4}{7} = -\left(\frac{28}{5} \cdot \frac{25}{7}\right) = -(4 \cdot 5) = -20$$

Name: \_\_\_\_\_ School Team: \_\_\_\_\_

Circle your final  
answer!**Event 1: Computations Without Calculator- 20 points total**

Part II (2 points each)

**Remember to simplify all fractions if able!**

1. Find the reciprocal of
- $-34\frac{6}{7}$

$$\left(\frac{-7}{244}\right)$$

$$-34\frac{6}{7} = -\left(\frac{34 \cdot 7 + 6}{7}\right) = -\left(\frac{238+6}{7}\right) = -\frac{244}{7}$$

2. How many hours are in 12.5% of a week? Remember to label.

$$24 \text{ hrs/day} \cdot 7 \text{ days/wk} = 168 \text{ hrs/wk}$$

Find 12.5% of 168

$$\rightarrow 0.125 \cdot 168 = 21$$

21 hours

- 3.
- $(5 + \frac{7}{9}) \times \frac{3}{4} \div 3 = 5\frac{7}{9} \times \frac{3}{4} \div 3 = \frac{52}{9} \cdot \frac{3}{4} \cdot \frac{1}{3} = \left(\frac{13}{9} \text{ or } 1\frac{4}{9}\right)$

4. Find 0.3% of 52

$$\frac{0.3}{100} \times 52$$

$$\text{or } 0.003 \times 52 = \left(0.156 \text{ or } \frac{39}{250}\right)$$

$$\frac{156}{1000} = \frac{78}{500} = \frac{39}{250}$$

- 5.
- $5.6 \times 7.8 \div 2.4$

$$5.6 \times 7.8 = 43.68$$

$$\begin{array}{r} 18.2 \\ 2.4 \overline{) 43.68} \\ \underline{-24} \phantom{00} \\ 196 \phantom{00} \\ \underline{-192} \phantom{00} \\ 48 \phantom{00} \end{array}$$

18.2

Name: \_\_\_\_\_

School Team: \_\_\_\_\_

Circle your final  
answer!**Event 2: Computations With Calculator- 25 points total**

Consumer Math (5 points each)

1. A movie grosses \$31.4 million on its premier weekend. If the sequel is expected to surpass this amount by 15.9%, how much will the sequel gross?

$$\begin{aligned} \$31.4 \text{ million} &= \$31,400,000 \\ 1.159 \times \$31,400,000 &= \boxed{\$36,392,600} \end{aligned}$$

2. Roman wants to purchase a car. The list price is \$19,899. He offers to buy the car for 10% less than the listed price. The salesman counters with a price 5% higher than Roman's offer. What is the counteroffer? Remember to always round to the nearest cent.

$$\begin{aligned} 0.9 \times \$19,899 &= \$17,909.10 \leftarrow \text{Roman's offer} \\ 1.05 \times \$17,909.10 &\approx \boxed{\$18,804.56} \leftarrow \text{Counteroffer} \end{aligned}$$

3. Ian can buy 3 pounds of tomatoes for \$4.95 at Store A. He knows that Store B offers 4 pounds of tomatoes for \$6. Ian wants to buy 22 pounds of tomatoes to buy salsa. Both stores offer to sell single pounds of tomatoes. How much money will he save by purchasing the tomatoes at the store offering the better deal?

$$\text{Store A: } 7 \times \$4.95 + \frac{1}{3}(\$4.95) = \$34.65 + \$1.65 = \$36.30$$

$$\text{Store B: } \underbrace{5 \times \$6}_{\text{for 20 lbs}} + \underbrace{\$3}_{\text{for 2 lbs}} = \$33$$

$$\$36.30 - \$33 = \boxed{\$3.30} \leftarrow \text{amount saved}$$

4. Laney gets a salary increase of 10% each year. By what percentage has her original salary increased after four such raises?

Her original salary is 100% of her salary

**46.41% increase**

1<sup>st</sup> raise  $\rightarrow$  110%

2<sup>nd</sup> raise  $\rightarrow$  110% + 0.1(110%) is 121%

3<sup>rd</sup> raise  $\rightarrow$  121% + 0.1(121%) is 133.1%

4<sup>th</sup> raise  $\rightarrow$  133.1% + 0.1(133.1%) is 146.41%

5. A local vendor needs \$2.14 of materials to make a craft to sell. It takes the vendor approximately 2 hours and 20 minutes to make each craft. Originally, she sold each item for \$15. In order to make an hourly wage of at least \$12 an hour, by what percent should she increase the price of the item?

\$12/hr means a profit of \$28 per item, so the cost per item must be \$30.14

If  $x$  is the percent increase,

$$15 + 15(x) = 30.14$$

$$15(x) = 15.14$$

$x = 1.009\bar{3}$  writing as a %, we get

**100.93% increase**

Name: \_\_\_\_\_ School Team: \_\_\_\_\_

**Event 3: Mathematical Reasoning With Calculator- 35 points total**Circle your final  
answer!

Part I: Algebra (7 points each)

Remember to use labels when appropriate

1. Parrot A is 4 times as tall as Parrot B. Parrot C is  $\frac{5}{8}$  the height of Parrot A. If the total height of all three parrots combined is 225cm, find the height of Parrot B.

Let  $x$  be the height of Parrot B.

$$4x + x + \frac{5}{8}(4x) = 225$$

$$15x = 450$$

$$x = 30$$

$$5x + \frac{5}{2}x = 225$$

$$\frac{15x}{2} = 225$$

30cm

2. A local woodworker makes stools and tables. Each stool she makes has 3 legs and each table she makes has 4 legs. All tables and stools use the same size legs. The woodworker has 35 legs to use to make tables and stools this weekend. She wants to use all the legs that she has, leaving none remaining. Find all possible combinations of stools and tables that she might make. Let  $s$  be number of stools,  $t$  be number of tables

s	t
x	1x
9	2
x	3
x	4
5	5
x	6
x	7

s	t
1	8

$$3s + 4t = 35, s + t \text{ are whole numbers.}$$

9 stools 2 tables

5 stools 5 tables

1 stool 8 tables

3. A family has three children. The oldest child is as old as the combined ages of the younger two. The middle child is two years older than the youngest child. A year ago, their combined ages was  $\frac{3}{4}$  of the sum of their current ages. Find the ages of the three children. Let  $x$  be the current age of the youngest child

Currently  $x, x+2, 2x+2$  is the 3 ages1 year ago, ages were  $x-1, x+1, 2x+1$ 

$$x-1 + x+1 + 2x+1 = \frac{3}{4}(x + x+2 + 2x+2)$$

$$4x+1 = 3x+3$$

$$x = 2$$

2 years  
4 years  
6 years

Name: \_\_\_\_\_ School Team: \_\_\_\_\_

**Event 3: Mathematical Reasoning With Calculator- 35 points total**

Circle your final answer!

Part II: Algebra (7 points each)

Remember to use labels when appropriate

4. The seating capacity of an auditorium is 600. The auditorium is not filled. We know that \$350 worth of tickets were sold, and that the price of an adult ticket was 75 cents. The price of a child's ticket was 25 cents. Find the minimum number of adult tickets sold.

Let  $c$  be the number of child tickets. Let  $a$  be the number of adult tickets.  
 $a, c$  must be whole numbers

$$c + a < 600$$

$$0.25c + 0.75a = 350$$

$$0.25c = 350 - 0.75a$$

$$c = 1400 - 3a$$

So

$$1400 - 3a + a < 600$$

$$-2a < -800$$

$$a > 400$$

Check: If 401 adult tickets are sold, price is \$300.75 and then 197 children's tickets are needed.

$$401 + 197 = 598$$

401 tickets

5. Everett spent a quarter of his allowance on a movie. He then spent  $\frac{11}{18}$  of the remainder on snacks. Later that day, he gave \$3 to a local charity. This left him with only  $\frac{1}{24}$  of his original allowance, which he decided to save. Find the amount of money that Everett saved that week.

Let  $x$  be the original allowance amount.

$$x - \frac{1}{4}x - \frac{3}{4}\left(\frac{11}{18}\right)x - \$3 = \frac{1}{24}x$$

$$\frac{1}{24}(\$12) = \$0.50$$

$$\frac{3}{4}x - \frac{33}{72}x - \frac{1}{24}x = \$3$$

$$\frac{54}{72}x - \frac{33}{72}x - \frac{3}{72}x = \$3$$

$$\frac{18}{72}x = \$3$$

$$x = \$12$$

\$0.50  
or  
50¢ saved

Name: \_\_\_\_\_ School Team: \_\_\_\_\_

**Event 4: Mental Math (no calculator)- 20 points total**  
(2 points each)

Example: 23

1) 7

2) -33

3) 22

4) -2

5) 102

6) 1942

7) -12

8) 18

9) 23,993

10) 168

Name: \_\_\_\_\_

School Team: \_\_\_\_\_

Circle your final answer!

**Event 5: Team Problems (with calculator)- 100 points total**

**Part 1: Measurement (5 points each)**

**Remember to label answers as needed.**

1. Andrew starts a project at 10AM. He finishes 800 minutes later. What time is it when he completes the project? Remember to label AM or PM.

$800 \div 60 = 13\frac{1}{3}$ , so 13 hrs 20 min  
 12 hrs later is 10 PM  
 13 hrs later is 11 PM

11:20 PM

2. Each day has 20 naps. Each nap lasts 40 winks. How many seconds are in one wink?

$60 \text{ sec/min} \times 60 \text{ min/hr} \times 24 \text{ hrs/day} = 86400 \text{ sec/day}$

$20 \text{ naps/day} \times 40 \text{ winks/nap} = 800 \text{ winks/day}$

$86400 \div 800 = 108$

108 seconds per wink

3. Find  $48'3'' - 29'11''$ .

$48 \text{ ft } 3 \text{ in} - 29 \text{ ft } 11 \text{ in} = 48 \text{ ft } 4 \text{ in} - 30 \text{ ft} = 18 \text{ ft } 4 \text{ in}$   
 or  
 $18'4''$

4. Pablo wants to run 3 miles on a local track. He knows that 3 laps is  $\frac{5}{8}$  of a mile. How many laps should Pablo run?

$3 \div \frac{5}{8} = \frac{3}{1} \cdot \frac{8}{5} = \frac{24}{5} = 4\frac{4}{5}$   
 → How many groups of  $\frac{5}{8}$  mile are in 3 miles?

So  $4\frac{4}{5}$  groups of 3 laps  
 $\frac{24}{5} \cdot 3 = \frac{72}{5} = 14\frac{2}{5}$

$14\frac{2}{5}$  or 14.4 laps

5. Three people stood at the starting line of a 250m circular track, facing the same direction. At the same time, they all began going around the track at a steady speed. The first person went 5km/hour, the second person 4km/hour, and the third person 3km/hour. How many minutes will it be until all three are crossing the starting line at the same time?

Note 1 km = 1000 m

$3000 \text{ m/hr} \rightarrow 12 \text{ laps/hr} \rightarrow 5 \text{ min/lap}$   
 $4000 \text{ m/hr} \rightarrow 16 \text{ laps/hr} \rightarrow 3\frac{3}{4} \text{ min/lap}$   
 $5000 \text{ m/hr} \rightarrow 20 \text{ laps/hr} \rightarrow 3 \text{ min/lap}$

15 minutes

We want the smallest multiple of

$5, 3\frac{3}{4}, 3$  ← in minutes  
 $\text{LCM}(5, 3) = 15$  ←

Check  
 $15 \div 3\frac{3}{4} = 4$



Name: \_\_\_\_\_ School Team: \_\_\_\_\_

Circle your final answer!

**Event 5: Team Problems (with calculator)**

**Part 2: Sequences (5 points each)**

1. Below are two sequences. Notice that the number 95 appears in both of them. Find the next number that will appear in both sequences.

$19 + 76n$  → Sequence A: 19, 95, 171, 247, ...

$20 + 25x$  → Sequence B: 20, 45, 70, 95, ...

$n, x$  are whole

To be in both sequences, the number will end in 5. That will happen in sequence A on term 2, 7, 12, etc. Find terms in A and check if they are in B.

Check:  $455 = 25x \rightarrow x$  isn't whole

Terms in A:	475	855	1235	1615	1995
Is in B:	no	no	no	no	yes

$(5)(76) = 380$

1995

2. Find the ones digit of  $2^{50}$ .

$2^1 = 2$	$2^2 = 4$	$2^3 = 8$	$2^4 = 16$
$2^5 = 32$	$2^6 = 64$	$2^7 = 128$	...
$2^{49}$	$2^{50}$		$2^{48}$

notice the pattern. Find where  $2^{50}$  falls

4

3. Find the 2020<sup>th</sup> letter in the pattern AABBBCCCCAABBBCCCC...

9 letters are repeating.

We'll get through 224 whole repetitions of the pattern before the 2020<sup>th</sup> letter

$224 \times 9 = 2016$ , so the last C is the 2016<sup>th</sup> term.

2017 2018 2019 2020  
A A B B B C C C C

B

4. I have a sequence of consecutive integers. The sum of the third and fourth terms is 47. Find the sum of the first 5 terms of the sequence.

$$\begin{array}{cccccc} \underline{x-2} & \underline{x-1} & \underline{x} & \underline{x+1} & \underline{x+2} & \\ & & \vee & & & \\ & & 47 & & & \end{array}$$

$2x+1 = 47$   
 $2x = 46$   
 $x = 23$

115

$21 + 22 + 23 + 24 + 25 = 115$

5. Find the next term of the sequence 1, 4, 27, 256, ...

$1 = 1^1$        $27 = 3^3$   
 $4 = 2^2$        $256 = 4^4$

Find  $5^5 = 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 3125$

3125

Name: \_\_\_\_\_ School Team: \_\_\_\_\_

Circle your final answer!

**Event 5: Team Problems (with calculator)**  
Part 3: Number Theory (5 points each)

1. Find the last two digits of  $5^{2020}$

25

$5^1 = 5$      $5^3 = 625$      $5^5 = 15625$   
 $5^2 = 25$      $5^4 = 3125$

Notice for  $5^n, n > 1$ , the last 2 digits are always 25

2.  $M \div 5$  has a remainder of 2.  $N \div 5$  has a remainder of 4. Find the remainder of  $(M + N) \div 5$ .

Notice that dividing  $M$  by 5 leaves 2 remaining; dividing  $N$  by 5 leaves 4 remaining. Rearrange remaining items together  $\rightarrow 2 + 4 = 6$ , which is another group of 5 and one leftover.

1

3. There are a dozen tickets numbered 1-12, one number per ticket. They are separated into two different piles, then the sum of each pile is found. The sum of both piles was surprisingly the same number. Find that sum.

If we find  $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12$ , this sum is the sum of the piles together, so find  $\frac{1}{2}$  of it to be the sum of each pile.

$78 \div 2 = 39$

39

4. Find the sum of all integers between 100 and 250 which are divisible by 6 and have a last digit of 6.

1 $\rightarrow$ Find all possibilities	106 x	156 $\checkmark$	206 x
2 $\rightarrow$ Check if divisible by 6 (divisible by 2 and 3)	116 x	166 x	216 $\checkmark$
	126 $\checkmark$	176 x	226 x
	136 x	186 $\checkmark$	236 x
3 $\rightarrow$ Add	146 x	196 x	246 $\checkmark$

$126 + 156 + 186 + 216 + 246 = 930$

A quicker way: To be divisible by 3, a number's digits must sum to a number divisible by 3. We could have just built those numbers ending in 6, which means the number is divisible by 2 (even)

5. A Pythagorean quadruple is a set of positive integers  $a, b, c$ , and  $d$  that satisfy the equation  $a^2 + b^2 + c^2 = d^2$ . If 2, 9, and 11 are three of the four integers that form a quadruple then find the fourth integer.

- either 2, 9, 11 are  $a, b, c$  or  $11 = d$  and one of  $a, b, c$  is unknown

$2^2 + 9^2 + 11^2 = d^2$

$4 + 81 + 121 = d^2$

$206 = d^2$

$d$  wouldn't be an integer

$a^2 + 4 + 81 = 121$

$a^2 = 36$

$a = 6$

6

Name: \_\_\_\_\_ School Team: \_\_\_\_\_

Circle your final answer!

**Event 5: Team Problems (with calculator)**

Part 4: Geometry (5 points each)

**Remember to label answers as needed.**

1. One angle of a triangle is double the size of the first angle. The third angle is 40 degrees less than the first angle. Find the measure of the smallest angle.

Let  $x$  be the first  $\angle$ . Note  $180^\circ$  in a  $\Delta$ .

$$x + 2x + x - 40 = 180$$

$$4x = 220$$

$$x = 55^\circ, \text{ other } \angle\text{s are } 110^\circ \text{ and } 15^\circ$$

15°

2. Two opposite sides of a square are increased in length by 25%. The other two sides are decreased by 40%. Find the decrease in area from the original square to the resulting rectangle.

Let  $x$  be the original side length.  
The original area was  $x^2$  units<sup>2</sup>

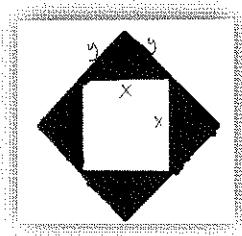


Area:  $(1.25x)(0.6x) = 0.75x^2$

Decrease of 25%

3. The hypotenuses of four congruent isosceles right triangles serve as the sides of a square, as shown. If the area of that unshaded square is  $18\text{cm}^2$ , find the area of the shaded region.

Label sides of square as  $x$ , Label isosceles  $\Delta$  sides as  $y$ .



$$x^2 = y^2 + y^2$$

$$x^2 = 2y^2$$

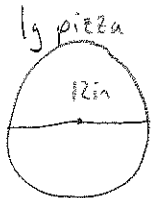
Large square:  $2y \cdot 2y = 4y^2$  as the area

Area shaded = Area  $\Delta$  square - area small square.

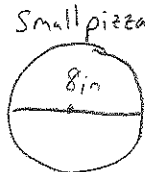
$$= 4y^2 - x^2$$

$$= 4y^2 - 2y^2 = 2y^2 = x^2 = 18\text{cm}^2$$

4. A local pizza place offers one large pizza or two small pizzas for the same price. A large pizza has a 12in diameter and a small pizza has an 8in diameter. If you're looking to get more pizza, should you order one large pizza or two small pizzas?



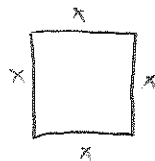
$A = 36\pi\text{in}^2$



$A = 16\pi\text{in}^2$   
 $2A = 32\pi\text{in}^2$

One large pizza

5. If the square root of the perimeter of a square is 6cm, find the area of the square.



Let  $x$  be the side length

$$\sqrt{4x} = 6$$

$$4x = 36$$

$$x = 9$$

$9^2 = 81$

81cm<sup>2</sup>

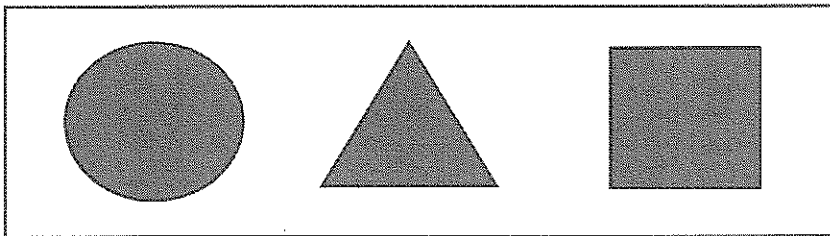
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Circle your final answer!

**TIE BREAKER**

Write all answers as a fraction. Remember to simplify!

- In a Kindergarten class, each child is given a red crayon and a green crayon. They are asked to color a circle, a triangle, and a square. Each shape can only be colored using one color. How many different ways could the children color the picture?



red red red  
 r r g  
 r g r  
 g r r

g g g  
 g g r  
 g r g  
 r g g

8 ways

- Gary typed a 6-digit number into his calculator. Unfortunately, the “1” key is broken and the two ones he typed didn’t show up. The calculator displayed the number 2020. How many different 6-digit numbers could Gary have typed?

112020 211020 201120 202110 202011  
 121020 210120 201210 202101  
 120120 210210 201201  
 120210 210201  
 120201

15

- Each day Santos makes an open-faced sandwich using only one slice of bread. He uses one kind of meat or one kind of cheese or one kind of each. If he chooses from 4 types of bread, 5 kinds of meat, and 3 kinds of cheese, how many different sandwiches can he make?

Just Meat:  $4 \times 5 = 20$  different kinds  
 Just Cheese:  $4 \times 3 = 12$  different kinds  
 Both:  $4 \times 3 \times 5 = 60$  different kinds

$20 + 12 + 60 = 92$

92