

7th -8th Grade
Regional Math Meet Tests
2019

- **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: _____

Event 1: Computations Without Calculator- 20 points totalCircle your final
answer!

Part I (2 points each)

Give all answers in simplest form.

$$1. \frac{3-4|2-5|}{5-9 \div 3+8} = \frac{3-4|-3|}{5-3+8} = \frac{3-4(3)}{2+8} = \frac{3-12}{10} = \left(\frac{-9}{10}\right)$$

$$2. (0.11 + \frac{1}{2} \times 0.11) \div 2 = 0.11 \left(1 + \frac{1}{2}\right) \div 2 = 0.11 \times 1.5 \div 2$$

$$= 0.165 \div 2$$

$$= \left(0.0825\right)$$

$$\begin{array}{r} .055 \\ .055 \\ \hline .110 \\ .055 \\ \hline 2 \overline{) 1.165} \underline{0.0825} \end{array}$$

$$3. -\sqrt{64} \times 8^2 - 39 \div 3 = -8 \times 8^2 - 39 \div 3 = -8 \times 64 - 13$$

$$= -512 - 13$$

$$= \left(-525\right)$$

4. What percent of 14 is 18.2?

$$\frac{x}{100} \cdot \frac{14}{1} = 18.2 \rightarrow \frac{14x}{100} = 18.2 \rightarrow \frac{14x}{14} = \frac{1820}{14}$$

$$\left(130\%\right) \quad x = 130$$

5. We know $6(x+4) - 7 = -7$. Find the value of $-3x^3 - 2x$

$$6x + 24 - 7 = -7$$

$$6x + 24 = 0$$

$$6x = -24$$

$$x = -4$$

$$-3(-4)^3 - 2(-4) = -3(-64) + 8$$

$$= 192 + 8$$

$$= \left(200\right)$$

Name: _____

School Team: _____

Circle your final
answer!

Event 1: Computations Without Calculator

Part II (2 points each)

Give all answers in simplest form.

1. Write 5,694.2% as a simplified mixed number.

$$5694.2\% = 56.942 = 56 \frac{942}{1000} = \boxed{56 \frac{471}{500}}$$

2. Find
- $\frac{2}{3}$
- of 680% of 27.

$$\frac{2}{3} \cdot 6.8 \cdot 27 = 18 \cdot 6.8 = \boxed{122.4}$$

$$3. \left[\left(\frac{2}{7} + \frac{2}{5} \right) \div \frac{1}{2} \right] \times \frac{5}{6} = \left[\left(\frac{10}{35} + \frac{14}{35} \right) \div \frac{1}{2} \right] \times \frac{5}{6} = \left[\frac{24}{35} \cdot \frac{1}{2} \cdot \frac{5}{6} \right] = \frac{4}{7 \cdot 2} = \frac{8}{7} \quad \boxed{\frac{8}{7}}$$

$$4. \left(1\frac{3}{4} + 1\frac{4}{5} \right) \div 71 = \left(\frac{7}{4} + \frac{9}{5} \right) \div 71 = \left(\frac{35}{20} + \frac{36}{20} \right) \div 71 = \frac{71}{20} \cdot \frac{1}{71} = \boxed{\frac{1}{20}}$$

5. Find the value of x.
- $6x - 18(2 + x) - 10 = 5(x + 1)$

$$6x - 36 - 18x - 10 = 5x + 5$$

$$-12x - 46 = 5x + 5$$

$$-51 = 17x$$

$$\boxed{-3 = x}$$

Name: _____

School Team: _____

Circle your final answer!

Event 2: Computations With Calculator- 25 points total

Consumer Math (5 points each)

1. A 12 ounce can of green beans costs 69 cents and a 20 ounce can of green beans costs \$1.17. Which is the better buy?

12 ounce can $\rightarrow \frac{0.69}{12}$ is 0.0575/ounce

20 ounce can $\rightarrow \frac{1.17}{20}$ is 0.0585/ounce

12 ounce can

2. A man decides to go into business selling vacuum cleaners. He purchases 53 vacuum cleaners for \$47.79 each. He marks up their price by 132% to sell. After selling 18 of the vacuum cleaners, he discounts the rest by 25%. Find his total profit or loss. Be sure to label if it is a profit or loss. Round to the nearest cent.

Man's cost: $53 \times \$47.79 = \2532.87
 $2.32 \times \$47.79 = \110.87 markup price
 $18 \times \$110.87 = \1995.66 first 18 sold
 $.75 \times \$110.87 = \83.15 discounted price

$35 \times \$83.15 = \2910.25 selling rest
 $\$1995.66 + \$2910.25 - \$2532.87 = \2373.04

Net profit \$2373.04

3. Ian's paycheck is \$168.04. He knows that his deductions were \$35.26 during this pay period. If he makes \$10.70 an hour, how many hours did he work?

$\$168.04 + \$35.26 = \$203.30$ check before deductions

$\$203.30 \div \$10.70 = 19$ hrs worked

19 hours

4. Suppose that you want to purchase a laptop for \$617.89 and a printer for \$134.57. You have a coupon for \$10 off the printer, which will be applied before tax. Additionally, the store offers a 5% discount for purchases on laptops on Tuesdays. If you buy everything on a Tuesday and sales tax is 5.7%, find the total cost. Round to the nearest cent.

Laptop:
 $0.95(\$617.89) = \587.00
 w/ tax
 $1.057(\$587) = \620.46

Printer:
 $\$134.57 - \$10 = \$124.57$
 w/ tax
 $1.057(\$124.57) = \131.67

Total Cost
 $\$620.46 + \$131.67 = \$752.13$

\$752.13

\$752.12

5. An entrepreneur spends \$18.71 on each craft he creates. He wants to sell 35 crafts and make at least \$400. Find the smallest percent markup that he must use to reach this profit. In calculations, round to the nearest cent. Round your percent to the nearest tenth.

$35 \times \$18.71 = \654.85 cost of entrepreneur
 $\$654.85 + \$400 = \$1054.85$ need sales to be
 $\$1054.85 \div 35 = \30.14 selling price

$\frac{x}{100} \cdot \$18.71 = \$30.14 \rightarrow 18.71x = 3014$
 $x = 161.1$

161.1%

Name: _____

School Team: _____

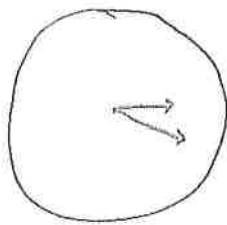
Event 3: Mathematical Reasoning With Calculator- 35 points total

Circle your final answer!

Geometry (7 points each)

Remember to use labels when appropriate

1. Find the measure of the acute angle made by the hands of a clock at 3:20.



$360^\circ \div 12 = 30^\circ$ in between each pair of numbers
 Hour hand moved $\frac{20}{60} = \frac{1}{3}$ of distance $\rightarrow 10^\circ$
 $30^\circ - 10^\circ = 20^\circ$

20°

2. Amber is thinking of an angle. The complement of the angle is $\frac{4}{9}$ of its supplement. Find the measure of the angle that Amber is thinking of.

Angle: x°
 Complement: $(90 - x)^\circ$
 Supplement: $(180 - x)^\circ$

$90 - x = \frac{4}{9}(180 - x)$

$90 - x = 80 - \frac{4}{9}x$

$10 = \frac{5}{9}x$

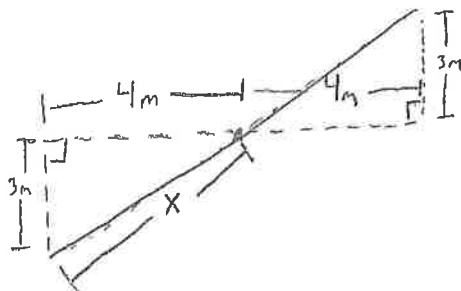
$x = 18$

18°

~~$90 - x = 80 - \frac{4}{9}x$~~
 $\frac{4}{9} \cdot \frac{18}{1} = \frac{72}{9}$

3. Two men start at the same point, walk in opposite directions for four meters, then turn left and walk another 3 meters. What is the distance between them now?

Distance is $2x$



$3^2 + 4^2 = x^2$

$9 + 16 = x^2$

$25 = x^2$

$5 = x$

$5 + 5 = 10$

10m

Name: _____ School Team: _____

Event 3: Mathematical Reasoning With Calculator- 35 points total

Circle your final answer!

Geometry Part II (7 points each)

Remember to use labels when appropriate

4. Ben is thinking of a rectangle with a perimeter of 216cm. The length of every side of the rectangle he's thinking of is a multiple of 3. The area of the rectangle he's thinking of is between 1000cm² and 1800cm². Find the dimensions of all possible rectangles that Ben might be thinking of.

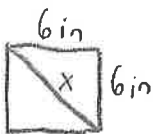
$$2l + 2w = P \quad lw = A$$

Possible l, w, area

l	w	area
3	105	315 - way too small
9	99	891 x
12	96	1152 ✓
15	93	1395 ✓
18	90	1620 ✓
21	87	1827 x rest too large

12cm x 96cm
 15cm x 93cm
 18cm x 90cm

5. A square has an area of 36in². What is the area of a circle whose diameter is as long as the diagonal of that square? Use 3.14 for pi. Do not round any other numbers until the very end of the problem, then round your final answer to the nearest hundredth.



$$x^2 = 6^2 + 6^2$$

$$x^2 = 72$$

$$x \approx 8.485281374$$

Diameter is 2r

$$2r \approx 8.485281374$$

$$r \approx 4.242640687$$

$$A = \pi r^2$$

$$A = 3.14 (4.242640687)^2$$

$$A = 56.52$$

56.52in²

$$3.14 \left(\frac{6\sqrt{2}}{2} \right)^2$$

Name: _____ School Team: _____

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

(2 points each)

Example: 23

1) 1

2) -1

3) 0

4) 73

5) 154

6) 251

7) -158

8) -17

9) 15

10) -87

$(12-5) + (4 \times 4)$

$2 \div \left(\frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \frac{4}{5} \right)$

$$\frac{19-99}{99-19}$$

$96 - 48 \div 2 \times 4$

$3^4 - 2^3$

$140\% \text{ OF } 110$

$11 \times 18 + 53$

$25 - 86 - 97$

$5 - (6 \div 3 \times 9 + 4)$

FIND $\frac{1}{8}$ OF $\frac{1}{2}$ OF 240

$4(397-412) - 27$

Name: _____ School Team: _____

Circle your final
answer!**Event 5: Team Problems (with calculator)- 100 points total**

Part 1: Number Theory (3 points each)

1. Some aliens have entered your classroom. They work math problems differently than what you're used to. They seem to follow some strange rules when solving arithmetic problems. The rules do not change- they always stay the same. Assume that the aliens found the correct answers to each of the problems shown below.

$5 \odot 4 = 23$

$1 \odot 3 = 6$

$2 \odot 8 = 19$

$3 \odot 7 = 24$

$A \times B + 3$

$6 \otimes 1 = 4$

$6 \otimes 5 = -4$

$8 \otimes 3 = 2$

$9 \otimes 2 = 5$

$A - 2B$

Solve each of the problems below, using the same rules as the aliens.

a) $7 \otimes 12 = 7 - 2(12) = 7 - 24 = -17$

Rule for \odot : Multiply the numbers and add 3

b) $4 \otimes 3 = 4 - 2(3) = 4 - 6 = -2$

Rule for \otimes : Take the first number and subtract twice the second

c) $8 \odot 7 = 8 \cdot 7 + 3 = 56 + 3 = 59$

d) $12 \odot 6 = 12 \cdot 6 + 3 = 72 + 3 = 75$

e) $(4 \odot 8) \otimes 9 = (4 \cdot 8 + 3) - 2(9) = 35 - 18 = 17$

f) $8 \otimes (2 \odot 3) = 8 - 2(2 \cdot 3 + 3) = 8 - 2(9) = 8 - 18 = -10$

Name: _____ School Team: _____

Circle your final answer!

Event 5: Team Problems (with calculator)- 100 points total
 Part 2: Probability (9 points each)

Write all answers as a fraction. Remember to simplify!

2. Solve each of the problems below.

a) Celia rolls a pair of fair dice, multiplying the values shown. Find

- i. The probability that the outcome is prime
- ii. The probability that the outcome is even
- iii. The probability that the outcome is greater than 10

	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

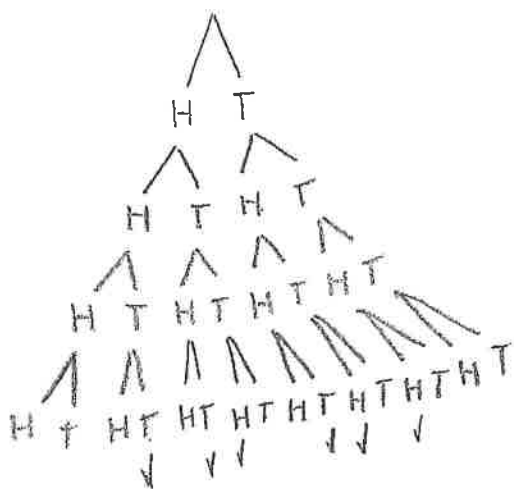
i. → Prime values possible are 2, 3, 5 so $\frac{6}{36} = \frac{1}{6}$

ii. → Evens occur in the loops marked $\frac{27}{36} = \frac{3}{4}$

iii. → Events occur in stairstep box (lower right) $\frac{17}{36}$

b) A fair coin is flipped 4 times. Find

- i. The probability that the outcome will **not** be 4 heads
- ii. The probability that the outcome is exactly 2 heads and 2 tails (any order)
- iii. The probability that the coin landed heads up at least once



i. → 4 heads happens exactly once, there are 15 other options $\frac{15}{16}$

ii. → See the six ✓ on the tree $\frac{6}{16} = \frac{3}{8}$

iii. → the only way to not be heads up at least once is by all tails. So $1 - \frac{1}{16} = \frac{15}{16}$

HHTT
 HHTT
 HTTH
 HTTH

TTHH
 TTHH
 THTH

TTTT not

Name: _____ School Team: _____

Circle your final answer!

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

Part 3: Problem Solving (8 points each)

Remember to simplify all fractions!

3. Solve each of the problems below.

- a) 10 years ago, Edwin was the same age that Falisha is now. In how many years will Falisha be as old as Edwin is now?

$F + 10$ F
 If Falisha is x yrs, Edwin is $10 + x$ yrs

10 yrs

- b) Gus has a drawer with socks in it. He knows that he has 8 red socks, 12 blue socks, 6 green socks, and 14 black socks. Gus wants to have a pair of blue socks to match his favorite shirt, but he can't turn on the lights. What is the smallest number of socks that Gus needs to pull out from the drawer in order to guarantee that he has a pair of blue socks?

He could pull out all the other colours first, so $8 + 6 + 14 = 28$
 Then he needs 2 blue

30

- c) Amber is thinking of an obtuse angle. The digits of the angle measure are all odd, no digits are the same, and the sum of the digits is 13. Find all possible angles that Amber could be thinking of.

$94 \times$ $166 \times$
 139 175
 $148 \times$
 157

139°, 157°, 175°

- d) Find the four digit number in which the first digit is five times the last, the second is four more than the first and three times the third, and the third is two more than the last and two less than the first.

Possible Last 1st
 0 0 → not 4 digit #
 1 5
 2 10 → no longer 4 digit #,
 nothing higher will work

5931

So use 5 _ _ 1, then $5 + 4 = 9$
 $9 \div 3 = 3$

Name: _____ School Team: _____

Circle your final
answer!**Event 5: Team Problems (with calculator)- 100 points total**

Part 4: Rates (8 points each)

- a) During a basketball camp Hector and Joe keep track of the number of free-throw shots that they make. Before the last day of camp, Hector has made 100 of his 150 attempts. Joe has made only 99 of his 150 attempts. On the last day, Joe shoots and makes 12 more. Hector shoots 13 more but only makes 11 of them. Who was the better free-throw shooter over the entire basketball camp?

$$\frac{\text{Hector}}{\frac{111}{163}}$$

$$\frac{\text{Joe}}{\frac{111}{162}}$$

Joe

- b) Two typists can type two pages in two minutes. How many typists will it take to type eighteen pages in six minutes?

2 typists need 6 min for 6 pages → need 18 pgs, so 3 groups

6 typists

- c) A mile-long train traveling at 60mph enters a mile long tunnel. How long does it take for the entire train to pass through the tunnel?

train takes 1 min to travel 1 mile
must travel 2 miles for entire train to
pass through

2 minutes

- d) Kensie runs one lap around the track at a speed of 3mph and a second lap around the track at a speed of 6mph. Find her average speed for the two total laps run.

Say 1 lap has distance of x

$$\frac{\text{Total distance}}{\text{Total time}} = \frac{2x}{\frac{x}{3} + \frac{x}{6}} = \frac{2x}{\frac{2x}{6} + \frac{x}{6}} = \frac{2x}{\frac{3x}{6}} = \frac{2x}{1} \cdot \frac{6}{3x} = 4$$

4 mph

Name: _____ School Team: _____

Circle your final
answer!**TIE BREAKER (with calculator)**

- 1) If you find the product of the first 25 positive integers, how many zeros will be at the end of the number?

Zeros are 10s, 10s made from 5·2
more 5s than 2s, so count 5s

5 10 15 20 25 → 6 fives, so 6 zeros
1 1 1 1 11

6

- 2) You roll 8 dice and find the product to be $2^3 \times 3^3$. What are all of the possible sums of the dice? only way to get this is from 2s, 3s, 6s

could be

666 11111 → 23 66 23 1111 → 21
222 333 11 → 17
6 22 33 111 → 19

17, 19, 21, 23

- 3) A rectangle has a perimeter of 40 centimeters. The length and the width are both integers. How many different rectangles are possible?

1 1 19 19
2 2 18 18
3 3 17 17
4 4 16 16
5 5 15 15
6 6 14 14
7 7 13 13
8 8 12 12
9 9 11 11
10 10 10 10

10