

Name: _____

School: _____

Grade: _____

**Round 1: Free Response Questions**

There are 20 problems in this round. Make sure to write your answers on the answer sheet. Correct answers are worth 11 points each; incorrect and blank answers are given 0 points. You do not have to write units. All fractions must be written in simplest form. Have fun! ☺

Problem 1

Hermione and Ron are practicing lifting feathers into the air with magic. Hermione can lift a feather 35 feet into the air, which is 5 times as high as Ron can lift a feather. How high can Ron lift a feather with his magic?

Problem 2

The sum of a negative integer n and its square is 6. What is the value of n ?

Problem 3

The pattern AABBBCCCCAABBBCCCC... continually repeats. What is the 369th letter in this pattern?

Problem 4

Evaluate $[2 - 4(2 - 3)^{-1}]^{-1}$. Express your answer as a common fraction.

Problem 5

What is the number of degrees the minute hand of a clock moves between 5:04 p.m. and 5:21 p.m.?

Problem 6

Samantha had a bag of gummy bears. She gave $\frac{1}{2}$ of them to Agni, $\frac{1}{3}$ of them to Vishal, and 15 to Anshul. If the bag were then empty, how many gummy bears were in the bag at the beginning?

Problem 7

The total area of four squares, each with whole-number side measurements, is 23 square inches. In inches, what is the positive difference between the perimeter of the largest square and the perimeter of the smallest square?

Problem 8

MathWizard rides $\frac{3}{5}$ of a mile in 1.5 minutes on her bicycle. What is her average speed in miles per hour?

Problem 9

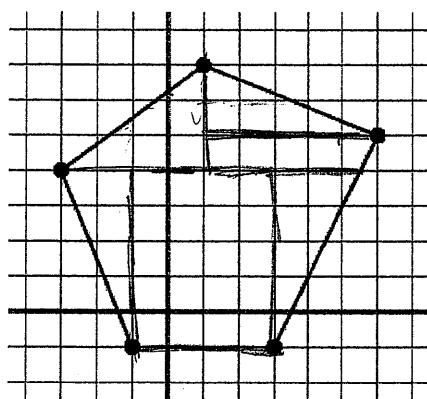
The length of each edge of a cube is increased by 20%. What is the percent increase in the surface area of the cube?

Problem 10

Five aluminum cans can be recycled to make a new can. How many new cans can eventually be made from 125 aluminum cans? (Remember that the first new cans that are made can then be recycled into even newer cans!)

Problem 11

The vertices of a convex pentagon are $(-1, -1)$, $(-3, 4)$, $(1, 7)$, $(6, 5)$, and $(3, -1)$. What is the area of the pentagon?

**Problem 12**

The arithmetic mean of 12 scores is 82. When the highest and lowest scores are removed, the new mean becomes 84. If the highest of the 12 scores is 98, what is the lowest score?

Problem 13

Lily ran at an average speed of five miles per hour along an entire circular park path. James ran along the same path in the opposite direction at an average speed of six miles per hour. It took James 30 minutes less than it took Lily to run the full path once. How many miles did Lily run when she completed one circular path?

Problem 14

Point Z is the midpoint of \overline{MN} . Point P is the midpoint of \overline{ZN} . Point Q is the midpoint of \overline{PN} and Point R is the midpoint of \overline{QN} . If \overline{PR} is 24 inches long, how many feet long is \overline{MN} ? Express your answer as a mixed number.

Problem 15

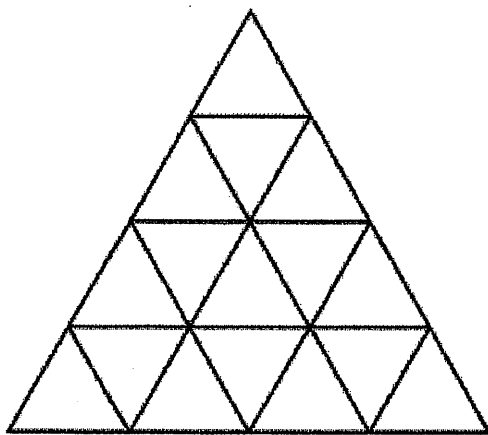
A jar contains 10 red, 7 blue and 5 yellow marbles. Blue marbles are then added in order to change the probability of randomly selecting a blue marble from the jar to "greater than $\frac{1}{2}$ ". What is the least number of blue marbles that must be added?

Problem 16

Cleopatra is designing a way to expand a pyramid using triangular pieces of size



How many more such triangular pieces would she need to add to the figure below to create ten more layers building on the bottom of the figure?



Problem 17

The fourteen digits of an account number are to be written, one per unit square, in the string of unit squares below. The sum of any three consecutive digits is 15. What is the value of x ?

			6				x				8		
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Problem 18

At 10:00 a.m., Mr. Yang is the 225th person in line to ride the Rocker Roller Coaster. Each roller coaster train holds 36 people. A full train leaves every four minutes. If the first 36 people in line leave on the 10:01 train, what time will Mr. Yang's train leave?

Problem 19

The four-member math team at Milton High School is chosen from the math club, which has 5 girls and 3 boys. How many different teams made up of two girls and two boys could be chosen?

Problem 20

The ratio of the sum and difference between two positive integers a and b is $\frac{7}{3}$. What is the greatest possible product of the two integers such that the product is less than 1000?

You did it – YAY!

Remember to place all answers on your answer sheet. You may keep your test questions. ☺



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Round 2: Multiple Choice Questions

There are 30 problems in this round. Make sure to write your answers (A, B, C, D, or E) on the answer sheet. NOTA means "none of the above". Correct answers are worth 6 points each. Have fun! ☺

Problem 1

Find the value of this expression:

$$3 \times [(2 \times 6 - 5) + (8 \div 4)] - 1$$

- A. 9
- B. 11
- C. 26
- D. 32
- E. NOTA

Problem 2

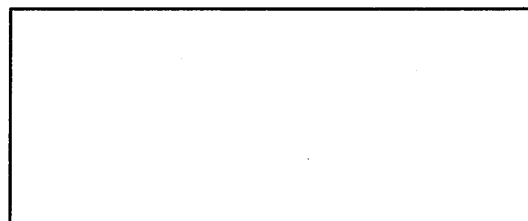
Sean Lu had $\frac{3}{4}$ of his book left to read on Sunday night. He read $\frac{1}{5}$ of the book Monday afternoon and $\frac{1}{4}$ of the book Monday evening. What fraction of the book did he still have left to read after Monday evening?

- A. $\frac{1}{5}$ of the book
- B. $\frac{2}{9}$ of the book
- C. $\frac{1}{4}$ of the book
- D. $\frac{3}{10}$ of the book
- E. NOTA

Problem 3

Catherine bought a rectangular rug for her new room. The diagram to the right shows the dimensions of Catherine's rug. What is the area of Catherine's rug?

- A. $7\frac{3}{4}$ square feet
- B. $10\frac{3}{4}$ square feet
- C. $13\frac{3}{4}$ square feet
- D. $15\frac{1}{2}$ square feet
- E. NOTA

 $2\frac{3}{4}$ feet


5 feet

Problem 4

Katniss had 3 more cookies than Peeta. Then Peeta gave her 4 of his cookies. Now how many more cookies does Katniss have than Peeta?

- A. 8
- B. 9
- C. 10
- D. 11
- E. 12

Problem 5

Beatrice has 5 striped shirts and 6 solid-colored shirts hanging together in her closet. In her hurry to get to school, she randomly grabs one of these 11 shirts. What is the probability that the shirt she grabs is solid-colored?

- A. $\frac{1}{5}$
- B. $\frac{5}{6}$
- C. $\frac{1}{11}$
- D. $\frac{5}{11}$
- E. $\frac{6}{11}$

Problem 6

Amanda has a basket of red, white, and pink roses in a ratio of 6:3:2. The basket contains a total of 44 roses. How many pink roses are in the basket?

- A. 2
- B. 6
- C. 8
- D. 12
- E. 14

Problem 7

Compute the following:

$$\frac{1}{4} \cdot \frac{2}{5} \cdot \frac{3}{6} \cdot \frac{4}{7} \cdot \frac{5}{8} \cdot \frac{6}{9} \cdot \frac{7}{10} \cdot \frac{8}{11} = ?$$

- A. $\frac{2}{15}$
- B. $\frac{1}{99}$
- C. $\frac{1}{165}$
- D. 2
- E. $\frac{11}{2}$

Problem 8

What is the least positive integer with exactly 9 factors?

- A. 35
- B. 34
- C. 39
- D. 33
- E. 36

Problem 9

Which situation can be represented by the fraction $\frac{20}{8}$?

- A. Leslie spent 20 dollars and 8 cents at a store. How is the amount of money Leslie spent written as a fraction?
- B. Mr. Kramer's 8 grandchildren shared 20 crackers equally. How many crackers did each grandchild get?
- C. Mitch bought 20 containers of flowers at a plant store. Each container had 8 flowers in it. How many flowers did Mitch buy?
- D. Stamps are sold in booklets of 20 stamps. Donna used 8 stamps to send invitations for a party. How many booklets of stamps did Donna use to send her invitations?
- E. Hannah, the birthday girl, distributed 8 cakes to her class of 20 students. What fraction of the total amount of cake did each student receive?

Problem 10

All together, 27 trapezoids have the same number of sides as ? triangles.

- A. 16
- B. 18
- C. 27
- D. 36
- E. NOTA

Problem 11

Dreamy-Lizzy had 28 dreams last month. If 16 of them involved cupcakes, 15 involved ice cream, and 4 involved no sweets, then at least how many dreams involved both cupcakes and ice cream?

- A. 3
- B. 5
- C. 7
- D. 9
- E. 11

Problem 12

If I add the number of sides that a hexagon has to the number of sides that a ? has, then the sum is an odd number.

- A. rhombus
- B. square
- C. pentagon
- D. quadrilateral
- E. octagon

Problem 13

How many degrees are in the measure of the smaller angle that is formed by the hands of a clock when it is 4 o'clock?

- A. 121
- B. 122
- C. 120
- D. 117
- E. 123

Problem 14

Tiffany loves pineapple pizza. She prepares a mini-pizza with a certain number of pineapple pieces on it. If the number of pieces is divisible by 4, 5, 6, 7, and 8, there must be at least _____ pineapple pieces.

- A. 140
- B. 210
- C. 420
- D. 840
- E. 6720

Problem 15

I have equal numbers of quarters, dimes, and nickels. These coins could have a total value of any of the following EXCEPT

- A. \$0.80
- B. \$2.40
- C. \$3.80
- D. \$4.40
- E. \$5.20

Problem 16

Ankita has blue, green, red, black and white pairs of shoes. She also has blue, green, red, black and white pairs of shoelaces. If she randomly selects a pair of shoes and a pair of shoelaces, what is the probability that they will not be both white? Express your answer as a common fraction.

- A. $24/25$
- B. $23/25$
- C. 1
- D. $22/25$
- E. $26/25$

Problem 17

Given that $5x + 9y = 10$ and $9x + 5y = 74$, what is the value of $x + y$?

- A. 7
- B. 8
- C. 3
- D. 6
- E. 9

Problem 18

A red circle of fabric is to be sewn onto a rectangular white flag that is 9 feet by 12 feet. The edge of the circle must be at least 3 feet from any edge of the white fabric. What is the maximum radius of a red circle that can be sewn on the flag?

- A. 1.5
- B. 2
- C. 2.5
- D. 3
- E. 3.5

Problem 19

A cube is increased in size to form a new cube so that the surface area of the new cube is 16 times that of the original cube. By what factor has the volume of the cube increased?

- A. 60
- B. 56
- C. 76
- D. 52
- E. 64

Problem 20

The area of the living room in a house is to be tripled. Before construction, the room is 12 feet by 16 feet. If the width is increased by 4 feet, by how many feet must the length increase?

- A. 18
- B. 20
- C. 24
- D. 28
- E. 36

Problem 21

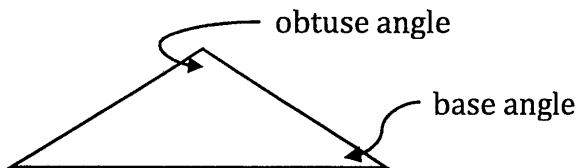
On a Sunday, Harrison put two bunnies in a cage. If the number of bunnies in the cage doubled every day, on what day did the cage first have more than 100 bunnies in it?

- A. Thursday
- B. Friday
- C. Saturday
- D. Sunday
- E. Monday

Problem 22

The obtuse angle of an isosceles triangle is bisected (divided into two equal parts) and each resulting angle is 52 degrees larger than a base angle. How many degrees are in the measure of the obtuse angle?

- A. 143
- B. 142
- C. 144
- D. 139
- E. 145

**Problem 23**

In a garage, the ratio of red cars to blue cars is 8:5, and the ratio of blue cars to white cars is 3:4. The minimum number of cars in the garage is

- A. 20
- B. 59
- C. 74
- D. 91
- E. 100

Problem 24

The houses on Milton Avenue are numbered consecutively from 1 to 710. How many brass digits are needed to form all the house numbers?

- A. 2023
- B. 2024
- C. 2019
- D. 2022
- E. 2025

Problem 25

If a radius of a circle whose area is $36\pi \text{ cm}^2$ equals the width of a rectangle, and the diameter of the circle is half the length of the rectangle, then the perimeter of the rectangle is

- A. 60 cm
- B. 90 cm
- C. 144 cm
- D. 172 cm
- E. NOTA

Problem 26

How many ways can the letters of the word SUPPER be scrambled so that the first and the last letters are both vowels?

- A. 240
- B. 48
- C. 24
- D. 12
- E. 120

Problem 27

What is $(-5a^4)^3$ equivalent to?

- A. $125a^{12}$
- B. $125a^7$
- C. $-5a^{12}$
- D. $-125a^7$
- E. $-125a^{12}$

Problem 28

Beginning with the letter H at the top of the triangle and reading diagonally downward to an adjoining letter, in how many ways is it possible to read the word HYPOTHENUSE?

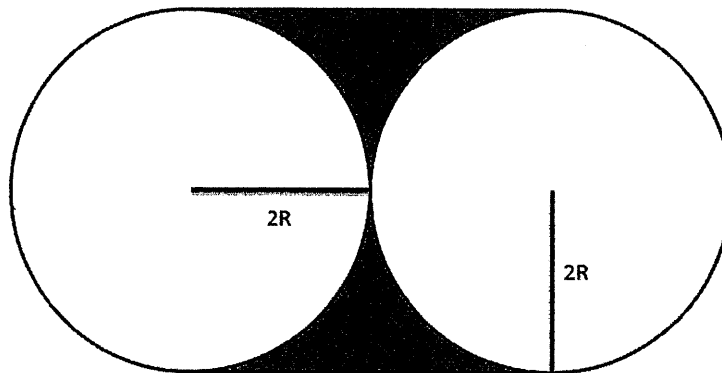
- A. 2048
- B. 4096
- C. 1024
- D. 128
- E. 8192

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      H
     Y Y
    P P P
   O O O O
  T T T T T
 H H H H H H
E E E E E E E
N N N N N N N
U U U U U U U U
S S S S S S S S S
E E E E E E E E E E
  
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Problem 29

If the radii of the two circles below are each $2R$, then what is the area of the shaded region?



- A. $4R^2$
- B. $4R^2(1 - \pi)$
- C. $16R^2$
- D. $4R^2(4 - \pi)$
- E. $2\pi R^2$

Problem 30

Let's take a tour of my bookshelf! Of my books, 85% are new and the rest are used. Some are biographies, 70% of which are new. What is the ratio of the fraction of new books that are biographies to the fraction of used books that are biographies?

- A. 7:17
- B. 14:17
- C. 1:2
- D. 17:14
- E. 17:7

You did it – YAY!

Remember to place all answers on your answer sheet. You may keep your test questions. ☺

Answers to the Mini-Mathletes Competition 2016

Test #1 (Free Response)	Test #2 (Multiple Choice)
<ol style="list-style-type: none">1. 7 feet2. -33. C4. $\frac{1}{6}$5. 102°6. 90 gummy bears7. 88. 24 mph9. 44%10. 31 cans11. 47 square units12. 4613. 15 miles14. $10\frac{2}{3}$ feet15. 9 marbles16. 180 triangles17. 118. 10:25 AM (accept 10:25)19. 30 teams20. 810	<ol style="list-style-type: none">1. C2. D3. C4. D5. E6. C7. C8. E9. B10. D11. C12. C13. C14. D15. C16. A17. D18. A19. E20. B21. C22. B23. B24. D25. A26. C27. E28. C29. D30. A

