School:_____ Team:_____

Directions: (1) Provide units with all answers when appropriate.
(2) Give exact answers: do not round or approximate answers.
(3) Write student names and fully simplified answers on the lines provided.

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1. A fan at a basketball game participates in a shooting contest. Each time she makes a basket, she earns 10 points. Each time she misses, she loses 5 points. After 20 attempts, the fan has -10 points. How many baskets did she make?

   Student name: _____ Answer:_____

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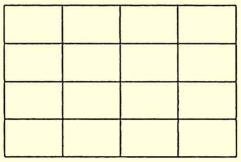
2. How many three-digit numbers are perfect squares?

   Student name: _____ Answer:_____

---

3. How many rectangles can be formed from the grid lines in the following figure?



   Student name: _____ Answer:_____

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4. Three distinct prime numbers are randomly selected from the first ten prime numbers. What is the probability that their sum is even?

   Student name: _____ Answer:_____

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5. A triangle has a base length of 63 cm and a height of 36 cm. If one of the two remaining sides is 60 cm long, what is the perimeter of the triangle?

   Student name: _____ Answer:_____

School:_____ Team:_____

Directions: (1) Provide units with all answers when appropriate.
(2) Give exact answers: do not round or approximate answers.
(3) Write student names and fully simplified answers on the lines provided.

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1. How many fives are there in the page numbers of a book that starts on page 1 and ends on page 72?

Student name: _____ Answer:_____

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2. A drawer of 40 socks contains ten blue socks, ten red socks, ten black socks, and ten white socks. You reach into the drawer without looking, and you pull out socks until you have removed four socks of the same color. What is the smallest number of socks you must take out to guarantee that four socks of the same color have been removed?

Student name: _____ Answer:_____

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3. If each dimension of a rectangular solid is doubled, then the volume of the solid is increased by what factor?

Student name: _____ Answer:_____

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4. The scores on five tests all range from 0 to 100, inclusive. If the average for the five tests is exactly 87, what is the lowest possible score on any one test?

Student name: _____ Answer:_____

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5. Timmy fell into a well that is 38 feet deep. Each hour Timmy climbed six feet, but then he would rest for 10 minutes and slide down two feet. How long did it take for Timmy to climb out of the well?

Student name: _____ Answer:_____

School:_____ Team:_____

Directions: (1) Provide units with all answers when appropriate.
(2) Give exact answers: do not round or approximate answers.
(3) Write student names and fully simplified answers on the lines provided.

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1. Emily has a rectangular garden in her backyard that is 15 meters long and 20 meters wide. She plans to build a sidewalk around the garden that is 1 meter wide on all sides. What will be the area of this sidewalk?

   Student name: _____ Answer:_____

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2. The surface of a cube with side length 3 inches is painted. The cube is then cut into 1-inch cubes. How many of the 1-inch cubes have paint on only two of their faces?

   Student name: _____ Answer:_____

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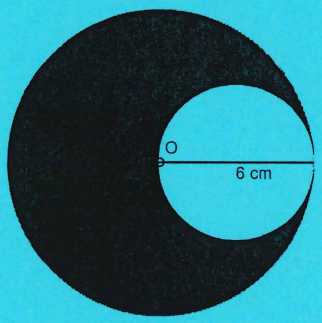
3. In the figure below, two circles are shown: a larger circle with center O, and a smaller circle that passes through O and touches the larger circle at one point. What is the exact area of the shaded region?



   Student name: _____ Answer:_____

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4. Solve for x: $\left(\frac{1}{3}\right)^{2x+8} = 9^{2x+5}$

   Student name: _____ Answer:_____

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5. At 2:00 p.m., a ship leaves an island port and sails east at 16 mph. At 4:00 p.m., another ship leaves the same port and sails north at 20 mph. At what time will these two ships be 100 miles apart?

   Student name: _____ Answer:_____

School:_____ Team:_____

Directions: (1) Provide units with all answers when appropriate.
(2) Give exact answers: do not round or approximate answers.
(3) Write student names and fully simplified answers on the lines provided.

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1. How many different seven-digit telephone numbers are possible if the only restriction is the first digit cannot be 0?

Student name: _____ Answer:_____

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2. If $n = 5$, what positive value of m will make the following equation true?

$$(m+n)^2 + (m-n)^2 + m^2 + n^2 = 318$$

Student name: _____ Answer:_____

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3. In the numeration system shown below, $B * C = B$. What is the value of $(B * B) * (C * C)$?

$*$	A	B	C
A	B	A	C
B	A	C	B
C	B	C	A

Student name: _____ Answer:_____

---

4. Natalia has a hot tub that drains in 12 minutes when the water needs replacing. She uses two hoses to refill the hot tub. One hose can fill the hot tub in 6 minutes by itself, while the other hose can fill the hot tub in just 4 minutes by itself. After draining and cleaning her hot tub, Natalia decides to use both hoses to fill it, but she forgets to put in the drain plug. In how many minutes will the hot tub be full?

Student name: _____ Answer:_____

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5. What is the remainder when 2^{2023} is divided by 5?

Student name: _____ Answer:_____

School:_____ Team:_____

Directions: (1) Provide units with all answers when appropriate.
(2) Give exact answers: do not round or approximate answers.
(3) Write student names and fully simplified answers on the lines provided.

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1. Simplify and express your answer in simplest radical form: $\sqrt[5]{32^2 + 16^3 + 8^4 + 4^5}$

Student name: _____ Answer:_____

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2. What is the sum of all the two-digit even numbers?

Student name: _____ Answer:_____

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3. Find the exact value of $(20232023)(20232023) - (20232021)(20232025)$.

Student name: _____ Answer:_____

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4. You have an unlimited supply of \$1, \$2, and \$5 bills. Using only these bills and not necessarily each type of bill, in how many ways can you form exactly \$11?

Student name: _____ Answer:_____

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5. The number 10 has exactly four positive divisors: 1, 2, 5, and 10. What is the smallest positive number with exactly five positive divisors?

Student name: _____ Answer:_____