DICK SCHAFF SUPERBOWL XLVI
2019 Junior High School Bomb Exam – Page 1 of 5

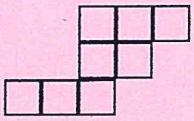
School _____ Team _____

Directions: **(1) Label answers with appropriate units.**
(2) Do not round or approximate answers.
(3) Write fully simplified answers on the lines provided.

1. Suppose a cube has a surface area of 21 square inches. If the lengths of its sides are doubled, what is the new surface area?

Student Name: _____ Ans: _____

2. The figure below consists of 8 congruent squares and has an area of 512 square meters. What is the perimeter of the figure?



Student Name: _____ Ans: _____

3. Consider all three-digit numbers that contain no even digits. How many of these three-digit numbers are divisible by 9?

Student Name: _____ Ans: _____

4. Six coins are in a sack. At least one nickel, at least one dime, and at least one penny are in the sack. There are more nickels than dimes and more dimes than pennies in the sack. If you select one coin randomly from the sack, what is the probability that you select a nickel?

Student Name: _____ Ans: _____

5. Find the value of $\sqrt{1,000,000,000,000}$

Student Name: _____ Ans: _____

School _____ Team _____

Directions: **(1) Label answers with appropriate units.**
(2) Do not round or approximate answers.
(3) Write fully simplified answers on the lines provided.

1. Last semester one-fifth of the students in a university math class earned As, one-fourth earned Bs, one-third earned Cs, one-sixth earned Ds, and 12 earned Fs. How many students were in the class?

Student Name: _____ Ans: _____

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

Student Name: _____ Ans: _____

3. What digit is in the one's place of 3^{2019} ?

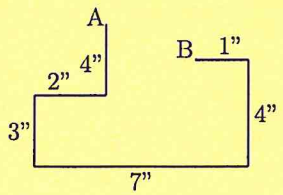
Student Name: _____ Ans: _____

4. Simplify the following continued fraction completely:

$$2+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+2}}}$$

Student Name: _____ Ans: _____

5. The path from A to B consists of straight line segments whose lengths (in inches) are as shown and whose angles are all right angles. What is the diagonal distance from A to B?

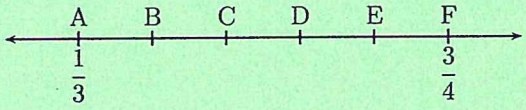


Student Name: _____ Ans: _____

School _____ Team _____

Directions: **(1) Label answers with appropriate units.**
(2) Do not round or approximate answers.
(3) Write fully simplified answers on the lines provided.

1. Points A-F are evenly spaced on a number-line. What reduced fraction corresponds to the point E?



Student Name: _____ Ans: _____

2. Two vertices of a rectangle are $(-4, 2)$ and $(-4, -1)$. The line with the equation $x = 1$ is a line of symmetry for this rectangle. How many square units are in this rectangle?

Student Name: _____ Ans: _____

3. Solve for x: $5^x - 5^{(x-2)} = 3000$

Student Name: _____ Ans: _____

4. Calculate the absolute value of the product of the solutions to the equation $x^2 + 2018x = 2019$.

Student Name: _____ Ans: _____

5. The numbers in the sequence $3, 8, 13, 18, 23, \ldots$ each increase by 5. The numbers in the sequence $4, 11, 18, 25, 32, \ldots$ each increase by 7. The number 18 occurs in both sequences. If the two sequences are continued, what is the next number that will appear in both sequences?

Student Name: _____ Ans: _____

School _____ Team _____

Directions: **(1) Label answers with appropriate units.**
(2) Do not round or approximate answers.
(3) Write fully simplified answers on the lines provided.

1. A three-digit number has the same digit in its hundreds place, tens place, and ones place. The sum of the prime factors of the number is 44. What is the three-digit number?

Student Name: _____ Ans: _____

2. What reduced fraction is the reciprocal of 4.76?

Student Name: _____ Ans: _____

3. Solve for x: $(4^x)\left(16^{3x-1}\right) = 8$

Student Name: _____ Ans: _____

4. Line L has equation $y = 2x - 8$. Line P has the same x-intercept as L and is also perpendicular to L. As an ordered pair, what is the y-intercept of line P?

Student Name: _____ Ans: _____

5. In Mr. Andrade's class tests are scored out of 100 points possible. If a student averages exactly 95% on five tests, what is the lowest possible grade on any one test?

Student Name: _____ Ans: _____

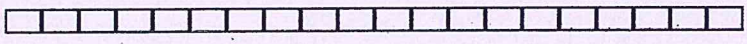
School _____ Team _____

Directions: **(1) Label answers with appropriate units.**
(2) Do not round or approximate answers.
(3) Write fully simplified answers on the lines provided.

1. The pattern AAABBCAAABBCAAABBC... continually repeats. What is the 1000^{th} letter in the pattern?

Student Name: _____ Ans: _____

2. How many distinct rectangles of any size are in the figure shown below?



Student Name: _____ Ans: _____

3. Eugene's Ice Cream Shoppe carries 22 flavors of ice cream. If you don't care in what order the scoops are put on your cone, how many three-scoop cones with three different flavors of ice-cream can be ordered?

Student Name: _____ Ans: _____

4. Two-thirds of the cube of a non-zero number equals three times the number's square. What is the number?

Student Name: _____ Ans: _____

5. *Modular arithmetic* is also called *clock arithmetic* because it can be thought of as arithmetic using the whole numbers on the face of a clock. For example, on a standard clock the equation $11 + 2 = 1$ is true. With a standard clock we would say we were working in *mod* 12. If we are working with a clock having only 5 numbers on its face, we say we are working in *mod* 5, and we have only the numbers $\{1, 2, 3, 4, 5\}$ to work with. In *mod* 5, what is $3 \div 2$?

Student Name: _____ Ans: _____