

2015 BOMB – Page 1

School _____ Team _____

Instructions: Label answers with appropriate units.
Do not round or approximate answers.
Write fully simplified answers on the lines provided.

1. Evaluate: $\lim_{x \rightarrow 5^+} \frac{5x - x^2}{|5 - x|}$

Team Member Name _____ Ans: _____

2. One solution of the equation $kx^2 + 4x + k = 0$ is $x = -2$. What is the other solution?

Team Member Name _____ Ans: _____

3. Evaluate: $\left(3 \sin \frac{\pi}{6}\right) \left(2 \tan \frac{\pi}{12}\right)$

Team Member Name _____ Ans: _____

4. Find the area of the triangle whose sides have lengths 5, 6, and 7.

Team Member Name _____ Ans: _____

5. There are 5 geese in a gaggle. If, working together, the gaggle produces 55 eggs in 5555 days, what is the average number of days it takes a single goose to produce an egg?

Team Member Name _____ Ans: _____

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School _____ Team _____

Instructions: Label answers with appropriate units.
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1. Find the range of $f(x) = \frac{x^2 + x + 2}{x^2 + x + 1}$.

Team Member Name _____

Ans: _____

2. The following message is a correct addition sum in which $D = 7$, $E = 5$ and $R = 8$. If each different letter represents a different digit, what is the sum?

SEND
MORE
MONEY

Team Member Name _____

Ans: _____

3. Evaluate: $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{3i}{n} - 2 \right)^2 \left(\frac{3}{n} \right)$

Team Member Name _____

Ans: _____

4. Find the radius of a circle inscribed in a rhombus with diagonals of 30 inches and 40 inches.

Team Member Name _____

Ans: _____

5. Find the quadratic function whose graph passes through the points $(2, -2)$, $(-3, 0)$, and $(4, 0)$.

Team Member Name _____

Ans: _____

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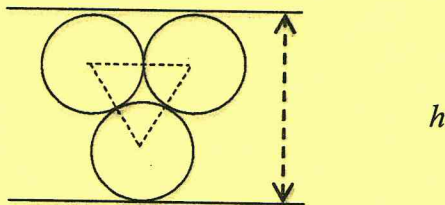
1. The polynomial $x^2 - 9x + 3$ has roots r and s . The polynomial $x^2 + bx + c$ has roots r^2 and s^2 . What is (b, c) ?

Team Member Name _____ Ans: _____

2. The roots of the cubic equation $x^3 - 9x^2 + 26x - 24 = 0$ form an arithmetic progression. Find the roots.

Team Member Name _____ Ans: _____

3. Three pipes, each of radius 4 in., are stacked as shown. What is the height of the stack?



Team Member Name _____ Ans: _____

4. Find the maximum value of the quotient $\frac{a}{b} \div \frac{c}{d}$ that can be obtained by replacing a, b, c, d with different numbers from the set $\{2, 3, 7, 9\}$.

Team Member Name _____ Ans: _____

5. Find $f'(\frac{\pi}{6})$ if $f(x) = \frac{\tan x}{1 - \tan^2 x}$.

Team Member Name _____ Ans: _____

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School _____ Team _____

Instructions: Label answers with appropriate units.
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1. Fresh cherries contain 99% water. You start with 100 pounds of fresh cherries. After a few hours in the sun, some of the water evaporates and the percentage of water in the cherries becomes 90%. What is the new weight of the cherries?

Team Member Name _____ Ans: _____

2. Evaluate: $\int_0^2 (1 - \sqrt{4 - x^2}) dx$

Team Member Name _____ Ans: _____

3. Solve:
$$\begin{cases} a + b = \frac{5}{6} \\ \frac{a}{b} + \frac{b}{a} = \frac{13}{6} \end{cases}$$

Team Member Name _____ Ans: _____

4. The diameter of each wheel of a car is 30 inches. If the wheels are turning at the rate of 3 revolutions per second, how fast is the car moving in miles per hour?

Team Member Name _____ Ans: _____

5. Two concentric circles have radii 3 cm and 6 cm. Find the area of the smaller region determined by a chord of the larger circle that is also tangent to the smaller circle.

Team Member Name _____ Ans: _____

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School _____ Team _____

Instructions: Label answers with appropriate units.
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1. A diagonal of a square has endpoints at $(-4, -1)$ and $(2, 1)$. Find the area of the square.

Team Member Name _____ Ans: _____

2. Solve: $\log_{\frac{1}{2}} \left[\log_8 \frac{x^2 - 2x}{x - 3} \right] = 0$

Team Member Name _____ Ans: _____

3. A cat is at the bottom of a 15-foot well. Each day it climbs up 3 feet, and each night it slides back 2 feet. How long will it take the cat to get out of the well?

Team Member Name _____ Ans: _____

4. Find all values of x that are solutions of the equation $\sum_{k=1}^x i^k = -1$.

Team Member Name _____ Ans: _____

5. The radius of a sphere is increasing at a rate of 4 mm/sec. How fast is the volume increasing when the diameter is 80 mm?

Team Member Name _____ Ans: _____