School_____ Team_____

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

1. A conjecture once claimed $6n + 1$ and $6n - 1$ are both prime numbers for $n \geq 1$ (n is natural). State the smallest value of n for which neither is prime.

Team member name_____ Answer_____

2. A person travels to Sonora at 40 miles per hour and returns at 60 miles per hour. What was the average speed for the entire trip?

Team member name_____ Answer_____

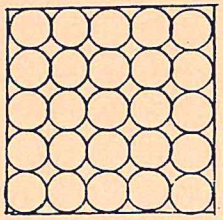
3. In a triangle with acute angles α and β, $\sin\alpha \cos\beta = \frac{3}{4}$.
Find the measure of β in degrees.

Team member name_____ Answer_____

4. Given $\log_{10} b = 3 \log_b 10$. State a value for b.

Team member name_____ Answer_____

5. The area of each circle in the sketch is $\pi/4$ square inches. State the area of the square.



Team member name_____ Answer_____

Instructions Label answers with appropriate units.
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1. No square of an integer may have which last digit(s)?

Team member name_____ Answer_____

2. Find a value of x such that $0° \leq x < 180°$ and $\tan(x) = -\cot(20°)$

Team member name_____ Answer_____

3. The first and second terms of a geometric sequence are $x^{-4}$and x^t respectively. If x^{52} is term 8, then state the value of t.

Team member name_____ Answer_____

4. In order to reduce the time to complete a round trip, a motorist travels the second half at a speed that is one fifth greater than the first half speed. If the second half requires 6 hours, then how long did the first half take in hours and minutes?

Team member name_____ Answer_____

5. What is the side length of the largest square that can be inserted in a round hole that is 8 inches in diameter?

Team member name_____ Answer_____

School_____ Team_____

Instructions Label answers with appropriate units.
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Write fully simplified answers on the lines provided

1. A merchant makes 20% profit instead of 40% on goods because his yardstick is too long. What is the actual length of the yardstick?

Team member name_____ Answer_____

2. State the smallest natural number divisible by 7 that leaves a remainder of 1 when divided by 2, 3, 4, 5, or 6

Team member name_____ Answer_____

3. Dick and Jane are looking at a flag on a rooftop. The flag is directly south of Dick and Jane is 100 feet to the east of him. The angle of elevation from Dick's position is 45° and from Jane's position is 30°. How high is the flag. Assume Dick and Jane are on level ground.

Team member name_____ Answer_____

4. Two evenly matched teams are engaged in a contest in which the first team to win three games is declared to be the champion. One team leads the series two games to one. what is the probability that the leading team will be the champion?

Team member name_____ Answer_____

5. A box contains at least two beetles (6 legs) and at least two spiders (8 legs). There are 46 legs in the box. How many legs belong to beetles?

Team member name_____ Answer_____

School_____ Team_____

Instructions Label answers with appropriate units.
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Write fully simplified answers on the lines provided

1. Ten cards numbered 1 to 10 are mixed in a hat. Two cards numbered p and q are drawn from the hat. State the probability that $p + q = 10$.

Team member name_____ Answer_____

2. In her will, a woman left her husband \$20,000 and her son \$12,000. Upon her death, her estate amounted to only \$16,400. If the court divides the estate in the ratio of the bequests in the will, how much should the son receive?

Team member name_____ Answer_____

3. State the largest root of the equation $3x^3 - x^2 - 17x + 7 = 0$

Team member name_____ Answer_____

4. State the length of the largest line segment that would fit in a rectangular box 4 feet long, 3 feet wide and 2 feet high.

Team member name_____ Answer_____

5. A farmer estimates that if he digs his potatoes now, he will have 100 bushels, which he can sell a \$1.50 per bushel. If he expects his crop to increase 10 bushels per week,but the price to drop 5 cents per week, in how many weeks should he sell to realize the maximum income from his potato crop?

Team member name_____ Answer_____

School_____ Team_____

Instructions Label answers with appropriate units.
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1. The value of $\tan 15° \tan 45° \tan 60° \tan 75°$ is

Team member name_____ Answer_____

2. Solve the equation: $|4 - 2x| + |x - 3| = 5$

Team member name_____ Answer_____

3. Two friends were talking, and one asked the other, "How old are you?" The reply he received was, "I am now twice as old as you were when I was your age. When you will be my age, our ages will add up to 63." How old is each of the friends?

Team member name_____ Answer_____

4. Find all integer values of the parameter m so that the two lines $x - y - m + 2 = 0$ and $2x - y + m - 9 = 0$ intersect in the second or fourh quadrant.

Team member name_____ Answer_____

5. Find the distance between the centers of the circles with equations $x^2 + y^2 + 4x - 6y = 2$ and $x^2 + y^2 - 8x + 10y = 0$

Team member name_____ Answer_____