TOSS-UP

1. MATH; Multiple Choice: If x/y is an integer, which of the following statements must be true?

(W) x is an integer

(X) both x and y are integers

(Y) y/x is an integer

(Z) x = ny where n is an integer

ANSWER: Z

BONUS

1. MATH; Short Answer: If (3x + 2)(2x – 5) = ax^2 + kx + n, what is the value of a – n + k?

ANSWER: 5

TOSS-UP

2. MATH; Short Answer: A large brick is composed of 12 smaller bricks each of side length 1. When the large brick is disassembled into its component small bricks, the total surface area of all the small bricks is how much greater than the surface area of the assembled large brick?

ANSWER: 40

BONUS

1. MATH; Multiple Choice: The first term in a sequence is 1 and the second term is 5. From the third term on each term is the average (arithmetic mean) of all preceding terms. What is the 25th term in the sequence?

(W) 3

(X) 5

(Y) 25

(Z) 50

ANSWER: W

TOSS-UP

3. MATH; Multiple Choice: Six years ago Anita was P times as old as Ben was. If Anita is now 17 years old, how old is Ben now in terms of P?

W) 11/p + 6

X) P/11 + 6

Y) 17 - P/6

Z) 17/P

ANSWER: W

BONUS

3. MATH; Short Answer: For how many integer values of n will the value of the expression 4n + 7 be an integer greater than 1 and less than 200?

ANSWER: 50

TOSS-UP

4. MATH; Short Answer: Given that the expected value of X is 6, the expected value of Y 2, and the expected value of XY is 24, calculate the covariance of X and Y.

ANSWER: 12

BONUS

4. MATH; Short Answer: Calculate the variance for the following four numbers: -2, 2, 4, 8.

ANSWER: 13

TOSS-UP

5. MATH; Multiple Choice: 12 liters of water a poured into an aquarium of dimensions 50cm length , 30cm breadth, and 40 cm height. How high (in cm) will the water rise?

(W) 6

(X) 8

(Y) 10

(Z) 20

ANSWER: X

BONUS

5. MATH; Short Answer: In a class of 160 seniors, the ratio of boys to girls is 3 to 5. In the junior class, the ratio of boys to girls is 3 to 2. When the two classes are combined, the ratio of boys to girls is 1 to 1. How many students are in the junior class?

ANSWER: 200

TOSS-UP

1. MATH; Short Answer: Find the derivative with respect to y of sec (4y + 3).

ANSWER: 4tan(4y + 3)sec(4y + 3)

BONUS

6. MATH; Short Answer: Find the integral with respect to x of tan (2x).

ANSWER: -(1/2)ln|cos(2x)| + c

TOSS-UP

7. MATH; Short Answer: Calculate the standard error of the mean given a sample standard deviation of 24 and a sample size of 16.

ANSWER: 6

BONUS

7. MATH; Short Answer: Calculate the sample size given a standard deviation of the sample mean of 3 and a population standard deviation of 15.

ANSWER: 25

TOSS-UP

8. MATH; Multiple Choice: Admission to a museum is $10 for each adult and $5 for each child. If a group of 30 people pays a total of $175 in admission, how many adults are in the group?

W) 3

X) 4

Y) 5

Z) 6

ANSWER: 5

BONUS

8. MATH; Short Answer: An isosceles triangle has isosceles sides of length b and a third side of length a. The perimeter of the triangle is 24. If the ratio of a to b is 2 to 3, what is the value of b?

ANSWER: 9

TOSS-UP

9. MATH; Short Answer: Given that the probability of A given B is 0.2, the probability of A is 0.3, and the probability of B given A is 0.5, calculate the probability of B.

ANSWER: 0.75

BONUS

1. MATH; Short Answer: A basketball team has 11 players on its roster. Only 5 players can be on the court at one time. How many different groups of 5 players can the team put on the floor?

ANSWER: 462

TOSS-UP

10. MATH; Short Answer: Find the derivative with respect to x of sech (15x).

ANSWER: -15sech(15x)tanh(15x)

BONUS

10. MATH; Short Answer: Find the integral with respect to x of 5 tanh (5x).

ANSWER: ln|cosh(5x)| + c