Would you like to receive feedback from our execs? (marking your solutions, giving corrections, etc.)
Yes/No: _____

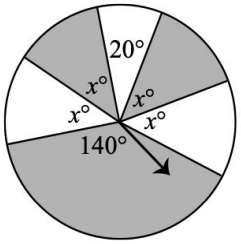
Multiple Choice

Highlight the correct answer for each question.

1. Which of the following expressions is equal to an odd integer for every integer n?

(A) $2021 - 3n$ (B) $2021 + n$ (C) $2021n$ (D) $2021 + n^2$ (E) $2021 + 2n$

2. A circular spinner is divided into six regions, as shown. Four regions each have a central angle of $x°$. The remaining regions have central angles of 20° and 140°. An arrow is attached to the centre of the circle. The arrow is spun once. What is the probability that the arrow stops on a shaded region?



(A) 5/12 (B) 1/2 (C) 7/12 (D) 2/3 (E) 7/8

3. A school has 1399 students. Of these 1399 students, 1173 like math, 940 like science, and 711 like English (it is possible for students to like more than one subject or no subjects at all). If x is the largest possible number of students who like all three subjects, and y is the smallest possible number of students who like all three subjects, then $x–y$ is

(A) 711 (B) 704 (C) 629 (D) 685 (E) 532

4. Six players compete in a checkers tournament. Each player plays exactly two games against every other player. In each game, the winning player earns 1 point and the losing player earns 0 points; if the game results in a draw (tie), each player earns 0.5 points. What is the minimum possible number of points that a player needs to earn in order to guarantee that they have more points than every other player?

(A) 8 (B) 8.5 (C) 9 (D) 9.5 (E) 10

5. If m and n are positive integers with $n > 1$ such that $m^n = 2^{25} \times 3^{40}$, then $m \times n$ is

(A) 209 962 (B) 1954 (C) 209 957 (D) 6598 (E) 1 049 760

Word Problems

Either type your solutions or insert images of handwritten solutions. Be sure to show your work for full credit!

1. A two-digit integer between 10 and 99, inclusive, is chosen at random. Each possible integer is equally likely to be chosen. What is the probability that its tens digit is a multiple of its units (ones) digit?

2. A magician has three cups labelled, in order, A, B, C that he has upside down on his table. He has a sequence of moves that he uses to scramble the three cups: he swaps the first and second, then he swaps the second and third, then he swaps the first and third. If he goes through this sequence of three moves a total of nine times, in what order will the cups be?

3. What is the value of $1234567^2 - 1234566 \times 1234568$? No calculators allowed.

Bonus Puzzle (Optional but Highly Recommended)

You have just been given a sack with 12 identical coins. However, one of the coins is counterfeit, and is either heavier or lighter than the rest. You have a balance scale so you can compare the weights of stacks of coins to each other. With only three weighings, how can you identify the fake coin, and determine whether or not it is lighter or heavier than the rest? (Stuck? Here's a fun hint.)

Survey

Your responses will not affect your likelihood of being counted for attendance. This is simply to let our execs know how we can improve. :)

1. Approximately how much time did you spend on this problem set?

(A) Less than 15 mins
(B) 15 mins to 30 mins
(C) 30 mins to 1 hour
(D) 1 to 2 hours
(E) Over 2 hours

2. How difficult did you find this problem set?

(A) Too easy
(B) Fairly easy
(C) Neutral
(D) Fairly difficult
(E) Too difficult

Thank you for your feedback!