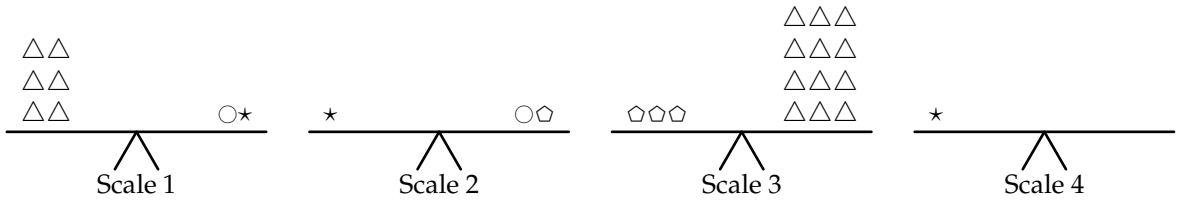
BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2022

Junior Final, Part A

Friday, May 6

1. Scales 1, 2, and 3 are perfectly balanced.



The number of triangles it will take to balance Scale 4, if the triangles are all placed on the right-hand side of the scale, is:

(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

2. The usual coloring pattern on an 8×8 checkerboard is changed so that 20 unit squares are now colored red, and the rest are colored white. When the board is folded in half along a line parallel to one edge of the board, exactly seven pairs of red unit squares coincide. The number of pairs of white unit squares that coincide is:

(A) 25 (B) 19 (C) 12 (D) 7 (E) 18

3. While walking through the donkey, bird and snake houses at the zoo, Antonino has counted 35 heads and 64 feet. He knows there were half as many donkeys as birds but remembers nothing about the snakes. The number of snakes minus the number of donkeys is equal to:

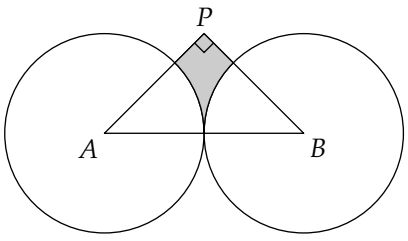
(A) -3 (B) -1 (C) 0 (D) 1 (E) 3

4. A palindrome is a positive integer that reads backwards the same as it reads forwards. For example, 67276 is a palindrome.

John thought he had added together every 2-digit positive integer, and the sum he got was a palindrome. Unfortunately, he had left one number out. The number that he left out was:

(A) 19 (B) 21 (C) 29 (D) 31 (E) 39

5. Circles with centres A and B each have radius 2. P is equidistant from A and B, and AP is perpendicular to BP. The area of the shaded region is:



(A) $24 - 4\pi$ (B) $8 - \pi$ (C) $6 - \pi$

(D) $4\sqrt{2} - \pi$ (E) $4 - \pi$

6. Marbles come in 8 different colors. There are 10 marbles in a pack. The number of packs one must have to be sure of having at least 12 marbles of the same color is:

(A) 6 (B) 7 (C) 8 (D) 9 (E) 10

7. Al, Bill and Chuck were discussing their scores on a French test. Al scored 3 points below the class average, Bill 5 points above, and Chuck got 67 points. The average of the 3 boys' scores was the same as the class average. Bill's score was:

   (A) 71 (B) 72 (C) 73 (D) 74 (E) 75

8. Simone plays a game starting with 3 blue marbles, 4 green marbles, and 5 red marbles. On each turn, Simone removes two marbles of different colors and adds one marble of the third color (e.g. she can remove one green and one blue and add one red.) She repeats this until only one marble is left. The final marble:

   (A) must be blue (B) must be green (C) must be red

   (D) can be blue or green, but not red (E) can be any color

9. I have three piles of cards, with each pile containing two cards, all lying face down so you can't see the colors of the cards. One pile has two red cards, one pile has two black cards, and one pile has one red card and one black card. You don't know which pile is which. Choose a pile at random, and flip over one of the two cards. If the card you see is red, then the probability that the other card in that pile is also red is:

   (A) $\frac{1}{3}$ (B) $\frac{2}{5}$ (C) $\frac{1}{2}$ (D) $\frac{3}{5}$ (E) $\frac{2}{3}$

10. The greatest integer that divides $n^3(n^2-1)(n^2-4)$ for every positive integer n is:

    (A) 40 (B) 60 (C) 120 (D) 180 (E) 360