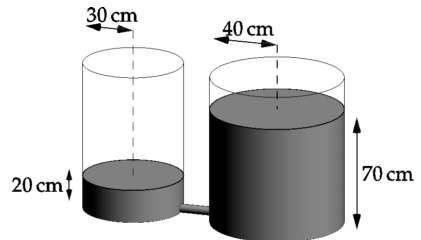
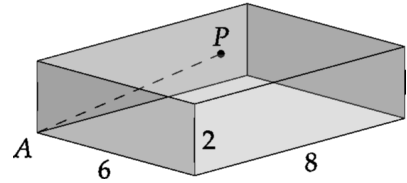


BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2019

Senior Preliminary

April 2019

- The number $\frac{(2019)^2 + 2019(2020)}{2019 + 2020}$ equals:
(A) 2020 (B) 2019 (C) 4040 (D) 4038 (E) 4039
- A group of students charters a bus for \$300. It is agreed that they will share the cost equally. Five students drop out at the last minute, leaving each remaining student to pay \$5 more than originally agreed. The number of students in the original group was:
(A) 40 (B) 35 (C) 30 (D) 25 (E) 20
- A rectangular room measures 2 m by 6 m by 8 m. A cord is fastened to the centre of the ceiling, P , and stretched to reach a lower corner, A . The length of the cord in metres is:
(A) $\sqrt{24}$ (B) 5 (C) $\sqrt{29}$
(D) $\sqrt{30}$ (E) none of these
- Two runners are running a 2-kilometre race on a circular 400-metre track. The ratio of their speeds is 3 : 2. The runners run in opposite directions, beginning at the same time at the start of the track. They both stop when the first person finishes. The number of times they pass each other is:
(A) 8 (B) 9 (C) 10 (D) 11 (E) 12
- Let $n > 26$ be an integer. The remainder when $n(n + 1)(n + 2)$ is divided by $n - 2$ is:
(A) 12 (B) 16 (C) 18 (D) 20 (E) 24
- The perimeter of a right triangle is 14 and its hypotenuse has length 6. The area of the triangle is:
(A) 6 (B) 7 (C) 8 (D) 9 (E) 14
- Two cylindrical tanks, one of radius 40 cm and the other of radius 30 cm, contain oil: the larger one to a depth of 70 cm, and the smaller one to a depth of 20 cm. The bottom of the tanks are at the same level and are connected by a pipe. Oil flows from one tank to the other until the depth in each tank is the same. When the oil stops flowing, the depth, in cm, of the oil in each tank will be:
(A) 52 (B) 50 (C) 48
(D) 45 (E) 43



8. The last digit of the number $1^{2019} + 2^{2019} + 3^{2019} + 4^{2019}$ is:
 (A) 0 (B) 3 (C) 5 (D) 7 (E) 9
9. A triangle with vertices $A(0,0)$, $B(3,4)$, and $C(2,c)$ has area 5. A possible value of c is:
 (A) -6 (B) $-\frac{2}{3}$ (C) $\frac{2}{3}$ (D) 4 (E) -4
10. Two hockey teams play to a score of 3, i.e. the game is over as soon as one team gets 3 goals. You make a list showing how the scoreboard changes over time. For example if Team 1 scores, scores again, then Team 2 scores, then Team 1 scores again, then your list is:

$$(0 - 0), \quad (1 - 0), \quad (2 - 0), \quad (2 - 1), \quad (3 - 1).$$

The number of different lists that can be made in this way is:

- (A) 11 (B) 12 (C) 16 (D) 20 (E) 30
11. According to Lewis Carroll in *The Hunting of the Snark* (1876):
- All Boojums are snarks.
 - Every Bandersnatch is a fruminous animal.
 - Only animals which frequently breakfast at 5 o'clock tea can be snarks.
 - No fruminous animals breakfast at 5 o'clock tea.

Which of the following are true?

- I No Boojums are Bandersnatches
- II Some snarks can be fruminous animals
- III No Bandersnatches breakfast at 5 o'clock tea

- (A) only I (B) only II (C) only III
 (D) both I and II (E) both I and III

12. The figure shows a unit square with four quarter-circles each having radius 1 and centre at one of the four corners of the square. The area of the shaded region is $a - \sqrt{b} + \frac{\pi}{c}$ where a, b, c are positive integers. The sum $a + b + c$ equals:

- (A) 3 (B) 5 (C) 7
 (D) 9 (E) 11

