BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2019

Junior Preliminary

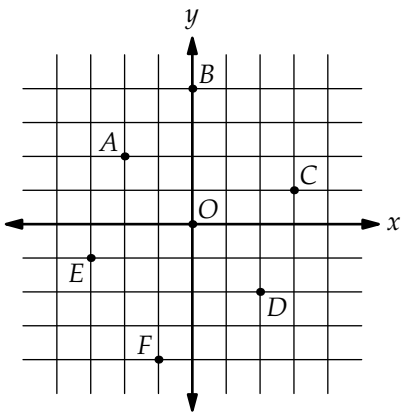
April 2019

1. Determine the positive integer n for which $1+2+3+\cdots+n=6+7+8$.

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

2. Six points are in the plane, including point O at $(0,0)$ and F at $(-1,-4)$. One of the points has coordinates (x,y) where $x+y=-4$. This point is:

   (A) A (B) B (C) C (D) D (E) E



3. The number $\dfrac{(2019)^2+2019(2020)}{2019+2020}$ equals:

   (A) 2020 (B) 2019 (C) 4040 (D) 4038 (E) 4039

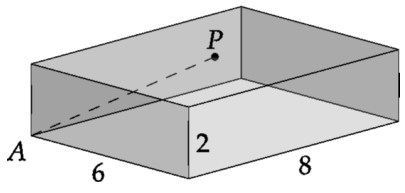
4. Ten numbers are written on a piece of paper. Their average is 24. After two of the numbers are erased, the average of the remaining numbers is 22. The average of the two erased numbers is:

   (A) 64 (B) 37 (C) 32 (D) 27 (E) 26

5. 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



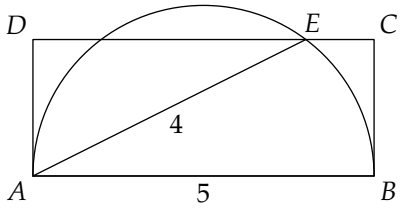
6. Two runners are running a 2-kilometre race on a circular 400-metre track. The ratio of their speeds is 3 : 2. The runners run in opposite directions, beginning at the same time at the start of the track. They both stop when the first person finishes. The number of times they pass each other is:

   (A) 8 (B) 9 (C) 10 (D) 11 (E) 12

7. Let $n>8$ be an integer. The remainder when $n(n+1)$ is divided by $n-2$ is:

   (A) 1 (B) 2 (C) 3 (D) 6 (E) 12

8. In the figure shown, $ABCD$ is a rectangle with $AB = 5$ such that the semicircle with diameter AB cuts CD at two points, one of which is E. If $AE = 4$ then the area of $ABCD$ is:



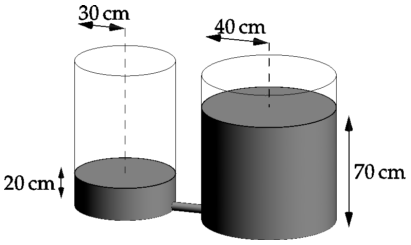
(A) 6 (B) 8 (C) 10

(D) 12 (E) 20

9. Start with a piece of paper and cut it into 8 pieces. Take any one of those 8 pieces, and cut it into 8 pieces. Take any one of *those* 8 pieces, and cut it into 8 pieces, and so on. If each time you finish cutting you count the number of pieces you have, then one possible count is:

(A) 4442 (B) 4443 (C) 4444 (D) 4445 (E) 4446

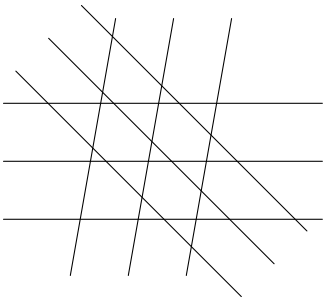
10. Two cylindrical tanks, one of radius 40 cm and the other of radius 30 cm, contain oil: the larger one to a depth of 70 cm, and the smaller one to a depth of 20 cm. The bottom of the tanks are at the same level and are connected by a pipe. Oil flows from one tank to the other until the depth in each 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

11. Three sets of three parallel lines are shown in the figure. The number of different triangles in the figure is:



(A) 18 (B) 21 (C) 24

(D) 27 (E) 30

12. 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