

BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2018

Senior Final, Part A – Draft 3

Friday, May 4

Note: Please refer to problems by the key:# in the margin: these don't change when problem numbers change due to adding / re-ordering. Thanks! _____

key:17069 1. There are n students in a gym class. Each is wearing a shirt (either red or blue) and shorts (also either red or blue). There are exactly 10 students wearing a red shirt, exactly 12 students wearing red shorts, and exactly 14 students wearing a shirt the same colour as their shorts. The smallest possible value of n is:
 (A) 16 (B) 18 (C) 20 (D) 22 (E) 24

key:18026 2. You have five cubes: one red, one yellow, one green, one light blue and one dark blue. The number of ways in which the five cubes can be stacked without the blue cubes touching is:
 (A) 24 (B) 48 (C) 72 (D) 96 (E) 120

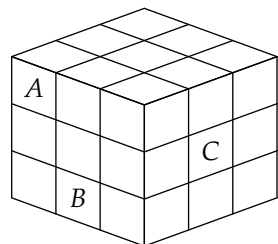
key:18037b 3. Suppose $f(x) = 4x$ for all x , $97 \leq x < 103$. If $f(x + 6n) = f(x)$ for any n , then the value of $f(2018)$ is:
 (A) 388 (B) 392 (C) 396 (D) 400 (E) 2018

key:18042 4. Three cars travel at constant speeds over a long, straight track. If they start at the same time at the same end of the track, we find that car A finishes the track when car B has 120 metres to go and car C has 210 metres to go. When car B finishes, car C has 100 metres to go. The length of the track (in metres) is:
 (A) 1000 (B) 1050 (C) 1100
 (D) 1200 (E) not enough information given

key:17094 5. Let $A(0,0)$, $B(2,2)$, $C(14,2)$, $D(16,0)$ be four points on a circle with radius r . The value of r is:
 (A) 8 (B) 10 (C) 12 (D) 15 (E) 20

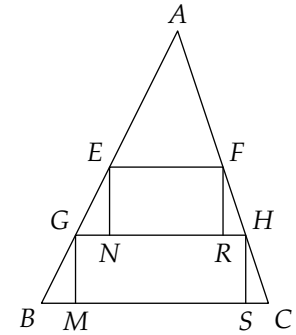
key:18049 6. Suppose all 120 arrangements of the digits 1 to 5 are ordered in increasing size: starting with 12345, 12354, 12435 and continuing in order up to 54321. The 74th number is:
 (A) 35412 (B) 35421 (C) 41235 (D) 41253 (E) 41325

key:18057 7. A cube is made up of 27 one-centimeter cubes, as shown in the diagram. If the three cubes marked A, B, C are removed, then the total surface area (in cm^2) of the object that remains is:
 (A) 60 (B) 58 (C) 57
 (D) 56 (E) 54



key:18052

8. Rectangles $FENR$ and $HGMS$ are inscribed in triangle ABC as shown. The area of triangle ABC is 60 and its base, BC , has length 10. If $EN = GM = 3$ then the sum of the areas of the two rectangles is:



- (A) 30 (B) 32.5 (C) 36
 (D) 36.5 (E) 37.5

key:18061b

9. The smallest value of n for which the product

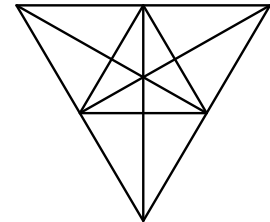
$$10^{1/2018} \times 10^{2/2018} \times 10^{3/2018} \times 10^{4/2018} \times \dots \times 10^{n/2018}$$

exceeds 10,000 is:

- (A) 88 (B) 89 (C) 90 (D) 126 (E) 127

key:16027

10. The total number of triangles that appear in the diagram is:



- (A) 38 (B) 38 (C) 41
 (D) 44 (E) 47