

BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2017

Junior Final, Part A – Draft 7

Friday, May 5

key: 17092 1. A bag contains red, blue and white marbles. Exactly $\frac{3}{4}$ of the marbles are not red. Exactly $\frac{1}{3}$ of the marbles are not blue. What fraction of the marbles are not white?

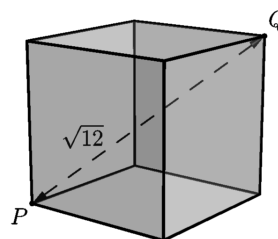
- (A) $\frac{1}{12}$ (B) $\frac{5}{12}$ (C) $\frac{1}{2}$ (D) $\frac{7}{12}$ (E*) $\frac{11}{12}$

key: 17060 2. Recall that $n! = n \cdot (n-1)(n-2) \cdots 2 \cdot 1$. For example, $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$. Find a 3-digit number ABC that equals the sum $A! + B! + C!$.

- (A) 125 (B) 135 (C*) 145 (D) 257 (E) none of these

key: 17009 3. A cube has diagonal PQ with length $\sqrt{12}$ as shown. Determine the volume of the cube.

- (A*) 8 (B) 12 (C) $12\sqrt{2}$
(D) 27 (E) $12\sqrt{2}$



key: 17015 4. Water from a full 1.5 L bottle is poured into an empty cup until both the cup and the bottle are $\frac{3}{4}$ full. How many litres of water were poured into the cup?

- (A) $\frac{1}{4}$ (B*) $\frac{3}{8}$ (C) $\frac{1}{2}$ (D) $\frac{9}{8}$ (E) none of these

key: 17087 5. In a right triangle, the two shorter sides have lengths 3 and 4, and are both altitudes. How long is the third altitude of the triangle?

- (A) $\frac{\sqrt{5}}{\sqrt{12}}$ (B) $\frac{5}{12}$ (C) $\frac{\sqrt{12}}{\sqrt{5}}$ (D*) $\frac{12}{5}$ (E) none of these

key: 16021 6. A $3 \times 4 \times 5$ rectangular prism is painted red, then cut into sixty $1 \times 1 \times 1$ cubes. How many cubes have exactly one painted face?

- (A*) 22 (B) 26 (C) 38 (D) 47 (E) 52

key: 16024 7. Twelve people sit around a circular table; some of them are knights, the rest are knaves. A knight always tells the truth; a knave always lies. When asked, "Are you a knight?" everyone at the table answers, "Yes." When asked, "Is the person to your right a knight?" all answer, "No." How many knights are there?

- (A) 2 (B) 3 (C) 4 (D*) 6 (E) 12

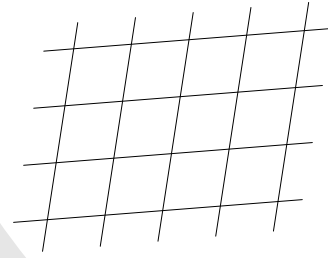
key: 17094 8. Consider a circle with radius r . Let A, B, C, D be four points on the circumference of the circle with coordinates $A = (0, 0), B = (2, 2), C = (14, 2), D = (16, 0)$. Determine the value of r .

- (A) 6 (B) 8 (C*) 10 (D) 15 (E) 20

- key:17093 9. Let the points $(0,0)$, $(6,4)$, $(p,10)$, and (q,r) be the four vertices of a parallelogram, where p, q, r are positive and $q > p$. If the area of the parallelogram is 60, determine the largest possible value of q .
- (A) -2 (B) 3 (C) 7 (D) 17 (E*) 27

- key:16012 10. Find the number of integers n such that $\frac{2n^2 - 13n + 20}{n^2 - 5n + 4}$ is an integer.
- (A) 1 (B) 2 (C*) 3 (D) 4 (E) 5

- key:17043 11. Five parallel lines are drawn, and then four other parallel lines are drawn in a different direction. How many distinct parallelograms are there in the picture?



- (A) 30 (B) 45 (C) 52 (D*) 60 (E) 100