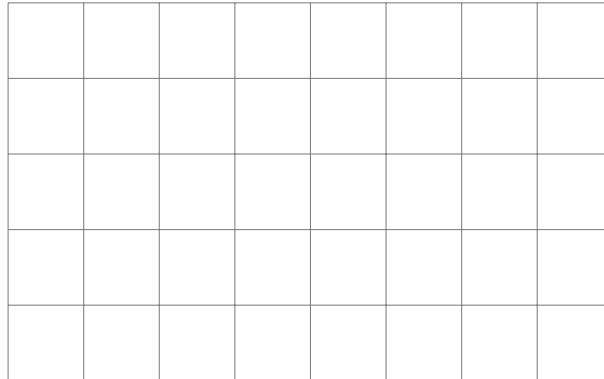


# BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2023

## Junior Final, Part A

May 5, 2023

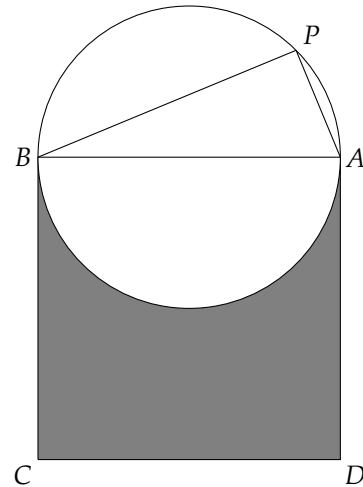
1. How many squares of *any size* are there in the  $5 \times 8$  diagram below?



- (A) 50  
(B) 68  
(C) 86  
(D) 96  
(E) 100
2. If  $x^4 = 9$ , then  $x^{10} =$   
(A) 81            (B) 243            (C) 22.5            (D) 729            (E) 486
3. You count the number of printed digits of each page in a book, and count 735 digits. (For example, there are two printed digits on page 85, and three printed digits on page 126.) How many pages are in the book?  
(A) 182            (B) 281            (C) 272            (D) 245            (E) 291
4. Three people, Pat, Nat, and Cat, know each other well. Each either always tells the truth, or always lies. They each make a statement.
- Pat: (can't be heard)
  - Nat: Pat claimed to be a liar.
  - Cat: Nat lied.
- From the following, choose a true statement.
- (A) Pat is telling the truth  
(B) Nat is telling the truth  
(C) Cat is telling the truth  
(D) They are all lying  
(E) They are all telling the truth
5. Oli has a rectangular sheet of plywood 135cm by 210cm. He wants to cover one side (face) with square tiles of the same size. If they need to fit exactly without overlapping or gaps, what is the *minimum* number of tiles he will need?  
(A) 15            (B) 126            (C) 1134            (D) 3150            (E) 28350

6. A five-digit number is made by randomly arranging the digits 1 to 5 with no repeats. The probability that the number is divisible by 4 is:
- (A) 0.2            (B) 0.25            (C) 0.4            (D) 0.5            (E) 0.1
7. The meaning of  $n!$  is  $n \cdot (n - 1) \cdot (n - 2) \cdot \dots \cdot 3 \cdot 2 \cdot 1$ . Which of these is a perfect square?
- (A)  $\frac{23! \cdot 24!}{3}$     (B)  $\frac{24! \cdot 25!}{3}$     (C)  $\frac{25! \cdot 26!}{3}$     (D)  $\frac{26! \cdot 27!}{3}$     (E)  $\frac{27! \cdot 28!}{3}$
8. In the diagram,  $AB$  is a diameter of the circle, and  $ABCD$  is a square. If  $AP = 12$  and  $PB = 16$ , then the area of the shaded region is:

- (A)  $100 - 100\pi$   
 (B)  $400 - 100\pi$   
 (C)  $100 - 50\pi$   
 (D)  $400 - 50\pi$   
 (E)  $400 - 400\pi$



9. A group of  $n$  students agreed to split the cost of a pizza that cost  $y$  dollars. If three students change their minds and decide not to, then how many more dollars will the remaining students need to contribute?
- (A)  $\frac{y}{n - 3}$     (B)  $\frac{ny}{3}$     (C)  $\frac{2n + ny}{3n - n^2}$     (D)  $\frac{3y}{n^2 - 3n}$     (E)  $\frac{3y}{3n - n^2}$
10. Twins Lucas and Lucia are going to their cousins' house, which is 10km from their home. To save time, they share a bicycle in the following way: Lucas starts out on the bicycle, with Lucia walking behind, then he leaves the bicycle at some point and walks the rest of the way. Lucia walks until she reaches the bicycle, then rides the bicycle the rest of the way. Both can walk at a rate of 3km per hour, and bike at a rate of 10km per hour, and they reach their cousins' house at the same time. How long was the bicycle left without a rider?
- (A) 1 hour  
 (B) 1 hour 10 minutes  
 (C) 1 hour 15 minutes  
 (D) 1 hour 20 minutes  
 (E) 1 hour 30 minutes