

# BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2007

## Junior Preliminary

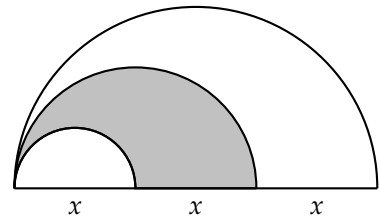
Wednesday March 7

1. Mr. Smith has three times as many girls as boys in his class. Ms. Perry has twice as many boys as girls in her class. Mr. Smith has 60 students in his class and Ms. Perry has 45 students. If the classes are combined into one class, the ratio of boys to girls is:

(A) 3 : 4      (B) 4 : 3      (C) 5 : 4      (D) 4 : 5      (E) 3 : 2

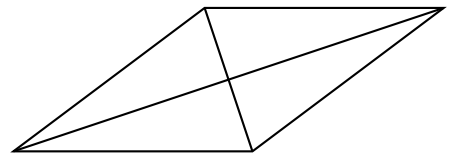
2. In the diagram, each of the arcs is a semicircle. Of the total area inside the largest semicircle, the fraction that is shaded is:

(A)  $\frac{x}{4}$       (B)  $\frac{2}{9}$       (C)  $\frac{1}{3}$   
(D)  $\frac{1}{\pi}$       (E)  $\frac{4}{9}$



3. A rhombus is a parallelogram with all sides equal. The rhombus shown has diagonals of lengths 2 units and 6 units. The perimeter of the rhombus is:

(A) 40      (B)  $2\sqrt{10}$       (C)  $4\sqrt{10}$   
(D)  $4(1 + \sqrt{3})$       (E)  $8\sqrt{10}$



4. The sum of the digits in the smallest positive integer that is divisible by 2, 4, 6, 10, 12, and 14 is:

(A) 3      (B) 6      (C) 9      (D) 15      (E) 18

5. Alan has thrown 24 passes and completed 25% of them. Over the rest of the season Alan completes all of his passes and he ends the season with an 80% pass completion record. The total number of passes Alan threw over the season was:

(A) 42      (B) 50      (C) 72      (D) 80      (E) 90

6. Let  $\lfloor n \rfloor$  be the largest prime number less than  $n$  and  $\lceil n \rceil$  be the smallest prime number greater than  $n$ . The expression

$$41 + \lfloor 35 \rfloor - \lceil 53 \rceil + \lceil \lfloor 35 \rfloor \rceil$$

equals:

(A) 45      (B) 50      (C) 52      (D) 56      (E) 60

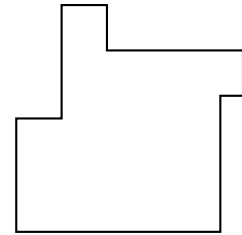
7. A nine-digit integer has each of the digits 1, 2, 3, 4, 5, 6, 7, 8, and 9 appearing exactly once (in some order). The probability that the integer is divisible by 9 is:

(A)  $\frac{1}{9}$       (B)  $\frac{1}{3}$       (C)  $\frac{1}{2}$       (D)  $\frac{2}{3}$       (E) 1

8. A two-digit integer is divided by the sum of its digits. The largest remainder that can occur is:

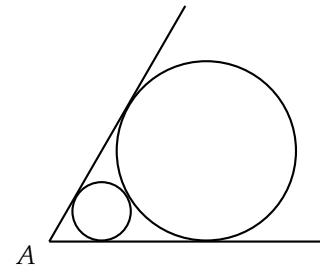
(A) 9      (B) 13      (C) 15      (D) 16      (E) 17

9. Three rectangular pieces are removed from the corners of a square piece of cardboard. The perimeter of the remaining portion is 40 cm and the total area of the three rectangles removed is  $20 \text{ cm}^2$ . The area, in  $\text{cm}^2$ , of the remaining piece of cardboard is:



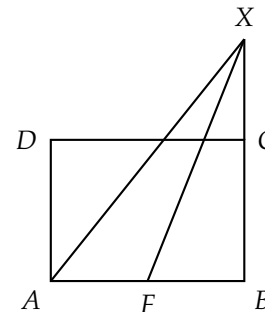
- (A) 20            (B) 60            (C) 80  
(D) 380           (E) 1580

10. In the diagram, the angle at  $A$  is  $60^\circ$  and the radius of the larger circle is 6. The radius of the smaller circle is:



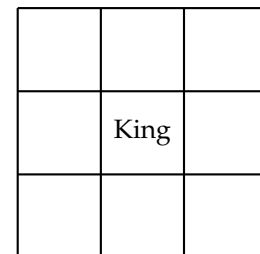
- (A) 2            (B) 3            (C)  $\frac{3}{2}$   
(D) 4            (E)  $\sqrt{6}$

11. In the diagram,  $ABCD$  is a rectangle,  $F$  is the midpoint of side  $AB$ , and  $X$  is on the extension of side  $BC$ . Further,  $\overline{AB} = \frac{33}{5}$  and  $\overline{BC} = \frac{14}{3}$ . The length of the segment  $BX$  for which the area of triangle  $AFX$  is  $\frac{5}{8}$  of the area of the rectangle  $ABCD$  is:



- (A)  $\frac{35}{3}$             (B)  $\frac{35}{6}$             (C)  $\frac{33}{2}$   
(D)  $\frac{33}{4}$             (E)  $\frac{154}{5}$

12. King Henry took twenty-four of his knights on a hunting expedition. They stayed in one of Henry's hunting lodges which had nine rooms, three on each side and one central room where Henry slept, as shown. The knights were assigned three to a room, but they were allowed to move among the rooms leaving more or less than three knights to a room, so long as there were always exactly nine knights on each side of the lodge. One night four friends of the knights came to the lodge disguised as knights. That night Henry made the rounds of the lodge and found that there appeared to be nine knights on each side of the lodge. The total number of knights and, possibly, disguised friends in the corner rooms was:



- (A) 0            (B) 4            (C) 6            (D) 8            (E) 12