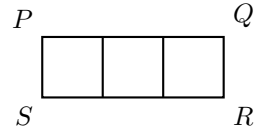


# BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2006

## Junior Preliminary Round

Wednesday March 1, 2006

1. In the diagram, rectangle  $PQRS$  is divided into three identical squares. If  $PQRS$  has a perimeter of 120 cm, then the area of one of the squares, in  $\text{cm}^2$ , is:



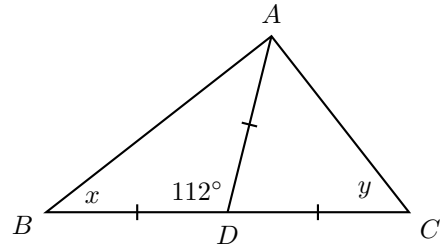
- (A) 675            (B) 400            (C) 225  
(D) 141            (E) 45

2. Alice has four friends who visit her regularly. Betty visits every three days, Charles visits every six days, and Dorothy visits every seven days. If the four friends all show up at once only every 84 days and Efran visits less often than any of the others, then Efran could visit every

- (A) 12 days        (B) 14 days        (C) 18 days        (D) 21 days        (E) 42 days

3. In triangle  $ABC$  segments  $AD$ ,  $BD$ , and  $CD$  are equal. The value of the difference  $(y - x)$ , in degrees, is:

- (A) 0                (B) 8                (C) 14  
(D) 22                (E) 34



4. The number  $10^{100}$  is a *googol* and number  $10000^n$  is also a googol. The value of  $n$  is:

- (A) 10                (B) 25                (C) 30                (D) 75                (E) 100

5. Three blocks and one top balance 15 marbles. One top balances one block and seven marbles. The number of marbles that balance one top is:

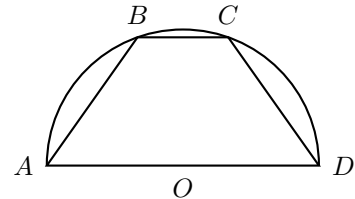
- (A) 3                (B) 5                (C) 9                (D) 11                (E) 12

6. The smallest whole number  $x$  that has exactly 12 distinct divisors, including 1 and  $x$ , can be found in the interval:

- (A)  $45 \leq x < 55$  (B)  $55 \leq x < 65$  (C)  $65 \leq x < 75$  (D)  $75 \leq x < 85$  (E)  $85 \leq x \leq 90$

7. The semicircle centred at  $O$  has a diameter of 6 units. The chord  $BC$  is parallel to the diameter  $AD$  and is one third the length. The area of the trapezoid  $ABCD$ , in square units, is:

- (A)  $4\sqrt{2}$                 (B)  $4\sqrt{5}$                 (C)  $16\sqrt{2}$   
(D)  $\frac{9\sqrt{3}}{4}$                 (E)  $8\sqrt{2}$



8. The value of

$$\left(\sqrt{1 + \frac{\sqrt{3}}{2}}\right) \left(\sqrt{1 - \frac{\sqrt{3}}{2}}\right)$$

in simplified form is:

- (A)  $\frac{3}{2}$       (B)  $\frac{1}{4}$       (C)  $\frac{1}{2}$       (D)  $\frac{\sqrt{3}}{4}$       (E) 1
9. Exactly  $57.245\overline{724}\%$  of the people replied ‘yes’ when asked if they used BLEU-OUT face cream. The fewest number of people who could have been asked is:
- (A) 11      (B) 3333      (C) 9999      (D) 111      (E) 1111
10. My front lawn is in the shape of an equilateral triangle, of area  $A$  square metres. I plan to tether Sadie the goat to a post at one corner of the triangle. I want Sadie to be able to eat exactly half the grass. The length of the tether, in metres, must be:
- (A)  $\sqrt{\frac{3A}{\pi}}$       (B)  $\frac{3A}{\pi}$       (C)  $\frac{6A}{\pi}$       (D)  $\sqrt{\frac{6A}{\pi}}$       (E)  $\sqrt{\frac{\pi}{3A}}$
11. Starting with the 2 in the grid shown, the number 2006 can be formed by moving horizontally, vertically, or diagonally from square to square in the grid, without backtracking. The number of distinct paths that can be followed to form 2006 in this way is:
- |   |   |   |   |   |
|---|---|---|---|---|
| 6 | 6 | 6 | 6 | 6 |
| 6 | 0 | 0 | 0 | 6 |
| 6 | 0 | 2 | 0 | 6 |
| 6 | 0 | 0 | 0 | 6 |
| 6 | 6 | 6 | 6 | 6 |
- (A) 24      (B) 48      (C) 64  
(D) 88      (E) 96
12. A six-team league has a schedule that requires each team to play every other team four times. The total number of games in the league schedule is:
- (A) 36      (B) 60      (C) 72      (D) 120      (E) 144