BRITISH COLUMBIA COLLEGES

Junior High School Mathematics Contest, 2005

Preliminary Round

Wednesday March 2, 2005

1. A wire is cut into two parts in the ratio 3 : 2. Each part is bent to form a square. The ratio of the perimeter of the larger square to the perimeter of the smaller square is:

   (A) 3 : 2 (B) 9 : 4 (C) 5 : 3 (D) 5 : 2 (E) 12 : 5

2. Given the following

   I. even II. odd III. a perfect square IV. a multiple of 5

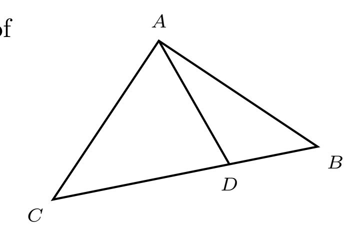
   then it is true that the product $21 \times 35 \times 15$ is:

   (A) II & IV (B) I & IV (C) II & III (D) III & I (E) II, III, & IV

3. The radius of the largest sphere that can fit entirely inside a rectangular box with dimensions $5\,\text{cm} \times 7\,\text{cm} \times 11\,\text{cm}$ is:

   (A) $2\,\text{cm}$ (B) $\frac{5}{2}\,\text{cm}$ (C) $3\,\text{cm}$ (D) $\frac{23}{6}\,\text{cm}$ (E) $\frac{9}{2}\,\text{cm}$

4. In the diagram, the area of the triangle ABC is 60. If $\overline{DB}$ is one third of $\overline{CB}$, then the area of triangle ACD is:

   (A) 20 (B) 30 (C) 40
   (D) 45 (E) 50

5. If $\frac{1}{n+5} = 4$, then $\frac{1}{n+6}$ equals:

   (A) 3 (B) $\frac{1}{5}$ (C) $\frac{5}{4}$ (D) $\frac{4}{5}$ (E) None of these

6. A standard 6-sided die is tossed twice. The probability of obtaining a sum of 5 is:

   (A) $\frac{1}{12}$ (B) $\frac{1}{9}$ (C) $\frac{5}{36}$ (D) $\frac{1}{6}$ (E) $\frac{2}{9}$

7. A rectangle has dimensions $20\,\text{cm} \times 50\,\text{cm}$. If the length is increased by 20% and the width is decreased by 20%, then the change in the area is:

   (A) an 8% increase (B) a 4% increase (C) a 0% increase (D) a 4% decrease (E) an 8% decrease

8. The greatest prime factor of 21831 is:

   (A) 435 (B) 57 (C) 783 (D) 383 (E) 10917

9. The number of houses sold in Kamloops in 2004 is exactly 40% more than the number sold in 2003. Assuming that at least one house was sold in 2004, the smallest possible number of houses sold in Kamloops in 2004 is:

   (A) 5 (B) 7 (C) 14 (D) 70 (E) 140

10. The minimum number of students that must be in a room to ensure that at least 10 are boys or at least 10 are girls is:

    (A) 10 (B) 11 (C) 18 (D) 19 (E) 20

11. The number of integers that satisfy the inequality $\frac{3}{7} < \frac{n}{14} < \frac{2}{3}$ is

    (A) 0 (B) 2 (C) 3 (D) 4 (E) 5

12. Given that $20! = 20 \times 19 \times 18 \times \cdots \times 2 \times 1$ and 2^n is a factor of $20!$, then the largest possible value of n is:

    (A) 10 (B) 12 (C) 18 (D) 20 (E) 24

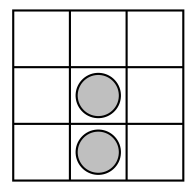
13. Terry has \$28.00 in nickels, dimes, and quarters. The value of the dimes is twice the value of the quarters, and it is half the value of the nickels. The total number of coins that Terry has is:

    (A) 72 (B) 264 (C) 416 (D) 560 (E) 632

14. The number 2005 can be written in the form $a^2 - b^2$, where a and b are integers that are greater than one, in exactly one way. The value of $a^2 + b^2$ is

    (A) 160825 (B) 160801 (C) 80418 (D) 80413 (E) 80406

15. The game of Solitaire JumpIt is played on a 3×3 grid with two identical game discs. If the two discs are adjacent horizontally, vertically, or diagonally, one disc can jump the other by moving onto the open space opposite the other disc. The disc that is jumped is removed. (See the diagram). The number of ways to place two identical game discs on the grid so that no jump is possible is:

    (A) 16 (B) 20 (C) 24 (D) 32 (E) 40