BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2008

Junior Preliminary

Wednesday, March 5

1. The value of

$$\frac{1}{10} + \frac{9}{100} + \frac{7}{10000}$$

   is:

   (A) 0.7091   (B) 0.0197   (C) 0.1907   (D) 0.1097   (E) 1.907
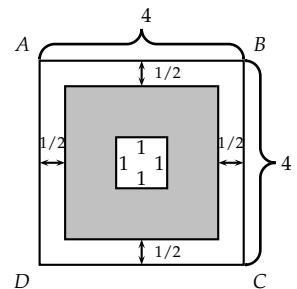
2. The value of

$$\frac{1}{3 + \cfrac{1}{2 + \cfrac{1}{2}}}$$

   is:

   (A) $\frac{1}{11}$ (B) $\frac{5}{17}$ (C) $\frac{2}{5}$ (D) $\frac{5}{8}$ (E) $\frac{22}{21}$

3. In the diagram, $ABCD$ is a square with side length 4. The fraction of the total area of square $ABCD$ that is shaded is:

   (A) $\frac{1}{3}$ (B) $\frac{7}{16}$ (C) $\frac{1}{2}$

   (D) $\frac{9}{16}$ (E) $\frac{7}{12}$

4. Suppose that $\boxed{x}$ means $5x^2 - x$. Then $\boxed{y+3}$ is equal to:

   (A) $5y^2 + 29y + 42$ (B) $5y^2 - y + 6$ (C) $5y^2 - y + 48$

   (D) $5y^2 + 14y + 6$ (E) $25y^2 + 145y + 210$

5. Comparing the numbers 10^{-49} and 2×10^{-50}, we can say that the first exceeds the second by:

   (A) 8×10^{-1} (B) 0.8×10^{-50} (C) 1×10^{-1} (D) 8×10^{-49} (E) 8×10^{-50}

6. Given a two digit number, make a three digit number by putting a 6 as the right most digit. Then add 6 to the resulting three digit number and remove the right most digit to obtain another two digit number. If the result is 76, the original two digit number was:

   (A) 68   (B) 72   (C) 74   (D) 75   (E) 76

7. The fitness bug is out for his daily run. In his first centimetre he runs at a speed of 1 cm/s, in the second centimetre at 2 cm/s, in the third centimetre at 3 cm/s, and so on, until the sixth centimetre which he runs at 6 cm/s. His average speed, in centimetres per second, for his entire six centimetre run is:

   (A) 3   (B) $\frac{400}{151}$ (C) $\frac{150}{71}$ (D) $\frac{120}{49}$ (E) $\frac{7}{2}$

8. A circle is inscribed in a square and then a circle is circumscribed outside
    the square, as shown in the diagram. The ratio of the area of the inner
    circle to the area of the outer circle is:

    (A) $1:2$ (B) $2:3$ (C) $1:\sqrt{2}$

    (D) $1:\sqrt{2}$ (E) $3:5$

9. The equation $x^2 + Bx + 2 = 0$ has only one real root. The possible values of B must be:

    (A) 0 (B) ± 4 (C) ± 1 (D) $\pm\sqrt{6}$ (E) $\pm\sqrt{8}$

10. A man bought a number of equally-priced cows for \$480. The price he paid was an integer number
    of dollars. After three of the cows died, the man sold the remaining cows for identical integer dollar
    amounts, making a profit of \$15 for the entire transaction. If the price the man paid for each cow was
    \$1 less than the price for which he sold each cow, the number of cows the man originally bought was:

    (A) 10   (B) 13   (C) 15   (D) 48   (E) 51

11. In the diagram, triangle ABC is equilateral with side length 2. Line
    segment DE is parallel to BC. The area of triangle ADE is equal to the area
    of quadrilateral $DECB$. The length of line segment DE is:

    (A) $\dfrac{3}{2}$ (B) $\sqrt{2}$ (C) $\sqrt{3}$

    (D) $\dfrac{\sqrt{3}}{2}$ (E) $\dfrac{3\sqrt{3}}{4}$

12. The positive integers are written out in rows and columns as follows:

$$
\begin{array}{cccc}
1 & 2 & 3 & \times \\
4 & 5 & \times & 6 \\
7 & \times & 8 & 9 \\
\times & 10 & 11 & 12 \\
\vdots & \vdots & \vdots & \vdots
\end{array}
$$

    where this pattern of blocks of four rows continues. The $\times$ does not count as a number, so the 3$^{\text{rd}}$
    number in the 2$^{\text{nd}}$ column is 10. The 50$^{\text{th}}$ number in the 2$^{\text{nd}}$ column is:

    (A) 134   (B) 149   (C) 185   (D) 197   (E) 209