BRITISH COLUMBIA COLLEGES

Junior High School Mathematics Contest

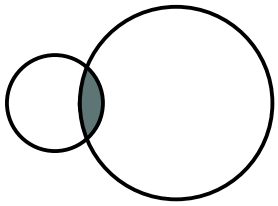
Part A Final Round April 30, 1999

1. A bottle of Dinosaur Crush (DC) makes enough drink to fill sixty glasses when it is diluted in the ratio 1 part DC to 4 parts water. The number of full glasses of drink it would make when diluted in the ratio 1 part DC to 5 parts water would be:

   (a) 48 (b) 60 (c) 72 (d) 75 (e) 80

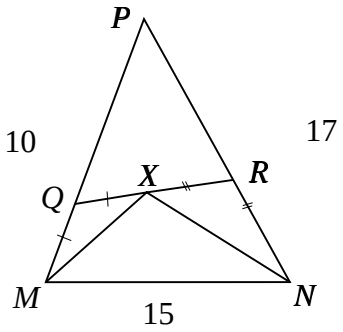
2. A circle of radius 1 unit and a circle of radius 3 units overlap as shown in the diagram to the right. The area of the shaded region is $\frac{\pi}{3}$ square units. The total area (in square units) of the two unshaded regions is:

   (a) 8π (b) $\frac{26\pi}{3}$ (c) 9π (d) $\frac{28\pi}{3}$ (e) $\frac{29\pi}{3}$



3. Given

$$\begin{aligned} QM &= QX \\ RN &= RX \\ PM &= 10 \\ MN &= 15 \\ PN &= 17 \end{aligned}$$



   then the perimeter of $\triangle PQR$ is:

   (a) 24 (b) 25 (c) 26 (d) 27 (e) 32

4. $LMNO$ is a square. P is a point inside the square such that NOP is an equilateral triangle. The measure of $\angle PMN$, in degrees, is:

   (a) 75 (b) 70 (c) 60 (d) 45 (e) 30

5. Four children are arguing over a broken toy. Ali says Barbara broke it. Barbara says Tyler broke it. Tyler and Hei-Lam say they do not know who broke it. Only the guilty child was lying. The child who broke the toy was:

   (a) Ali (b) Barbara (c) Tyler (d) Hei-Lam (e) cannot be sure

6. Josh found the value of 3^{19} to be

$$3^{19} = 11a2261467$$

   He found all the digits correctly, except the third decimal digit which is denoted by a. The value of a is:

   (a) 1 (b) 3 (c) 4 (d) 6 (e) 7

7. What is the acute angle between the minute hand and the hour hand of a clock at 3:26?

   (a) 51° (b) 59° (c) 60° (d) 61° (e) none of these

8. A tetrahedron is a three dimensional solid in the shape of a pyramid with a triangular base. A tetrahedron can be constructed by first drawing a triangle ABC in the plane, then placing a point D in space so that it is not in the same plane as ABC, and finally connecting D to each of A, B, and C.

   If the corners of a tetrahedron are cut off so that a triangle is formed at each corner, then the maximum number of edges in the resulting solid is:

   (a) 9 (b) 12 (c) 15 (d) 18 (e) none of these

9. Positive integers which read the same backwards as forwards are called *palindromes;* for example, 11, 252, and 31013 are palindromes. The number of palindromes less than 10^6, but greater than 10 is:

   (a) 999 (b) 10^3 (c) 1089 (d) 1989 (e) 2209

10. A store offered triple the GST in savings. A sales clerk calculated the selling price by first reducing the original price by 21% and then adding the 7% GST based on the reduced price. A customer protested, saying that the store should first add the 7% GST and then reduce that total by 21%. They agreed on a compromise: the clerk just reduced the original price by the 14% difference. How do the three ways compare with one another from the customer's point of view?

    (a) The clerk's way is better than the customer's way.

    (b) The compromise is the worst while the other two ways are equally good.

    (c) The compromise is the best.

    (d) The three ways are the same.

    (e) The best way cannot be determined unless we know the original selling price.