Edmonton Junior High Mathematics Contest
May 7, 2003

Part I: Multiple Choice

1. Half of $49\frac{1}{2}$ is equal to

   a) $24\frac{1}{4}$ b) $24\frac{1}{2}$ c) $24\frac{3}{4}$ d) 99

2. After its price has been reduced by 20%, a tennis racket is still not selling. So the manager decides to restore the original price. This means a raise of

   a) 16% b) 20% c) 24% d) 25%

3. A fair six-sided die has the numbers 1, 2, 3, 5, 6, 7 on its faces, while a fair eight-sided die has the numbers 1,2,4,6,8,10,12 and 13 on its faces. The two dice are rolled and the numbers on the top faces are added. The probability that this sum is even is

   a) $\frac{5}{12}$ b) $\frac{1}{4}$ c) $\frac{1}{6}$ d) $\frac{4}{7}$

4. Cranky became a bus driver at age 20. His company allowed retirement when his age and his years of service added up to at least 80. Cranky retired after 50 years of continuous service. His age at that time was

   a) 30 b) 50 c) 60 d) 70

5. Tom catches 5 mice and eats 2 rats per day, while Sylvester catches 3 rats and eats 1 mouse per day. As their retirement saving plan, they keep the uneaten mice and rat in a cage. There are no births or deaths in captivity. The difference in the numbers of mice and rats in the cage can never be

   a) 12345 b) 12456 c) 23456 d) 123456

6. A, B,C ,D , E and F are points on a line such that AB = BC = CD = DE = EF = 1. On the same side of this line are four isosceles right triangles, with respective hypotenuses AC, BD, CE and DF. The total area covered by the resulting figure is

a) 3 b) $3\frac{1}{4}$ c) $3\frac{1}{2}$ d) $3\frac{3}{4}$

7. Let a and b be positive numbers such that (111+a)(111-b) = 12345. The relation between a and b is

a) a > b b) a = b c) a < b d) not constant

8. A cylinder has height 6 and base circumference 16. A bug is at a point B on the top edge of the cylinder, and wishes to crawl along its surface to the point on the bottom edge directly below the point diametrically opposite to B. The shortest crawling distance is

a) 6 b) 10 c) 14 d) 16

9. Dima lives at the north-west corner of a square city block, and Sunera lives in the south-east corner of the same block. Every morning, they start jogging around the block at the same time, Dima going clockwise and Sunera going counter-clockwise. Both jog at constant speeds, but Dima's is four times as fast as Sunera's. At their 2003rd meeting, they find themselves at a corner of the block. This corner is the

a) north-east b) north-west c) south-west d) south-east

10. When a barrel is 20% empty, it contains 20 litres more than when it is 20% full. How many litres does the barrel contain when full?

a) 80 b) $66\frac{1}{2}$ c) $66\frac{2}{3}$ d) $33\frac{1}{3}$

Part II: Numeric Response

1. The shortest diagonal of a regular octagon has length $\sqrt{2}$. The longest diagonal of the same octagon has length _____.

2. The fractions $\frac{1}{n}$ *and* $\frac{1}{n+3}$ can both be expressed as terminating decimals. The smallest positive integral value of such an n is 1, and the next smallest ones are 2 and 5. The next smallest is _____.

3. There are ___ positive integers under 100 which can be expressed as products of two even numbers.

4. Jina wrote down a number and passed it to Rata. Rata doubled it and passed the product to Hema. Hema multipled it by 5 passed the product back to Jina. Jina subtracted her original number from it, and passed the difference to Niti. Niti divided it by 9, ignored any remainder and passed the quotient back to Jina. Jina again subtracted her original number from it. The maximum value of her final difference is _____.

5. Nine points are arranged uniformly in a 3 x 3 configuration. Among the distances between two of these points are ____ different values.

6. When the positive integer __ is added to 44 and to 100, both sums are squares of integers.

7. In the quadrilateral ABCD, AB = BC = CD = 5, AD = 11 and BC is parallel to AD. The area of ABCD is _____.

8. There are _____ two-digit prime numbers that form a different prime number when the order of the two digits is reversed.

9. A book with 96 pages are printed on 24 sheets of paper. The first sheet contains pages 1 and 2 back to back, as well as pages 95 and 96 back to back. The second sheet contains pages 3, 4, 93 and 94, and so on. On the same sheet which contains page 37, the other odd-numbered page is page _____.

10. In a circle with centre O, the perpendicular bisector of a radius cuts the circle at A and B. The measure of $\angle AOB$ is _____ degrees.