

Name:

High School:

**3rd Annual Lock Haven University
Mathematics Competition for High School Students
Thursday November 18, 2010 from 9:45 - 10:20 a.m. (35 minutes)**

Individual Test for Grades 9 and 10

Directions: *No calculators or reference materials are permitted. You may use a pencil, an eraser and your examination paper as scratch paper. Additional pencils and scratch paper will be provided if you raise your hand. You will receive one point for each correct answer.*

1. When a triangle's base is increased by 10%, and the altitude to this base is decreased by 10%, the change in area is
 - (a) 1% increase
 - (b) 1% decrease
 - (c) 0% change
 - (d) There is no way to determine from the given information.

2. The value of $\frac{(1-\sqrt{5})(2+\sqrt{5})}{7+\sqrt{5}}$ is
 - (a) $\frac{1+\sqrt{5}}{4}$
 - (b) $\frac{4-\sqrt{5}}{11}$
 - (c) $\frac{-4-\sqrt{5}}{11}$
 - (d) $\frac{8+4\sqrt{5}}{11}$

3. The number of values of x which satisfy the equation $\frac{2x^2-10x}{x^2-5x} = x - 3$ is
 - (a) one
 - (b) three
 - (c) two
 - (d) zero

4. When $x^3 + k^2x^2 - 2kx - 6 = 0$ is divided by $x + 2$ the remainder is 10, then k must be
 - (a) -2 or 3
 - (b) -1
 - (c) 2 or -3
 - (d) none of these

5. When the last digit of a certain 6 digit number N is transferred to the first position, the other digits moving one place to the right, the new number is exactly one-third of N . The sum of the six digits of N is
- (a) 28
 - (b) 27
 - (c) 26
 - (d) 25
6. The number of digits in $2^{12} \times 5^8$ is
- (a) 9
 - (b) 10
 - (c) 11
 - (d) 12
7. If b people take c days to lay f bricks, then the number of days it will take c people working at the same rate to lay b bricks, is
- (a) fb^2
 - (b) $\frac{b}{f^2}$
 - (c) $\frac{f^2}{b}$
 - (d) $\frac{b^2}{f}$
8. The fourth power of $\sqrt{1 + \sqrt{1 + \sqrt{1}}}$ is
- (a) $3 + 2\sqrt{2}$
 - (b) 3
 - (c) $1 + 2\sqrt{3}$
 - (d) 9
9. The smallest value of $x^2 + 8x$ for real values of x is
- (a) -16.25
 - (b) -16
 - (c) 0
 - (d) -8
10. The square of an integer is called a perfect square. If x is a perfect square, then the next largest perfect square is
- (a) $x + 1$
 - (b) $x^2 + 1$
 - (c) $x^2 + 2x + 1$
 - (d) $x + 2\sqrt{x} + 1$
11. (Tie Breaker) Six people are at a meeting, and at the end of the meeting each person shakes every other person's hand exactly once. How many hand shakes take place.