

Name:
High School:

Lock Haven University
Second Annual Mathematics Competition for High School Students
Wednesday November 11, 2009

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. In this examination all problems are multiple choice questions with five possible answers. Read each problem carefully and decide which is the best answer. You will receive one point for each correct answer.*

1. Find the next number in the sequence

1, 2, 11, 36, 85, \dots

A. 258 **B.** 166 **C.** 188 **D.** 170 **E.** none of A, B, C, or D

2. The sum of the squares of the lengths of three sides of a right triangle is 200. Find the length of the hypotenuse.

A. 10 **B.** $10\sqrt{2}$ **C.** 20 **D.** 11 **E.** none of A, B, C or D

3. Katie Promised Chris a free movie if he could simplify

$$\frac{\frac{1}{3} + \frac{1}{2} + \frac{5}{6}}{\frac{2}{3} + \frac{3}{4} + \frac{1}{6}} \times 4\frac{3}{4}$$

What should Chris answer to win a free movie?

A. 4 **B.** 6 **C.** 5 **D.** 12 **E.** none of A, B, C, D

4. The equation of the line perpendicular to $y = 5$, containing the point $(5, -5)$ is

A. $y = -5$ **B.** $x + y = 5$ **C.** $x = 5$ **D.** $x + y = 0$ **E.** none of A, B, C or D

5. Sheila Checked the cash register tape for birthday party items. Prizes cost \$15, decorations cost \$25, and the cake costs \$10. The cake wasn't taxed, but the other items were for a total tax of \$3.20. What was the tax rate?

A. 7% **B.** 10% **C.** 8% **D.** 9% **E.** neither A, B, C, nor D

6. Tom had a party and invited his brother, along with 4 pairs of brothers. Their ages, all different, were from 4 to 13. The sum of the ages of each pair were 10, 13, 17, 22 and 23. Tom was 9. How old is his brother?

A. 4 **B.** 8 **C.** 13 **D.** 12 **E.** neither A, B, C, nor D

7. The solution for the equation

$$2[-(x - 1) + 4] = 5 + [-(6x - 7) + 9x]$$

is:

A. -2 **B.** $-\frac{2}{5}$ **C.** 2 **D.** $\frac{2}{5}$ **E.** neither A, B, C, nor D

8. The length of a rectangle is 7 ft. more than the width. If the length was decreased by 3 ft. and the width was increased by 2 ft., the perimeter would be 32 ft. Find the length of the original rectangle.

A. 5 **B.** 7 **C.** 16 **D.** 12 **E.** neither A, B, C, nor D

9. A stereo was to be sold at an 18% discount, which amounted to \$72. Which statements are true?

i: The sale price of the stereo is \$428.

ii: The original price of the stereo was \$500.

A. i: only **B.** ii: only **C.** Both i: and ii: **D.** None of the statements are true. **E.** More information is needed.

10. How many seconds longer is 2% of an hour than 30% of a minute?

A. 0 **B.** 48 **C.** 54 **D.** 60 **E.** neither A, B, C, nor D

11. If

$$1 - \frac{4}{x} + \frac{4}{x^2} = 0,$$

then $\frac{2}{x}$ equals

A. -1 **B.** 1 **C.** 2 **D.** -1 or 2 **E.** -1 or -2

12. If four times the reciprocal of the circumference of a circle equals the diameter of the circle, then the area of the circle is

A. $\frac{1}{\pi^2}$ **B.** $\frac{1}{\pi}$ **C.** π **D.** π^2 **E.** 1

13. Four boys bought a video game for \$60. The first boy paid one half of the sum of the amounts paid by the other boys; the second boy paid one third of the sum of the amounts paid by the other boys; and the third boy paid one fourth of the sum of the amounts paid by the other boys. How much did the fourth boy pay?

A. \$10 **B.** \$12 **C.** \$13 **D.** \$14 **E.** \$15

14.

$$\frac{3}{2} + \frac{5}{4} + \frac{9}{8} + \frac{17}{16} + \frac{33}{32} + \frac{65}{64} - 7 =$$

A. $-\frac{1}{64}$ **B.** $-\frac{1}{16}$ **C.** 0 **D.** $\frac{1}{16}$ **E.** $\frac{1}{64}$

15. The product of $\sqrt[3]{4}$ and $\sqrt[4]{8}$ equals

A. $\sqrt[7]{12}$ **B.** $2\sqrt[7]{12}$ **C.** $\sqrt[7]{32}$ **D.** $\sqrt[12]{32}$ **E.** $2\sqrt[12]{32}$

Name:

High School:

Tie Breaker Question: Find a four digit number which is a perfect square, and such that its first two digits are the same, and also, its last two digits are the same.