

Name:  
High School:

Lock Haven University  
Mathematics Competition for High School Students  
Tuesday April 21, 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, and will be penalized one-fourth of a point for each incorrect answer. There is no penalty for skipping a question. Therefore it is better to leave a question unanswered if you have no idea regarding its solution.*

1. Compare the perimeter of these polygons.

- (i) A square with side 4 cm
- (ii) A rectangle with length 6 cm and width 3 cm
- (iii) A triangle with two sides having equal length of 4 cm each, and the length of the third side not given.

- A. (i) < (ii) < (iii)      B. (i) < (iii) < (ii)      C. (iii) < (i) < (ii)  
D. (i) = (ii) = (iii)      E. None of A, B, C, or D is correct.

2. How far will a wheel with radius  $\frac{5}{\pi}$  roll in two revolutions?

- A. 5 units      B.  $\frac{10}{\pi}$  units      C. 10 units      D.  $\frac{25}{\pi}$  units      E. 20 units

3. If a radio station in the United States has call letters that begin with a *W* or a *K* and has four letters altogether. How many arrangements of four letters are possible as call letters?

- A.  $26^6$       B.  $2 \cdot 26^3$       C.  $26^4$       D. 80      E. 79

Name:

4. Let  $A, B$  be sets. If  $n(A) = 14$ ,  $n(A \cap B) = 5$ , and  $n(A \cup B) = 22$ , find  $n(B)$ .
- A. 8    B. 5    C. 1    D. 13    E. 17
5. In the land of Odd, they only use quarters, nickels, and pennies for their coins. Maria who lives in Odd likes to carry as few coins as possible. What is the minimum number of coins that Maria will carry to the store if she plans to take 117 cents?
- A. 117    B. 3    C. 5    D. 8    E. 9
6. A stereo was to be sold at an 18 percent discount, which amounted to 72 dollars. Which statement is true?
- (i) The sale price of the stereo is 428 dollars.  
(ii) The original price of the stereo was 500 dollars.
- A. (i) only    B. (ii) only    C. Both (i) and (ii)  
D. None of the statements are true.    E. More information is needed.
7. One of the 240 eighth grade students at Franklin Middle School is to be selected at random to win a raffle prize. If the probability of selecting a female student is  $\frac{3}{5}$ , how many male eighth grade students are there at Franklin Middle School?
- A.  $\frac{2}{5}$     B.  $\frac{3}{5}$     C. 96    D. 120    E. 144
8. A sequence had terms
- $$1, 2, 3, 5, 8, 13, \dots$$
- then the 7<sup>th</sup> term in the sequence is
- A. 9    B. 7    C. 19    D. 21    E. 23
9. What is the greatest number of bags that can be used to hold 190 marbles if each bag must contain at least one marble but no two bags may contain same number of marbles?
- A. 9    B. 89    C. 90    D. 19    E. None of the above

Name:

10. A Farmer can plow the entire circular field of radius 30 yards, in two hours, and her daughter can plow two-thirds of the same field in two hours. What is the area (in square yards) of the field that can be plowed in one hour if farmer and her daughter work together?
- A.  $750\pi$     B. 750    C.  $800\pi$     D. 800  
E. Neither A, B, C, or D are correct answers
11. A circle has center  $O$  and points  $N$  and  $P$  are on the circle. Suppose that  $\angle NOP$  is  $120^\circ$ . What is  $\angle ONP$ ?
- A.  $30^\circ$     B.  $35^\circ$     C.  $60^\circ$     D.  $70^\circ$     E.  $125^\circ$
12. What is the equation of the line through  $(4, 1)$  that is parallel to the line  $2x - 3y = 2$ .
- A.  $3y = 2x - 5$     B.  $2y = -3x + 14$     C.  $4x - y = 15$     D.  $3y = -2x - 5$   
E. None of A, B, C, or D
13. The price of a certain candy bar doubled over a five year period. Suppose that the price continues to double every 5 years and that the candy bar cost 25 cents in 2000. What would be the cost (in dollars) of the candy bar in 2045?
- A. 64.00    B. 1.28    C. 128.00    D. 625    E. 6.25
14. If for a test two-sevenths of the students in a class got A's, one-fifth of the students got B's, one-half of the students got C's, 1 student got a D and there were no F's, then which of the following statements are true?
- (i) There are 70 students in the class.  
(ii) 28 students got B's.  
(iii) 35 students got C's.
- A. (i) and (ii) only    B. (i) and (iii) only    C. (ii) and (iii) only    D. (i),(ii) and (iii)  
E. None of the statements are true.
15. A can of vegetables is in the shape of a cylinder. The surface area of the label of the can is  $24\pi$  square inches and the volume of the can is  $120\pi$  cubic inches. What is the height of the can (in inches)?
- A. 10    B.  $10\pi$     C.  $1.2\pi$     D. 1.2    E.  $3\pi$