



Knights of Pi Math Tournament – Dec. 15, 2012  
Algebra & Operations 7th/8th

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| 1  | Newport is holding its annual “buy 2 get 1 free” sale on shirts. If one shirt usually costs \$15, how many dollars would you save by getting a total of 6 shirts?  |
| 2  | Brian has taken five reading quizzes and has scored an average of 80. If he scored 70, 80, 85, and 95 on four of the quizzes, what did Brian score on the fifth quiz?  |
| 3  | If a positive number $n$ is equal to its reciprocal, what is the value of $n^8$ ?  |
| 4  | A bowl of 200 mL of water has a 10% concentration of lemonade. How many milliliters of pure lemonade should be added to the water to increase its concentration to 20%?  |
| 5  | How many minutes after 3 <i>p. m.</i> do the hour and minute first coincide (point in the same direction)?   |
| 6  | Karl threw a grapefruit at the sun. If the height of the grapefruit above the ground in meters after $t$ seconds is $70t - 10t^2$ , for how many seconds will the grapefruit be at least 120 meters above the ground?  |
| 7  | For how many integer values of $k$ does the equation $1 - \frac{2k-2}{x-1} = k$ have a unique positive solution for $x$ ?  |
| 8  | Dogiva sells chocolates in packages of nine and five. What is the largest number of chocolates I cannot buy an exact number of from Dogiva?  |
| 9  | If $0 < a, b, c < 1$ , which of the following inequalities must be true? Express your answer as the letter corresponding to the correct answer choice.<br><br>(A) $a^2 + b^2 + c^2 < 0$<br>(B) $a + b + c > 0$<br>(C) $-1 < abc < 0$<br>(D) $(abc)^2 > 1$                |
| 10 | In a sequence of four positive integers, the first three terms form a geometric sequence while the last three terms form an arithmetic sequence. If the ratio between the fourth and first term is 3, what is the common ratio of the geometric portion of the sequence? |