Warm-Up 8

101. _____ The greatest common factor of 42 and 24 is m. What is the least common multiple of m and 15?

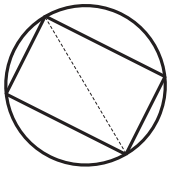
102. _____ degrees Circle P has diameter CD. Point B is on the circle such that $m\angle BPC = 30$ degrees. Point A is on the circle such that $\overline{AD}$ is parallel to $\overline{PB}$. What is the degree measure of arc ABC?

103. _____ units Points A, B, C, D and E are collinear. If AB = 6, B is the midpoint of line segment AD, D is three-fourths the way from A to E and C is one-fifth the way from B to E, what is CE?

104. _____ What integer is closest to the value of $\frac{999}{200} + \frac{898}{301} + \frac{797}{402} + \frac{696}{503}$?

105. _____ What is the value of $\frac{1000^2}{252^2 - 248^2}$?

106. _____ units^2 The figure shows a rectangle inscribed in a circle. If the rectangle has integer sides and integer diagonal lengths, what is the smallest possible area of the rectangle?



107. _____ pennies On March 1st, Kenny and Linny had jars containing the same number of pennies. One month later, Kenny has two more than three times Kenny's original number of pennies, while Linny has seven fewer than four times Linny's original number. If Linny has eight more pennies than Kenny, how many pennies did they each start with on March 1st?

108. _____ minutes A train departs D.C. at 8:15 a.m. EST and arrives in New York City at 12:05 p.m. EST on the same day. How many minutes was the train ride?

109. _____ If $(x^2y^3)^4(x^4y^5)^6 = x^ay^b$ for all real numbers x and y, what is the sum of a and b?

110. _____ What is the value of 11,111,111 – 2,222,222 + 333,333 – 44,444 + 5555 – 666 + 77 – 8?

Warm-Up 9

111. _____ years Now that it is a year after Jake joined the National Math Club, he has been a member for one-third of the time that Maggie has been a member. In how many more years will Jake have been a member for two-thirds of the time that Maggie will have been?

112. _____ cm^2 Kent draws a regular hexagon of side length 4 cm and then draws a semicircle outward along each side. The total area enclosed by Kent's drawing can be expressed in simplest radical form, in terms of π, as $a\sqrt{b} + c\pi$. What is the value of $\frac{a}{b} + c$?

113. _____ minutes Sandy rakes and bags the leaves on her front lawn in 30 minutes. Randy does the same job in 20 minutes. How many fewer minutes will it take to complete the same job if Sandy and Randy work together than if Sandy works alone?

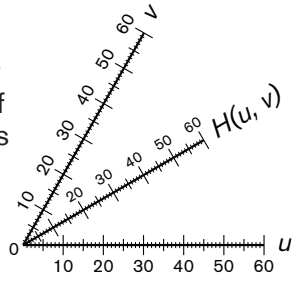
114. _____ $units^2$ What is the area of an isosceles triangle that has a base of length 12 units and base angles measuring 30 degrees? Express your answer in simplest radical form.

115. _____ If $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{n} + \frac{1}{62} + \frac{1}{124} + \frac{1}{248} = \frac{495}{496}$, what is the value of n?

116. _____ If a and b are integers such that $a^2 = b^2 + 15$, what is the greatest possible value of a?

117. _____ If $\frac{18}{x} = \frac{y}{28} = \frac{3}{7}$, what is the value of $\frac{x}{y}$? Express your answer as a common fraction.

118. _____ A *nomogram* is a graphical calculating device that relates three or more variables. The nomogram shown relates u, v and the value of the function $H(u, v)$. A straight line passing through specific values of u and v intersects the third scale at the value of the function H for those two variables. To the nearest multiple of 5, what is the value of $H(60, 36)$?



119. _____ In the array of numbers shown, each row begins and ends with the number 1. In every row after the first, each interior entry is the sum of the number immediately above it, the number above and to the left (if there is one) and the number above and to the right (if there is one). What is the value of $p + q + r$?

```
                1
            1   1   1
        1   2   3   2   1
    1   3   6   7   6   3   1
1   4  10  p   q   r  10   4   1
```

120. _____ What is the value of $\left(\frac{1}{2}\right)^{-3}$?

Warm-Up 10

121. _____ feet When the sun was at a particular place in the sky, a 40-foot tall vertical tree cast a 60-foot long shadow on the ground. Two years later, the tree had grown to 60 feet tall. When the sun was again at that particular place in the sky, how many feet longer was its shadow?

122. _____ What is the absolute difference between the median and mean of $\frac{5}{8}$, $\frac{3}{5}$ and $\frac{13}{20}$?

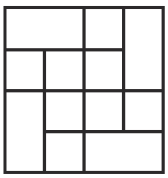
123. _____ ft^2 Spot is on a 9-foot leash that is attached to an outside corner of his doghouse. If Spot's doghouse is a regular hexagon of side length 9 feet, how many square feet is the entire area that Spot can reach outside of the doghouse? Express your answer in terms of π.

124. _____ times A path drawn in the coordinate plane begins at (1, 1), then goes up 2 units, right 2 units, up 3 units, right 3 units, up 4 units, right 4 units, and so on. Each time, the number of units up increases by 1, and the number of units right increases by 1 until the path ends at (91, 91). How many times does this path from (1, 1) to (91, 91) intersect the line $y = x$?

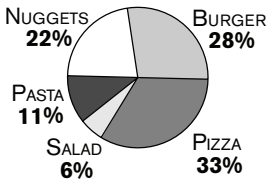
125. _____ Filip expresses a number in the form $4x + 5$. Gala expresses the same number as $6x - 7$. If Henry wants to express this number in the form $5x + d$, what would be the value of d?

126. _____ cm The length of the base of a particular triangle is 2 cm more than its height. If the triangle has area 12 cm^2, what is its height?

127. (,) The point (5, 12) is rotated 90 degrees counterclockwise about the origin. What are the coordinates of its image? Express your answer as an ordered pair.

128. _____ rectangles  How many rectangles of any size are in the figure shown?

STUDENT LUNCH ORDERS



129. _____ students The circle graph shows what percent of the students who bought lunch on Friday ordered each of the five lunch options available at Lowe HS. If 132 students ordered pizza, what is the total number of students who bought lunch at Lowe HS on Friday?

130. _____ If $a \textcircled{n} b = \frac{a^n + b^n}{n}$, what is the value of $5 \textcircled{2} (1 \textcircled{3} 2)$?