

Warm-Up 16

1. _____ inches Four circles are stacked vertically, as shown. Each of the top three circles has a diameter that is half the diameter of the circle just below it. The total area of the four circles is 765π square inches. What is the height of the stack?



2. _____ The fourth Farey sequence, $F_4 = \frac{0}{1}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{1}{1}$, is the list, written in increasing order, of all the common fractions with distinct values from 0 through 1, inclusive, that use only the integers 0, 1, 2, 3 or 4 as numerators and denominators. In the fifth Farey sequence, what is the product of the third and tenth terms? Express your answer as a common fraction.

3. _____ uses There are 64 identical-looking coins, one of which is slightly heavier than the others. A balance scale can be used to show which one of two groups of coins is heavier or that the two groups weigh the same. What is the minimum number of uses of the balance scale that is guaranteed to determine which of the coins is the heavier one?

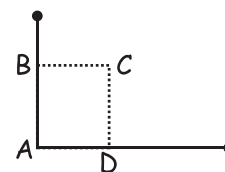


4. _____ units A square is inscribed in a right triangle with legs of 8 units and 15 units. If two of the vertices of the square lie on the hypotenuse and the other two vertices of the square lie on the legs of the triangle, what is the length of a side of the square? Express your answer as a common fraction.

5. _____ meters An apothem of a regular polygon is a line segment joining the center of the polygon to the midpoint of any side. What is the length of an apothem of a regular hexagon of side length 3 meters? Express your answer as a common fraction in simplest radical form.

6. _____ Suppose an equilateral triangle and a square have perimeters of equal length. What is the ratio of the area of the triangle to the area of the square? Express your answer as a common fraction in simplest radical form.

7. _____ meters Betty and Don are standing on point A of rectangle ABCD. They walk away from each other on different sides of the rectangle. Betty walks in a straight line and stops 12 meters beyond point B. Don walks in a straight line through point D and continues until point C is directly between himself and Betty. The area of rectangle ABCD is 348 square meters. How far beyond point D did Don walk?



8. _____ Suppose we replace each x in the expression $\frac{x+1}{x-1}$ with the expression $\frac{x+1}{x-1}$. What is the value of the resulting expression when $x = \frac{4}{5}$? Express your answer as a common fraction.

9. _____ sq units What is the area of the region in the plane bounded by the lines with the equations $y = 0$, $x = 0$, $x = 3$ and $y = 2x + 1$?

10. _____ degrees In the figure, if $a + b + c = 180$ degrees, what is the value of $u + v + w$?

