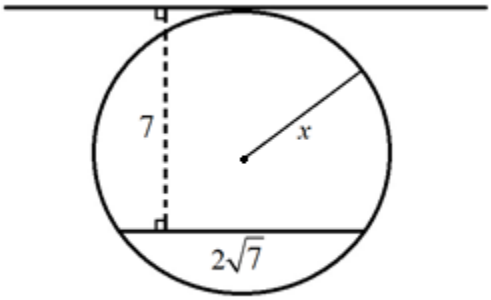
ROUND #1

University of North Georgia
Mathematics Tournament
April 1, 2017

Given the figure below, find x, where x is the radius of the circle.



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ROUND #2

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Solve the following system of equations. Write your solution as an ordered triplet.

$$\log_2 x + \log_4 y + \log_4 z = 2$$
$$\log_3 y + \log_9 z + \log_9 x = 2$$
$$\log_4 z + \log_{16} x + \log_{16} y = 2$$

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ROUND #3

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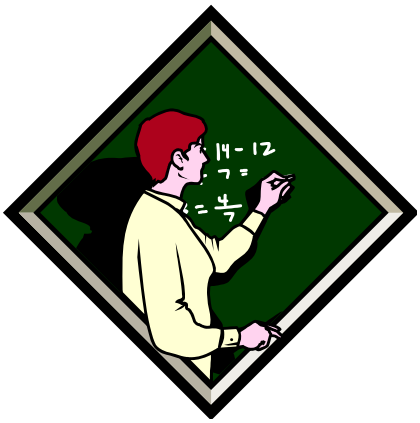
A certain function f satisfies $f(x) + 2f(6-x) = x$ for all real numbers x.

Find $f(1)$.



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ROUND #4

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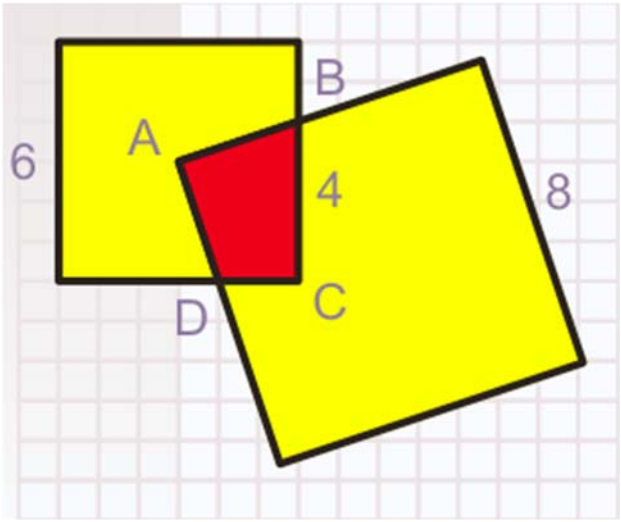
Consider the figure:



Suppose that A is the center of the small square, one side of the large square has length 8 units, one side of the small square is 6 units, and $BC = 4$ units. Compute the area of the shaded region $ABCD$.

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ROUND #5

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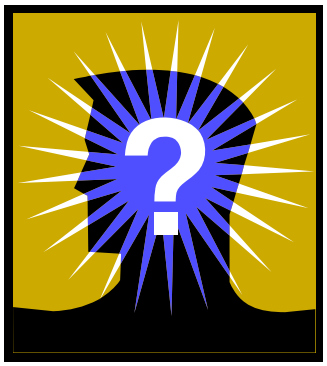

The total sum of the internal angles of a regular polygon is $1800°$. Given that the side length is $\frac{1}{\sqrt{3}}$, find the area of this regular polygon.

Give an exact answer simplified as much as possible.

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ROUND #6

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An airline has a policy of booking as many as 25 people on an airplane that can seat only 24 people. Past studies have shown that 92% of the booked passengers actually arrive for the flight. Find the probability that if the airline books 25 people, not enough seats will be available. Round your answer to the nearest hundredth of a percent.

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ROUND #7

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Let x and y be two nonzero real numbers such that $x^4y^5 + x^5y^4 = 810$ and

$x^3y^6 + x^6y^3 = 945$. Evaluate $2x^3 + (xy)^3 + 2y^3$.

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ROUND #8

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Determine the measure of angle θ shown in the figure below between the hands of an analog clock at 4:42.

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ROUND #9

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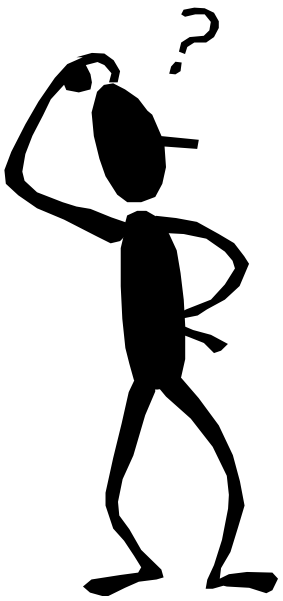

If the length of each side of a triangle is increased by 20%,

then the area of the triangle is increased by what percent?

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ROUND #10

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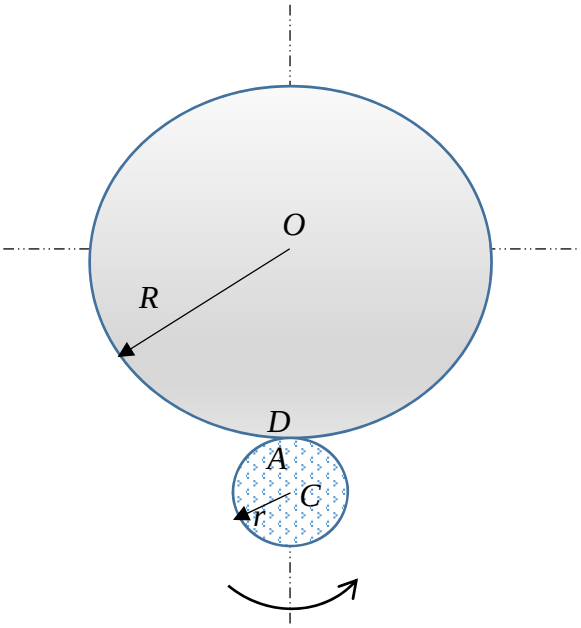
A smaller cylinder of radius r rolls without slipping, in the counter clockwise direction, on a larger cylinder of radius R with center O, as shown in the figure below. If $R = 3\,meters$ and $r = 1\,meter$, how many complete rotations does the smaller cylinder undergo as it makes one complete transit around the larger cylinder?



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