ROUND #1

A baker cut a whole round cake that is 3 *inches* high and has a 12 *inch* diameter into pieces. Each piece of cake has a volume of 9π *cubic inches*. Into how many pieces did the baker cut the whole cake?
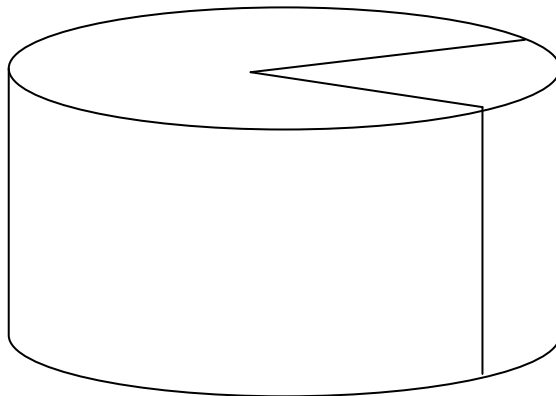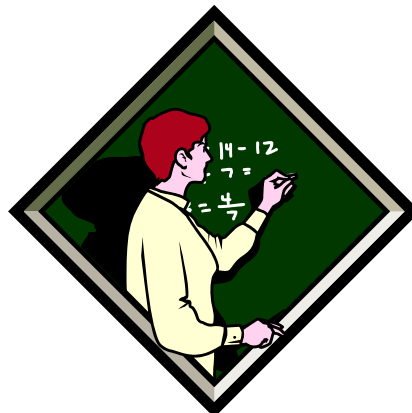
ROUND #2

There are 4 people in a room. Each person randomly chooses a positive integer less than 11. What is the probability that at least two of the people choose the same number?

Express your answer as a decimal.

ROUND #3
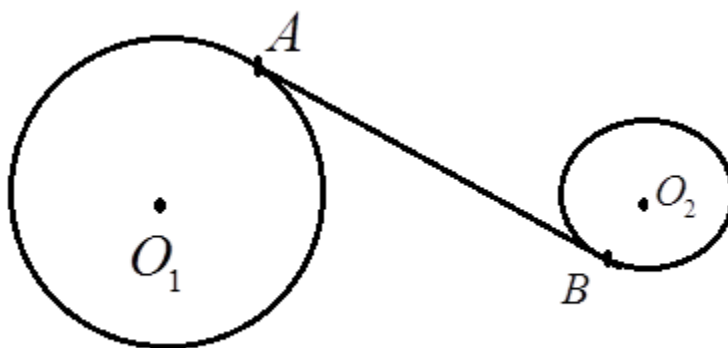
Let $f(x) = x^4 + ax^2 + bx + c$ where a, b, and c are real numbers. If $f(x)$ is

divisible by $(x-1)^3$, find $f(2)$.

ROUND #4

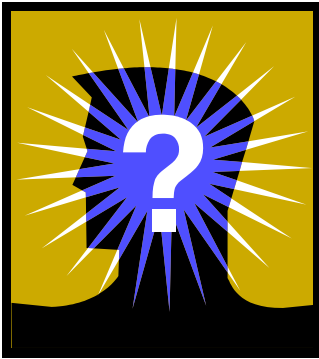The centers, O_1 and O_2, of two circles are 24 *centimeters* apart. The larger circle

has a radius of 6 *centimeters* and the smaller circle has a radius of 3 *centimeters*.

What is the length AB of their common internal tangent? Provide an exact answer.

ROUND #5

Determine $\tan(\alpha + \beta)$ if $\tan\alpha + \tan\beta = 7$ and $\cot\alpha + \cot\beta = 4$. Provide an exact answer.

ROUND #6

One *inch* is exactly 2.54 *centimeters*. Find the radius of the smallest circle whose

area is both a natural number of *square inches* and a natural number of *square*

centimeters. Give your answer as an exact number of *inches*.

ROUND #7

Given $f(x) = 2x^2 + 4x^4 + 6x^6 + \cdots + 100x^{100}$ and $g(x) = x + 3x^3 + 5x^5 + \cdots + 99x^{99}$,

evaluate $\dfrac{f^2(1) - g^2(1)}{100}$ in simplest form (an integer).

ROUND #8

Find the largest number less than 1,200 that is a product of four

different prime numbers.

ROUND #9

Consider the grid of points given below. Let a path from S to F consist of only those paths that can travel down or to the right at each intersection point. How many paths from S to F pass through M or N?
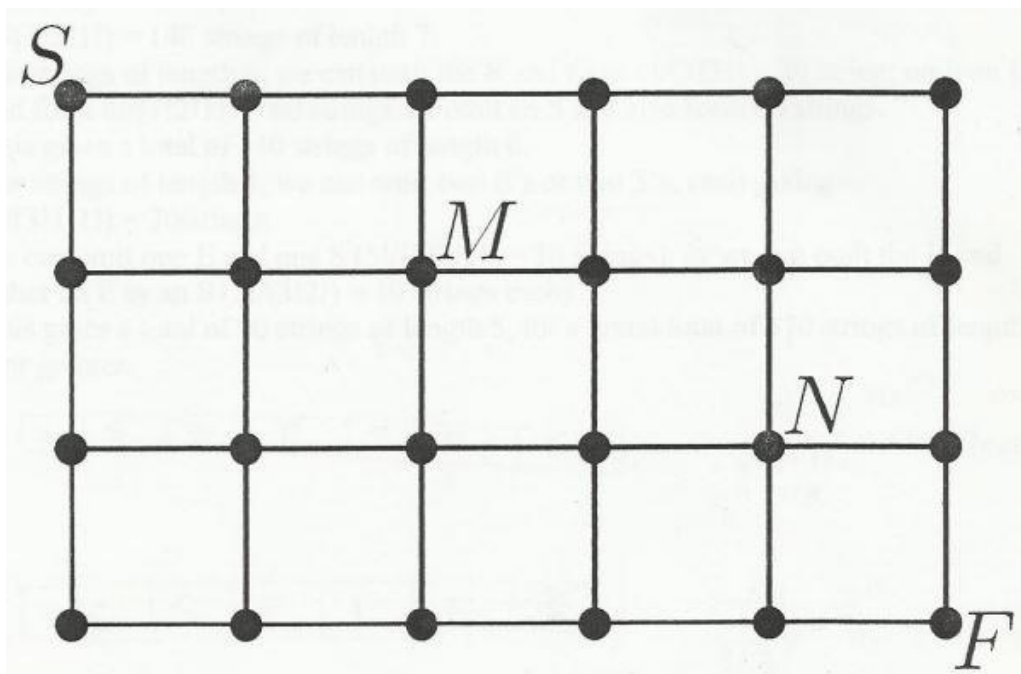
ROUND #10

If $y = \log_{1/3}\left(\dfrac{1}{x^2 - 2}\right)$, for what values of x is $y > 0$?

Provide an exact answer written in interval notation.