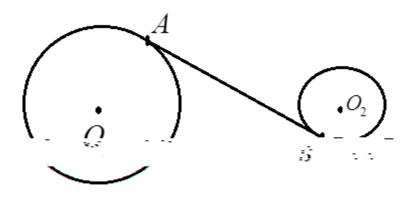# 1

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?
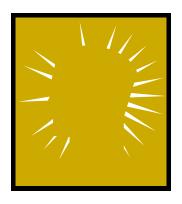
Express your answer as a decimal.

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*April 5, 2014*

Let $f(x) = x^4 + ax^2 + bx + c$ where $a$, $b$, and

**1**

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.

# 1

Determine $\tan$ ___ if $\tan$ ___ $\tan$ ___ 7 and $\cot$ ___ $\cot$ ___ 4. Provide an exact answer.
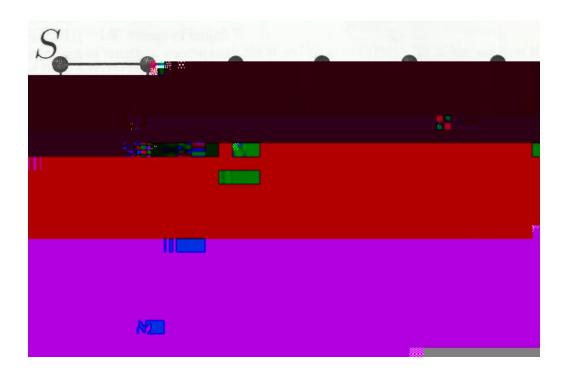
One *inch* is exactly 2.54 *centimeters*.  Find the radius of the smallest circle whose area is both a natural number of *square inches* and a natural number of *square centimeters*.  Give your answer as an exact number of *inches*.

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Given $f\ x\quad 2x^2\quad 4x^4\quad 6x^6\quad\cdots\quad 100x^{100}$ and $g\ x\quad x\quad 3x^3\quad 5x^5\quad\cdots\quad 99x^{99}$,

evaluate $\dfrac{\quad^2\quad^2\quad}{\quad\quad}$ in simplest form (an integer).

**1**

Find the largest number less than 1,200 that is a product of four different prime numbers.

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 $N$?

**1**

If $y = \log_{\frac{1}{3}} \dfrac{1}{x^2 + 2}$ , for what values of $x$ is $y \geq 0$?

Provide an exact answer written in interval notation.