Yavapai County Math Contest

HS College Bowl Competition

February 1, 2011

Is your adrenalin engaged?

$$10 - (9 - (8 - (7 - (6 - 5)))) = ?$$

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3

Simplify:

$$\frac{\frac{A}{B}+\frac{A+\sqrt{B}}{B+\sqrt{A}}}{\frac{A+\sqrt{B}}{B+\sqrt{A}}+\frac{A}{B}}.$$

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1

The mean of the four numbers x, 10, -25, 5 is 6. What is the value of x?

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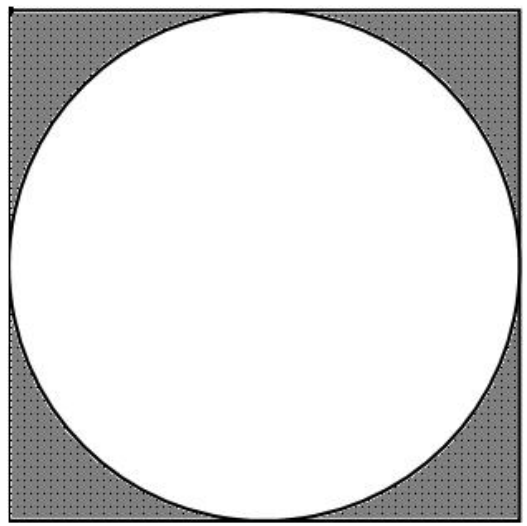
34

The square is 10 inches on a side. What is the area of the shaded region?



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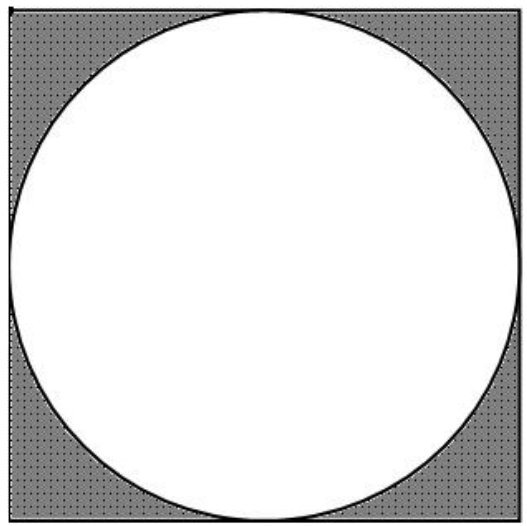

$100 - 25\pi$

The base of an isosceles triangle is 5 and its perimeter is 11. The base of a similar isosceles triangle is 10. What is the perimeter of the larger triangle?

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22

Fill in every box with one of the operations $+$, $-$, or $*$, such that an equality holds:

$$1 \square 9 \square 8 \square 4 = 13$$

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The supplement of the complement of an angle is $130°$. How many degrees has the angle?

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40°

Find the solutions of the equation:

$$2^{x^2} \cdot 4^{-x} = 2^3.$$

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-1 and 3

The sum of two consecutive counting numbers is 147. What are the numbers?

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73 and 74

A cube is inscribed in a sphere. What is the quotient between the radius of the sphere and the side of the cube?

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$\sqrt{3}/2$

The difference in the squares of two consecutive even numbers is 52. What is the biggest of the two numbers?

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14

Compute the difference $x - z$ if you know that

$$y - x = 183 \text{ and } z - y = 217.$$

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-400

Write the quadratic equation

$$x^2 + bx + c = 0$$

that has as roots $1 + \sqrt{5}$ **and** $1 - \sqrt{5}$**.**

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$$x^2 - 2x - 4 = 0$$

A soccer ball has a volume 27 times bigger than the volume of a tennis ball. What is the quotient between the soccer ball's diameter and the tennis ball's diameter?

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3

At a farm there are hens and rabbits. In total there are 40 heads and 100 legs. How many hens and how many rabbits are at the farm?

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30 hens and 10 rabbits

The 100th term in the arithmetic progression

$$5, 9, 13, 17, 21, \ldots$$

is what number?

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401

For what values of x is the function

$$f(x) = \frac{x+2}{x-1}$$

negative?

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$$x \in (-2, 1)$$

Find all the solutions of the equation

$$(x-1)^{2/3} = 4.$$

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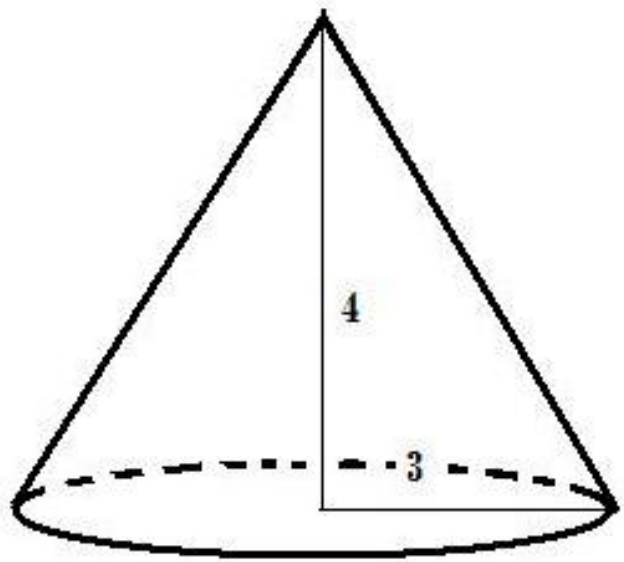
-7 and 9

What is the lateral surface of the right circular cone with height 4 in and radius of the base 3 in?



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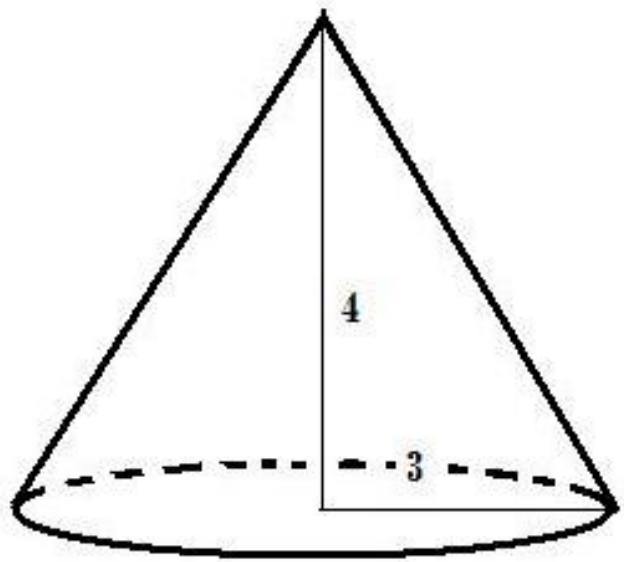

15π **sq in**

A lily pad doubles in size each day. If it takes 28 days for the lily pad to cover the entire pond, how many days will it take to cover one eighth of the pond?

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25 days

Simplify

$$\frac{7-4\sqrt{3}}{2-\sqrt{3}}.$$

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$$2-\sqrt{3}$$

What is a half of a third of a fourth of 120?

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5

A function f satisfies

$$f(x) = f(x-2) - f(x-1).$$

If $f(1) = 2$ and $f(2) = 5$, find $f(4)$.

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8

How many diagonals are there in a regular heptagon (polygon with 7 sides)?

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14

K=cx. When x is 2, K is 6. What does x have to be to make K = 48?

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16