

MATHCOUNTS[®] Problem of the Week Archive

Pi Day! – March 11, 2024

Problems & Solutions

Thursday is Pi Day! For all of the following calculations, use 3.14 for pi.

In honor of Pi Day, Wilma's class is having a pie party. Wilma brought in her favorite kind of pie – apple. When she cuts her slice of pie, it has a central angle of 60 degrees. If the diameter of the pie was 10 inches, what is the area of Wilma's slice of pie? Express your answer as a decimal to the nearest tenth.

First, find the area of the whole pie.

$$A = \pi r^2$$

$$A = (3.14)(10/2)^2 = 78.5 \text{ square inches}$$

Now, multiply by the fraction of the pie that Wilma took.

$$78.5(60/360) \approx \mathbf{13.1 \text{ square inches}}$$

A buggy has front wheels with a diameter of 12 inches and back wheels with a diameter of 18 inches. If Molly pushes the buggy for 300 yards, how many more revolutions does each of the front wheels make than each of the back wheels? Express your answer as a decimal to the nearest tenth.

First, find the circumference of each of the wheels.

$$C = \pi d$$

$$C = (3.14)(12) = 37.68 \text{ inches}$$

$$C = (3.14)(18) = 56.52 \text{ inches}$$

Now, convert the number of yards traveled by the buggy to inches.

$$300 \text{ yds } (3 \text{ ft/yd}) (12 \text{ in/ft}) = 10,800 \text{ inches}$$

Divide the distance traveled (in inches) by the distance traveled in one revolution of each wheel.

$$10,800/37.68 \approx 286.624$$

$$10,800/56.52 \approx 191.083$$

Finally, find the difference.

$$286.624 - 191.083 \approx \mathbf{95.5 \text{ revolutions, to the nearest tenth.}}$$

Semi-circle A's radius is twice as long as semi-circle B's radius. The length of semi-circle B's radius is 30 percent of the length of semi-circle C's radius. None of the semi-circles overlap any of the others. If A's radius is 10 cm, what is the sum of the areas of semi-circles A, B and C?

If semi-circle A's radius is 10 cm, we know that B's radius is 5 cm and that C's radius is 16.66667 cm. Now, we can find the area of each semi-circle.

$$A = (\pi r^2)/2$$

$$A = (3.14)(10)^2/2 = 157$$

$$A = (3.14)(5)^2/2 = 39.25$$

$$A = (3.14)(16.66667)^2/2 = 436.111...$$

Now, find the sum.

$$(436.111...) + (157) + (39.25) = \mathbf{632.36111...}$$

NOTE: Your final answer may differ SLIGHTLY because of differences in rounding on this problem.

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