To the hunt of hidden number Π in the ZOE car...

This task in mathematics is continuing the collaborative contributions already posted online.

Imagine for a minute what human life would be if circular shapes had not been studied : no wheel, no vehicle!

Let's now find circular shapes in the ZOE car, take measurements and find again approximations of that π number contained in this car.

material : 4 measure tapes, calculator, posters, markers

1. Using the measure tape, measure the perimeter of each tyre and diameter of each wheel with tyre. Calculate an approximate value of π up to 8 significant digits. Repeat for all four tyres.

tyre	left front tyre	right front tyre	left rear tyre	right rear tyre
measure of circumference				
measure of diameter				
calculation of π				
approximation of π found up to 8 significant digits				

2. Repeat the procedure on the four wheel trims.

tyre	left front wheel	right front wheel	left rear wheel	right rear wheel
measure of circumference				
measure of diameter				
calculation of π				
approximation of π found up to 8 significant digits				

3. Repeat the procedure inside the car on the driving wheel.
   Driving wheel : circumference is ....
   diameter is ....
   calculation of π is ....
   final result : ....

4. Find another circular shape in the car and measure, calculate an approximation of π

5. Use posters and markers to show directly onto the carbody of the car measurements, calculations and found approximation of π
6. Your documentary should contain the following elements with keywords :
   - comment on your various approximations of π that you just found,
   - how this task is related to the math collaborative tasks posted online before this meeting,
   - additional information about that bizarre number π, given below. DO NOT READ, TALK !

Key words for your presentation :
circle, circumference, perimeter, radius, diametre, centre point, endpoint, chord, area, approximate value, significant digits, decimals, decimal equivalent of a number,

More properties about $\pi \simeq 3.14159265358979323846264338327950288419716939937510582097494459 23\ldots$

In Antiquity already this constant number lying behind all circles was puzzling. Many attempts to give an exact value to this number failed and it became easier to give it a name to speak about it. The name in use today was given by the end of the 18th century by a Swiss mathematician named Euler and was then accepted by the community of mathematicians and scientists.

1. Back to the Antiquity in 250 BC, Archimedes has imagined a method using regular polygons inscribed in a circle to approximate π, see diagram below. He found that $\dfrac{223}{71} < \pi < \dfrac{22}{7}$, see figure 1.

2. π is called irrational number : it is impossible to find a fraction with whole numbers that would be exactly equal to π. Its decimal representation never settles into a permanent repeating pattern.
3. π is called transcendant number : it is impossible to find any polynomial equation with whole numbers as coefficients whose solution would be π.
4. Moreover, this number π also appears in problems totally disconnected from geometry and circles. For example the game of Buffon's needles shows this surprising result.

   Suppose we have a wooden floor made of parallel stripes of width t and we drop a needle of length l onto the floor. Then the probability that this needle will lie accross a line betwween two stripes is given by $P = \dfrac{2 \times l}{t \times \pi}$, see Figure 2

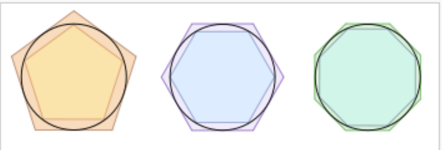
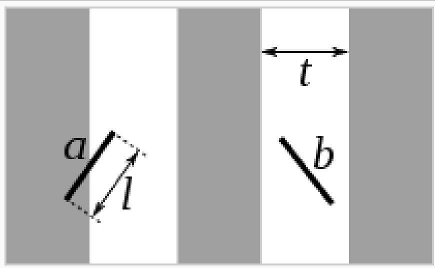

π can be estimated by computing the perimeters of circumscribed and inscribed polygons.

Figure 1



The a needle lies across a line, while the b needle does not.

Figure 2