



π IN THE SKY

Pi isn't just a fancy number. It actually powers NASA spacecraft, keeps the Mars rover's wheels spinning, lets us peer beneath the clouds of Jupiter and gives us new perspectives on Earth. You might say pi is flying all over our skies. Can you solve these stellar math problems that keep NASA spacecraft doing what they do best? Hint: Pi guides the way.



The Soil Moisture Active Passive, or SMAP, satellite is designed to image 1,000-kilometer-wide swaths of Earth from a near-polar, sun-synchronous orbit 685 kilometers above Earth's surface. **How many days will it take SMAP to image all of Earth's surface?**

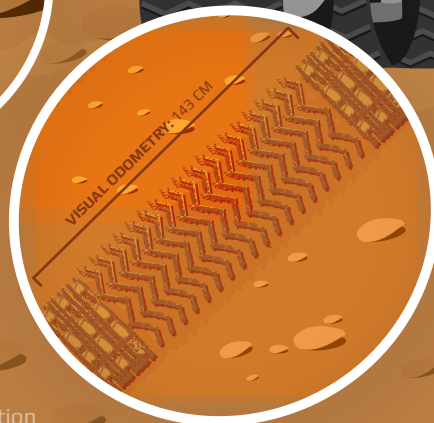
* You may disregard any overlap that may occur



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The Curiosity Mars rover doesn't have an odometer like those found in cars, so rover drivers calculate how far the rover has driven based on wheel rotations. Since landing on Mars in August 2012, Curiosity's 50-centimeter-diameter wheels have rotated 3689.2 times in 568 sols (Martian days). **How many kilometers has Curiosity traveled?**



Loose sand, dirt, slopes and rocks can influence the rover's progress, so engineers use a technique called visual odometry to determine how much Curiosity's wheels are slipping. On a steep slope covered in loose dirt, engineers note that the distance between the rover's visual odometry markers is only 143 centimeters. **What percent are Curiosity's wheels slipping with each rotation?**

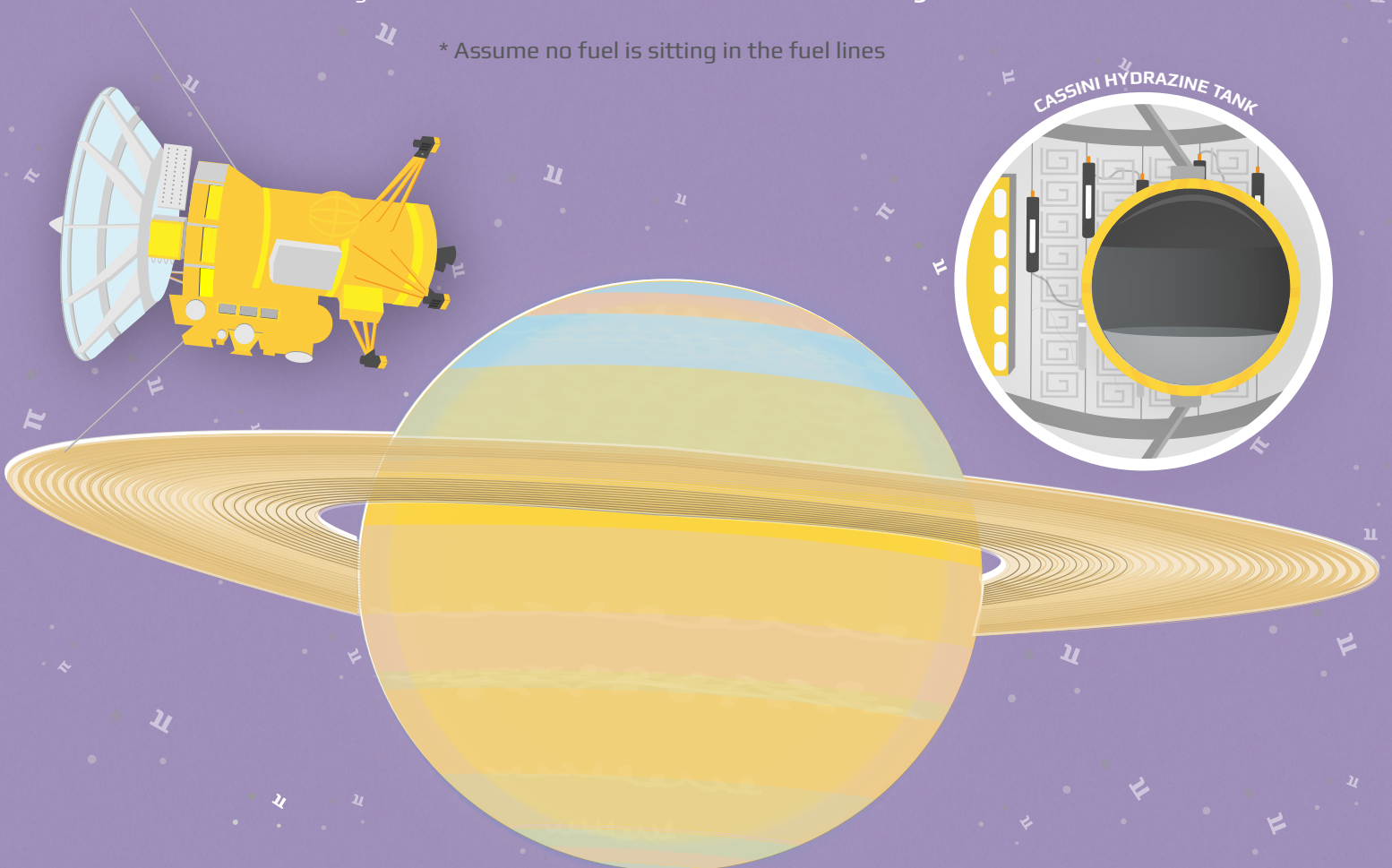


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The Cassini spacecraft was launched to Saturn with its 28-inch spherical hydrazine tank filled to 69 percent of its volume with hydrazine. After many years of studying Saturn, 82 kilograms of hydrazine have been used to maneuver around the ringed planet. Given the density of hydrazine is 1.02 grams/cubic centimeter, **how much fuel is remaining in the tank?**

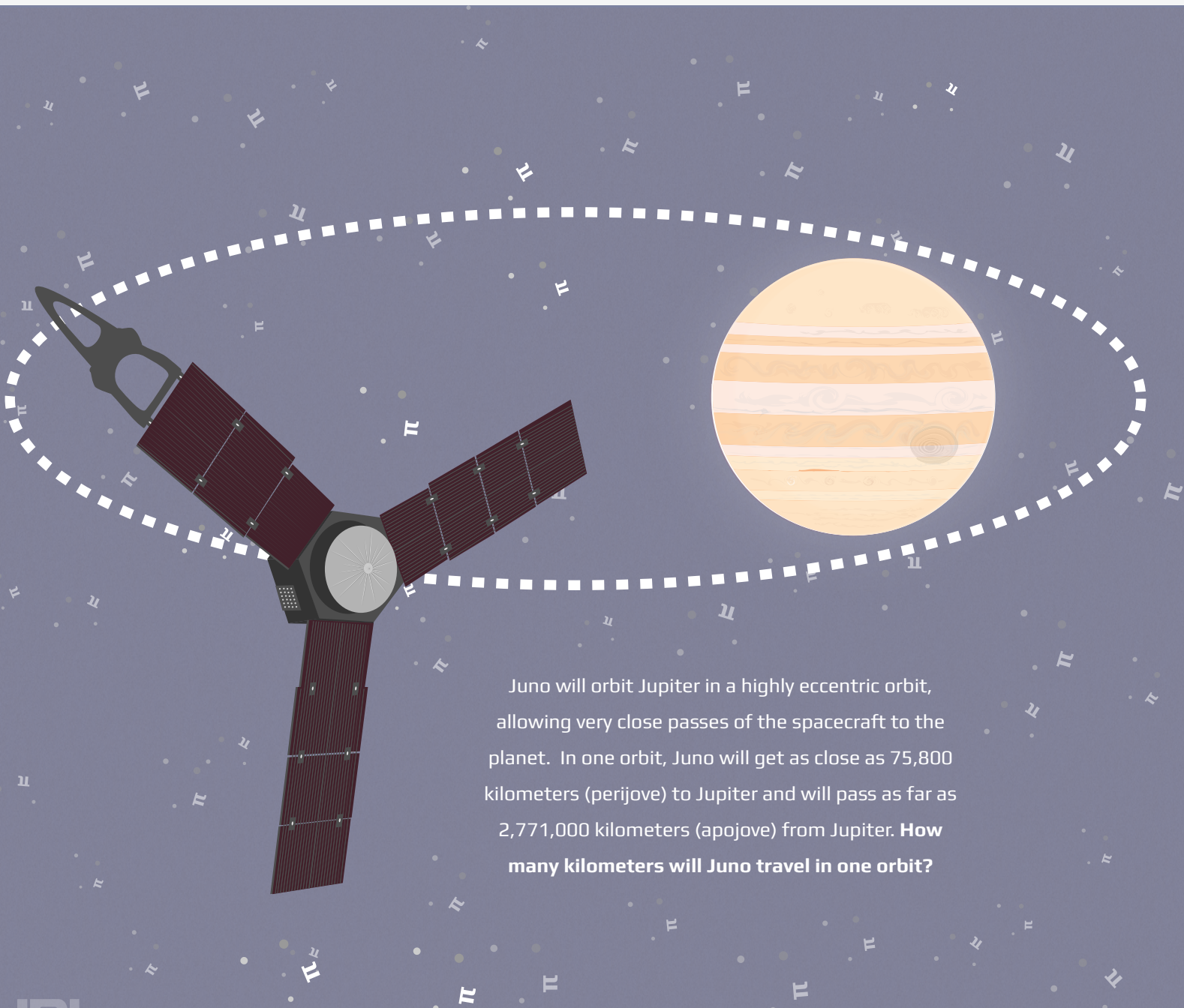
* Assume no fuel is sitting in the fuel lines





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Juno will orbit Jupiter in a highly eccentric orbit, allowing very close passes of the spacecraft to the planet. In one orbit, Juno will get as close as 75,800 kilometers (perijove) to Jupiter and will pass as far as 2,771,000 kilometers (apojove) from Jupiter. **How many kilometers will Juno travel in one orbit?**