



π IN THE SKY²

Pi is back in our skies, helping mathematical sleuths such as yourself solve stellar problems -- like this one: Find the dizzying number of times a Mars rover's wheels have rotated in 11 years.

Remember, pi leads the way.

Discover more " π in the sky" math problems at:

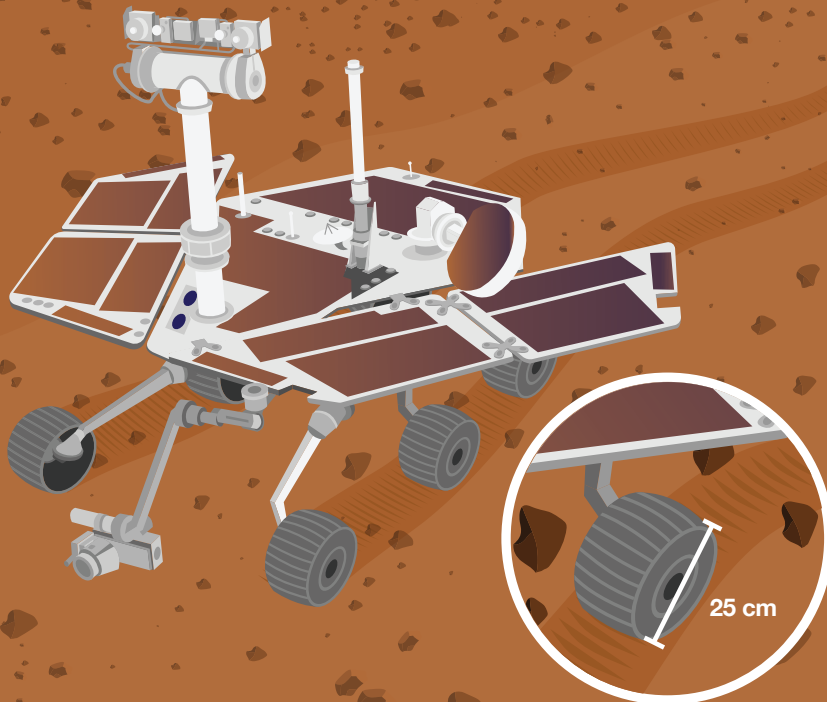
jpl.nasa.gov/edu/piday2015

MARS MARATHON

The Mars Exploration Rover Opportunity has been driving on the Red Planet for more than 11 years -- not bad for a mission only planned to last for three months! Opportunity has already beat the off-Earth driving distance record of 39 kilometers and is approaching a marathon distance: 42,195 kilometers.

When Opportunity reaches the marathon mark, how many times will its 25-centimeter diameter wheels have rotated?

LEARN MORE ABOUT THE MISSION
mars.nasa.gov/mer





π IN THE SKY²

Pi is back in our skies, helping mathematical sleuths such as yourself solve stellar problems -- like this one: Discover how many images it takes to map a new world, the dwarf planet Ceres. Remember, pi leads the way.

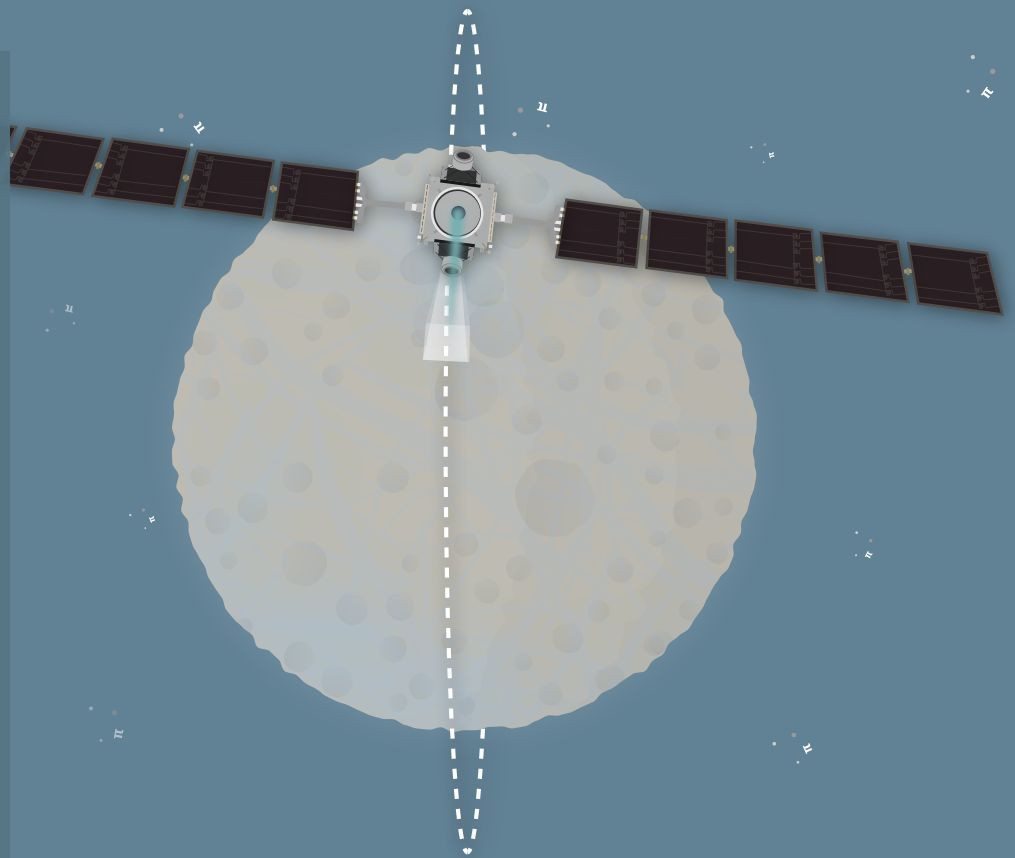
Discover more “ π in the sky” math problems at:
jpl.nasa.gov/edu/piday2015

PIXEL PUZZLER

The Dawn spacecraft is orbiting Ceres -- a nearly spherical dwarf planet with an average radius of 475 kilometers -- in a perfectly circular polar orbit. While in orbit, Dawn will snap images of Ceres' surface to piece together a global map. From its lowest altitude orbit of 370 kilometers, Dawn's camera can see a patch of Ceres about 26 kilometers on a side.

Assuming no overlap in the images, how many photographs would Dawn have to take to fully map the surface of Ceres?

LEARN MORE ABOUT THE MISSION
dawn.jpl.nasa.gov





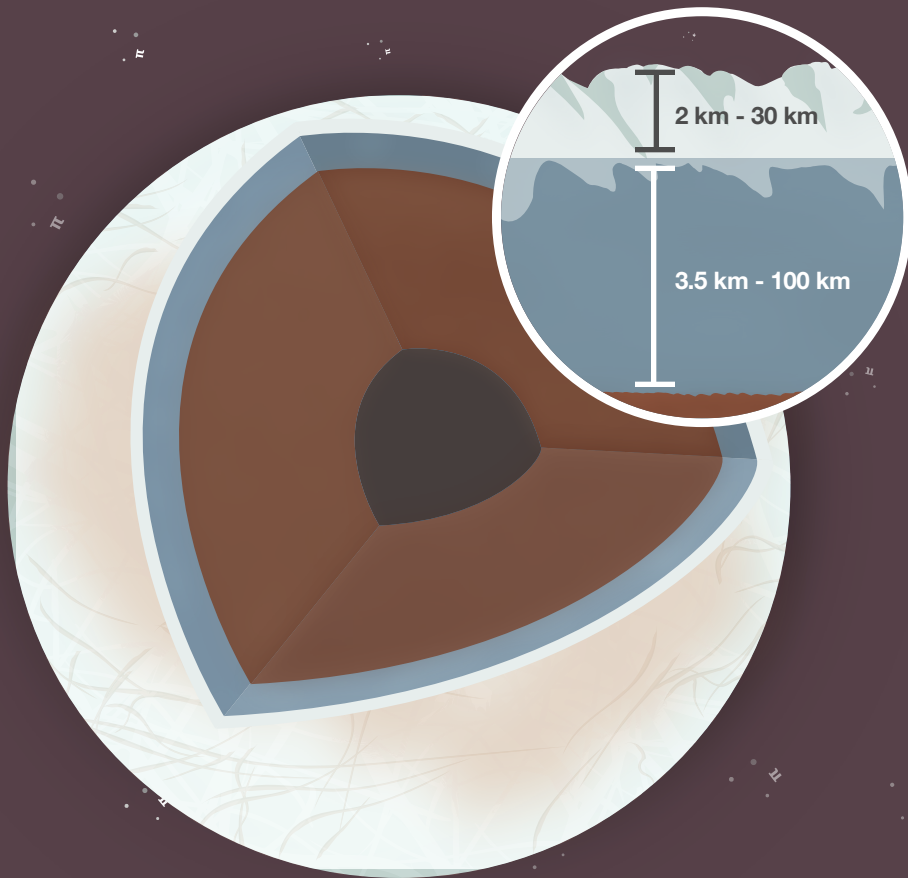
π IN THE SKY²

Pi is back in our skies, helping mathematical sleuths such as yourself solve stellar problems -- like this one: Estimate the volume of the alien ocean on Jupiter's frozen moon Europa.

Remember, pi leads the way.

Discover more “ π in the sky” math problems at:

jpl.nasa.gov/edu/piday2015



FROZEN FORMULA

Scientists have good reason to believe that Jupiter's moon Europa has a liquid ocean wedged between its ice shell and a rocky sea floor.

Though it has a known radius of 1,561 kilometers -- slightly smaller than Earth's moon -- uncertainty exists about the exact thickness of Europa's ice shell and the depth of its ocean.

Assuming Europa's ice shell is between 2 and 30 kilometers thick and its ocean is between 3.5 and 100 kilometers deep, what is the minimum and maximum volume of its ocean?

LEARN MORE ABOUT EUROPA
solarsystem.nasa.gov/europa



π IN THE SKY²

Pi is back in our skies, helping mathematical sleuths such as yourself solve stellar problems -- like this one: Discover just how powerful -- or faint -- our most distant spacecraft's voice can be.

Remember, pi leads the way.

Discover more “ π in the sky” math problems at:

jpl.nasa.gov/edu/piday2015

HEAR HERE

The twin Voyager spacecraft, which launched in 1977, are the most distant human-made objects in space. It takes more than 18 hours for a signal from the 12.5-watt X-band transmitter on Voyager 1 to reach Earth, nearly 131 astronomical units away (one astronomical unit, AU, is equal to about 150,000,000 kilometers). The Voyager high-gain antenna, a circular parabolic reflector, transmits a circular radio signal about 0.5 degrees wide.

At the current distance, what fraction of the Voyager 1 radio beam is received on Earth by a 70-meter-diameter antenna at NASA's Deep Space Network (DSN)?

How many of the original 12.5 watts are received by the DSN antenna?

LEARN MORE ABOUT THE MISSIONS

voyager.jpl.nasa.gov

deepspace.jpl.nasa.gov

