

# LESSON 2: SATURN BY NUMBERS

NAME: \_\_\_\_\_

## OBJECTIVE

How much do you know about Saturn? Use the Saturn Data Chart below to answer these questions and increase your numeric knowledge of Saturn, its rings, and its distance from the Earth.

## LESSON LENGTH

45 minutes

## MATERIALS

- Paper and pencil
- Saturn Data Chart (shown here)
- Calculator

## START

- 1 How many Saturn days occur during one Earth day? \_\_\_\_\_
- 2 Arrange the rings in order of distance from Saturn:
  - Which ring is closest to Saturn? \_\_\_\_\_
  - Which ring is the farthest from Saturn? \_\_\_\_\_
  - Which ring is the widest? \_\_\_\_\_
  - Which ring is the narrowest? \_\_\_\_\_
- 3 Calculate the distance between the orbits of Earth and Saturn. \_\_\_\_\_
- 4 Calculate the mean circumference of each ring. How long would it take a spacecraft traveling at 56,000 km/hr to go around each ring? \_\_\_\_\_
- 5 Traveling at the speed of light, radio transmissions from the Cassini spacecraft took between 1 hour 14 minutes and 1 hour 24 minutes to get to Earth. (The transmission time changes, based on the distance between planets as they move in their orbits.) About how long would it take for mission controllers to know if a command was executed properly, after it was sent to Cassini? \_\_\_\_\_

**Saturn Data Chart**

Planet	Day Length	Orbit Radius
Earth	23 hours 56 minutes	149,589,262 km
Saturn	10 hours 14 minutes	1,426,666,422 km

  

Ring - Named alphabetically in the order discovered	Radii (km) - Measured from planet center to start of ring	Width (km)
A	122,050-136,770	14,600
B	91,980-117,580	25,500
C	74,490-91,980	17,500
D	66,970-74,490	7500
E	180,000-480,000	300,000
F	140,224	30-500
G	166,000-174,000	8000

Ring	Mean Circumference Rounded to nearest km	Time to Travel in Spacecraft Rounded to nearest hour
E	1,036,200	19
G	533,800	10
F	440,303	8
A	406,347	7
B	329,009	6
C	261,358	5
D	222,092	4

Results by Ring (for Question #4)

1. Earth Day: 23 hr 56 min = 23.93 hr  
Saturn Day: 10 hr 14 min = 10.23 hr  
23.93 hr / 10.23 hr = 2.34 Saturn days per each Earth day  
1,426,666,422 km (Saturn's mean orbit) - 149,589,262 km (Earth's mean orbit) = 1,277,077,160 km
3. (Nearest to farthest) D C B A F G E  
Nearest ring: D; Farthest ring: E; Widest ring: F; Narrowest ring: C
4. Mean Circumference: Add both radii and divide by 2 for mean radius, then multiply by pi (3.14). Travel time around each ring: Divide circumference (km) by 56,000 (km/hr).  
(For individual results, see Results by Ring table on the right)
5. Double the time; the transmission would have to travel to Cassini and back. The time would be between 2 hr 28 min and 2 hr 48 min.

ANSWER KEY (Hey! No cheating.)