

## ENRICHMENT

2

# Saturn Puzzles

## Huygens' Anagram

*In the spring of 1655, the Dutch astronomer Christiaan Huygens (pronounced HOY-genz) announced his discovery that Saturn had a moon orbiting it. (This was the first moon of Saturn found, and was in fact the largest moon, later called Titan.) Huygens used an interesting method for this announcement — he sent a coded message, an anagram, to his fellow astronomers. An anagram is a word or sentence in which the letters have been moved around to make a new word or sentence. An anagram doesn't have to make sense; for example, the sentence "Garbage smells bad" could be made into the perfectly meaningless anagram "Dear gas bell gamb." In Huygens' time, astronomers and other scientists would use anagrams to pass around the news of their discoveries. No one else could claim to be the discoverer in the meantime, because no one else even knew what it was that had been discovered. After everyone had received the anagram, the scientist told them how to unscramble it, revealing the message.*

Huygens' anagram was: "ADMOUERE OCULIS DISTANTIA SIDERA NOSTRIS UUUUUUU CCCRRHNBQX." When the anagram is unscrambled, it reads, in Latin, "Saturno luna sua circunducitur diebus sexdecim horis quatuor," which means "Saturn's moon revolves in sixteen days and four hours." This was how Huygens told the world that he had discovered a moon that orbited around Saturn in a



Huygensmuseum, Hofwijck

Christiaan Huygens, discoverer of Titan.

little more than 16 days. Huygens' moon was not given its official name, Titan, until almost 200 years later.

### ACTIVITY

After you have written out Huygens' anagram and explained it, have students devise their own anagrams for the English translation of Huygens' announcement of discovery: "Saturn's moon revolves in sixteen days and four hours." For example: EVOLVE ADDRESSERS ANTI-TOXINS HUMOROUS FUNNY SONAR.

### EQUIPMENT, MATERIALS, AND TOOLS

#### For the teacher

Chalkboard, whiteboard, or easel with paper  
Chalk or markers

#### For each student

Paper  
Pencils



## Saturn Crossword Puzzle

This crossword puzzle (see Figure 1) has references to Saturn and to the Cassini–Huygens mission.

### ACTIVITY

Students can try out the crossword puzzle to practice spelling and puzzle-solving capabilities.

### EQUIPMENT, MATERIALS, AND TOOLS

| <i>For the students</i> | <i>Materials to reproduce</i> |              |                           |
|-------------------------|-------------------------------|--------------|---------------------------|
| Pencils                 | FIGURE                        | TRANSPARENCY | COPIES                    |
|                         | 1                             |              | 1 per student<br>or group |
|                         | 2                             | optional     |                           |

Make a copy of the blank puzzle (Figure 1) for each student, or make one copy per group and have students work in teams to solve the puzzle. Figure 2, the *Saturn Crossword Puzzle Answer Key*, can be prepared as a transparency for display and discussion.



## Materials

**Figure 1**

**Saturn Crossword Puzzle (3 pages)**

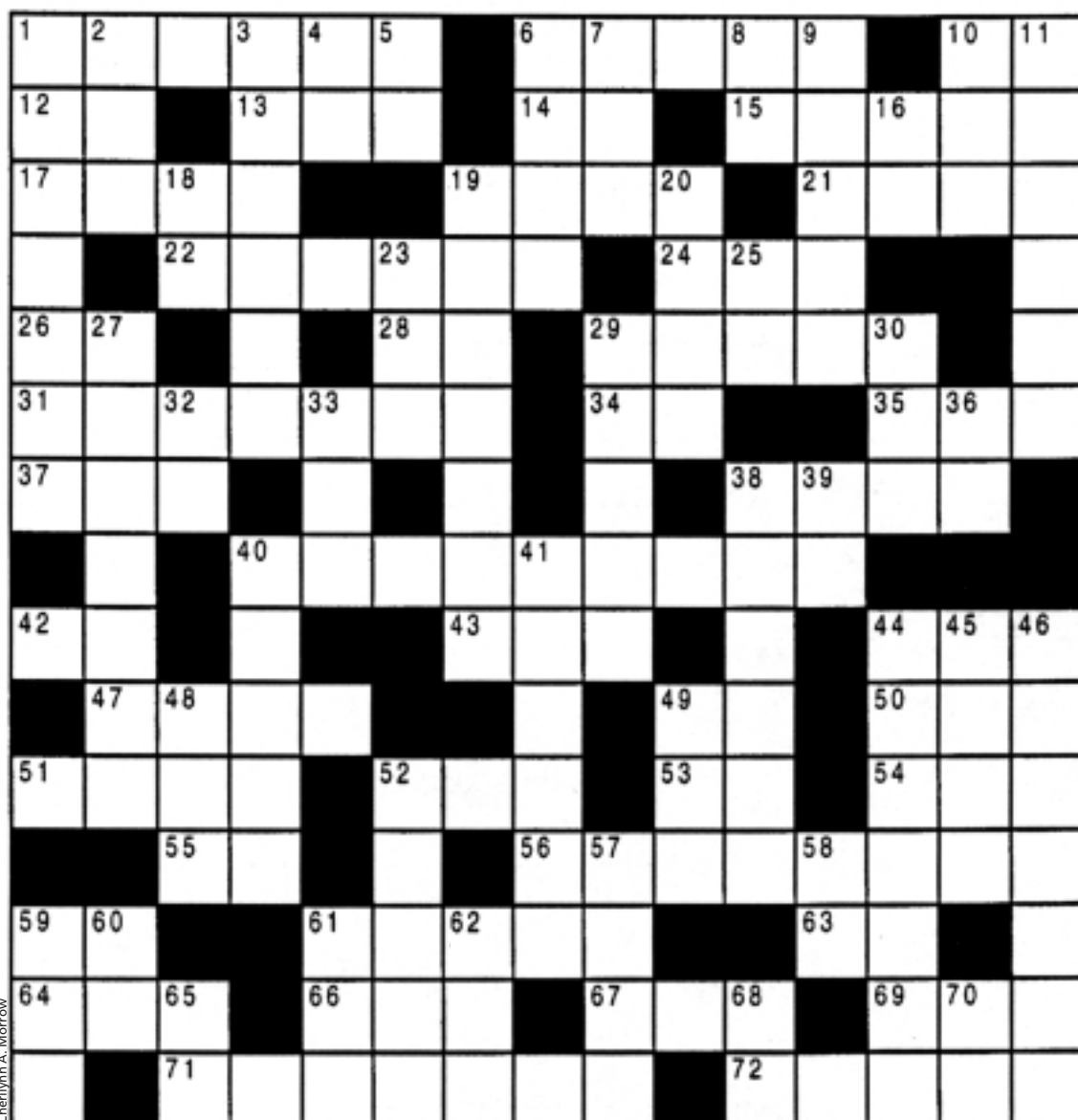
**Figure 2**

**Saturn Crossword Puzzle Answer Key**



Figure 1

## Saturn Crossword Puzzle (1 of 3)



Cherilyn A. Morrow

**ACROSS**

- 1 The ringed planet with 18 moons, named for a Roman god.
- 6 Kepler showed that the shape of a planetary \_\_\_\_\_ is an ellipse.
- 10 Associate of Arts (abbr), a two-year college degree.
- 12 Recorded device used to play music in your home (abbr). A related technology, DVD, is carrying the signatures of 600,000 Earthlings to Saturn aboard the Cassini spacecraft.
- 13 Coded information sent from a spacecraft to Earth before analysis or refinement is referred to as \_\_\_\_\_ data.
- 14 The state of Virginia (abbr).
- 15 Huygens discovered these around Saturn in 1659.
- 17 Often symbolized by a lit-up light bulb.
- 19 There are many of these in Saturn's ring system — the most prominent is known as the Cassini Division.
- 21 Links or connections.



Figure 1

**Saturn Crossword Puzzle (2 of 3)**

- 22 A living organism that is not a plant is probably an \_\_\_\_\_.
- 24 If the Sun were the size of a large grapefruit, Saturn would be about the size of a \_\_\_\_\_.
- 26 North Pole or neptunium (abbr).
- 28 U.S. Vice President from 1993–2001: \_\_\_\_\_ Gore.
- 29 There are 18 of these currently known in Saturn's system, and probably more to be discovered by Cassini.
- 31 NASA's newest mission to Saturn, named for a 17th century Italian–French scientist.
- 34 He, she, \_\_\_\_\_.
- 35 A small child is a tiny \_\_\_\_\_.
- 37 The \_\_\_\_\_ of the Cassini mission is July 1, 2008, but many scientists are hoping it will be extended.
- 38 A big hug and a \_\_\_\_\_.
- 40 This smooth, shiny moon may have ice geysers whose eruptions feed Saturn's E ring.
- 42 If everything is working properly, then the launch director will say, "All systems are \_\_\_\_\_!"
- 43 Organization of American States (abbr).
- 44 \_\_\_\_\_, skip and a jump.
- 47 Unusual.
- 49 Direction you look to see the sky.
- 50 United Barcode Industries (abbr); also Latin for "where."
- 51 Not the whole.
- 52 Organization (abbr).
- 53 Common Era (abbr).
- 54 \_\_\_\_\_-Hoo! An expression for getting attention; also a chocolate soft drink.
- 55 The last two letters of an abbreviated word that serves as a general term for things like arithmetic, geometry, algebra, trigonometry, and calculus.
- 56 This lightest of elements is the primary constituent of Saturn.
- 59 Year before Sr. year in school (abbr).
- 61 Saturn is less \_\_\_\_\_ than water, and thus would float if it were placed in a large enough ocean.
- 63 Pronoun for a male.
- 64 A cat or dog is usually this.
- 66 Long \_\_\_\_\_ and far away.
- 67 American Geophysical Union (abbr) — an organization of scientists devoted to the study of Earth.
- 69 Opposite of South–Southwest (abbr).
- 71 Name of the two deep space missions to explore Saturn in the 1980s. They may have inspired the name for Captain Janeway's starship (of *Star Trek*).
- 72 The blind chief engineer of the starship Enterprise, Geordi LaForge, wears one so that he can see.

**DOWN**

- 1 Arthur C. Clarke's *2001: A Space Odyssey* is a classic example of \_\_\_\_\_ fiction.
- 2 Opposite of subtract.
- 3 The next planet out from the Sun after Saturn, discovered by musician and astronomer William Herschel in 1781.
- 4 Right ascension (abbr); longitude on the celestial sphere.
- 5 Northwest (abbr).
- 6 Some orbits have this sort of shape.
- 7 A modern style of music, or an open conversation: a \_\_\_\_\_ session.
- 8 Abbreviation for infrared radiation. The Cassini instruments called the Composite Infrared Spectrometer (CIRS) and the Visible and Infrared Mapping Spectrometer (VIMS) will measure the infrared light coming from Saturn and its moons.



Figure 1

**Saturn Crossword Puzzle (3 of 3)**

- 9 Saturn's largest moon, whose name refers to mythological giants.
- 10 The \_\_\_\_\_ of the Solar System is about 4.6 billion years.
- 11 The Cassini spacecraft uses gravity \_\_\_\_\_ at Venus, Earth, and Jupiter to help it get to Saturn without using too much rocket fuel.
- 16 The element nickel (abbr).
- 18 The \_\_\_\_ ring is Saturn's outermost ring; the ring just outside the Cassini Division is named the \_\_\_\_\_ ring.
- 19 In 1610, he thought Saturn's rings resembled "ears" or "handles."
- 20 Jupiter has a Great Red \_\_\_\_\_ — a huge storm whose diameter is larger than Earth's.
- 23 "That's one small step for a \_\_\_\_\_; one giant leap for mankind." These were the words spoken by Neil Armstrong as the first human to set foot on the Moon.
- 25 Equal Opportunity (abbr).
- 27 One of the shepherd moons of Saturn's F ring, named for the woman of Greek mythology whose opened box unleashed troubles upon humanity.
- 29 This moon has a huge crater that inspired its nickname, the "Death Star" moon. (The Death Star was a space station of the evil Empire in the movie *Star Wars*.)
- 30 Space Transportation System (abbr); the formal name for the Space Shuttle.
- 32 State where Mount Rushmore is located (abbr).
- 33 A charged atom; also the \_\_\_\_\_ and Neutral Mass Spectrometer (INMS), a Cassini instrument that will analyze the gases in Titan's upper atmosphere.
- 36 The densest known metal, osmium (abbr).
- 38 He discovered Titan's atmosphere in 1944. NASA named an airborne infrared observatory after him.
- 39 I am, you are, she \_\_\_\_.
- 40 Humans live on this planet — the third planet from the Sun.
- 41 What a true friend does in response to your funny joke.
- 44 Name of the probe that will explore Titan's atmosphere; also the name of the scientist who discovered Titan in 1655.
- 45 Woodwind instrument.
- 46 Name of the first deep space mission to visit Saturn; also, an American who ventured westward in the 19th century.
- 48 The Cassini mural, painted by eight Hispanic students, is an example of this.
- 49 University of Colorado at Denver (abbr).
- 52 Last letter of the Greek alphabet.
- 57 The time it takes for Earth to orbit the Sun once.
- 58 \_\_\_\_\_ my! An expression of surprise.
- 59 Jet Propulsion Laboratory (abbr) — the place in California where the Cassini spacecraft was assembled.
- 60 Do \_\_\_\_ Mi Fa So La Ti Do.
- 61 We call the time taken for one rotation of Earth a \_\_\_\_\_.
- 62 A cold drink consisting of eggs beaten up with sugar and cream is called egg \_\_\_\_\_.
- 65 Short for television.
- 68 Short for ultraviolet radiation. A Cassini instrument called the Ultraviolet Imaging Spectrograph (UVIS) will study the ultraviolet sunlight reflected off Saturn's rings.
- 70 "\_\_\_\_\_ man is an island." — John Donne.



Figure 2

## Saturn Crossword Puzzle Answer Key

|     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  |
| S   | A   | T   | U   | R   | N   | O   | R   | B   | I   | T   |
| 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  |
| C   | D   | R   | A   | W   | V   | A   | R   | I   | N   | G   |
| 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  |
| I   | D   | E   | A   | G   | A   | P   | S   | T   | I   | E   |
| 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  |
| E   | A   | N   | I   | M   | A   | L   | P   | E   | A   | I   |
| 45  | 46  | 47  | 48  | 49  | 50  | 51  | 52  | 53  | 54  | 55  |
| N   | P   | U   | A   | L   | M   | O   | O   | N   | S   | S   |
| 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  |
| C   | A   | S   | S   | I   | N   | I   | I   | T   | T   | O   |
| 67  | 68  | 69  | 70  | 71  | 72  | 73  | 74  | 75  | 76  | 77  |
| E   | N   | D   | O   | L   | M   | K   | I   | S   | S   |     |
| 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  |
| D   | E   | N   | C   | E   | L   | A   | D   | U   | S   |     |
| 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  |
| G   | O   | A   | O   | A   | S   | I   | H   | O   | P   |     |
| 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 |
| R   | A   | R   | E   | U   | U   | P   | U   | B   | I   |     |
| 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 |
| P   | A   | R   | T   | O   | R   | G   | C   | E   | Y   | O   |
| 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 |
| T   | H   | M   | H   | Y   | D   | R   | O   | G   | E   | N   |
| 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 |
| J   | R   | D   | E   | N   | S   | E   | H   | E   | E   |     |
| 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 |
| P   | E   | A   | G   | O   | A   | G   | U   | N   | N   | E   |
| 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 |
| L   | V   | O   | Y   | A   | G   | E   | R   | V   | I   | S   |

Cherilyn A. Morrow



