

# LESSON | What is a telescope?

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American astronauts have walked on the moon. But long before they did, telescopes gave us a good idea of what the moon's surface looks like.

You can see the planet Saturn with your eyes alone. But you cannot see its rings. A telescope shows the rings clearly.

Jupiter is visible to the naked eye, too. But you cannot see its moons. Using even a low-power telescope, you can see four of its moons. But with a high-power telescope you can find that there are at least eight more.

There is no question about it . . . The most useful tool in astronomy is the **telescope**.

There are two main types of telescopes: optical telescopes and radio telescopes.

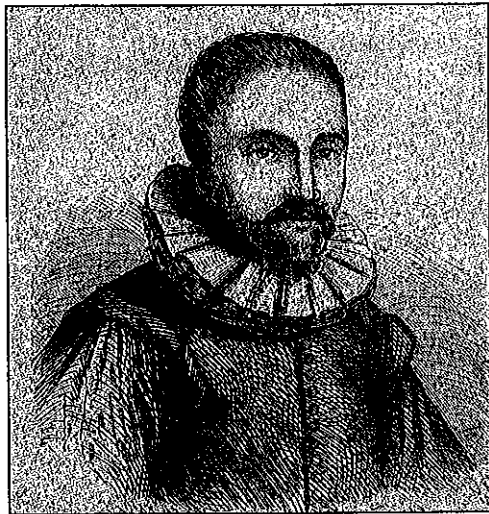
**OPTICAL TELESCOPES** An optical telescope is an instrument that gathers light from faraway places. It makes distant objects seem much larger and closer than they really are.

There are two kinds of optical telescopes:

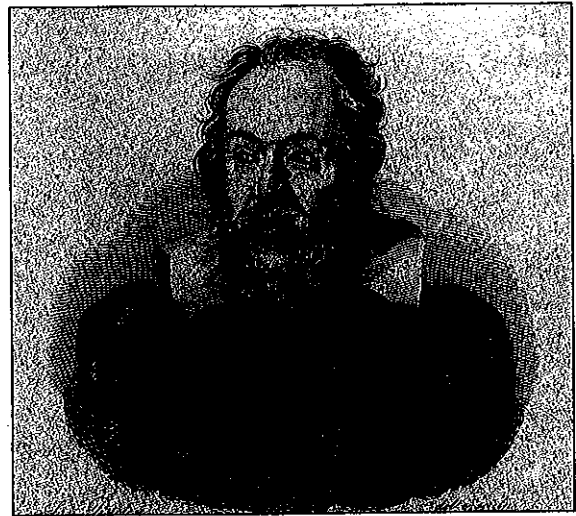
- A **refracting** [rih-FRAKT-ing] telescope uses **lenses** to gather light. A lens is a curved piece of glass. When a beam of light passes through a lens, the light is focused to a single point.
- A **reflecting** [rih-FLEKT-ing] telescope uses a curved mirror.

**RADIO TELESCOPES** A radio telescope does not gather visible light. Instead, a radio telescope gathers invisible radio energy from objects deep in space. The signals give us clues about the location and makeup of the objects.

## MORE ABOUT TELESCOPES



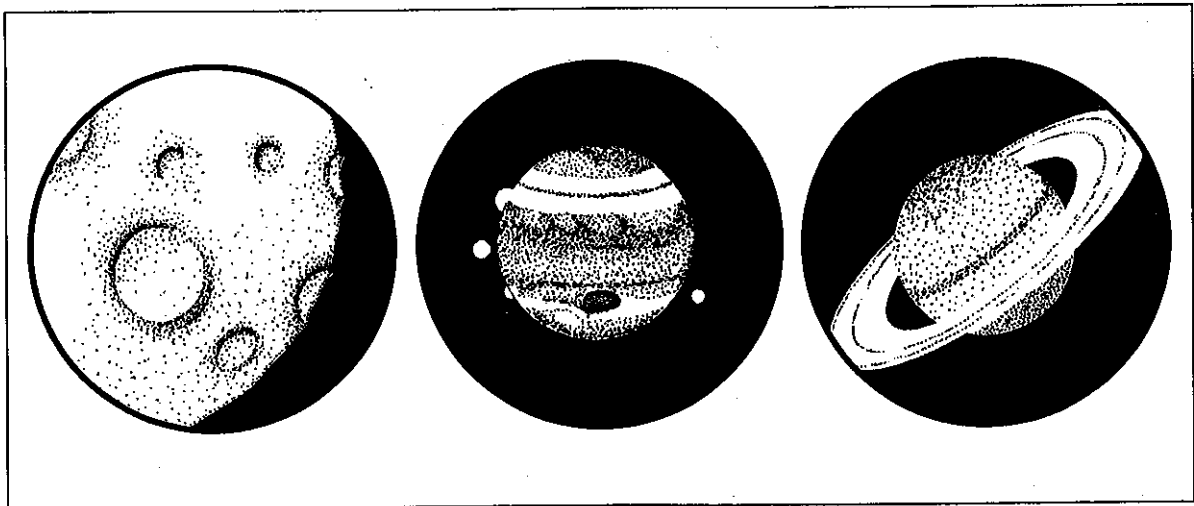
**Figure A** *Hans Lippershey*



**Figure B** *Galileo*

The optical telescope was invented in 1608 by a Dutch lens maker named Hans Lippershey. Strange as it seems, he was refused a patent.

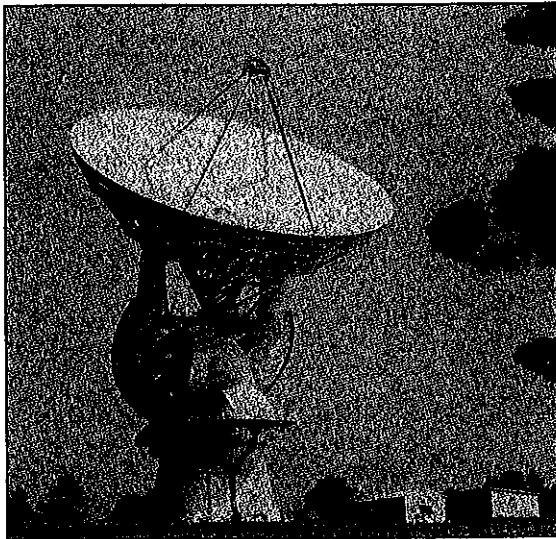
An Italian astronomer named Galileo made the first practical use of Lippershey's invention. In 1609, Galileo made his first telescope. It was crude and low powered, yet it enabled him to make important discoveries. Galileo was the first person to see mountains and craters on the moon, the rings of Saturn, and four of Jupiter's moons.



**Figure C** *Galileo used his telescope to see things that are not visible to the naked eye.*

## RADIO TELESCOPES

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**Figure G** *Radio telescope*

Radio telescopes work like reflecting telescopes. Instead of having a mirror, radio telescopes have large radio dishes. Instead of reflecting visible light, radio dishes reflect radio waves. The radio waves are recorded by a detector into a computer just as light is recorded by a camera onto film.

## MATCHING

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*Match each term in Column A with its description in Column B. Write the correct letter in the space provided.*

	Column A	Column B
_____	1. reflecting telescope	a) gathers and amplifies radio waves from outer space
_____	2. refracting telescope	b) made first practical use of the telescope
_____	3. radio telescope	c) lens gathers light
_____	4. Lippershey	d) mirror gathers light
_____	5. Galileo	e) invented the optical telescope

## REACHING OUT

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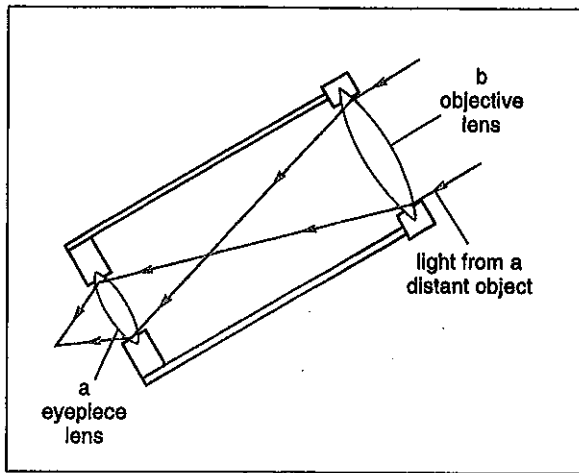
Galileo made a large number of astronomical discoveries. Why was he able to do this?

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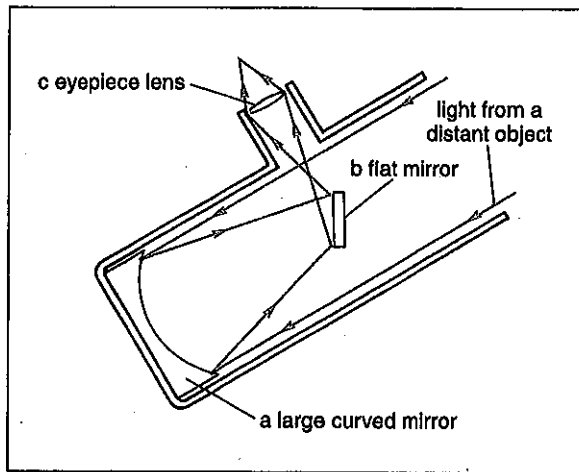
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## UNDERSTANDING TELESCOPES



**Figure D** *Refracting telescope*

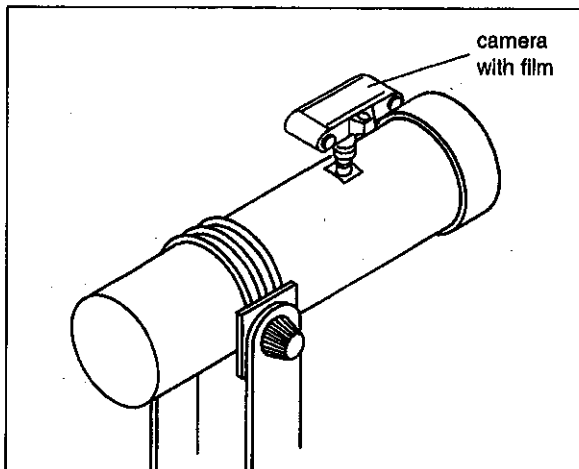
Refracting telescopes have two lenses. The objective lens is closer to the object being observed. The eyepiece lens is closer to the eye of the person looking through the telescope.



**Figure E** *Reflecting telescope*

Reflecting telescopes use a curved mirror instead of an objective lens. A curved mirror focuses the light rays the same way that a lens does. A flat mirror is used to change the direction the light is traveling.

Since scientists can make very large mirrors, very large reflecting telescopes can be made. Some telescopes have mirrors that are 10 meters (33 feet) wide.



**Figure F** *Camera attached to a telescope*

Sometimes, a camera is attached to a telescope so that pictures of objects in space can be taken. The camera "looks" through the telescope just as a person would, and a picture is taken. The pictures are then studied.