



Science Exemplary Text Student Handout

You can see planets, stars, and other objects in space just by looking up on a clear night. But to really see them--to observe the craters on the moon, the rings around Saturn, and the countless other wonders in our sky--you must use a telescope.

A telescope is an instrument used to produce magnified (enlarged) images of distant objects. It does this by gathering and focusing the light or other forms of electromagnetic radiation emitted or reflected by those objects. The word "telescope" comes from two Greek words meaning "far" and "see."

Kinds of Telescopes

There are many different types of telescopes, both optical and non-optical. Optical telescopes are designed to focus visible light. Non-optical telescopes are designed to detect kinds of electromagnetic radiation that are invisible to the human eye. These include radio waves, infrared radiation, x rays, ultraviolet radiation, and gamma rays. The word "optical" means "making use of light."

Some telescopes are launched into space. These telescopes gain clearer views. And they can collect forms of electromagnetic radiation that are absorbed by the Earth's atmosphere and do not reach the ground.

Optical Telescopes

Different types of optical telescopes gather and focus light in different ways. Refracting telescopes, or refractors, use lenses. Reflecting telescopes, or reflectors, use mirrors. And catadioptric telescopes, or catadioptrics, use a combination of lenses and mirrors. The main lens or mirror in an optical telescope is called the objective.

Refracting Telescopes. A refracting telescope is typically a long, tube-shaped instrument. The objective is a system of lenses at the front end of the tube (the end facing the sky). When light strikes the lenses, it is bent and brought to a focus within the tube. This forms an image of a distant object. This image can be magnified by the eyepiece. This consists of a group of small lenses at the back of the tube. A camera can replace or be added to the eyepiece. Then photographs can be taken of celestial objects. For many years, these cameras used film. Today most are equipped with charge-coupled devices (CCD's). These devices use semiconductor chips to electronically capture images. CCD's are similar to the devices in home digital cameras

This is an example of exemplary text found in *Common Core Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects: Appendix B Text Exemplars and Sample Performance Tasks*. Retrieved from http://www.corestandards.org/assets/Appendix_B.pdf



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Ronan, Colin A. (2010). "Telescopes." *The New Book of Knowledge*. New York: Scholastic.

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Science Exemplary Text Teacher Resource

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Teacher introduces the text with minimal commentary and students read it independently. Teacher then reads passage aloud. Give a brief definition to words students would likely not be able to define from context (underlined in text). Teacher guides the students through a series of text-dependent questions. Complete the performance task as a cumulative evaluation of the close-reading.

Text-Dependent Questions

1. What is the purpose of a telescope?
2. In the first paragraph, the author writes that you need a telescope "to really see" objects in space. Based on the paragraph, what does it mean "to really see" objects in space?
3. In your own words, how does a telescope work?
4. Why are non-optical telescopes helpful?
5. What is the difference between optical and non-optical telescopes?
6. Based on the passage, why might a scientist choose to use a non-optical telescope instead of an optical telescope?
7. What is a catadioptric telescope, and how does it work?
8. Describe how refracting telescopes work.
9. How are catadioptric telescopes different from refracting telescopes and reflecting telescopes?
10. How is the information in paragraph 5 related to the information in paragraph 6?
11. Why are telescopes launched into space?

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EFL 3
Word Count 378

helpful?

12. What do we use instead of cameras inside refracting telescopes today? Where are some other places you might find these?

Performance Tasks for Informational Texts

Students determine the main idea of Colin A. Ronan's "Telescopes" and create a summary by explaining how key details support his distinctions regarding different types of telescopes. [RI.4.2]