

Science 9 Unit 5: Space Exploration
9SA - Reading Logs –SCIENCE FOCUS

Note – textbook pages correspond to **Science Focus Text**, a full PDF copy of this text is available on Ms. Booth's Website.

Topic	Page #s	Complete (Yes or No)
1. For Our Eyes Only	356-365	
2. Stronger Eyes and Better Numbers	366 - 375	
3. The Spectroscope New Meanings in Light	376-384	
4. Bigger and Smarter Telescopes	385 - 392	
5. What Channel is That?	393 - 398	
6. Above the Atmosphere and Under Control	399 - 408	
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Space 1 - For Our Eyes Only – Pages 356-365

What is a Frame of Reference?

What are two frames of reference we use on the Earth to identify locations?

Myths, folklore and legends were used to explain what ancient people observed in the night sky. Select 3 of the following peoples and describe what they believed about objects in the sky: First nations of the Pacific Northwest, Algonquin Tribes, Iroquois Tribes, Arctic Inuit, Ancient Egyptians.

Ancient Peoples:	Beliefs:

Explain what each of the following mean in describing position from a frame of reference on the Earth.

Altitude:

Azimuth:

Zenith:

Identify the culture that built each of the following structures to understand the way objects in the sky behave in predictable ways.



Constellation -

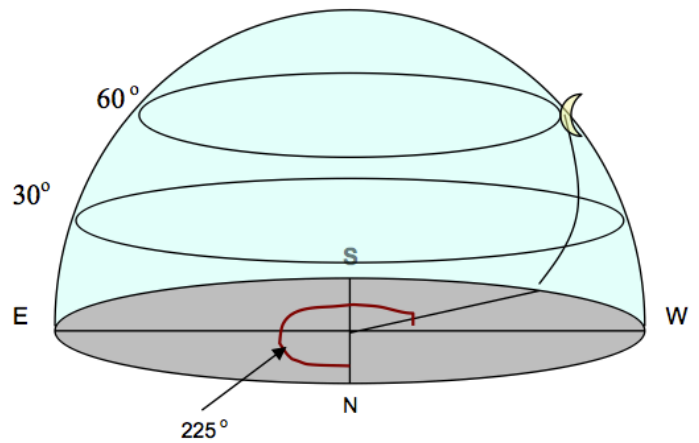
Winter Solstice
When:
What:
Why/How:

Summer Solstice
When:
What:
Why/How:

What are the sky coordinates for the moon in the illustration to the right?

Azimuth: _____

Altitude: _____



Illustrate and label the Celestial Sphere – the very large imaginary “*sphere of sky*” surrounding the Earth.

How can you use the stars as a frame of reference:

Use words or pictures to explain the different models of the solar systems identified below:

Geocentric – the Earth-centred model

Heliocentric – the sun-centred model

To see an animation of the Geocentric and Heliocentric Models:
<http://www.astro.utoronto.ca/~zhu/ast210/geocentric.html>

Topic 2 – Stronger Eyes and Better Numbers *Pages 366 – 375*

Explain the *difference* between an **ocular lens** and an **eyepiece lens**.

Using his telescope, describe 5 observations Galileo made that nobody else had made:

- 1.
- 2.
- 3.
- 4.
- 5.

Galileo's observations helped to prove which model of the solar system:



Explain how the Hubble Space Telescope improved the images of distant objects.

Illustrate with light rays how each type of optical telescope works:

Refracting Telescope	Reflecting Telescope

How can the resolving power of a telescope be increased?

How do combination telescopes work?

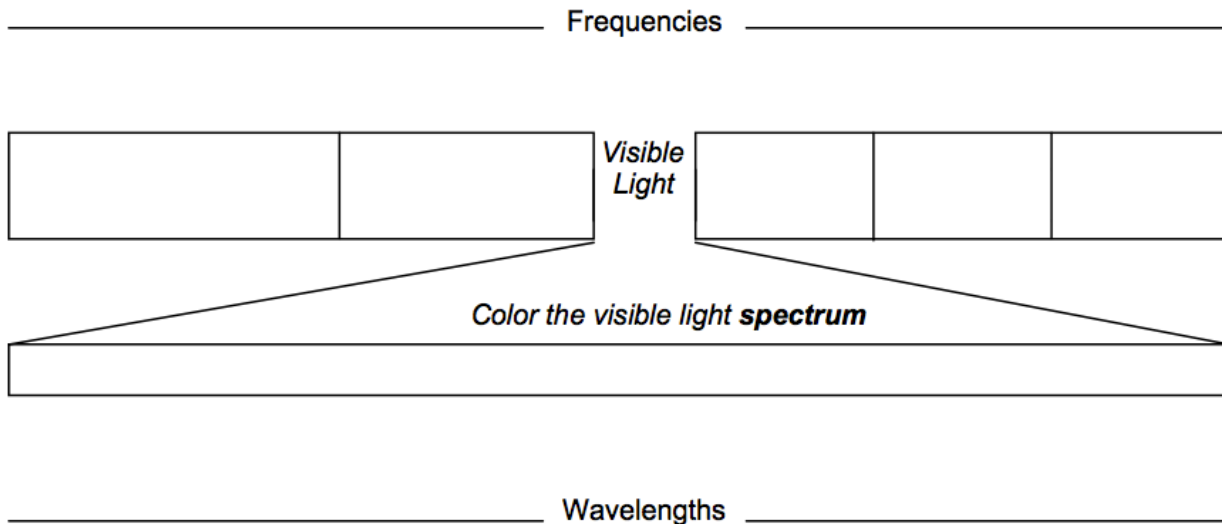
What did Johannes Kepler contribute to the Copernicus Model?

Explain Isaac Newton's Universal Law of Gravitation:

Topic 3 – The Spectroscope: New Meanings in Light - Pages 376-384

What did Isaac Newton discover when he used a **prism**?

Identify the different forms of energy present in the **electromagnetic spectrum** and put arrows at the end of the frequencies and wavelengths lines to identify whether they increase or decrease.

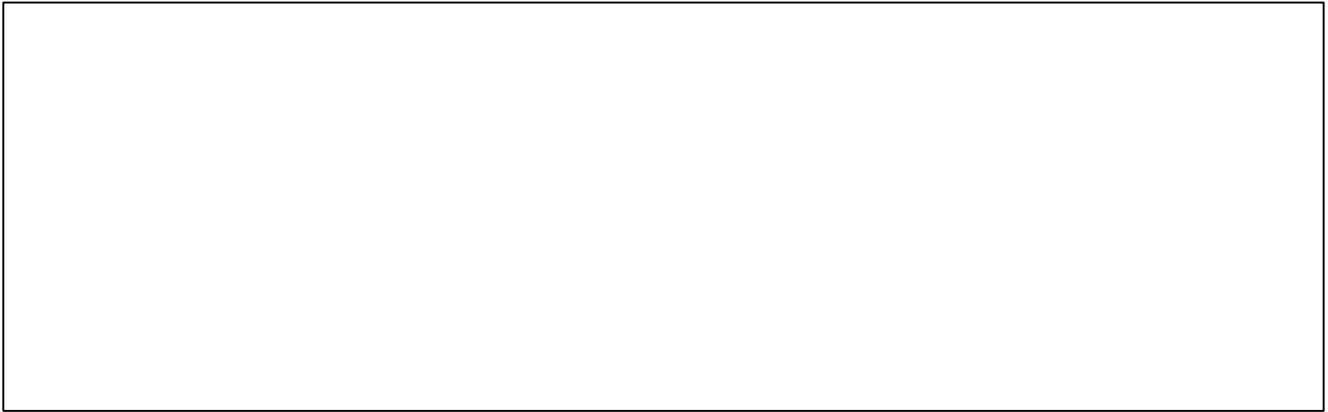


Explain how **spectral lines** can be formed and observed and what device is used to achieve this effect.

The significance of spectral lines was only discovered some 50 years after they were first observed. What is the science of **spectroscopy**?

Illustrate and explain how each of the three types of spectra is observed.

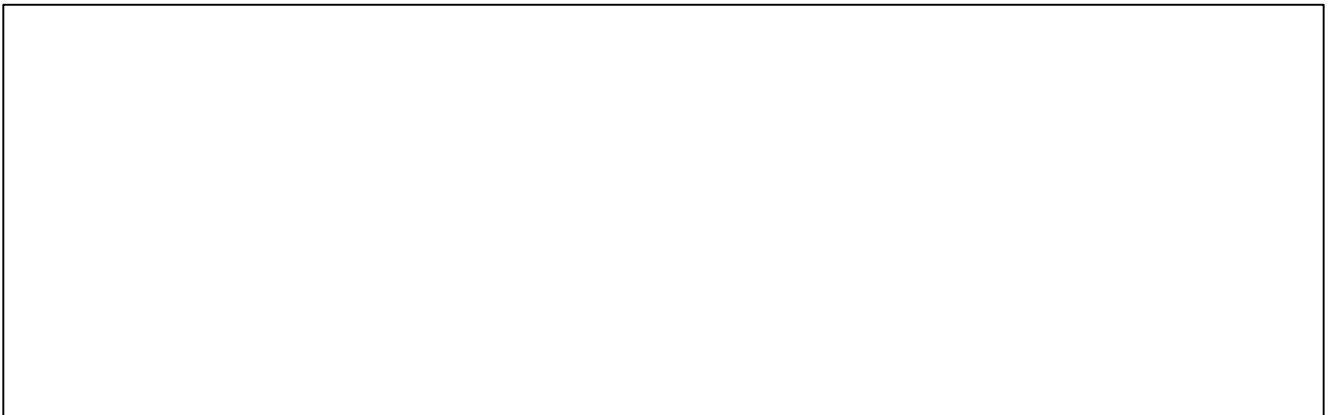
1. Emission or Bright Line Spectrum



2. Continuous Spectrum



3. Absorption or Dark Line Spectrum

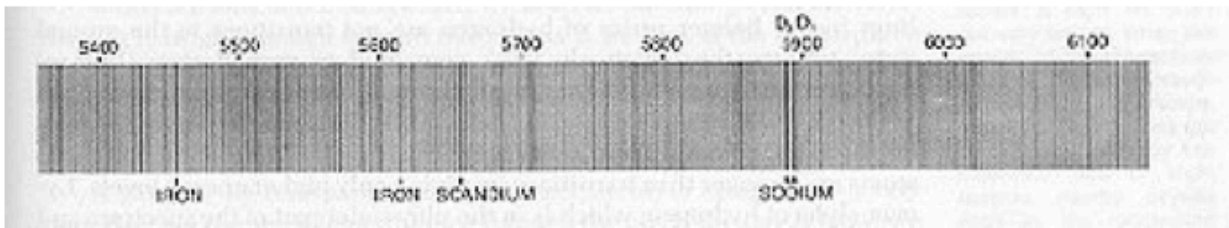


How do astronomers use a **spectrometer** to determine a star's composition?

How does **diffraction grating** work? Why is it used?

What do astronomers use **spectral analysis** to determine?

Identify what elements are present in each MYSTERY STAR in the Think and Link Investigation Activity on page 381 in Science Focus.



Mystery Star # 1 _____

Mystery Star # 2 _____

Mystery Star # 3 _____

Explain the differences between a **red shift** star and a **blue shift** star.

Describe what the **Doppler effect** is and identify 3 practical applications for its use.



Application 1:

Application 2:

Application 3:

Topic 4 – Bigger and Smarter Telescopes *Pages 385 – 392*

Identify important discoveries made using telescopes in the following years:

1773 (1781) _____

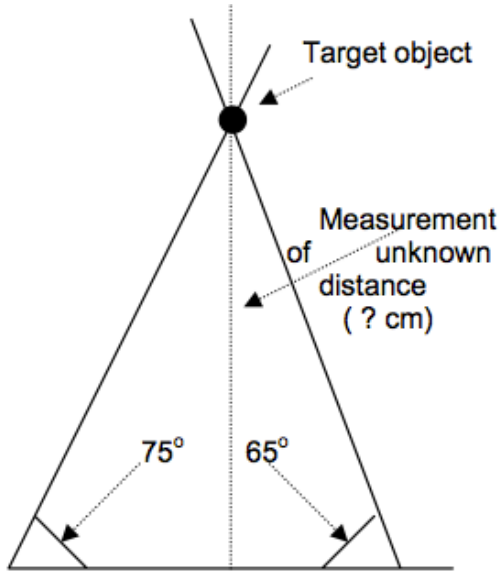
1948 _____

late 19th Century _____

1990 (HST) _____

What is **adaptive optic** technology (NIT) able to do and how is it possible?

Measure the “unknown distance” in the illustration using the **triangulation** technique.

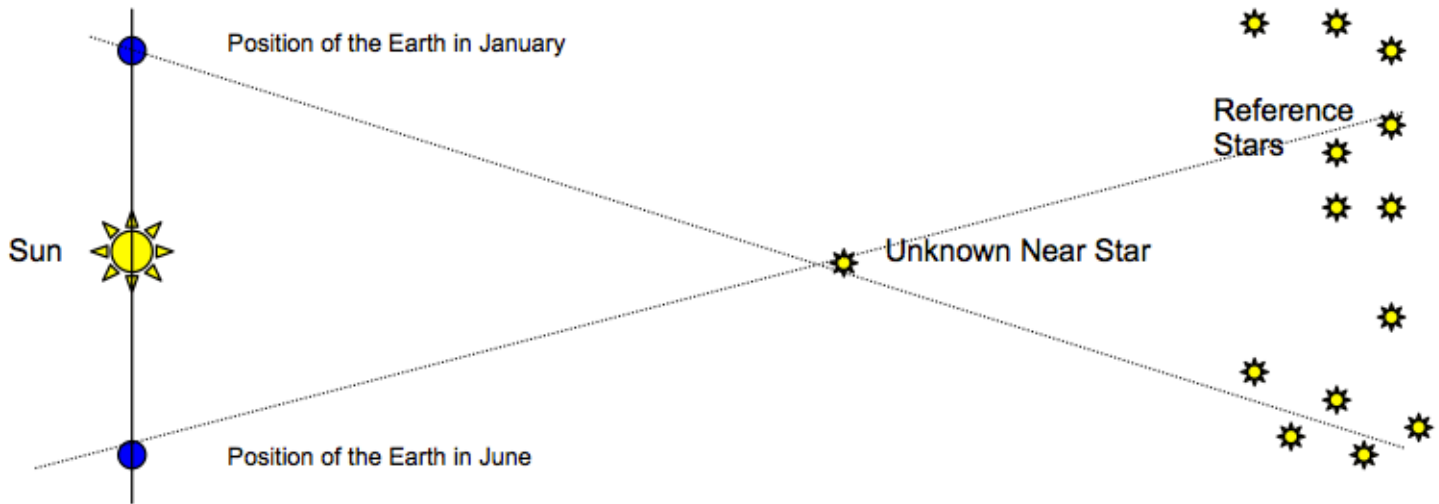


Baseline (6.0 cm)
Scale of drawing: 1 cm = 20 m

Show your work

There are also two activities in the Textbook p. 387, 388 for practice

Solve the following **parallax** problem



How do scientists determine how far a particular star is away from the Earth using **parallax**?

What is the difference between an **astronomical unit**, a **light year**, and a **parsec**?

Topic 5 – What Channel is This? *Pages 393 - 398*

What is the advantage of **radio telescopes**?

How can astronomers see radio waves?

What is the speed of light?

What type of wave sends the highest energy/
frequency?

What type of wave sends the smallest signal?

Explain **radio interferometry**.


What is **VLBI** and what advantages does it have?

Topic 6 – Above the Atmosphere and Under Control *Pages 399 – 408*

Illustrate and **label** the parts of a rocket outlining in your illustration what the function of each part is.

Briefly describe the important achievement in Rocketry that took place on each date.

400 B.C	-	_____
1926	-	_____
Oct. 4, 1957	-	_____
1962	-	_____
1969	-	_____
1981	-	_____



What is **gravitational escape velocity**?

What is **ballistic missile**?

Explain what **gravitational assist** is – include a diagram.

Explain the difference between natural and artificial satellites.

What are main categories for which **satellites** are used (give an example for each category).

How many **GPS satellites** are orbiting the Earth and how many are needed to pinpoint a specific location on Earth?

Topic 7 – The Solar System Up Close *Pages 409 - 419*

What protects the Earth from the Sun's **solar winds**?

Briefly explain the **protoplanet hypothesis**.

What place have humans landed in space and when did it happen?

Complete the table (you can use the textbook or the data from <http://www.edquest.ca/content/view/208/>)

	Inner Planets	Outer Planets
<i>Planet names</i>	<hr/> <hr/>	<hr/> <hr/>
<i>Composition</i>	<hr/>	<hr/>
<i>Total # of Moons</i>	<hr/>	<hr/>
<i>Average Diameter</i>	<hr/>	<hr/>
<i>Average Temperature</i>	<hr/>	<hr/>

What **space probes** are the most recent ones to land on Mars and explore the surface?

How can astronomers **trace and predict** where bodies in space are, have been and will be in the future.

How long does it take for **light** to reach us from the Sun?

What did Hertzsprung and Russell compare when they studied stars?

How long does it take for transmissions from **Voyager 1 and 2** to reach the Earth?

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Topic 8 – People in Space *Pages 420 – 431*

What factors affect the launch and flight of a spacecraft from the surface of the Earth and in space?

Briefly describe three tragedies that occurred, reinforcing the dangers of space travel.

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When did each of the following **Space Achievements** occur and which country achieved it?

Sputnik _____

Vostok _____

Freedom 7 _____

Apollo 11 _____

Apollo/Soyuz joint mission _____

Check out the Canada Space Agency Website (<http://www.space.gc.ca/asc/eng/default.asp>)

What contribution to the Space Program did Canada make in each of the following years?

1839

1972

1973

1981

1984

2001

What are the functions of **life-support systems** on board the International Space Station?

How is oxygen produced on the International Space Station?

How does **microgravity** in space affect the human body?

Explain how an **ion drive** works.

Explain how **Solar Sails** work.