

Science 10: Astronomy Worksheet

Name: _____

Date: _____

Textbook Unit 4: The formation of the universe can be explained by the big bang theory

Textbook: BC Science Connections 10 Nelson 2018

Throughout this unit you will be expected to synthesize information, conduct inquiries and express your opinion. While this worksheet is only 9 pages long, you will find that it is going to take you some significant time to complete. There are several activities, inquiries and assignments that require deep thought and external research. There is NO final test for this unit, rather the final unit assignment will be used as a summative assessment.

Take a moment now to review the **Reliable Sources** section of Science 10 found on adamsteaches.weebly.com and if you haven't done so already, complete the reliable sources assignment.

When answering the questions in this worksheet be sure to answer in full sentences and where applicable structure your paragraph using the four elements of good paragraph writing

1. **Element #1: Unity.** Unity in a paragraph begins with the topic sentence. Every paragraph has one single, controlling idea that is expressed in its topic sentence, which is typically the first sentence of the paragraph. A paragraph is unified around this main idea, with the supporting sentences providing detail and discussion. In order to write a good topic sentence, think about your theme and all the points you want to make. Decide which point drives the rest, and then write it as your topic sentence.
2. **Element #2: Order.** Order refers to the way you organize your supporting sentences. Whether you choose chronological order, order of importance, or another logical presentation of detail, a solid paragraph always has a definite organization. In a well-ordered paragraph, the reader follows along easily, aided by the pattern you've established. Order helps the reader grasp your meaning and avoid confusion.
3. **Element #3: Coherence.** Coherence is the quality that makes your writing understandable. Sentences within a paragraph need to connect to each other and work together as a whole. One of the best ways to achieve coherence is to use transition words. These words create bridges from one sentence to the next. You can use transition words that show order (first, second, third); spatial relationships (above, below) or logic (furthermore, in addition, in fact). Also, in writing a paragraph, using a consistent verb tense and point of view are important ingredients for coherence.
4. **Element #4: Completeness.** Completeness means a paragraph is well-developed. If all sentences clearly and sufficiently support the main idea, then your paragraph is complete. If there are not enough sentences or enough information to prove your thesis, then the paragraph is incomplete. Usually three supporting sentences, in addition to a topic sentence and concluding sentence, are needed for a paragraph to be complete. The concluding sentence or last sentence of the paragraph should summarize your main idea by reinforcing your topic sentence.

Source: <https://www.time4writing.com/writing-resources/paragraph-writing-secrets/>

Topic 4.1 What is the universe, and how do we make sense of it?

1. Read page 292-296
2. Read page 296 and think deeply about the questions presented in the reading. Do you think your answers to questions like those in the paragraph could change over the course of the unit? Do they apply only to your study of this unit?

3. Read page 298.
4. Who else is affected by light pollution, and in what ways? (Don't forget astronomers.)

5. What solutions have been proposed to reduce or combat light pollution? How effective are they?

6. What arguments can be made in favour of having well-lit cities and towns, even at the expense of light pollution?

Topic 4.2 What do we know about the universe based on what we can see only with our eyes?

1. Read pages 300-309.
2. Define retrograde.

Retrograde:

3. Complete the Activity on page 310 then answer the following questions.
4. Why is retrograde motion visible only with planets farther from the Sun than Earth?

5. While in retrograde motion, in which direction does Mars appear to move with respect to the background stars?

Topic 4.3 How has technology expanded our knowledge and understanding of the universe?

6. Read pages 320-326.
7. Complete activity page 326, record your observations below then answer the following questions.

Observations:

- a. Compare how the different materials behave in the swirling water. How is this model similar to real galaxy motion?

- b. What are the limitations of this model?

8. Read pages 327-347. As you read answer the following questions.

9. How can the temperature of a star be inferred from its physical properties?

10. Which types of stars are thought to be the sources for enriching the universe with heavy elements? Explain why.

11. Place the following from youngest to oldest. Explain your sequence. Star, nebula, red giant and white dwarf.

12. Can a star such as our Sun become a supernova? Explain why or why not.

13. How can the evolution of a star over its life cycle be tracked using an H-R diagram? Use a specific example of a category of star.

14. How far does light travel in one second?

15. How far does light travel in one nanosecond?

16. What are black holes, and why are they considered to be unusual?

Topic 4.4 How do we use the big bang theory to explain what we know about the universe?

17. Read pages 352-357.

18. Watch YouTube video: Origins of the Universe 101 | National Geographic

<https://youtu.be/HdPzOWILrbE>

19. Complete activity on page 357 then answer the following questions:

a. Measure and record the distances between the galaxies

Distance between A and B:

Distance between B and C:

Distance between C and D:

b. What happened to the distances between galaxies as you blew up the balloon?

c. Imagine you are standing within galaxy A while the balloon is expanding. Which galaxy would appear to move away from you more quickly? Which galaxy would appear to move away from you more slowly?

d. According to this model, what is moving here? Are the galaxies moving or is space expanding? What is the difference?

e. What are the strengths and limitations of this model?

Unit 4 in Review

20. Many First Peoples have words to describe a person who is trained to observe the skies. Sometimes they are translated as stargazer or moon reader. Find examples of such words in the language of a local First Nations community (Ktunaxa) or other First Peoples cultures. **DO NOT STRESS IF YOU CAN'T FIND ANYTHING, JUST DO YOUR BEST.**

21. Complete the Unit Assessment assignment on page 376-377. *What are our responsibilities as explorers of the universe?* **For this activity you will hand in a separate assignment.**

- a. Select one of the three options:
 - i. Protecting Life: How do we protect life on Earth from potential aliens as well as protect possible alien life from contamination by us?
 - ii. Societal Responsibility: Is it responsible to spend taxpayer money on space investigation when so many on Earth live in poverty?
 - iii. Ethical Dilemmas: No single nation “owns” Antarctica or the International Space Station. Who owns space? What are the implications of this question?
- b. Brainstorm at least three more options and questions of your own about a situation related to the unit assessment question.
- c. Decide on one of the six option questions to investigate. While much of this assignment is opinion based, your opinion should still be backed up by facts, so be sure to include several sources.
- d. Communicate the results of your inquiry in a suitable manner such as: video, poster, essay, advertisement, podcast, song, drama skit, etc...