25SCHOOLS
FREE LEARNING NOTES FOR ZAMBIA

FORM 1

Physics

Elementary astronomy: the universe

Lesson notes for learners · Competence-Based Curriculum

INSIDE

1. What astronomy studies
2. The universe
3. Building astronomical models
4. Check yourself

On a clear night you can look up and see stars. Astronomy is the study of such objects in space and of what happens among them. In this topic you learn what the universe is and how to build models that show how the parts of space are arranged and how they move.

AFTER THESE NOTES YOU SHOULD BE ABLE TO

- Say what astronomy and the universe are
- Describe what the universe contains
- Build a scale model or diagram of the planets, showing their relative sizes and positions
- Use a model to show an astronomical event such as an eclipse or planetary motion

KEY WORDS

astronomy	the study of the physical nature of celestial objects and of the events in the universe
universe	everything that exists, including all matter, energy, space and time
galaxy	a very large group of stars
star	a celestial object that makes up galaxies
planet	a celestial object in the solar system
model	a scale model or diagram that shows how something works
celestial phenomenon	an event in space, such as an eclipse

1 What astronomy studies

Astronomy is the study of the physical nature of celestial objects and of the phenomena we observe in the universe. Celestial objects are things found in space, such as stars and planets.

In elementary astronomy you explore the solar system, stars, planets, galaxies and celestial phenomena. This gives a better understanding of how large the universe is and how many questions about it remain.

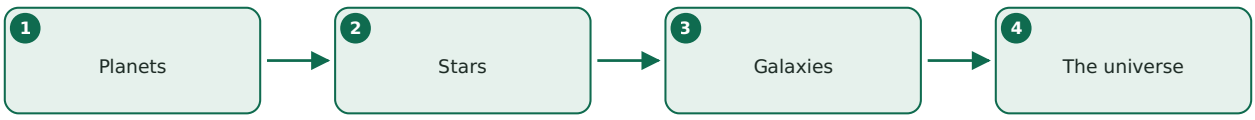

Figure 1. Some parts of the universe

2 The universe

The universe is the totality of all existence. It includes all matter, energy, space and time. Scientists estimate that it is about 13.8 billion years old.

It contains billions of galaxies. Each galaxy is made of billions of stars. This means that the number of stars in the universe is far too large to count one by one.

The universe is the only sub-topic of this topic, so these facts form the base on which you build your models.

Fact	Value
What it includes	All matter, energy, space and time
Estimated age	About 13.8 billion years
Galaxies	Billions
Stars in each galaxy	Billions

Figure 2. Key facts about the universe

3 Building astronomical models

A model helps you to understand what is too large to see. The Ministry asks learners to construct astronomical models to show that they understand elementary astronomy.

One activity is to create a scale model or diagram of the planets that shows their relative sizes and their positions. Draw or build it to scale so that a larger planet looks larger than a smaller one, and place each planet at its correct place in the solar system.

A second activity is to simulate an astronomical event such as an eclipse or the motion of the planets, using materials that you can find in the classroom or at home.

WORKED EXAMPLE

Why is it important for a scale model of the planets to show relative sizes and positions?

A model that keeps the sizes in the right proportion shows which planets are larger and which are smaller

A model that keeps the positions in the right order shows how the planets are arranged in the solar system

So the model explains the real arrangement better than a drawing with equal planets

TRY THIS

In groups, make a scale model or diagram of the planets using materials from your school or home, such as paper, soil, seeds or bottle tops. Show the relative sizes and positions. Then present your model and explain to the class how you decided the sizes and places.

REMEMBER

- Astronomy is the study of celestial objects and phenomena.
- The universe is all matter, energy, space and time.
- It is estimated to be about 13.8 billion years old.
- It contains billions of galaxies, each with billions of stars.
- A scale model of the planets shows relative sizes and positions.
- Models can also simulate events such as an eclipse or planetary motion.

? Check yourself

1. What is astronomy?
2. What does the universe include?
3. About how old is the universe, according to estimates?
4. What does a galaxy contain?
5. Name two things that a scale model of the planets must show.
6. Your class is asked to make a scale model of the planets for an open day at your school. A learner says that all the planets can be the same size because the model is only for show. (a) Do you agree? (b) Say what the model must show instead. (c) Suggest materials you could use to make it.
7. A group wants to show an eclipse or the motion of the planets to Form 1 learners who have never seen a model of space. (a) Which kind of astronomical activity is this? (b) Explain why a model helps the learners to understand. (c) Say one thing the group should do to make sure that the learners can s

ANSWERS

1. The study of the physical nature of celestial objects and the phenomena in the universe.
2. All matter, energy, space and time.
3. About 13.8 billion years.
4. Billions of stars.
5. Their relative sizes and their positions.
6. (a) No. (b) The model must show the relative sizes of the planets, so larger ones look larger, and their positions in the solar system. (c) Any local materials, for example paper, seeds, soil or bottle tops.
7. (a) Simulating an astronomical event. (b) Space is too large to see, and a model shows the parts and their movement in a way that can be seen in the classroom. (c) Make the parts large and clear, keep their sizes and positions in proportion and explain each part to the learners.

Written by 25Schools to follow the Form 1 Physics syllabus of the Zambian competence-based curriculum. Free for learners to read, download and share. More notes and quizzes at 25schools.com.