



Components

| | NAME | DESCRIPTION | AUDIENCE |
|--|--|---|----------|
| | <i>Impact of satellites</i> teacher guide | The guide shows how resources may be used to explain the impact of satellites and associated technologies on everyday life. | teachers |
| | <i>Satellite facts</i> fact sheet | A table summarises information about satellites, their orbits and their uses. | students |
| | <i>Impact of satellites</i> worksheet | Students gain understanding about the impact of satellites and their associated technologies on everyday life. | students |

Purpose

Students make use of a fact sheet in gaining understanding about the impact of satellites and their associated technologies on everyday life.

Outcomes

Students describe and explain the impact of satellites and associated technologies on everyday life.

Activity summary

| ACTIVITY | POSSIBLE STRATEGY |
|---|--|
| Students use the fact sheet with the corresponding worksheet to produce a report or participate in discussions. A number of strategies are outlined in the following pages. | individual, small group or class discussion. |

Technical requirements

The guide, fact sheet and worksheet require Adobe Reader, which is a free download from adobe.com. The worksheet is also provided in Microsoft Word format.

Acknowledgements

Designed and developed by the Centre for Learning Technology, The University of Western Australia.
Production team: Graham Baker, Leanne Bartoll, Geoff Cody, Alwyn Evans, Jenny Gull, Trevor Hutchison and Michael Wheatley, with thanks to Roger Dickinson, Bob Fitzpatrick, Pauline Charman and Wendy Sanderson.

Banner image – 'Car navigator in action' by SeppVei. PD, commons.wikimedia.org/wiki/File:Car_navigator_in_action.jpg

Using the fact sheet, *Satellite facts*

The fact sheet, *Satellite facts*, contains information on:

- types of satellite,
- their purpose,
- altitude,
- inclination,
- orbital period,
- the nature of the information they provide, and
- why the information is useful in everyday life.

Teachers may use the completed fact sheet, or prepare a 'cloze' sheet by selecting and deleting cells within the table as described below. This guide includes two alternative templates for a student report on the impact of satellites and associated technologies on everyday life.

Teachers may use these resources in different ways, including:

| USING THE COMPLETED FACT SHEET | USING A PARTIALLY-COMPLETED (CLOZE) FACT SHEET |
|--|---|
| <p>Student report 1 or 2</p> <p>Teacher distributes the fact sheet, <i>Satellite facts</i>, for students to expand on information in the form of a report. This can be done in one of two alternative activities, for which templates are included in this guide.</p> <ul style="list-style-type: none"> • Students present an overview of the impact of satellites and their associated technologies on everyday life, and a detailed report on one specific type of satellite. • Students prepare a five-minute proposal to the Australian government to support and fund a satellite for a purpose of their own choice. <p>Student worksheet, <i>Impact of satellites</i></p> <p>Students answer a series of questions designed to integrate their physics understanding with an understanding of impacts of satellite technology on everyday life. Suitable questions include:</p> <ul style="list-style-type: none"> • What information can satellites provide about Earth? • What instruments would a satellite need to carry to make observations about the weather, or to relay telecommunications to Earth stations? • How can we make use of information provided by satellites? • What would everyday life be like on Earth without the benefit of satellites? • How do satellites benefit us in everyday life? <p>Whole class or small group discussion</p> <p>Teacher distributes the fact sheet and facilitates discussion of the impact of satellites and their associated technologies on everyday life. Suitable questions are listed above.</p> <p>Following discussion, students summarise the positive and negative impacts of satellites on everyday life.</p> <p>Class debate</p> <p>Teacher distributes the fact sheet and facilitates a class debate on a statement such as 'Satellites: space treasure or space junk?' or 'Satellites: big brother or big bother?'</p> <p>Following the debate, students summarise positive and negative impacts of satellites on everyday life.</p> | <p>In order to use this strategy, teachers would first select and delete information from the fact sheet, <i>Satellite facts</i>, eg some or all of the cells in columns 2-7, before distributing it to students.</p> <p>Students complete the table individually, in small groups or through a strategy, such as jigsaw.</p> <p>Following the activity, students summarise positive and negative impacts of satellites on everyday life.</p> |

Student report 1

In this activity you are required to describe and explain the impact of satellites and their associated technologies on everyday life.

Materials to be submitted for assessment

1. An overview of the impact of satellites and their associated technologies on everyday life. Your overview may be in the form of a written account (approximately 500 words), PowerPoint presentation, verbal or videotaped account (approximately 3 minutes).
2. A detailed written account of one specific type of satellite, eg a global positioning or weather satellite, explaining its impact and the impact of associated technologies on everyday life.

In addition to considering the social and economic impacts, your account should include at least one section discussing, in detail, physics associated with your satellite and its equipment (approximately 1000 words).

Suggestion

Set up an information table, similar to that below, to organise and store research data relating to your chosen satellite.

| type of satellite | purpose of satellite | associated technologies | physics of the satellite and its equipment | social and economic impact |
|---|----------------------|---|---|--|
| data-gathering satellite, eg photographic imaging | accurate mapping ... | high-resolution lens systems ... visible, infra-red capabilities ... satellite navigational systems ... | Low Earth, solar-synchronous, polar orbits are used because ... | Provides accurate data for land use, erosion, crop monitoring, monitoring global warming ... |

Marking guide

Your report will be assessed according to the following criteria:

| CRITERION | MARK | | | | | |
|---|------|---|---|---|---|---|
| Overview explains impacts of satellites on everyday life. | 0 | 1 | 2 | 3 | 4 | 5 |
| Overview explains impacts of associated technologies on everyday life. | 0 | 1 | 2 | 3 | 4 | 5 |
| Detailed account explains physics principles of the satellite and its monitoring equipment. | 0 | 1 | 2 | 3 | 4 | 5 |
| Detailed account explains social/economic impacts of the satellite and its associated technologies. | 0 | 1 | 2 | 3 | 4 | 5 |
| Overall report presents relevant and accurate physics information. | 0 | 1 | 2 | 3 | 4 | 5 |
| TOTAL | / 25 | | | | | |

Student report 2

In this activity you are required to develop a proposal for a new Australian satellite system. In doing so, describe and explain impacts of the proposed system, and its associated technologies, on everyday life.

Proposal to the Australian Government for a new satellite system

Scenario

Your company has been given a five-minute audience with the Australian prime minister and senior advisors to present a proposal for a new satellite system. In the short time available, you must provide details of your proposal (what is required and why) and present your case for the government to invest \$600 million in the project.

Suggestions

- Construct your proposal around a particular purpose, such as a satellite defence system, communications satellite or Earth monitoring system.
- Give consideration to impacts of the satellite system and its associated technologies on the everyday life of Australian people.
- Support your proposal with an explanation of physics principles of the satellite system and its associated equipment, and a statement of its potential social and economic benefits.
- Present a clear and persuasive argument to support your proposal.

Materials to be submitted for assessment

Your proposal may include one or more of the following:

- written report
- PowerPoint presentation
- poster(s)
- hand-out or flyer
- technical information

The proposal should include notes to support a verbal presentation.

Marking guide

Your report will be assessed according to the following criteria:

| CRITERION | MARK | | | | | |
|---|------|---|---|---|---|---|
| Student explains impacts of the satellite system on physics. | 0 | 1 | 2 | 3 | 4 | 5 |
| Student explains social/economic impacts of the satellite system. | 0 | 1 | 2 | 3 | 4 | 5 |
| Student explains impacts of associated technologies on everyday life. | 0 | 1 | 2 | 3 | 4 | 5 |
| Student presents accurate and relevant physics information to support the proposal. | 0 | 1 | 2 | 3 | 4 | 5 |
| Student presents a clear and persuasive argument to support the proposal. | 0 | 1 | 2 | 3 | 4 | 5 |
| TOTAL | / 25 | | | | | |

Associated SPICE resources

Satellites 3: Impact of satellites may be used in conjunction with related SPICE resources to address the broader topic of motion and forces in a gravitational field.

| DESCRIPTION | LEARNING PURPOSE |
|--|-----------------------|
| <p><i>Satellites</i></p> <p>The learning pathway shows how a number of SPICE resources can be combined to teach the topic of motion and forces in a gravitational field.</p> | |
| <p><i>Satellites 1: Orbiting Earth</i></p> <p>An interactive learning object engages students' interest in satellites and their impact on everyday life. It also allows students to explore a range of satellite orbits, and visualise Earth from the perspective of an orbiting satellite.</p> | Engage/Explore |
| <p><i>Satellites 2: Satellite motion</i></p> <p>Students integrate their knowledge of Newton's Law of Universal Gravitation with their understanding of forces and circular motion to explain satellite motion. The worksheet provides qualitative and quantitative problems related to satellites and the sensation of 'weightlessness' experienced by astronauts in orbiting spacecraft.</p> | Explain |
| <p><i>Satellites 3: Impact of satellites</i></p> <p>Students elaborate on their understanding of how satellites and their associated technologies impact on everyday life.</p> | Elaborate |

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