Welcome, Team Leader, and thank you for registering for Operation: Eyes on Earth.

In this document, you will find information intended to help you and your team of Space Designers to prepare for this important mission.

Session Outline

Operation: Eyes on Earth is a 90 minute experiential workshop in which students will exercise their creative thinking and decision-making skills by applying a design process model to the process of planning an Earth Observation satellite mission.

On arriving at the Australian Space Discovery Centre, your class of space designers will move into the theatrette, where they will view a short presentation (approx. 20 minutes), introducing them to their mission and providing background information.

After the presentation, they will divide into teams of three, and be assigned a Mission Specialist (Discovery Centre Space Communicator) to assist them for the rest of the session. The Mission Specialists will lead their teams in a creative thinking warm-up exercise, before guiding them into their mission planning process.

Students will then use provided resources and the Discovery Centre Space Gallery to research, plan, and make decisions around their choice of aspect(s) of an earth observation satellite mission.

Before You Arrive

Please assign your students into teams of three (preferred) or four prior to arrival.

> *In making team selections, please bear in mind that the focus of the workshop is on creative thinking and design more than challenging students' collaborative skills, so you may prefer to create teams who already have well-established rapport.*

Included with this document is a pre-mission briefing video from Katherine Bennell, Director of Spaceflight and Infrastructure for the Australian Space Agency. We recommend you watch this with your students prior to arrival, if possible, as it introduces some core concepts and sets the tone for the experience.

Australian Space Agency

Australian Space Discovery Centre

Operation: Eyes On Earth

A Schools In Space Programme

Pre-Visit Information Pack

Action Required

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Learning Intentions

Students will:

- Strengthen their critical and creative thinking skills through the application of an unfamiliar design process model
- Develop familiarity with satellite design and function, and with Earth observation technologies
- Recognise the usefulness of Earth observation from space
- Identify the three main orbital zones around the Earth, and understand that the different zones are best suited to different purposes
- Appreciate the scope of current space utilization in Earth's orbit and identify some of the associated challenges
- Understand the breadth of roles and career opportunities in the Space Sector

Outcomes

After completion of this workshop, students will:

- Have commenced a mission planning process, and developed sufficient understanding of the requirements of this process to continue building their plan, if desired
- Have practiced techniques for generating ideas, possibilities and actions, and understand that similar techniques can be used in other creative thinking contexts.
- Be able to define earth observation and provide an example of how it might be used
- Be able to explain what a satellite is, and identify some key systems of an earth observation satellite

Curriculum Connections

Note: this workshop has been designed to align with the Critical and Creative Thinking General Capability.

Additional curriculum connections are included to highlight content relevance and possible learning applications, but do not indicate explicit coverage of that curriculum dot point.

Australian Curriculum 7-10

General Capability: Critical and Creative Thinking

Science

Year 7	Year 8	Year 9	Year 10
Science as a Human Endeavour: Nature and Development of Science ACSHE119, ACSHE223; Use and Influence of Science ACSHE120, ACSHE121	Science as a Human Endeavour: Nature and Development of Science ACSHE134, ACSHE226; Use and Influence of Science ACSHE135, ACSHE136	Science as a Human Endeavour: Nature and Development of Science , ACSHE158; Use and Influence of Science ACSHE160, ACSHE228	Science as a Human Endeavour: Nature and Development of Science ACSHE192; Use and Influence of Science ACSHE194, ACSHE230
Science Understanding: Physical sciences ACSSU117; Earth and space sciences ACSSU115	Science Understanding: Physical sciences ACSSU115	Science Understanding: Physical sciences ACSSU182	Science Understanding: Earth and space sciences ACSSU189

Technologies

Year 7 &8	Year 9 & 10
Design and Technologies Processes and Production Skills ACTDEP035, ACTDEP036, ACTDEP037	Design and Technologies Processes and Production Skills ACTDEP048, ACTDEP049, ACTDEP051
Design and Technologies Knowledge and Understanding ACTDEK029	Design and Technologies Knowledge and Understanding ACTDEK040, ACTDEK046
Digital Technologies Processes and Production Skills ACTDIP027	Digital Technologies Processes and Production Skills ACTDIP038
Digital Technologies Knowledge and Understanding ACTDIK023	Digital Technologies Knowledge and Understanding ACTDIK034

Humanities and Social Sciences: Geography

Year 7	Year 8	Year 9	Year 10
Geographical Knowledge and Understanding, Unit 2: Place and Liveability ACHGK044, ACHGK045	Geographical Knowledge and Understanding, Unit 2: Changing nations ACHGK055, ACHGK059	Geographical Knowledge and Understanding, Unit 1: Biomes and food security ACHGK060, ACHGK63; Unit 2: Geographies of interconnections ACHGK060	Geographical Knowledge and Understanding, Unit 2: Geographies of human wellbeing ACHGK080
Geographical Inquiry and Skills, Interpreting, analysing and concluding ACHGS051, ACHGS052	Geographical Inquiry and Skills, Interpreting, analysing and concluding ACHGS059, ACHGS060	Geographical Inquiry and Skills, Interpreting, analysing and concluding ACHGS067, ACHGS069	Geographical Inquiry and Skills, Interpreting, analysing and concluding ACHGS076, ACHGS077, ACHGS078

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Stage 1 & 2 (SACE)

Capabilities: Critical and Creative Thinking

Science Enquiry Skills: Deconstruct a Problem

Science as a Human Endeavour: Communication and Collaboration, Development, Influence, and Application and Limitation.
Development, deployment, use and impacts of satellite and/or earth observation technologies within subject-specific contexts can be used to illustrate all SHE key concepts.

Earth and Environmental Science

Stage 1	Stage 2
All topics: *use and influence of earth observation technologies as an increasingly crucial source of data.*	All topics: *use and influence of earth observation technologies as an increasingly crucial source of data.* Topic 2, 3: *satellite observation and communication as a key technological component in resource extraction and tracking.*

Chemistry

Stage 1	Stage 2
Topic 5: Acids and bases—*environmental impacts and monitoring* Topic 6: Redox reactions—*power systems in space*	Topic 1: Monitoring the environment Topic 3: Organic and biological chemistry — *the chemical products and physical effects of biological chemical reactions can be spectroscopically measured on large/ environmental scales using earth observation* Topic 4: Managing resources — *satellite observation, communication, and tracking for resource identification, extraction, use, and monitoring*

Physics

Stage 1	Stage 2
Topic 1: Linear motion and forces Topic 3: Heat Topic 4: Energy and momentum Topic 5: Waves—*especially wireless communications contexts*	Topic 1: Motion and Relativity

Scientific Studies

Stage 1	Stage 2
Science Inquiry Skills: All *This workshop requires students to exercise their skills in observation, questioning, proposal, planning, design, and reflection. It can readily be used as a basis for an extended investigation, or as a supplement to any unit that uses a space, agriculture, or environmental*	

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