## iSTEM – Critical problem-solving

**Sample assessment package: Guided inquiry**



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## Advice to teachers

**Note:** The examples in this package are provided so that schools and teachers may choose relevant information and adjust for their contexts and their school-based practices. Relevant information should be transferred into the school’s assessment task template.

### Focus question

How does the angle of incident light affect the performance of a solar cell?

### Evidence of learning

Students will work in assigned groups to conduct a guided inquiry to determine how solar cell angle, in relation to a light source, affects the output voltage of solar cells.

The guided inquiry can be presented in different formats. Scientific investigations are usually presented in scientific report format; however, student direction may be incorporated into presentation format choice. The inquiry could be presented as a poster, presentation, website, video, or science exposition display board. Teachers should choose communication mode and change the advice to students below.

### Guided inquiry

Student groups discuss, research, plan, acquire materials, conduct investigation, analyse results, and communicate their findings following scientific report guidelines.

**Note:** The guided inquiry steps provided in the advice to students section are provided for use at teacher discretion. These can be used as a stimulus for students. They can also be used as a template for brainstorming during the inquiry or as a template for the final scientific report.

### Duration

Three lessons of class time are required to complete the practical component. Assessment advice and due dates should be informed by school assessment policy and assessment schedules.

### Scheduling

As part of an evolving sequence of inquiry-based learning (IBL), as defined by Banchi and Bell (2008), this task is designed for Week 8 of the iSTEM Critical problem-solving learning sequence. Consider this when creating your iSTEM scope and sequence. School reporting timelines may dictate whether this learning sequence and assessment is used in Term 1 or Term 3.

### Elaborations

One of the main aims of this assessment is for students to demonstrate critical understanding of scientific methodology. During the task teachers should employ Socratic questioning to empower student thinking and create the most accurate, valid, and reliable inquiry possible.

For example, ‘How can students either control the temperature or measure the temperature of their solar cell?’

### Assessment type

This task is intended to directly contribute to the final course assessment, either formative when developing student skills and knowledge, or summative when determining student outcomes for this learning sequence.

Formative assessment is an active learning process that enables teachers to continuously gather evidence of learning and respond to student learning with the goal of improving student achievement (Cowie and Bell 2010). It is an interactive process that monitors student learning to provide ongoing feedback and can be used by teachers to improve their teaching and by students to improve their understanding. During the assessment task, teachers should continuously question student thought processes and decisions to elicit critical thinking and deeper understanding.

### Inclusion and wellbeing

This assessment package has been prepared by the NSW Department of Education. It has been developed as a model for teachers, to assist in the development of an assessment task that can be contextualised to an individual school's needs.

The specific implementation of the assessment should reflect the school's context, expertise of the teachers, and the prior knowledge and English language proficiency of the students. Inquiry-based learning is a highly scaffolded pedagogy that reduces student cognitive load, supports student scientific process skill development, enhances student positive attitude toward science, improves student creative thinking levels and increases student achievement and understanding of content knowledge (Hmelo-Silver et al. 2007; Jiang and McComas 2015; Yakar and Bakyara 2014).

Plan assessment tasks that are inclusive and accommodate the needs of all students in your classroom. Some students may require more specific adjustments and enhancements to allow them to participate on the same basis. The iSTEM [learning sequences](https://education.nsw.gov.au/teaching-and-learning/curriculum/department-approved-courses/istem#/asset3) have example adjustments and enhancements. For further advice, see [Inclusive practice resources for secondary school.](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/secondary-school)

## Advice to students

### Task details

**Focus question:** How does the angle of incident light affect the performance of a solar cell?

**Type of task:** Guided inquiry

**Format:** Scientific report

**Weighting:** School-based decision

**Submission:** Students conduct inquiry in groups. Students submit individual reports.

**Description:** Students conduct a guided inquiry to determine how solar cell angle, in relation to a light source, affects the voltage of solar cells.

**Outcomes assessed:**

* **ST5-2** demonstrates critical thinking, creativity, problem-solving, entrepreneurship and engineering design skills and decision-making techniques in a range of STEM contexts
* **ST5-5** analyses a range of contexts and applies STEM principles and processes
* **ST5-8** uses a range of techniques and technologies, to communicate design solutions and technical information for a range of audiences
* **ST5-9** collects, organises, and interprets data sets, using appropriate mathematical and statistical methods to inform and evaluate design decisions.

Outcomes referred to in this document are from the [iSTEM Course Document](https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/curriculum/elective-courses/media/documents/istem-s5-course-document.docx) © 2021 NSW Department of Education for and on behalf of the Crown in the State of New South Wales.

### Managing your time

Use this checklist as a progress guide during the inquiry.

Table 1 – Student progress

|  |  |
| --- | --- |
| Steps | Complete |
| Gather and reflect on background information regarding solar cell angle and output |  |
| Consider skills and knowledge learnt in previous investigations |  |
| Identify the aim of the inquiry |  |
| Construct your hypothesis |  |
| Brainstorm methods for testing the hypothesis |  |
| Draft method and requisition required materials |  |
| Discuss method with colleagues and teacher |  |
| Test method and equipment |  |
| Adjust method if required |  |
| Conduct method |  |
| Record results |  |
| Analyse results using available technology |  |
| Construct data representations |  |
| Critically analyse method, results, possible conclusions, implications of results, and limitations of the investigation in the discussion section |  |
| Document answer to research question and aim in conclusion |  |

### Creating your report

#### Language

Personal language is avoided in scientific reports, with preference given to impersonal language that emphasises scientific objectivity. Scientific reports use a formal style of writing, referred to as ‘third person, passive voice’. The passive voice is usually used in scientific reports where the writing is intended to be impersonal and objective. Passive voice is used to highlight the object that experiences an action rather than the thing that performs the action.

#### Research question

The research question is a question that an inquiry or research project aims to answer. The importance of a research question is that it narrows down a wide topic of interest into a specific area of study. The question can include the independent and dependent variables.

This is a guided inquiry; therefore, the research question has been provided. Research question ‘How does the angle of incident light affect the performance of a solar cell?’

#### Aim

The aim generally has the form ‘To observe the effect of an independent variable on a dependent variable’. It changes the research question into a statement of intent. For this inquiry, the aim has the form ‘To determine if the angle of incident light affects the performance of a solar cell’.

#### Background information

Build upon earlier investigations that have been completed by the class or conduct background research to determine what is known about the topic under investigation, for example:

* Publications in journals – Sharma R (2019) [‘Effect of obliquity of incident light on the performance of silicon solar cells’](https://www.sciencedirect.com/science/article/pii/S2405844019355768#:~:text=In%20present%20work%2C%20the%20effect,with%20respect%20to%200o), *Heliyon*, 5(7).
* Education articles – ‘[Photovoltaic efficiency: solar angles and tracking systems’](https://www.teachengineering.org/lessons/view/cub_pveff_lesson01)
* Websites
* Other high school science experiments.

Summarise your experience and research. Use this to inform your hypothesis.

#### Hypothesis

The hypothesis has the form ‘If (change in the independent variable) then (predicted change in the dependent variable) or similar and can be tested by experimentation’.

If in-depth statistical analysis will be conducted, a null and alternative hypothesis is created instead of a single hypothesis. The null hypothesis states what is expected if there is no change in the dependent variable if the independent variable is changed. The null hypothesis has the form ‘change in the independent variablethen no predicted changein the dependent variable’. The alternative hypothesis states what is expected if there is a change in the dependent variable if the independent variable is changed. The alternative hypothesis has the form ‘change in the independent variable then predicted change in the dependent variable will occur’.

#### Method

This section documents the procedure used in the inquiry. A detailed step-by-step procedure will give other researchers the ability to reproduce the inquiry.

The method should include:

* risk assessment determining and mitigating potential safety risks in experiments, investigations, and inquiries (determine at least 2 risks in this inquiry and describe how these risks are controlled or mitigated)
* materials or equipment used
* detailed steps documenting setup of materials, timeline of events and collection of data
* labelled diagram
* the independent variable
* the dependent variable and how it was measured or observed to optimise accuracy
* a control test if appropriate, possibly including a positive control and a negative control
* account for controlled variables to enhance test validity
* repetition of tests, if appropriate
* how results are recorded
* how data was analysed.

#### Results

Clear and concise presentation of data is included in this section. This is usually in the form of a table that presents data that was gathered.

#### Data analysis

A graph showing the relationship between solar cell angle and solar cell output voltage should be produced and presented. Spreadsheet software, previously demonstrated in class, should be used to analyse the data, and produce the graphs.

#### Discussion

The discussion should demonstrate critical understanding of the investigation.

Data analysis and methods should be summarised. Results should be related to the background information. Have you discussed the social, economic, or ethical impacts of the inquiry? Assess how this inquiry could inform further potential inquiries.

Limitations of the investigation should be communicated. Has technology, equipment, time, money, or other factors impacted the potential validity, reliability, or accuracy of the investigation? It is important to present conclusions in a transparent way with full disclosure of these limitations. Presenting limitations before conclusions is an honest way to frame results so that the audience has a true understanding of the conditions that led to the results.

#### Conclusion

The conclusion is the answer to the original question and aim. Include a brief summary of results that led to the conclusion. State whether the hypothesis was supported.

## Marking rubric

**Note:** The criteria and outcomes presented in this table are not mandatory for assessing the task. Teachers are encouraged to select and/or adjust criteria based on their students’ needs and the assessment and reporting requirements of their school.

Table 2 – Marking rubric

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Criteria | A | B | C | D | E |
| Background Information  ST5-5 | Synthesises sufficient, credible, relevant research and experience from a range of sources and explicitly relates synthesis to the research question. | Summarises credible, relevant research from a range of sources. Identifies and describes previous investigations. | Presents sufficient, credible, relevant research from a range of sources. | Presents relevant research from a range of sources. | Presents relevant information from a source. |
| Hypothesis  ST5-2 | States clear and relevant hypothesis explicitly linked to the research question and aim. | Clearly uses background information to develop a relevant hypothesis. | States relevant hypothesis. | States relevant but incorrectly applied hypothesis. | States inaccurate but contextually relevant aim and hypothesis. |
| Method structure  ST5-8 | Communicate clear and concise steps documenting setup of materials, reliability enhancement, timeline of events and collection, recording and analysis of data.  Accurate and labelled diagram(s). | Detailed steps documenting setup of materials, timeline of events, repetition of tests, and collection, recording and analysis of data.  Accurate and labelled diagram(s). | Steps documenting setup of materials, timeline of events and collection, recording and analysis of data.  Labelled diagram.  Includes repetition of steps where appropriate. | Steps documenting setup of materials, timeline of events.  Chooses appropriate equipment to complete the practical investigation. | Steps documenting setup of materials, timeline of events. |
| Method variables  ST5-2 | Consistently applies valid methods to accurately collect scientific data.  Accurate independent, dependent and controlled variables.  Calibration or testing of measuring devices and test circuit detailed. | Applies valid methods to establish a fair test and accurately collects scientific data.  Accurate independent, dependent and controlled variables.  Calibration or testing of measuring devices and test circuit identified. | Applies method to accurately collect scientific data. Accurate independent and dependent variables.  Several controlled variables accounted for. | Applies variables correctly to the method, including several controlled variables. | Applies variables within the method, including controlled variables. |
| Results  ST5-8 | Communicates clear, coherent, and accurate results in a formatted table.  Clearly identifies variables, test groups and measurements including units. | Table clearly identifies variables, test groups and measurements including units. | Table identifies test groups and measurements including units. | Table identifying test groups and measurements. | Results displayed in an organised but incorrect format. |
| Data analysis  ST5-9 | Accurately collects, organises, and interprets data sets, using mathematical and statistical methods.  Derives trends, patterns and relationships in data and information.  Appropriate data visualisation with accurate heading, axes, labels, and data. | Accurately collects, organises, and interprets data sets, using mathematical and statistical methods.  Derives trends, patterns and relationships in data and information.  Data visualisation with accurate heading, axes, labels, and data. | Collects, organises, and interprets data sets.  Derives trends, patterns and relationships in data and information.  Data visualisation with accurate heading, axes, labels, and data. | Collects, organises, and interprets data sets.  Data visualisation with heading, axes, labels, and data. | Presents trends with limited or incorrect analysis. |
| Discussion –  limitations and uncertainty  ST5-2 | Demonstrates thorough understanding of error, limitations, and uncertainty.  Critical analysis of accuracy, reliability and validity clearly demonstrated. Clear and logical improvements suggested. | Assesses error, uncertainty, and limitations in data and inquiry methodology.  Assesses the relevance, accuracy, validity, and reliability of primary and secondary data and suggests improvements to inquiries. | Justifies and evaluates the use of variables and experimental controls to ensure that a valid procedure is developed that allows for the reliable and accurate collection of data. | Explains the selection of variables to produce a valid procedure. | Identifies variables and controlled variables. |
| Discussion – impact and future investigations  ST5-1 | Results are related to the background information.  Evaluates and proposes future inquiries in response to results and analysis. | Results are related to the background information.  Proposes future inquiries in response to results and analysis. | Results are related to the background information.  or  Evaluates and proposes future inquiries in response to results and analysis. | Results are related to the background information.  or  Proposes future inquiries in response to results and analysis. | Proposes future inquiry. |
| Conclusion  ST5-2 | Conclusion clearly answers research question or aim. Hypothesis support or non-support clearly stated. Conclusion clearly supported and explicitly linked to results. | Conclusion clearly answers research question or aim. Hypothesis support or non-support clearly stated. Conclusion clearly linked to results. | Makes a credible conclusion that is consistent with evidence. | Makes a credible conclusion. | Makes a conclusion that is not consistent with evidence. |

## STEM skills student self-evaluation

**Note:** The self-evaluation tool is designed to be used as a prompt and a continuous reflection tool for students. Teachers ask students to submit it at the end of a task to use with the marking guideline. However, the self-evaluation tool can be used throughout iSTEM topics and tasks. Teachers can demonstrate the use of this self-evaluation tool.

Table 3 – Student self-evaluation rubric

|  |  |  |  |
| --- | --- | --- | --- |
| Skill | Developing | Sound | Outstanding |
| Role allocation | Identifies some specific individual roles within the team. | Identifies specific individual roles within the team and makes suggestions as to how they should be allocated. | Matches team members to roles according to the specific requirements of the task and based on the skills of the individual. |
| Open communication | Expresses opinions and ideas. | Respectfully expresses opinions and ideas. | Communicates opinions and ideas respectfully, succinctly, and logically. Encourages others to share problems and solutions. |
| Listening and negotiation | Uses some active listening and negotiation skills. | Demonstrates skills in active listening and negotiation. | Demonstrates high-level active listening and negotiation skills. |
| Engages in and monitors teamwork | Takes responsibility in a negotiated role to follow a plan to meet goals and timelines. | Takes responsibility for roles within the team and works with others to meet goals and timelines and monitor progress of the task. | Demonstrates responsibility in several roles and in decision-making so that goals and timelines are met, and the progress of the task is monitored. |
| Safely uses a range of technologies | Takes responsibility for maintaining a safe working environment when reminded by others. | Takes responsibility for maintaining a safe working environment. | Demonstrates a high level of responsibility for maintaining a safe working environment. |
| Applies project management strategies | Identifies some processes that assisted the team to complete the task. | Describes the effectiveness of some parts of the plan and some processes used by the team to complete the task. | Evaluates the effectiveness of the planning and processes used by the team in completing the task. |

## Additional information

Please complete the following [feedback form](https://forms.office.com/Pages/ResponsePage.aspx?id=muagBYpBwUecJZOHJhv5kbKo2q_ZUXlHndJMnh2Wd8NUOUk0VTIzUDVVSlVFQVM5MkdOMkJGTjVKNCQlQCN0PWcu) to help us improve our resources and support.

The information below can be used to support teachers when using this assessment package for iSTEM.

### Rationale

Australian businesses competing in a global economy will need more employees trained in science, technology, engineering, and mathematics (STEM). Research indicates that 75% of the fastest-growing occupations require STEM skills. Global accounting firm PwC (formerly known as PricewaterhouseCoopers) produced a report titled [‘A smart move’](https://www.pwc.com.au/publications/a-smart-move.html) where it found that shifting just 1% of the Australian workforce into STEM roles would add $57.4 billion to the Gross Domestic Product (GDP) (net present value over 20 years).

iSTEM is a student-centred Stage 5 elective course that delivers science, technology, engineering, and mathematics education in an interdisciplinary, innovative, and integrated fashion. It was developed in direct response to industry’s urgent demand for young people skilled in science, technology, engineering, and mathematics.

The course was developed in collaboration with, and is supported by, industry, business, government, and universities, ensuring that students develop future-focused STEM skills. The course has a number of specialised topics, many of which are aligned with NSW State Government priority industries, identified in the [NSW Industry Development Framework](https://www.investment.nsw.gov.au/living-working-and-business/nsw-industry-development-framework/).

iSTEM develops enabling skills and knowledge that increasingly underpin many professions and trades, and the skills of a technologically enabled workforce. It provides students with learning opportunities to develop knowledge and skills to use the most up-to-date technologies including additive manufacturing (3D printing), laser cutters, augmented and virtual reality, drones, smart robotics and automation systems, Artificial Intelligence (AI) and a range of digital systems.

Students gain and apply knowledge, deepen their understanding, and develop collaborative, creative and critical thinking skills within authentic, real-world contexts. The course uses inquiry, problem and project-based learning approaches to solve problems and produce practical solutions utilising engineering design processes.

iSTEM is aligned to the concept of ‘[Industry 4.0](https://www.weforum.org/agenda/2019/01/why-companies-should-strive-for-industry-4-0/)’ which refers to a new and emerging phase in the industrial revolution that heavily focuses on interconnectivity, automation, machine learning and real-time data.

iSTEM has been developed to meet the goals of National Federation Reform Council (NFRC) Education Council’s [National STEM School Education Strategy (2016-2026)](https://www.dese.gov.au/education-ministers-meeting/resources/national-stem-school-education-strategy), and supports the NSW Government’s [NSW Industry Development Framework](https://www.investment.nsw.gov.au/living-working-and-business/nsw-industry-development-framework/), the NSW Department of Education’s [Rural and Remote Education Strategy (2021-2024)](https://education.nsw.gov.au/about-us/strategies-and-reports/rural-and-remote-education-strategy-2021-24) and the [High Potential and Gifted Education policy](https://education.nsw.gov.au/policy-library/policies/pd-2004-0051).

### Aim

The aim of the course is to engage and encourage student interest and skills in STEM, appreciate the scope, impact and pathways into STEM careers, and learn how to work collaboratively, entrepreneurially, and innovatively to solve real-world problems.

### Purpose and audience

This assessment package provides a range of assessment strategies and supplementary material that can be used to support student achievement in the task outlined. This resource is for teachers when creating a program of assessment for the iSTEM course.

### When and how to use this document

Use the assessment package in the context that best supports your school context.

### Assessment for learning

Possible formative assessment strategies that could be included:

* Learning Intentions and Success Criteria assist educators to articulate the purpose of a learning task to make judgements about the quality of student learning. These help students focus on the task or activity taking place and what they are learning and provide a framework for reflection and feedback. [Online tools](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/622) can assist implementation of this formative assessment strategy.
* Eliciting evidence strategies allow teachers to determine the next steps in learning and assist teachers in evaluating the impact of teaching and learning activities. Strategies that may be added to a learning sequence to elicit evidence include all student response systems, [exit tickets](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/543), mini whiteboards (actual or [digital](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/575)), [hinge questions](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/557), [Kahoot](https://app.education.nsw.gov.au/digital-learning-selector/LearningTool/Card/621), [Socrative](https://app.education.nsw.gov.au/digital-learning-selector/LearningTool/Card/587), [Quizlet](https://quizlet.com/) or quick quizzes to ensure that individual student progress can be monitored and the lesson sequence adjusted based on formative data collected.
* Feedback is designed to close the gap between current and desired performance by informing teacher and student behaviour (AITSL 2017). AITSL provides a [factsheet to support evidence-based feedback](https://www.aitsl.edu.au/teach/improve-practice/feedback#:~:text=FEEDBACK-,Factsheet,-A%20quick%20guide).
* [Peer feedback](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/549) is a structured process where students evaluate the work of their peers by providing valuable feedback in relation to learning intentions and success criteria. It can be supported by [online tools](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Browser?cache_id=1d29b).
* Self-regulated learning opportunities assist students in taking ownership of their own learning. A variety of strategies can be employed and some examples include reflection tasks, [Think-Pair-Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645), [KWLH charts](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/562), [learning portfolios](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/583) and [learning logs](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/564).

The primary role of assessment is to establish where individuals are in their learning so that teaching can be differentiated and further learning progress can be monitored over time.

Feedback that focuses on improving tasks, processes and student self-regulation is the most effective. Students engaging with feedback can take many forms including formal, informal, formative, summative, interactive, demonstrable, visual, written, verbal and non-verbal.

[What works best update 2020](https://education.nsw.gov.au/about-us/educational-data/cese/publications/research-reports/what-works-best-2020-update) (CESE 2020a)

### Differentiation

Differentiated learning can be enabled by differentiating the teaching approach to content, process, product and the learning environment. For more information on differentiation go to [Differentiating learning](https://education.nsw.gov.au/teaching-and-learning/professional-learning/teacher-quality-and-accreditation/strong-start-great-teachers/refining-practice/differentiating-learning) and [Differentiation](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/primary-school/teaching-strategies/differentiation).

When using these resources in the classroom, it is important for teachers to consider the needs of all students in their class, including:

* **Aboriginal and Torres Strait Islander students**. Targeted [strategies](https://education.nsw.gov.au/teaching-and-learning/aec/aboriginal-education-in-nsw-public-schools) can be used to achieve outcomes for Aboriginal students in K-12 and increase knowledge and understanding of Aboriginal histories and cultures. Teachers should utilise students’ Personalised Learning Pathways to support individual student needs and goals.
* **EAL/D learners**. EAL/D learners will require explicit English language support and scaffolding, informed by the [EAL/D enhanced teaching and learning cycle](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/resources-for-schools/eald/enhanced-teaching-and-learning-cycle) and the student’s phase on the [EAL/D Learning Progression](https://education.nsw.gov.au/teaching-and-learning/curriculum/multicultural-education/english-as-an-additional-language-or-dialect/planning-eald-support/english-language-proficiency). In addition, teachers can access information about [supporting EAL/D learners](https://education.nsw.gov.au/teaching-and-learning/curriculum/multicultural-education/english-as-an-additional-language-or-dialect/planning-eald-support/english-language-proficiency) and [literacy and numeracy support specific to EAL/D learners](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/resources-for-schools/eald).
* **Students with additional learning needs**. Learning adjustments enable students with disability and additional learning and support needs to access syllabus outcomes and content on the same basis as their peers. Teachers can use a range of [adjustments](https://education.nsw.gov.au/teaching-and-learning/disability-learning-and-support/personalised-support-for-learning/adjustments-to-teaching-and-learning) to ensure a personalised approach to student learning. In addition, the [Universal Design for Learning planning tool](https://education.nsw.gov.au/teaching-and-learning/learning-from-home/teaching-at-home/teaching-and-learning-resources/universal-design-for-learning) can be used to support the diverse learning needs of students using inclusive teaching and learning strategies. Subject specific curriculum considerations can be found on the [Inclusive Practice hub](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/primary-school/teaching-strategies/differentiation).
* **High potential and gifted learners**. [Assessing and identifying high potential and gifted learners](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/assess-and-identify#Assessment1) will help teachers decide which students may benefit from extension and additional challenge. [Effective strategies and contributors to achievement](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/evaluate) for high potential and gifted learners help teachers to identify and target areas for growth and improvement. In addition, the [Differentiation Adjustment Tool](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/implement/differentiation-adjustment-strategies) can be used to support the specific learning needs of high potential and gifted students. The [High Potential and Gifted Education Professional Learning and Resource Hub](https://schoolsnsw.sharepoint.com/sites/HPGEHub/SitePages/Home.aspx) supports school leaders and teachers to effectively implement the High Potential and Gifted Education Policy in their unique contexts.

All students need to be challenged and engaged to develop their potential fully. A culture of high expectations needs to be supported by strategies that both challenge and support student learning needs, such as through appropriate curriculum differentiation. (CESE 2020a:6).

### About this resource

All curriculum resources are prepared through a rigorous process. Resources are periodically reviewed as part of our ongoing evaluation plan to ensure currency, relevance and effectiveness. For additional support or advice contact the Teaching and Learning Curriculum team by emailing [secondaryteachingandlearning@det.nsw.edu.au](mailto:secondaryteachingandlearning@det.nsw.edu.au).

**Alignment to system priorities and/or needs**:

This resource aligns to the School Excellence Framework elements of curriculum (curriculum provision) and effective classroom practice (lesson planning, explicit teaching).

This resource supports teachers to address [Australian Professional Teaching Standards](https://educationstandards.nsw.edu.au/wps/portal/nesa/teacher-accreditation/meeting-requirements/the-standards/proficient-teacher) 5.1.2, 5.5.2

This resource has been designed to support schools with successful implementation of new curriculum, specifically the NSW Department of Education approved elective course, [iSTEM](https://education.nsw.gov.au/teaching-and-learning/curriculum/department-approved-courses/istem#/asset2) © 2021 NSW Department of Education for and on behalf of the Crown in right of the State of New South Wales.

The resource is produced to assist schools with promoting and implementing the course for the first time. As the course may be taught by teachers from a range of key learning areas, the resource is designed to support teachers from a variety of KLA expertise.

**Department approved elective course**: iSTEM

**Course outcomes**: ST5-2, ST5-5, ST5-8, ST5-9

**Author**: Curriculum Secondary Learners

**Publisher**: State of NSW, Department of Education

**Resource**: Teaching resource

**Related resources**: Further resources to support iSTEM can be found on the Department approved elective courses webpage including course document, sample scope and sequences, assessment materials and other learning sequences.

**Professional Learning**: Join the [Teaching and Learning 7-12 statewide staffroom](https://education.nsw.gov.au/teaching-and-learning/curriculum/statewide-staffrooms) for information regarding professional learning opportunities.

**Universal Design for Learning Tool**: [Universal Design for Learning planning tool](https://education.nsw.gov.au/teaching-and-learning/learning-from-home/teaching-at-home/teaching-and-learning-resources/universal-design-for-learning). Support the diverse learning needs of students using inclusive teaching and learning strategies.

**Consulted with**: Aboriginal Outcomes and Partnerships, Inclusion and Wellbeing, and EAL/D.

**Reviewed by**: This resource was reviewed by Curriculum Secondary Learners and by subject matter experts in schools to ensure accuracy of content.

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**Evidence base**

The range of assessment strategies outlined in the advice encourages ‘a variety of assessment methods each lesson to check for students’ understanding and inform what should be taught next’. (CESE, 2020a, p 22). The assessment strategies outlined are student-centred, providing ‘students with opportunities to reflect on their progress to inform future learning goals’ (CESE, 2020a, p 22).

The assessment advice complies with NESA’s assessment advice, outlined on NESA’s ACE website, NESA official notices and department memorandums. They:

* include statements of school procedures for allocating grades in Year 10
* set out requirements to retain student work samples to support grade allocation as required by NESA for the RoSA (NESA, 2006).

The assessment strategies outlined provide teachers with important information about whether students learned what was intended. Wiliam (2013) claims ‘the term formative should apply not to the assessment but to the function that the evidence generated by the assessment actually serves’.

## References

**Links to third-party material and websites**

Please note that the provided (reading/viewing material/list/links/texts) are a suggestion only and implies no endorsement, by the New South Wales Department of Education, of any author, publisher, or book title. School principals and teachers are best placed to assess the suitability of resources that would complement the curriculum and reflect the needs and interests of their students.

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