Mathematics Stage 5 (Year 10) – unit of learning

Surveying

Contents

[Rationale 4](#_Toc167716369)

[Overview 5](#_Toc167716370)

[Outcomes 6](#_Toc167716371)

[Core 6](#_Toc167716372)

[Path 6](#_Toc167716373)

[Lesson sequence and details 10](#_Toc167716374)

[Learning episode 1 – traverse survey 10](#_Toc167716375)

[Teaching and learning activity 10](#_Toc167716376)

[Syllabus content 10](#_Toc167716377)

[Learning episode 2 – approximating distance 12](#_Toc167716378)

[Teaching and learning activity 12](#_Toc167716379)

[Syllabus content 12](#_Toc167716380)

[Learning episode 3 – river crossing 14](#_Toc167716381)

[Teaching and learning activity 14](#_Toc167716382)

[Syllabus content 14](#_Toc167716383)

[Learning episode 4 – slope seekers 16](#_Toc167716384)

[Teaching and learning activity 16](#_Toc167716385)

[Syllabus content 16](#_Toc167716386)

[Learning episode 5 – the Great Pyramid 18](#_Toc167716387)

[Teaching and learning activity 18](#_Toc167716388)

[Syllabus content 18](#_Toc167716389)

[Learning episode 6 – getting my bearings 20](#_Toc167716390)

[Teaching and learning activity 20](#_Toc167716391)

[Syllabus content 20](#_Toc167716392)

[Learning episode 7 – lost in the clouds 22](#_Toc167716393)

[Teaching and learning activity 22](#_Toc167716394)

[Syllabus content 22](#_Toc167716395)

[Learning episode 8 – bearing it all 24](#_Toc167716396)

[Teaching and learning activity 24](#_Toc167716397)

[Syllabus content 24](#_Toc167716398)

[Learning episode 9 – going around in circles 26](#_Toc167716399)

[Teaching and learning activity 26](#_Toc167716400)

[Syllabus content 26](#_Toc167716401)

[Learning episode 10 – GPS positioning 28](#_Toc167716402)

[Teaching and learning activity 28](#_Toc167716403)

[Syllabus content 28](#_Toc167716404)

[Learning episode 11 – sine of the apostle 30](#_Toc167716405)

[Teaching and learning activity 30](#_Toc167716406)

[Syllabus content 30](#_Toc167716407)

[Learning episode 12 – tracking erosion 32](#_Toc167716408)

[Teaching and learning activity 32](#_Toc167716409)

[Syllabus content 32](#_Toc167716410)

[Learning episode 13 – cosine rules 34](#_Toc167716411)

[Teaching and learning activity 34](#_Toc167716412)

[Syllabus content 34](#_Toc167716413)

[Learning episode 14 – cos it’s the angle 36](#_Toc167716414)

[Teaching and learning activity 36](#_Toc167716415)

[Syllabus content 36](#_Toc167716416)

[Learning episode 15 – radial survey 38](#_Toc167716417)

[Teaching and learning activity 38](#_Toc167716418)

[Syllabus content 38](#_Toc167716419)

[References 40](#_Toc167716420)

# Rationale

The NSW Department of Education publishes a range of curriculum support materials, including samples of lesson sequences, scope and sequences, assessment tasks, examinations, student and teacher resource booklets, and curriculum planning and curriculum evaluation templates. The samples are not exhaustive and do not represent the only way to complete or engage in each of these processes. Curriculum design and implementation is a dynamic and contextually-specific process. While the mandatory components of syllabus implementation must be met by all schools, it is important that the approach taken by teachers is reflective of their needs, and faculty or school processes.

The NSW Education Standards Authority (NESA) defines [programming](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/understanding-the-curriculum/programming) as ‘the process of selecting and sequencing learning experiences which enable students to engage with syllabus outcomes and develop subject specific skills and knowledge’ (NESA 2022). A program is developed collaboratively within a faculty. It differs from a unit in important ways, as outlined by NESA on their [Advice on units](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/understanding-the-curriculum/programming/advice-on-units) page. A unit is a contextually-specific plan for the intended teaching and learning for a particular class for a particular period. The organisation of the content in a unit is flexible and it may vary according to the school, the teacher, the class and the learning space. They should be working documents that reflect the thoughtful planning and reflection that takes place during the teaching and learning cycle. There are mandatory components of programming and unit development, and this template provides one option for the delivery of these requirements. The NESA and department guidelines that have influenced this template are elaborated upon at the end of the document.

This resource has been developed to assist teachers in NSW Department of Education schools to create learning that is contextualised to their classroom. It can be used as a basis for the teacher’s own program, assessment, or scope and sequence, or be used as an example of how the new curriculum could be implemented. The resource has suggested timeframes that may need to be adjusted by the teacher to meet the needs of their students.

# Overview

**Description**: this program of learning addresses content from the focus areas of Trigonometry B and C, Non-linear relationships C and Properties of geometrical figures A. The lessons and sequences in this program of learning are designed to allow students to explore mapping and navigation of the world using right-angled and non-right-angled trigonometry, circles and similar figures.

**Duration**: this program of learning is designed to be completed over a period of approximately 7 weeks but can be adapted to suit the school context.

**Explicit teaching**: suggested learning intentions and success criteria are available for some lessons provided. Learning intentions and success criteria are most effective when they are contextualised to meet the needs of students in the class. The examples provided in this document are generalised to demonstrate how learning intentions and success criteria could be created.

# Outcomes

## Core

A student:

* develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly **MAO-WM-01**
* applies trigonometry to solve problems, including bearings and angles of elevation and depression **MA5-TRG-C-02**
* identifies and applies the properties of similar figures and scale drawings to solve problems **MA5-GEO-C-01**

## Path

A student:

* applies Pythagoras’ theorem and trigonometry to solve 3-dimensional problems and applies the sine, cosine and area rules to solve 2-dimensional problems, including bearings **MA5-TRG-P-01**
* interprets and compares non-linear relationships and their transformations, both algebraically and graphically **MA5-NLI-P-01**

The identified Life Skills outcomes that relate to this unit are **MALS-LEN-01** – measures and uses length in everyday contexts**, MALS-GEO-01** – explores 2-dimensional shapes and 3-dimensional objects**,** and **MALS-POS-01** – demonstrates knowledge of position and direction in everyday contexts.

[Mathematics K**–**10 Syllabus](https://curriculum.nsw.edu.au/learning-areas/mathematics/mathematics-k-10-2022/overview) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2022.

**Prior to planning for teaching and learning, please consider the following**:

**Engagement**

* How will I provide authentic, relevant learning opportunities for students to personally connect with lesson content?
* How will I support every student to grow in independence, confidence, and self-regulation?
* How will I facilitate every student to have high expectations for themselves?
* How will I identify and provide the support each student needs to sustain their learning efforts?

**Representation**

* What are some different ways I can present content to enable every student to access and understand it?
* How will I identify and address language and/or cultural considerations that may limit access to content for students?
* How will I make lesson content and learning materials more accessible?
* How will I plan learning experiences that are relevant and challenging for the full range of students in the classroom?

**Expression**

* How will I provide multiple ways for students to respond and express what they know?
* What tools and resources can students use to demonstrate their understanding?
* How will I know every student has understood the concepts and language presented in each lesson?
* How will I monitor if every student has achieved the learning outcomes and learning growth?

# Lesson sequence and details

## Learning episode 1 – traverse survey

### Teaching and learning activity

Students conduct a traverse offset survey and calculate the area and perimeter of the irregular shape.

### Syllabus content

This lesson contains Stage 4 outcomes **MA4-ARE-C-01** – Area and **MA4-PYT-C-01** – Right-angled triangles (Pythagoras’ theorem). This lesson allows students to revise this content before starting the Stage 5 content.

Table 1 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Traverse survey (DOCX 878.7 KB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l01-traverse-survey.docx)Duration**:** 1 lessonLearning intentions* To be able to use Pythagoras' theorem to solve problems.
* To be able to use the area of a right-angled triangle to solve problems.

Success criteria* I can conduct a traverse offset survey.
* I can calculate areas to solve problems.
* I can calculate the length of an unknown side.
 | * A class set of Appendix A, B and D
* Appendix C, printed (one per 3 students)
* [*Traverse survey* (PPTX 7.5 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l01-traverse-survey-slideshow.pptx) PowerPoint `
* 5 witches’ hats, cones or markers (one per 3 students)
* Set square (one per 3 students)
* 2 tape measures (one per 3 students)
 |  |

## Learning episode 2 – approximating distance

### Teaching and learning activity

Students explore similar triangles to approximate their distance from an object.

### Syllabus content

* Solve problems involving unknown lengths and scale factors of similar figures and related practical problems.

Table 2 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Approximating distance (DOCX 654.8 KB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l02-approximating-distance.docx)Duration**:** 1–2 lessonsLearning intentions* To understand the concept of similar figures.
* To be able to use similar figures to solve problems.

Success criteria* I can explain why 2 triangles are similar.
* I can explain how similar triangles can be used to find unknown sides.
* I can calculate the value of an unknown side using similar figures.
 | * Appendix A and B, printed (one per 3 students)
* [*Approximating distance* (PPTX 1.4 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l02-approximating-distance-slideshow.pptx) PowerPoint
* Ruler (one per 3 students)
* Tape measure (one per 3 students)
* Isometric grid printed on A3 paper (one per 3 students)
* A3 plastic pocket (one per 3 students)
 |  |

## Learning episode 3 – river crossing

### Teaching and learning activity

Students discover how to find the distance ‘as the crow flies’ between objects separated by an obstruction using similar triangles.

### Syllabus content

* Solve problems involving unknown lengths and scale factors of similar figures and related practical problems.

Table 3 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [River crossing (DOCX 2.0 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l03-river-crossing.docx)Duration**:** 1–2 lessonsLearning intention* To understand how to use similar triangles to find distances.

Success criteria* I can explain why 2 triangles are similar.
* I can find an unknown length using similar triangles.
* I can explain the most efficient method to solve a problem.
 | * Appendix A, printed (one per 3 students)
* [*River crossing* (PPTX 2.7 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l03-river-crossing-slideshow.pptx) PowerPoint
* One roll of masking tape (one per 3 students)
* One ball of yarn (one per 3 students)
* A tape measure (one per 3 students)
 |  |

## Learning episode 4 – slope seekers

### Teaching and learning activity

Students calculate angles of elevation and depression, using side measurements of triangles.

### Syllabus content

* Identify and describe angles of elevation and depression
* Solve practical problems involving angles of elevation and depression

Table 4 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Slope seekers (DOCX 1010.1 KB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l04-slope-seekers.docx)Duration**:** 1 lessonLearning intention* To be able to use angles of elevation and depression in trigonometric calculations.

Success criteria* I can identify the angle of elevation or depression.
* I can calculate the angle of elevation or depression from lengths in a triangle.
* I can calculate the length of a side in a triangle using the angle of elevation or depression.
 | * Appendix A and D, printed (one per 3 students)
* A class set of Appendix B and C
* [*Slope seekers* (PPTX 3.5 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l04-slope-seekers-slideshow.pptx) PowerPoint
* Tape measure (one per 3 students)
* Metre ruler or similar (one per 3 students)
* A series of books or blocks (one per 3 students)
 |  |

## Learning episode 5 – the Great Pyramid

### Teaching and learning activity

Students learn how to perform calculations in 3-dimensional space using right-angled triangles.

### Syllabus content

* Apply Pythagoras’ theorem to solve problems involving the lengths of the edges and diagonals of rectangular prisms and other 3-dimensional objects (Path)
* Apply trigonometry to solve problems involving right-angled triangles in 3 dimensions, including using bearings and angles of elevation and depression (Path)

Table 5 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [The Great Pyramid (DOCX 649 KB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l05-the-great-pyramid.docx)Duration**:** 1 lessonLearning intention* To be able to calculate the dimensions of a 3‑dimensional object.

Success criteria* I can identify right-angled triangles in 3-dimensional shapes.
* I can apply Pythagoras’ theorem to solve problems in 2 and 3 dimensions.
* I can solve problems involving trigonometric ratios in 2 and 3 dimensions.
 | * A class set of Appendix D
* Appendix A and D, printed (one per 3 students) on A3 paper
* Appendix B, C and E, printed (one per 3 students)
* [*The Great Pyramid* (PPTX 2.5 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l05-the-great-pyramid-slideshow.pptx) PowerPoint
* A3 plastic pocket (one per 3 students)
 |  |

## Learning episode 6 – getting my bearings

### Teaching and learning activity

Students use bearings to navigate their way back to a starting point.

### Syllabus content

* Identify and interpret true bearings and compass bearings
* Explain the difference between true bearings and compass bearings and convert between them
* Solve practical problems involving bearings

Table 6 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Getting my bearings (DOCX 495.5 KB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l06-getting-my-bearings.docx)Duration**:** 1 lessonLearning intention* To know how to read and use bearings.

Success criteria* I can convert between compass and true bearings.
* I can use a compass to find a bearing.
* I can use bearings to calculate angles.
* I can explain the importance of words when indicating direction.
 | * A class set of Appendix A and C
* 2 copies of Appendix B (one per 3 students)
* Appendix C, printed on A3 paper (one per 3 students)
* [*Getting my bearings* (PPTX 1.5 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l06-getting-my-bearings-slideshow.pptx) PowerPoint
* A3 plastic pocket (one per 3 students)
* Compass (one per 3 students)
* 5 cones (one per 3 students)
 |  |

## Learning episode 7 – lost in the clouds

### Teaching and learning activity

Students explore locating places for drone delivery using bearings and distances. Students will use Bathurst as a case study due to its grid-like street layout.

### Syllabus content

* Solve practical problems involving bearings

Table 7 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Lost in the clouds (DOCX 4.2 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l07-lost-in-the-clouds.docx)Duration**:** 1 lessonLearning intention* To be able to calculate bearings to and from a point.

Success criteria* I can identify directions using compass points.
* I can estimate the value of a bearing from a diagram.
* I can calculate bearings to and from a point.
 | * Appendix A, printed on A3 paper (one per 3 students)
* A class set of Appendix B
* [*Lost in the clouds* (PPTX 3.1 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l07-lost-in-the-clouds-slideshow.pptx) PowerPoint
* Grid paper printed on A3 paper
 |  |

## Learning episode 8 – bearing it all

### Teaching and learning activity

Students look at locality sketch plans which provide surveyors with bearings to surveyor markers. Students will use these bearings to find unknown distances.

### Syllabus content

* Solve practical problems involving bearings

Table 8 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Bearing it all (DOCX 1.1 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l08-bearing-it-all.docx)Duration**:** 1 lessonLearning intention* To be able to calculate distances given a bearing.

Success criteria* I can calculate the size of an angle in a right-angled triangle given a bearing.
* I can calculate the length of a side given a bearing and a known distance.
* I can explain the difference between a bearing from and a bearing to.
 | * Appendix A and B, printed (one per 2 students)
* A class set of Appendix C
* A copy of Appendix D (one per 3 students)
* [*Bearing it all* (PPTX 2.2 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l08-bearing-it-all-slideshow.pptx) PowerPoint
 |  |

## Learning episode 9 – going around in circles

### Teaching and learning activity

Students review Pythagoras’ theorem and use it to derive the equation of a circle.

### Syllabus content

* Derive the equation of a circle $x^{2}+y^{2}=r^{2}$ with centre 0, 0 and radius $r$ using the distance formula (Path)
* Identify and describe equations that represent circles with centre at the origin and radius of the circle $r$ (Path)
* Graph circles of the form $x^{2}+y^{2}=r^{2}$, where r is the radius of the circle using graphing applications (Path)

Table 9 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Going around in circles (DOCX 806.4 KB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l09-going-around-in-circles.docx)Duration**:** 1 lessonLearning intention* To understand the connection between the graph of a circle and its equation.

Success criteria* I can find the distance between 2 points.
* I can derive the equation for a circle.
* I can find the radius of a circle from the equation.
* I can graph a circle with centre at the origin.
 | * 2 copies of Appendix A printed on A3 paper (one per 3 students)
* A3 plastic sleeve (one per 3 students)
* A class set of Appendix B
* [*Going around in circles* (PPTX 2.0 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l09-going-around-in-circles-slideshow.pptx) PowerPoint
 |  |

## Learning episode 10 – GPS positioning

### Teaching and learning activity

Students model trilateration using equations of circles with Desmos and an outdoor activity.

### Syllabus content

* Identify and describe equations that represent circles with centre at the origin and radius of the circle r (Path)
* Graph circles of the form $x^{2}+y^{2}=r^{2}$, where r is the radius of the circle using graphing applications (Path)
* Establish the equation of the circle with centre $(a,b)$ and radius $r$, and graph equations of the form $\left(x-a\right)^{2}+\left(y-b\right)^{2}=r^{2}$ (Path)

Table 10 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [GPS positioning (DOCX 427.9 KB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l10-gps-positioning.docx)Duration**:** 1–2 lessonsLearning intention* To understand the relationship between the graph and the equation of a circle.

Success criteria* I can graph circles from an equation.
* I can write the equation of a circle with centre at the origin.
* I can write the equation of a translated circle.
* I can apply the equation of a circle to solve real-world problems.
 | * [*GPS positioning* (PPTX 2.4 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l10-gps-positioning-slideshow.pptx) PowerPoint
* Digital device (one per 2 students)
* Optional: 2 basketballs
* Optional: tape measure
* Optional: 3 position markers
* Optional: a copy of Appendix A (one per 3 students)
 |  |

## Learning episode 11 – sine of the apostle

### Teaching and learning activity

Students discover and use the sine rule to explore how to find the distance between the Twelve Apostles.

### Syllabus content

* Use graphing applications to verify the sine rule and that the ratios of a side to the sine of the opposite angle is a constant (Path)
* Apply the sine rule in a given triangle ABC to find the value of an unknown side (Path)

Table 11 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Sine of the apostle (DOCX 2.1 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l11-sine-of-the-apostle.docx)Duration**:** 1 lessonLearning intention* To know how to find the length of a side using the sine rule.

Success criteria* I can substitute values into the sine rule.
* I can calculate an unknown side length in a triangle using the sine rule.
* I can deduce the sine rule using trigonometric ratios.
 | * Appendix A, D, E and F printed on A3 paper (one per 3 students)
* A class set of Appendix C and D
* [*Sine of the apostle* (PPTX 2.3 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l11-sine-of-the-apostle-slideshow.pptx) PowerPoint
* A3 plastic pocket (one per 3 students)
* Optional: Appendix B
 |  |

## Learning episode 12 – tracking erosion

### Teaching and learning activity

Students explore finding an angle using the sine rule by looking at rates of erosion.

### Syllabus content

* Apply the sine rule in a given triangle ABC to find the value of an unknown angle (ambiguous case excluded) (Path)

Table 12 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Tracking erosion (DOCX 543 KB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l12-tracking-erosion.docx)Duration**:** 1 lessonLearning intention* To be able to find the size of an angle in a non-right-angled triangle when given 2 sides and an angle.

Success criteria* I can correctly substitute values into the sine rule.
* I can explain how to rearrange the sine rule to find an angle.
* I can calculate the size of an angle using the sine rule.
 | * A class set of Appendix A, B and C
* Appendix C, printed on A3 paper (one per 3 students)
* Appendix D, printed (one per 3 students)
* [*Tracking erosion* (PPTX 2.2 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l12-tracking-erosion-slideshow.pptx) PowerPoint
 |  |

## Learning episode 13 – cosine rules

### Teaching and learning activity

Students discover the cosine rule by investigating different triangles and then use the cosine rule to find lengths.

### Syllabus content

* Apply the cosine rule to find the unknown sides for a given triangle ABC (Path)

Table 13 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Cosine rules (DOCX 547.4 KB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l13-cosine-rules.docx)Duration**:** 1 lessonLearning intention* To know how to find the length of a side using the cosine rule.

Success criteria* I can correctly substitute values into the cosine rule.
* I can calculate the length of a side using the cosine rule.
* I can verify that the measurements given for a triangle are possible.
* I can apply the cosine rule to practical situations.
 | * 2 copies of Appendix A
* A class set of Appendix B, C and D
* Appendix D, printed on A3 paper (one per 3 students)
* Appendix E, printed (one per 3 students)
* [*Cosine rules* (PPTX 2.3 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l13-cosine-rules-slideshow.pptx) PowerPoint
* Mini whiteboards (optional)
* Plastic pocket (one per 3 students)
 |  |

## Learning episode 14 – cos it’s the angle

### Teaching and learning activity

Students rearrange the cosine rule to make $\cos(C)$ the subject of the equation and then use the rule to find missing angles.

### Syllabus content

* Rearrange the formula to deduce that $\cos(C)=\frac{a^{2}+b^{2}-c^{2}}{2ab}$ and use this to find an unknown angle (Path)
* Change the subject of a formula

Table 14 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Cos it’s the angle (DOCX 1.0 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l14-cos-its-the-angle.docx)Duration****:**** 1 lessonLearning intention* To know how to find the size of a missing angle using the cosine rule.

Success criteria* I can explain the relationship between the longest side in a triangle and the largest angle.
* I can rearrange the cosine rule to make the angle the subject of the equation.
* I can calculate a missing angle using the cosine rule.
 | * Appendix A and C, printed (one per 3 students)
* A class set of Appendix B
* Appendix B, printed on A3 paper (one per 3 students)
* [*Cos it’s the angle* (PPTX 6.5 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l14-cos-its-the-angle-slideshow.pptx) PowerPoint
* A class set of rulers
* Plastic pocket (one per 3 students)
 |  |

## Learning episode 15 – radial survey

### Teaching and learning activity

Students will conduct a radial survey to calculate the area of an irregular polygon by finding the areas of non-right-angled triangles.

### Syllabus content

* Apply the formula $A=\frac{1}{2}ab\sin(C)$, where $a$ and $b$ are the sides that form angle $C$ to find the area of a given triangle ABC (Path)

Table 15 – lesson sequence and details

|  |  |  |
| --- | --- | --- |
| Teaching and learning activities | Required resources | Registration, adjustments and evaluation notes |
| [Radial survey (DOCX 1.4 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l15-radial-survey.docx)Duration**:** 1 lessonLearning intention* To be able to find the area of non-right-angled triangles.

Success criteria* I can use bearings to find the angle between 2 sides.
* I can substitute values into the area of a triangle formula.
* I can find the area of an irregular shape by breaking it into known shapes.
 | * A class set of Appendix A, B and C
* Appendix C, printed on A3 paper (one per 3 students)
* A copy of Appendix D and E (one per 3 students)
* [*Radial survey* (PPTX 2.7 MB)](https://education.nsw.gov.au/content/dam/main-education/documents/teaching-and-learning/curriculum/mathematics/mathematics-s5-unit-09-l15-radial-survey-slideshow.pptx) PowerPoint
* 6 witches’ hats, cones or markers (one per 3 students)
* Compass (one per 3 students)
* Tape measure (one per 3 students)
 |  |

# References

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NESA (NSW Education Standards Authority) (n.d.) ‘[Advice on units](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/understanding-the-curriculum/programming/advice-on-units)’, Programming, NESA website, accessed 27 May 2024.

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