

Lesson plan

Lesson 2

Trigonometry in engineering and manufacturing

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Lesson plan

Programme name	T Level: Technical qualification in design and development for engineering and manufacturing (8714)	Suggested Duration	2 Hours
Lesson topic	Trigonometry in engineering and manufacturing	Lesson	2 of 4

Session description and context, including any last-minute information

The session is designed to explain how to do trigonometry calculations as a follow-on session from the first introduction session. The aim of this session is that the learners will be able to calculate angles and the lengths of sides of triangles then progress to contextualised examples, culminating in a case study plenary exercise.

Learning outcomes

By the end of the lesson, learners should be able to:

- apply trigonometric functions (sin, cos and tan)
- determine the dimension of a triangle using sine and cosine rules
- explain and discuss what right-angled triangles and acute angles are
- define what the sides of a triangle are called
- state how we would identify these sides
- explain the ratio or functions of the sides SOA, CAH and TOA.

Links to the specification

4.1 Applied mathematical theory in engineering applications.

Trigonometry: Pythagoras' theorem, triangle calculations, trigonometric, sine and cosine rules, common trigonometric identities and values.

Prerequisites

It is expected that learners are able to use a calculator prior to starting this lesson.

Lesson resources

Scientific calculator

Protractor

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Smart phone
Tape measure/rule
Sticky notes

Timings	Slides	Teacher activity	Learner activity	Stretch and Challenge
10 mins	1-2	• Introduction to the topic. • Explain that this is session 2 from a set of four sessions. • Starter activity of individual and group discussion • Encourage learners to offer practical examples of application for the subject area from previous session and new examples. (Teacher example could be a venturi intake).	• Time for individual thought around practical examples followed by group discussion about new examples raised and examples used in previous session.	
10 mins	3	• Recap discussion on the relationships of the ratios of the angles and the lengths of sides of a triangle. • Teacher to ask open questions on the ratios and formulas, as written on the slide	• Learners to answer both directed and open questions on the relationship of the ratio of angles to sides.	More able learners to rearrange formulas showing the relationships of SOH, CAH and TOA.
20 mins	4–8	• Explain how to calculate missing information on sides and angles for a right-angled triangle. • Discuss the application of SOH, CAH, TOA. Ensure learners are clear on this by asking directed questions. • Explain examples of calculating the missing information on sides.	• Complete relevant sections of the given worksheet. • Learners to answer directed questions.	More able learners to create their own examples for each other for peer assessment and to offer support for less able learners.

10 mins	9–11	Ask learners to complete activity 1 using the worksheet to record their answers. Encourage them to come up with ideas that you could share around to reinforce the skills.	Learners will complete activity 1.	Missing
25 mins	13	- Learners to complete activity 2. - Learners to download clinometer app to their phone. Those who cannot do this can be paired or tripled with learners who can do this or in the event of not being able to use phones a protractor can be used. - Teacher to distribute tape measures or rules to learners. - Explain how to measure distance to a point away from the table they are sitting at, the height of the table and the angle so that they can calculate the length of the third side (hypotenuse). - Teachers to ask learners to do this with three items and surfaces in the room. This is relevant because most tables have metal legs that are manufactured by engineers.	- Learners to download app or be paired with those who can. - Learners to measure distance away from table, the height and the angle, calculate the hypotenuse and show calculations.	Missing
15 mins	14	- Learners to complete activity 3. - Teacher to explain that learners need to calculate the pitch of the angle of rafters for a roof.	Learners to complete activity 3.	Missing
25 mins	15	- Learners to complete Plenary activity. - Teacher to explain scenario of upright Christmas tree and lights. State how learners are to produce a diagram after relevant calculations have been made.	- Learners to complete plenary activity. - Calculate the required lengths and diameter of the base. - Produce a suitable scale diagram.	Missing

5 mins		- Recap subjects covered and checked for understanding (sticky notes: two things they have learnt and one item that they need to revisit). - End session.	Complete sticky notes exercise.	
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