Mathematics Department Workshops

Topic: Trigonometry

Overview

Objectives related to this topic are:

- understand and use trigonometric relationships in right-angled triangles, and use these to solve problems, including those involving bearings (Year 10)

- use trigonometric relationships in right-angled triangles to solve 3-D problems, including finding the angles between a line and a plane (Year 11)

- calculate the area of a triangle using the formula $\frac{1}{2}ab\sin C$ (Year 11e)

- use the sine and cosine rules to solve 2-D and 3-D problems (Year 11e)

Materials required

- Resource Sheets **HT2.TRG.1** to **HT2.TRG.5**

- Data projector and internet access

Suggested activities

Activity 1: Getting Started
The video **http://www.teachers.tv/video/2282** shows an introduction to trigonometry which is practically based. As a team, discuss whether this is an approach which could be used with your learners, and what practical issues would need to be addressed in your institution.

Activity 2: Sample Learning Activities
As a team use the following resource sheets to explore the suggested learning activities.

HT2.TRG.1 – Exploring similar triangles
Discuss how you would use this resource sheet with your learners.

HT2.TRG.2 – 'Stick on the Maths'
This activity is designed to be used in two different ways.
Whole class: project the three by three grid (only) onto a board. Challenge learners to write a solution to each problem on a post-it note and place it in the right position on the grid. Pick out solutions that are either particularly interesting or significant and ask learners to justify its position on the grid. There are a number of open questions so the answers may not be unique.
Paired / individual: learners cut out the nine 'answer cards' at the bottom of the sheet and place them onto the grid. These answer cards have been carefully chosen to ensure some very similar possibilities and therefore challenge learners to think – and justify to each other.

HT2.TRG.3 – Matching activity
Discuss the value of this type of activity.

HT2.TRG.4 – Exploring error
Develops learners' understanding of the nature of the tangent function. Learners do related calculations and use the patterns in those calculations to explore the non-linear relationship between error in angle measurement and error in calculated heights.
The video **http://www.teachers.tv/video/667** shows some real-life applications of the sine ratio. As a team, consider when you might use this with your learners, and what discussion you would want to have after

learners have seen it.

Activity 3: Probing Questions
Challenge members of your team to write some probing questions using the question stems on resource sheet **HT2.TRG.5**. Share ideas and consider how such questioning techniques could be used in your teaching.

Activity 4: Reflection
As a team, investigate the hooks for learning below.

Embedding in practice

Hooks for Learning

- Trigonometry was used as the basis for surveying the British Isles to a remarkable degree of accuracy (as compared with current standards from GPS measurements). See the following websites for some background on the history.

    - **http://www.oncloudseven.com/fayers/fbmlist.htm**

    - **http://www.totalsurveys.co.uk/datum+and+grid.aspx**

- How can one calculate the distance from earth to the sun? There are various websites such as **http://www.newton.dep.anl.gov/askasci/ast99/ast99155.htm** which show different methods and tell stories about the historical development.

Action points

At the end of the session, spend time recording some actions. What do you need to do:
- Next day?

- Next week?

- Next year?

Further reading

- A Short History of Nearly Everything (Bill Bryson), especially chapter 4