

Eclipse geometry activities for IGCSE and GCSE

IGCSE Math Revision · IGCSE and GCSE (Higher and Extended) · Student sheet

Name _____

Class _____

Date _____

The starter is non-calculator. A calculator is needed for the main activity.

Starter (5 minutes)

1. Write 1 400 000 in standard form.
2. Write 3500/1 400 000 as a fraction in its simplest form.
3. A 1.8 m person casts a 2.4 m shadow. At the same time a tree casts a 12 m shadow. How tall is the tree?
4. Write down $\tan 45^\circ$.

Main activity (35 minutes)

Task A: Why the Moon just covers the Sun

Take these rounded values: Sun diameter 1 400 000 km at 150 000 000 km from us; Moon diameter 3500 km at 380 000 km.

- a. How many times wider is the Sun than the Moon?
- b. How many times further away is the Sun than the Moon? Give 3 significant figures.
- c. Use similar triangles to find the distance at which the Moon would exactly cover the Sun.

Task B: Angles with tan

Half of the Moon's width and its distance make a right-angled triangle, so the angle the Moon fills is $2 \times \tan^{-1}(1750 \div 380\,000)$.

- a. Find the angle the Moon fills, in degrees, to 3 significant figures.
- b. Find the angle the Sun fills, in degrees, to 3 significant figures, using $2 \times \tan^{-1}(700\,000 \div 150\,000\,000)$.
- c. When the Sun's angle of elevation is 40° , a tree casts a shadow 12 m long. Find the height of the tree, to 3 significant figures.

Task C: A pinhole viewer

Never look at the Sun. A pinhole in a card makes a safe image of the Sun on a screen behind it. The image and the Sun make similar triangles with the pinhole.

- a. The screen is 1 m behind the pinhole. Find the width of the image, in mm, to 3 significant figures.
- b. The screen is moved to 2 m behind the pinhole. Find the width of the image, to 3 significant figures.
- c. How far behind the pinhole must the screen be for an image 2 cm wide? Give your answer in metres, to 3 significant figures.

Extension

1. Write $150\,000\,000 \div 380\,000$ in standard form, to 3 significant figures, and explain what it tells you.