

Eclipse geometry activities for IGCSE and GCSE: answers

IGCSE Math Revision · IGCSE and GCSE (Higher and Extended) · Teacher answers and notes

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

Teacher notes

- Safety first: never look at the Sun directly, even during an eclipse. A pinhole viewer (task C) is a safe way to see it.
- Every physical value is a rounded value given in the question; the real values vary.
- Task A is the big idea: 400 times wider and about 400 times further away is why the Moon can just cover the Sun.

Starter

1. **1.4×10^6**
 - $1\,400\,000 = 1.4 \times 1\,000\,000$
2. **$1/400$**
 - $1\,400\,000 \div 3500 = 400$
3. **9 m**
 - $12 \div 2.4 = 5$, and $1.8 \times 5 = 9$
4. **1**
 - Opposite = adjacent in a right-angled isosceles triangle.

Task A: Why the Moon just covers the Sun

- a. **400 times**
 - $1\,400\,000 \div 3500 = 400$
- b. **395 times**
 - $150\,000\,000 \div 380\,000 = 394.7...$
- c. **375 000 km**
 - Distance $\div 3500 = 150\,000\,000 \div 1\,400\,000$
 - Distance = $3500 \times 150\,000\,000 \div 1\,400\,000 = 375\,000$ km

Task B: Angles with tan

- a. **0.528°**
 - $\tan^{-1}(1750 \div 380\,000) = 0.2638...^\circ$
 - $\times 2 = 0.5277...^\circ$
- b. **0.535°**
 - $2 \times \tan^{-1}(0.004666...) = 0.5347...^\circ$
- c. **10.1 m**
 - height = $12 \times \tan 40^\circ = 10.06...$

Task C: A pinhole viewer

a. **9.33 mm**

- Image $\div$ 1000 mm = 1 400 000 $\div$ 150 000 000
- Image = 9.333... mm

b. **18.7 mm**

- Twice the distance gives twice the width: 18.66... mm

c. **2.14 m**

- 20 mm $\div$ 9.333... mm per metre = 2.142... m

Extension

1. **3.95×10^2 : the Sun is about 395 times further away**

- $150\,000\,000 \div 380\,000 = 394.7... = 3.95 \times 10^2$ (3 s.f.)
- The Sun is 400 times wider but only about 395 times further away, so it looks very slightly bigger.

Every question is original and every answer was recomputed by computer before publishing.