The Project

You buy an old-fashioned Victorian terraced house in a trendy part of London in order to convert it into a coffee shop.
So that everyone can access your shop, you decide to do away with the stairs and put a ramp in its place instead.

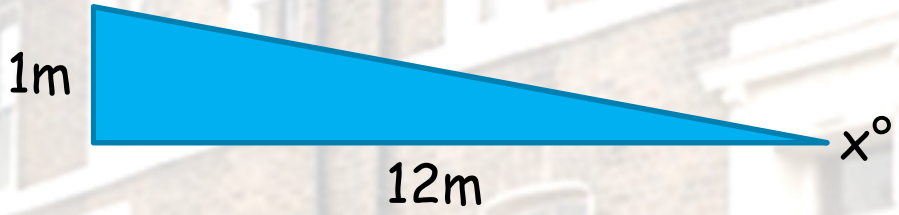
Initial Task

Read the problem carefully, then try to draw a diagram showing what will happen to the building.
Think about what information you will need to know before you can draw up your construction plans.

LO: Solve problems using trigonometry.

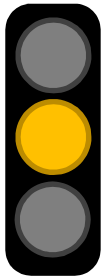
You are going to put a ramp in instead of stairs to the shop. The door is 0.5 m off the ground.

It is advisable for health and safety that wheelchair ramps do not exceed a 1 in 12 gradient. This means the ramp must go horizontally 12 metres for every 1 metre it goes vertically.



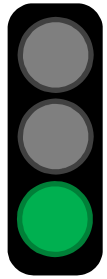
Task

Calculate the maximum angle of elevation, x°, that your ramp may have.

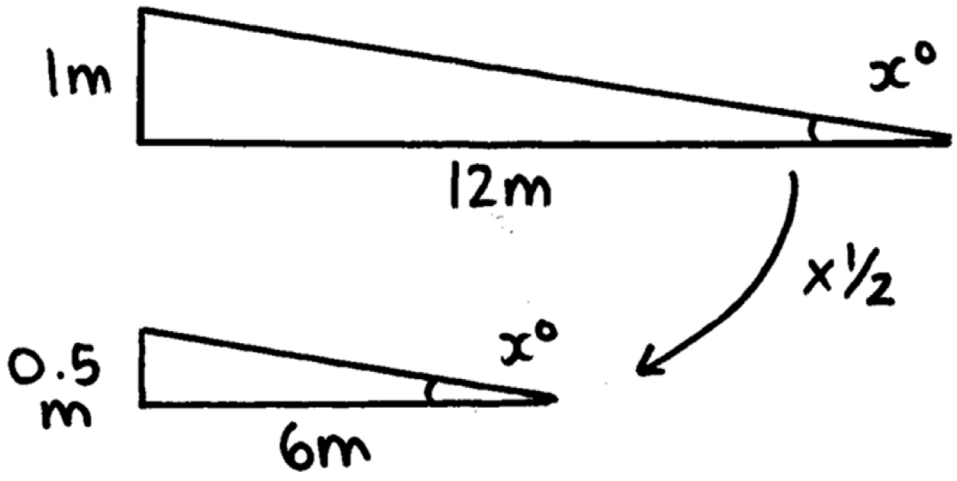


Challenge

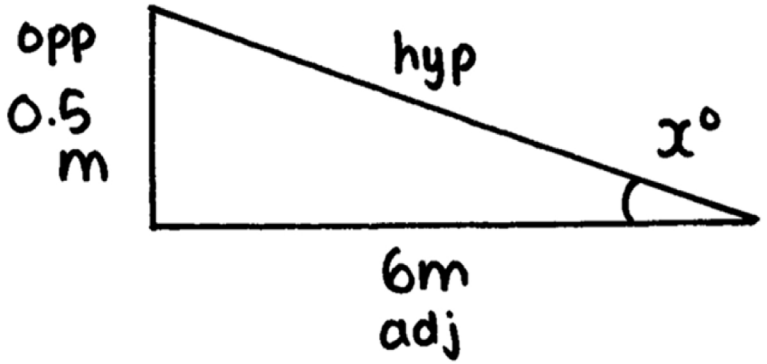
In exceptional circumstances, the ramp can be made steeper. If the angle of the ramp was 8°, what would the length of the ramp be?



Main Task



Use trigonometry to find missing angle.



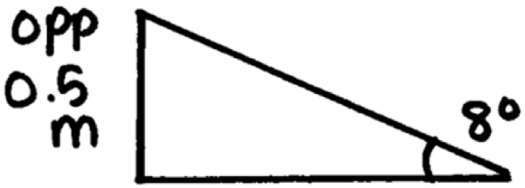
$$\tan x = \frac{0.5}{6}$$

$$x = \tan^{-1}\left(\frac{0.5}{6}\right)$$

$$= 4.763...$$

$$= \underline{\underline{5^\circ}} \text{ (to nearest degree)}$$

Challenge



$$\tan 8 = \frac{0.5}{L}$$

$$L = \frac{0.5}{\tan 8} = 3.557...$$

$$= \underline{\underline{3.56\,m}}$$