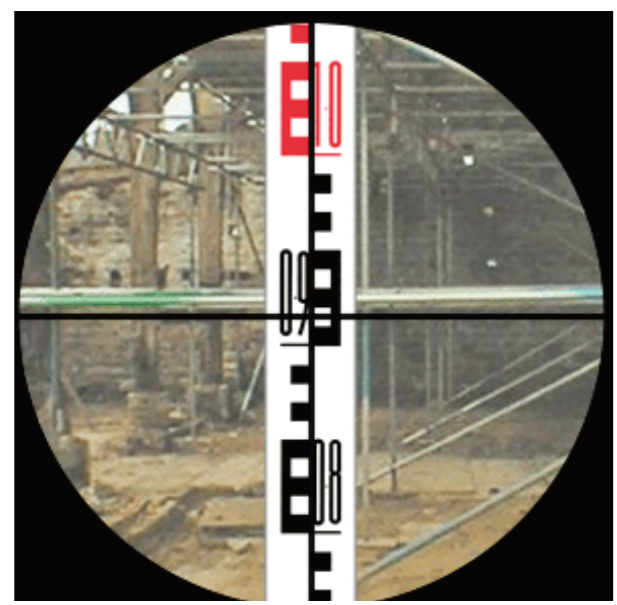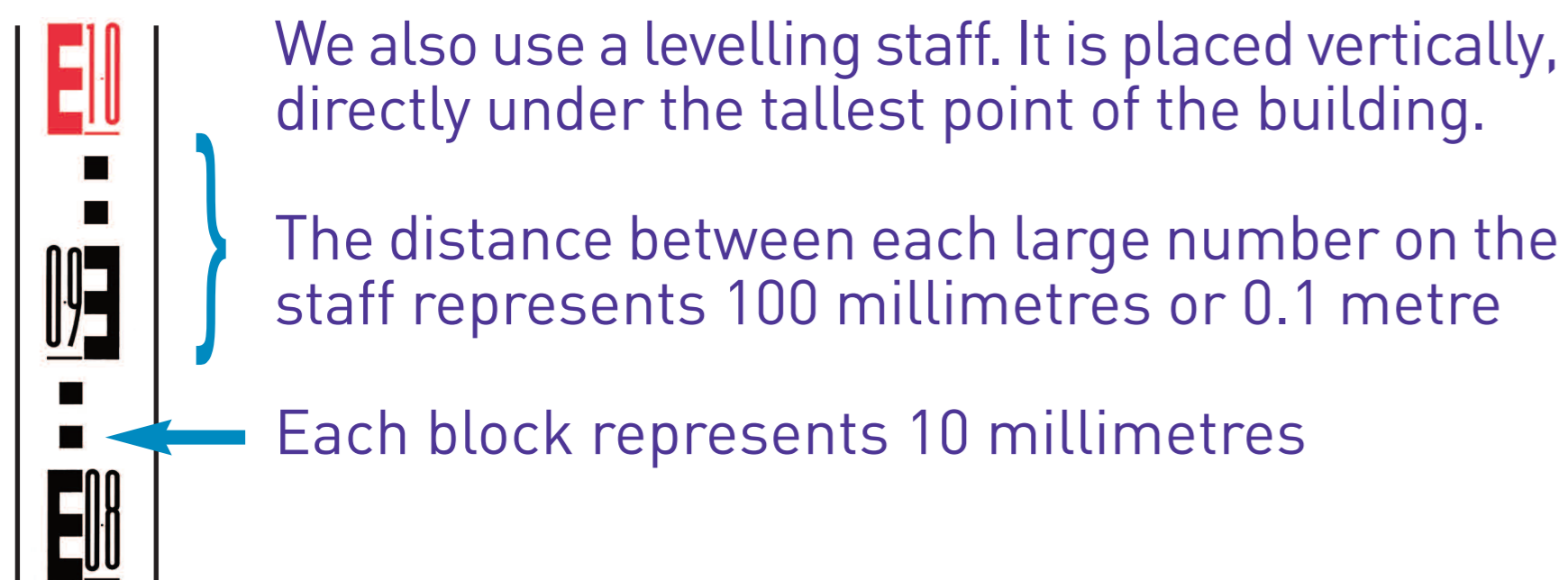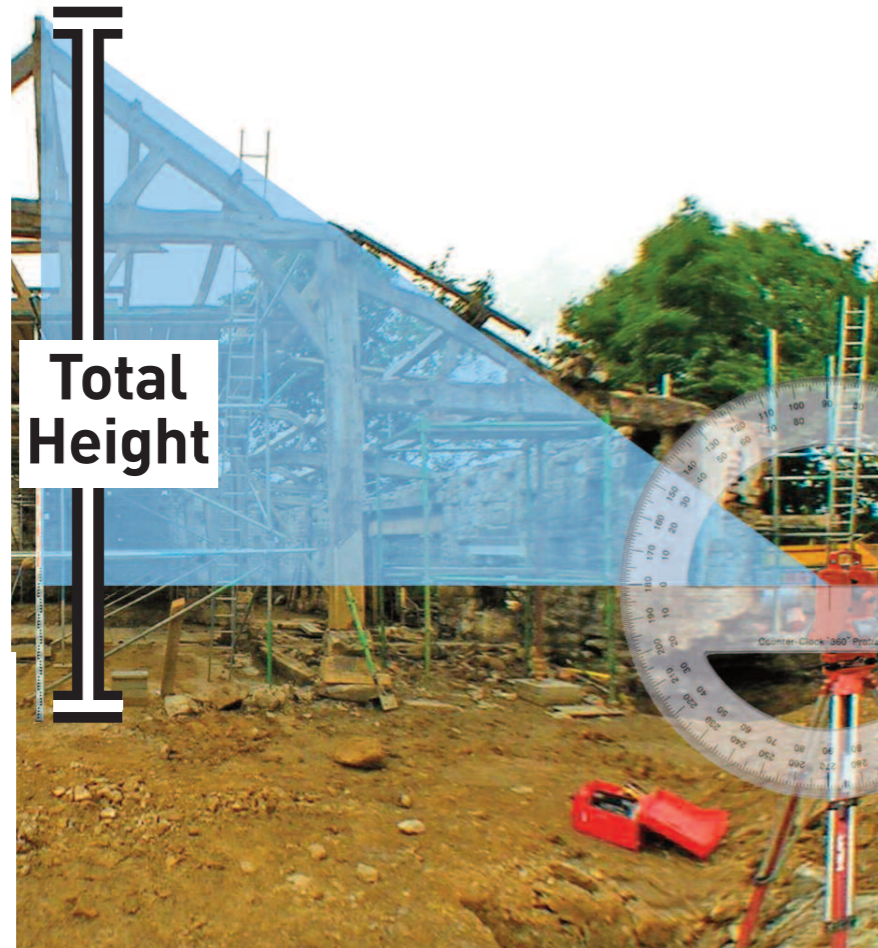# MOTIVATIONAL MATHS
SCHOOL OF THE BUILT ENVIRONMENT

The WYLLN Motivational Maths project, led by Leeds Metropolitan University, is developing open access maths materials. Using web technology, mathematics is set and contextualised in construction environments. The activities, plant and equipment within construction sites are ideal for exploring applied maths.
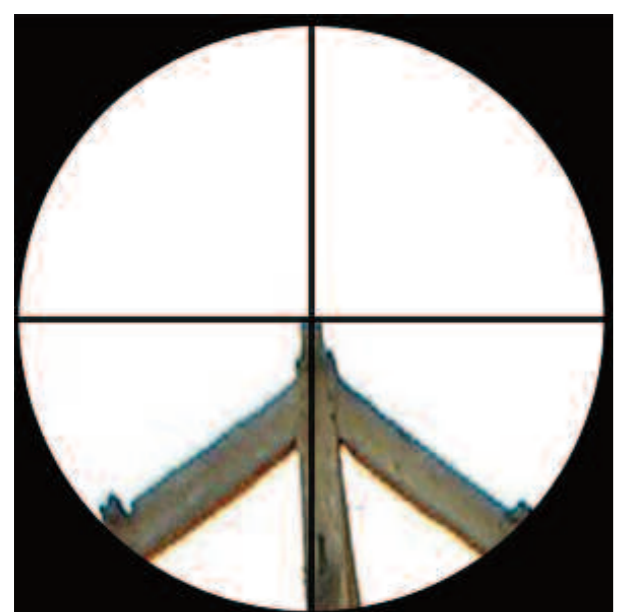
West Yorkshire Lifelong Learning Network

CONSTRUCTION KNOWLEDGE EXCHANGE

leeds metropolitan university

We will use a theodolite to calculate the total height of the building.

Total Height

We also use a levelling staff. It is placed vertically, directly under the tallest point of the building.

The distance between each large number on the staff represents 100 millimetres or 0.1 metre

Each block represents 10 millimetres

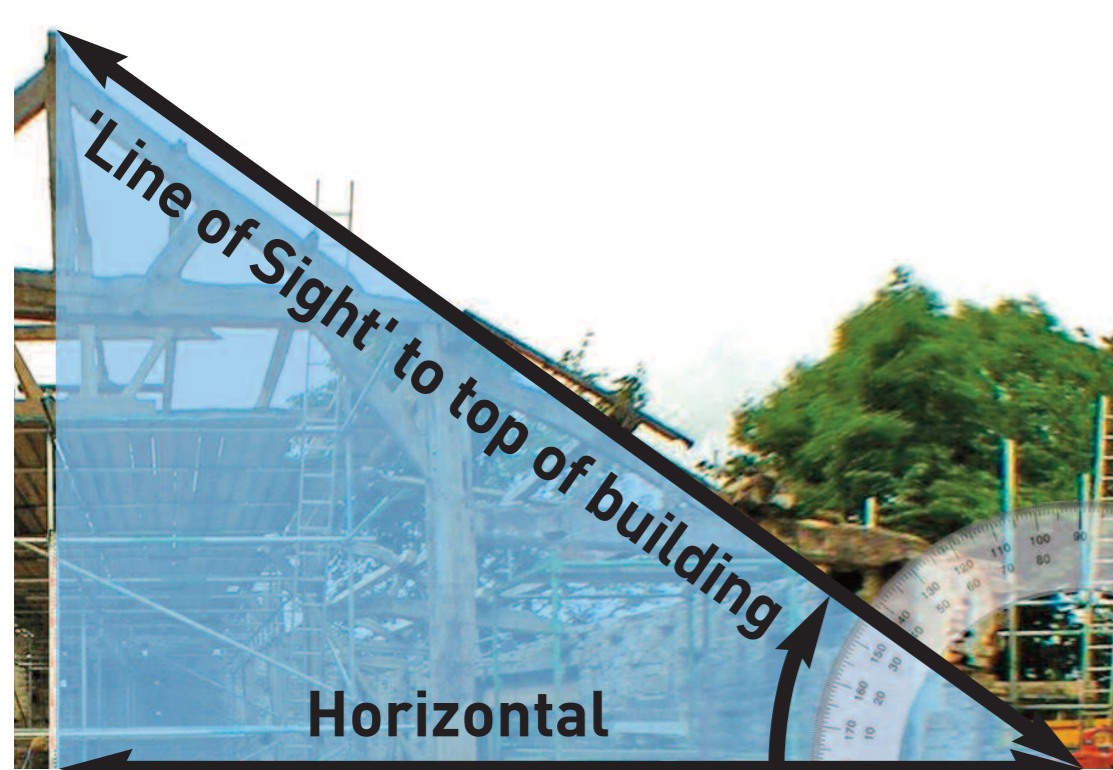We align the theodolite view to horizontal, then focus onto the staff.

The reading is the distance from the ground to the bottom of the blue triangle.

We then point the theodolite viewer at the top of the building and align the crosshairs to it.
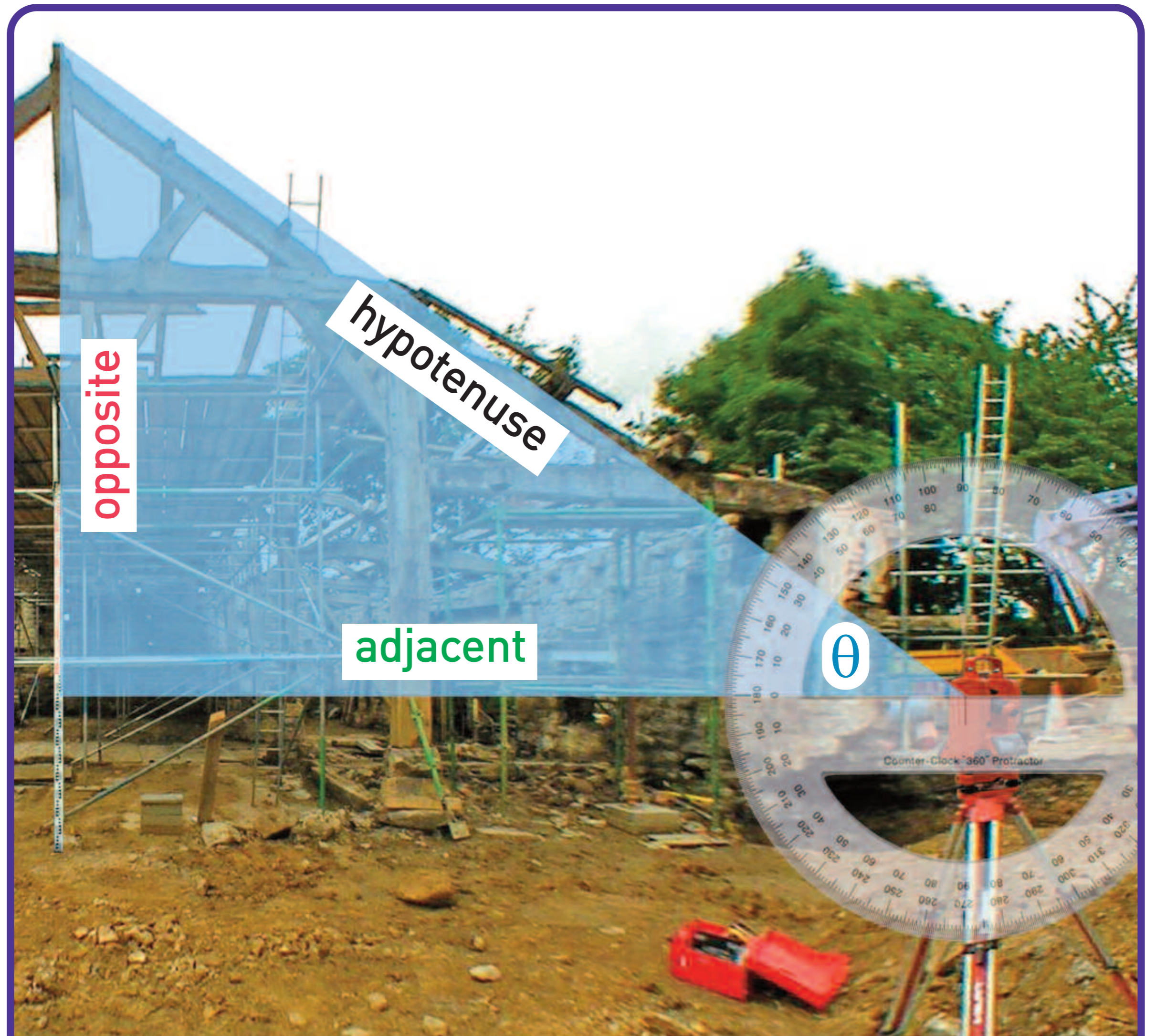
The theodolite display gives a digital readout of the angle between horizontal and the top of the building.

The angle is a rotation from 0 degrees (Horizontal) to the 'Line of Sight' to the top of the building.

'Line of Sight' to top of building

Horizontal

We also measure the distance from the centre of the theodolite to the staff, which gives us the **adjacent** length of the triangle.

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opposite   **hypotenuse**   **adjacent** θ

θ (theta) is the mathematical symbol used to represent the angle between the **hypotenuse** and **adjacent** lengths of a triangle.

Because we have measured the **adjacent** length and **theta** angle, we can work out the length **opposite** the angle using this formula:

$$\tan \theta = \frac{opp}{adj}$$

We know the value of θ and **adj**

but we don't know the value of **opp** so we rearrange the formula as:

$$opp = adj \times \tan \theta$$