

Thalès test (p. 47 in exercise notebook)

Ex 1 The lumberjack's cross

[top-right caption] lumberjack's cross
[caption just below] eye of the observer

Julien wants to measure a young oak tree with a lumberjack's cross, as shown in the diagram below. He places the cross so that O, D and A on one hand, and O, E and D on the other hand, are aligned.

He knows that $DE = 20$ cm and $OF = 35$ cm. He places segment $[DE]$ vertically and segment $[OF]$ horizontally. He measures $BC = 7.7$ m on the floor.

- Triangle ABO is an enlargement of triangle ODE. *Justify that the enlargement coefficient is 22.*
 - Calculate the height of the tree in metres.*
 - Some lumberjack crosses are such that $DE = OF$. *What is the advantage of this type of cross?*
-

Ex 2 The coconut tree

Document 1: extracts from the alphabetical list of pupils in 3^e 4 and from data gathered in P. E. to prepare for athletics events.

[table] first name date of birth year heith (in m) number of steps taken over 100m

Document 2 : in the sketch below, the tiki represents Moana, a pupil in 3^e 4.

Moana first placed coconuts on the ground from the coconut tree, evenly spaced with each step, and then positioned themselves exactly as shown on the sketch at the 7th coconut.

Using information from the previous documents, calculate the height of the coconut tree.

Ex 3 Adjusting the headlights

To adjust a car's dipped headlights, it is placed facing a vertical wall. The headlight, identified with point P, emits a beam of light directed towards the ground. The following measurements are taken :

In the diagram below, which is not to scale, point S represents the point where the upper ray of the beam would meet the ground in the absence of the wall. The dipped headlights are considered to be correctly adjusted if ratio KQ/PQ lies between 1.5% and 2%.

- Check that the car's dipped headlights are adjusted correctly.*
- At what maximum distance from the car will an obstacle on the road be illuminated by the dipped headlights?*