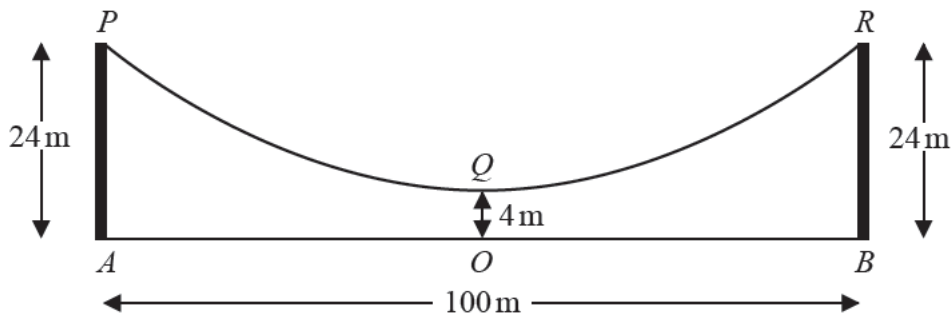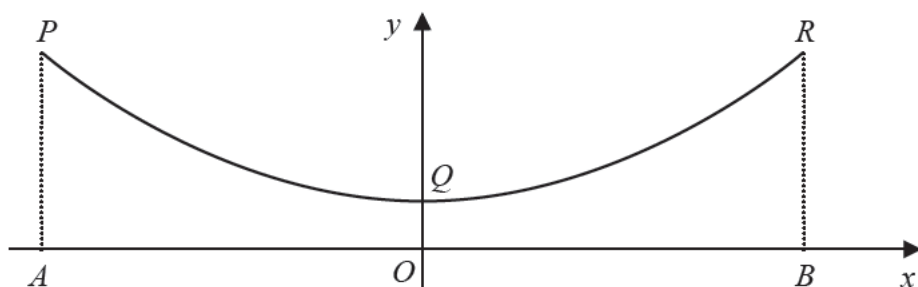**12.**

Figure 5

Figure 6

A suspension bridge cable PQR hangs between the tops of two vertical towers, AP and BR, as shown in Figure 5.

A walkway AOB runs between the bases of the towers, directly under the cable.

The towers are $100\,\text{m}$ apart and each tower is $24\,\text{m}$ high.

At the point O, midway between the towers, the cable is $4\,\text{m}$ above the walkway.

The points P, Q, R, A, O and B are assumed to lie in the same vertical plane and AOB is assumed to be horizontal.

Figure 6 shows a symmetric quadratic curve PQR used to model this cable.

Given that O is the origin,

(a) find an equation for the curve PQR.

(3)

Lee can safely inspect the cable up to a height of $12\,\text{m}$ above the walkway.

A defect is reported on the cable at a location $19\,\text{m}$ horizontally **from one of the towers**.

(b) Determine whether, according to the model, Lee can safely inspect this defect.

(2)

(c) Give a reason why this model may not be suitable to determine whether Lee can safely inspect this defect.

(1)