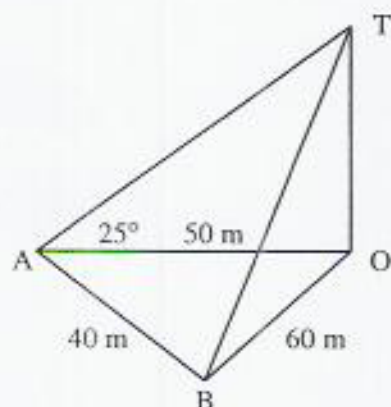


4. In the figure, OT is a vertical tower, and the points O, A and B are on level ground. The lengths AB, OA and OB are 40 m, 50 m and 60 m respectively and the angle of elevation of T from A is 25° .



Calculate the angle ATB.

[6]

5. At a particular point on the earth's surface, the number n of hours of daylight x days after the start of the year is modelled by the formula

$$n = 12 - 6 \cos\left(\frac{2\pi x}{360}\right)$$

where the angle is in radians.

- (a) Calculate the length of the day on May 1st, which is day 121.

[1]

- (b) Find the value of x for which the length of day is increasing fastest.

[4]

- (c) Criticise the model, and indicate how you could improve it.

[2]

6. Over the first 2 seconds as it accelerates from rest, the velocity v m/s of an aeroplane is modelled by the equation $v = 10\sqrt{t}$, where t is measured in seconds from the moment that the aeroplane starts to move.

- (a) According to the model, how far does the aeroplane travel in the first two seconds?

[4]

- (b) Calculate the acceleration of the aeroplane when $t = 2$.

[3]

- (c) Why does this model not give a satisfactory value for the acceleration at $t = 0$?

[1]