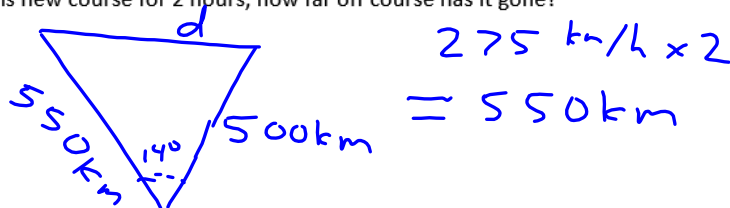


Applying Trigonometry in Real-World Problems

Example 1

- An airplane leaves a city. It begins by flying 250 km/h on a course 9° East of North. However wind changes the speed of the plane to 275 km/h and its direction to a course of 5° West of North. If the plane continues flying on this new course for 2 hours, how far off course has it gone?

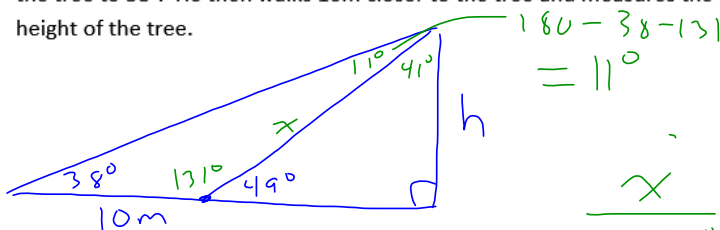


$$d^2 = 550^2 + 500^2 - 2(550)(500)\cos 140^\circ$$

$$d \approx 137.2 \text{ km}$$

Example 2

A lumberjack wants to estimate the height of a tree. He begins by measuring the angle of elevation to the top of the tree to 38°. He then walks 10m closer to the tree and measures the angle of elevation to be 49°. Find the height of the tree.



$$\sin 49^\circ = \frac{h}{32.3}$$

$$h = 32.3 \sin 49^\circ$$

$$h \approx 24.4 \text{ m}$$

$$\frac{x}{\sin 38^\circ} = \frac{10}{\sin 11^\circ}$$

$$x = \frac{10 \sin 38^\circ}{\sin 11^\circ}$$

$$x \approx 32.3 \text{ m}$$

MCF3M

Lesson 7

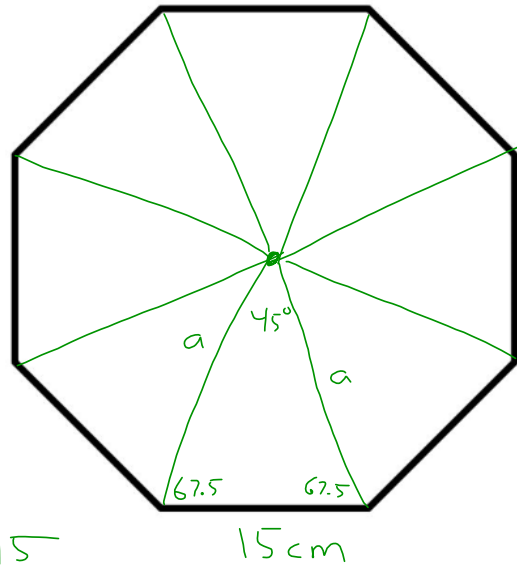
Example 3

A **regular octagon** has all side lengths equal to 15 cm. Find the length of the apothem.

NOTES:

Regular polygon – has all sides and angles equal.

Apothem – the distance from the centre of a regular polygon to one of the vertices.



$$\frac{180 - 45}{2} = \frac{135}{2} = 67.5^\circ$$

$$\frac{360^\circ}{8} = 45^\circ$$

$$\frac{a}{\sin 67.5^\circ} = \frac{15}{\sin 45^\circ}$$

$$a = \frac{15 \sin 67.5^\circ}{\sin 45^\circ}$$

$$a \approx 19.59 \text{ cm}$$

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