

## Triangles Ex 4.7 Q20

#### Answer:

(i) Since AD perpendicular to BC we obtained two right angled triangles, triangle ADB and triangle ADC.

We will use Pythagoras theorem in the right angled triangle ADC

$$AC^2 = AD^2 + DC^2 \dots (1)$$

Let us substitute AD = h, AC = b and DC = (a - x) in equation (1) we get,

$$b^2 = h^2 + (a - x)^2$$

$$b^2 = h^2 + a^2 - 2ax + x^2$$

$$b^2 = h^2 + a^2 + x^2 - 2ax$$
 .....(2)

(ii) Let us use Pythagoras theorem in the right angled triangle ADB as shown below,

$$AB^2 = AD^2 + BD^2 \cdot \dots (3)$$

Let us substitute AB = c, AD = h and BD = x in equation (3) we get,

$$c^2 = h^2 + x^2$$

Let us rewrite the equation (2) as below,

$$b^2 = h^2 + x^2 + a^2 - 2ax$$
 .....(4)

Now we will substitute  $h^2 + x^2 = c^2$  in equation (4) we get,

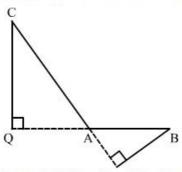
$$b^2 = c^2 + a^2 - 2ax$$

Therefore,  $b^2 = c^2 + a^2 - 2ax$ 

# Triangles Ex 4.7 Q21

### Answer:

Given: △ABC where ∠BAC is obtuse. PB ⊥AC and QC⊥AB.



To prove: (i)  $AB \times AQ = AC \times AP$  and (ii)  $BC^2 = AC \times CP + AB \times BQ$ 

Proof: In  $\triangle$ ACQ and  $\triangle$ ABP,

∠CAQ = ∠BAP (Vertically opposite angles)

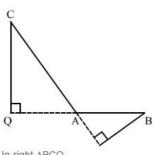
$$\angle Q = \angle P (= 90^{\circ})$$

∴ ∆ACQ ~ ∆ABP [AA similarity test]

$$\Rightarrow \frac{CQ}{BP} = \frac{AC}{AB} = \frac{AQ}{AP} \quad \text{[Corresponding sides are in the same proportion]}$$

$$\frac{AC}{AB} = \frac{AQ}{AP}$$

$$\Rightarrow AQ \times AB = AC \times AP \tag{1}$$



In right 
$$\Delta BCQ$$
,

$$\Rightarrow$$
 BC<sup>2</sup> = CQ<sup>2</sup> + QB<sup>2</sup>

$$\Rightarrow$$
 BC<sup>2</sup> = CQ<sup>2</sup> + (QA + AB)<sup>2</sup>

$$\Rightarrow$$
 BC<sup>2</sup> = CQ<sup>2</sup> + QA<sup>2</sup> + AB<sup>2</sup> + 2QA × AB

$$\Rightarrow$$
 BC<sup>2</sup> = AC<sup>2</sup> + AB<sup>2</sup> + QA × AB + QA × AB

$$\Rightarrow$$
 BC<sup>2</sup> = AC<sup>2</sup> + AB<sup>2</sup> + QA × AB + AC × AP

$$\Rightarrow$$
 BC<sup>2</sup> = AC (AC + AP) + AB (AB + QA)

$$\Rightarrow$$
 BC<sup>2</sup> = AC × CP + AB × BQ

# \*\*\*\*\*\*\*\*\* END \*\*\*\*\*\*\*

[In right  $\triangle ACQ$ ,  $CQ^2 + QA^2 = AC^2$ ]

(Using (1))