

Pythagorean Theorem: Proof and Applications

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Solutions for Homework Exercises

1. (The lake Exercise): We know that the distance between the points A and C , (i.e., $AC = 150\text{m}$) as well as $CB = 90\text{m}$. Since the angle ABC is 90° and we have right triangle angle in B , we apply Pathygonean theorem to find the length of the lake AB .

$$(AC)^2 = (AB)^2 + (CB)^2$$

$$(150)^2 = (90)^2 + (CB)^2$$

which implies that $CB = \sqrt{22500 - 8100} = 120$

2. (Television Exercise) To find the length of diagonal of TV, we can apply the Pathagorean theorem. Assuming that the screen of TV is

$$(CB)^2 = (BC)^2 + (DC)^2$$

$$(BD)^2 = (15)^2 + (19)^2$$

solve for BD we get,

$$BD = 24\text{in}$$

3. (Minimum distance) We need to find the minimum of $AP + BP$, we already know that the optimal position of P is the middle point of CD , i.e., $DP = PC = 4$. Now, to find AP , we apply Pathegorean theorem as

$$(AP)^2 = (DP)^2 + (AD)^2$$

$$(AP)^2 = 4^2 + 3^2$$

which implied that $AP = 5$. Similarly, we apply Pathegorean theorem on the triangle BCP , to find $BP = \sqrt{41}$. Therefore $AP + PB = 5 + \sqrt{41}$