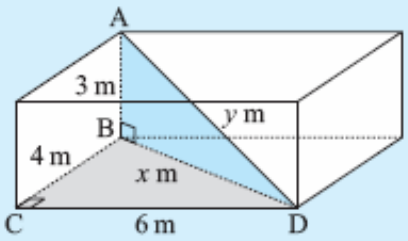
More IB Trig Revision
Chapter 10 – "Practical Trigonometry"

We all know the Pythagorean Theorem!
Let's look at it in 3 dimensions!

See page 207 in our textbook:

Example 3

A room is 6 m by 4 m at floor level and the floor to ceiling height is 3 m. Find the distance from a floor corner point to the opposite corner point on the ceiling.



The required distance is AD. We join BD.

In ΔBCD, $x^2 = 4^2 + 6^2$ {Pythagoras}

$\therefore \quad x^2 = 16 + 36 = 52$

In ΔABD $y^2 = x^2 + 3^2$

$\therefore \quad y^2 = 52 + 9 = 61$

$\therefore \quad y = \sqrt{61} \div 7.81$

i.e., the required distance is 7.81 m.

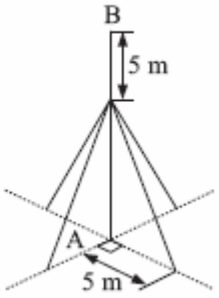
An alternate approach would be to built the room to specifications and then measure what you needed. That is NOT practical!

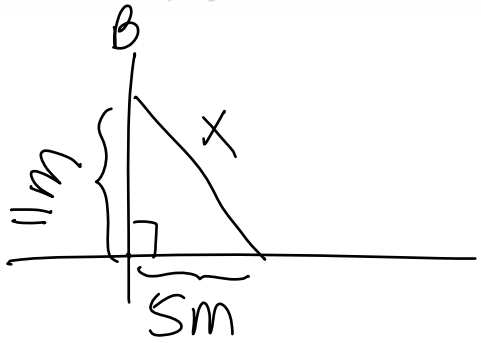
Let's try #1 on page 207

EXERCISE 10B

1 A pole AB is 16 m tall above the ground. At a point 5 m below B, four wires are connected from the pole to the ground.

Each wire is pegged to the ground 5 m from the base of the pole. What is the total length of the wire needed given that a total of 2 m extra is needed for tying?





$x^2 = 5^2 + 11^2$

$x^2 = 146$

$x = \sqrt{146}$

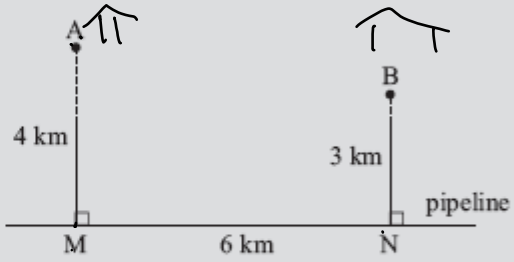
Need $4\sqrt{146}\text{ m} + 2\text{m} = 50.32\text{m}$

($4\sqrt{146}$ m: 4 wires; $+ 2$m: + extra; 50.32m: total amt of wire)

Now let's consider the investigation on page 208:

INVESTIGATION **SHORTEST DISTANCE**

A and B are two farm houses which are 4 km and 3 km away from a water pipeline. M and N are the nearest points (on the pipeline) to A and B respectively, and MN = 6 km. The cost of running a spur pipeline across country from the main pipe line is \$3000 per km and the cost of a pump is \$8000. Your task is to determine the most economic way of pumping the water from the pipeline to A and B. Should you use two pumps (located at M and N) or use one pump located somewhere between M and N knowing that one pump would be satisfactory to pump sufficient water to meet the needs of both farm houses?



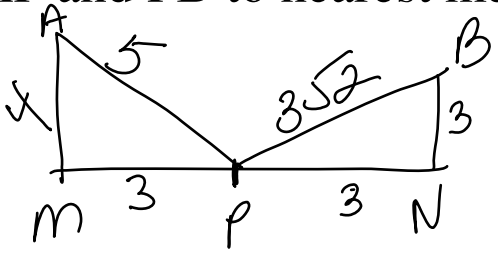
1. Total cost if two pumps are used

2 PUMPS = \$16000

7 KM = \$21000

TOTAL COST = \$37000

2. (a) Find AP and PB to nearest meter [metre]



$AP = 5$ KM

$BP = 3\sqrt{2}$ KM

2. (b) Find Total Cost

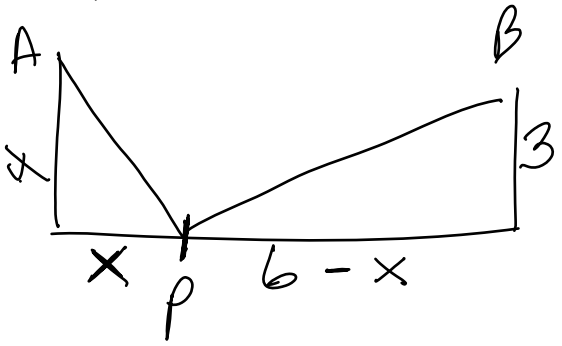
1 PUMP $8000

$5 + 3\sqrt{2} \approx 9.2$

$9.2 (\$3000) \approx 27727$

TOTAL COST $\approx \$35727$

3.



(a) Find AP in terms of x

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

$\sqrt{x^2 + 4^2} = AP$

(b) Find BP in terms of x

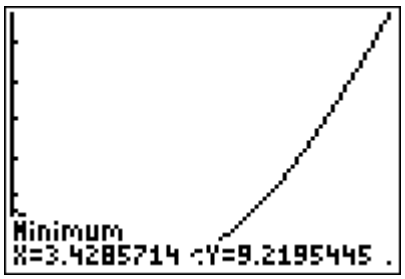
$(6-x)^2 + 3^2 = (BP)^2$

$\sqrt{(6-x)^2 + 9} = BP$

(c) Show AP +BP = $\sqrt{x^2+16} + \sqrt{x^2-12x+45}$

AMOUNT OF PIPE LINE

(d) Use G.D.C. to find the minimum value of AP +BP

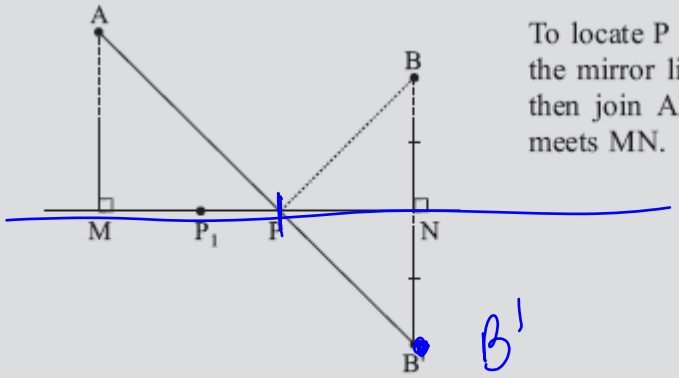


MIN AMT OF PIPE LINE
$\approx$ 9.22 m

5. Find Total Cost

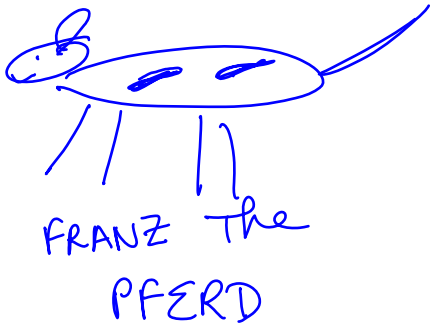
\$8000 + 9.22 (\$3000)
$\approx$ \$35660

6



To locate P geometrically we reflect B in the mirror line MN. Its image is B′. We then join AB′. P is located where AB′ meets MN.

Show that the above statement is correct. (**Hint:** AP + PB = AP + PB′ and compare APB′ with AP_1B' for any other point P_1 on MN.)



I will assume that we all know our six trig ratios.

So, for homework: Read Chapter 10 and do page 215 #7, 8, 9, and 10