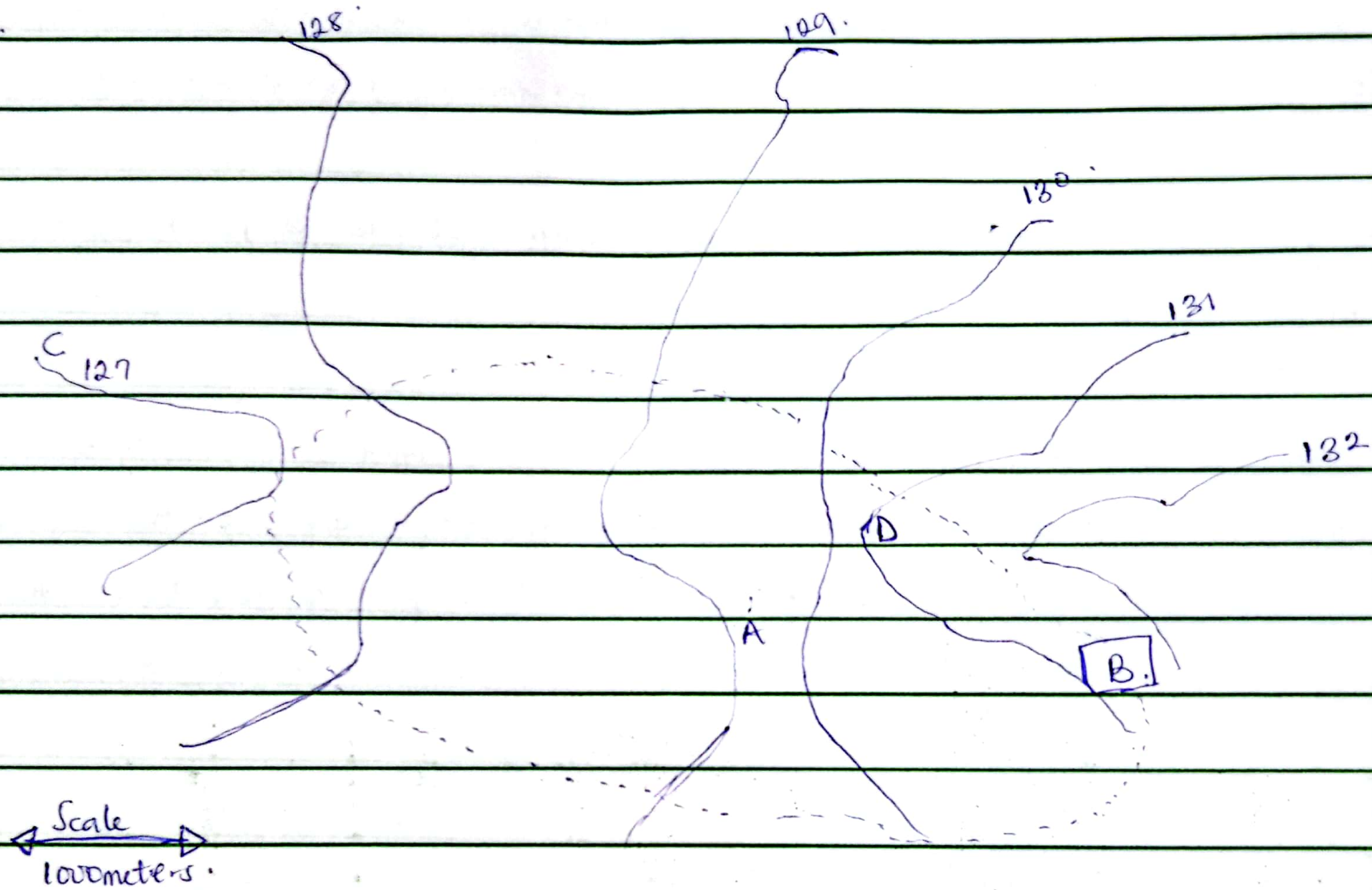
2.



2a. Hydraulic ~~gradient $\frac{dh}{dx}$~~ (H) = Δh

2a. Hydraulic gradient (H) = $\sqrt{(dh/dx)^2 + (dh/dy)^2} = \frac{\Delta h}{L}$

$$H = \frac{132 - 127}{1000 - 0}$$

$$H = \frac{5}{1000} = 0.005$$

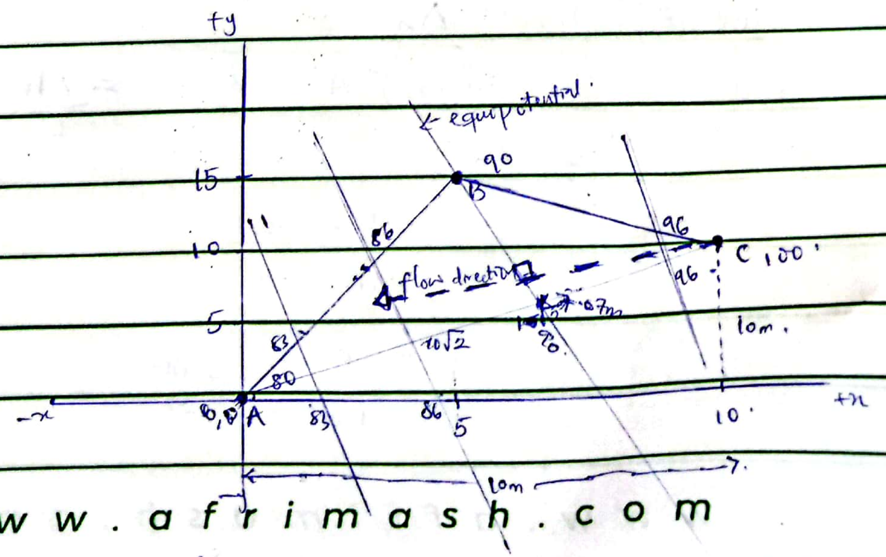
2b. The dotted lines on the sketch are the area/region that will be impacted by contaminant from B due to the hydraulic gradient, since water flows from high potential to low potential

c. For the given sketch, the likely recharge area in the aquifer system is at point B, Height (132) while the discharge point is at C.

d. It is likely ~~for~~ that any portion of the water entering the aquifer in the vicinity of point D will eventually arrive at point C because of slope or ~~higher~~ height difference. Water flows from high level to low level and since point C has the lowest point of 127, therefore, it is likely that water from point D with a height of 131 will arrive at C with a height of 127.

3. Given:

$[x, y] = [0,0], [5,15], [10,10]$



Applying the pythagoras theorem.

$$|AC|^2 = 10^2 + 10^2.$$

$$|AC| = \sqrt{100 + 100}$$

$$|AC| = 10\sqrt{2}\,m = 14.14m.$$

(i) But Hydraulic gradient is given by: change in water level (height) / distance (L).

B

$$H = \frac{\Delta h}{L.} = \frac{h_2 - h_1}{L} = \frac{100 - 80}{10\sqrt{2}} = \frac{20}{10\sqrt{2}} = 1.414m$$

(ii) To get the flow direction, we calculate the equipotential line using:

$$L = \left[\frac{m - l}{h - l}\right] \times D.$$

where, L = equipotential line. for the middle between the highest & lowest

m = the middle well height.

l = the lowest well height.

h = highest well height.

D = Distance between the highest well height and lowest well height.

$$L = \left(\frac{90 - 80}{100 - 80}\right) \times 10\sqrt{2}. = \frac{10}{20} \times 10\sqrt{2}.$$

$$L = 7.07m.$$

Since the flow direction must be perpendicular to the equipotential, hence the flow ~~move~~ travels from point C to point A.

WEEK 2 HOMEWORK.

1. Given

Area of watershed = 100 ha.

change in water table (Δw in water table) = 5m.

Porosity of the area (n) = 30%.

Specific retention (S_r) = 10%.

Specific yield (S_y) = ?

change in groundwater storage (ds) = ?

(i) Recall that porosity (n) = $S_y + S_r$.

$$\frac{30}{100} = S_y + \frac{10}{100}.$$

$$0.3 = S_y + 0.1$$

$$S_y = 0.3 - 0.1$$

$$S_y = 0.2 \equiv \underline{20\%}.$$

(ii) change in groundwater storage (ds) = Area of watershed $\times \Delta w \times S_y$.

$$= 100 \times 5 \times 20\%.$$

$$= 100 \times 5 \times 0.2.$$

$$= 100\,\text{ha-m} \equiv 100 \times 10^4\,m^3 . \equiv \underline{1 \times 10^6\,m^3}$$