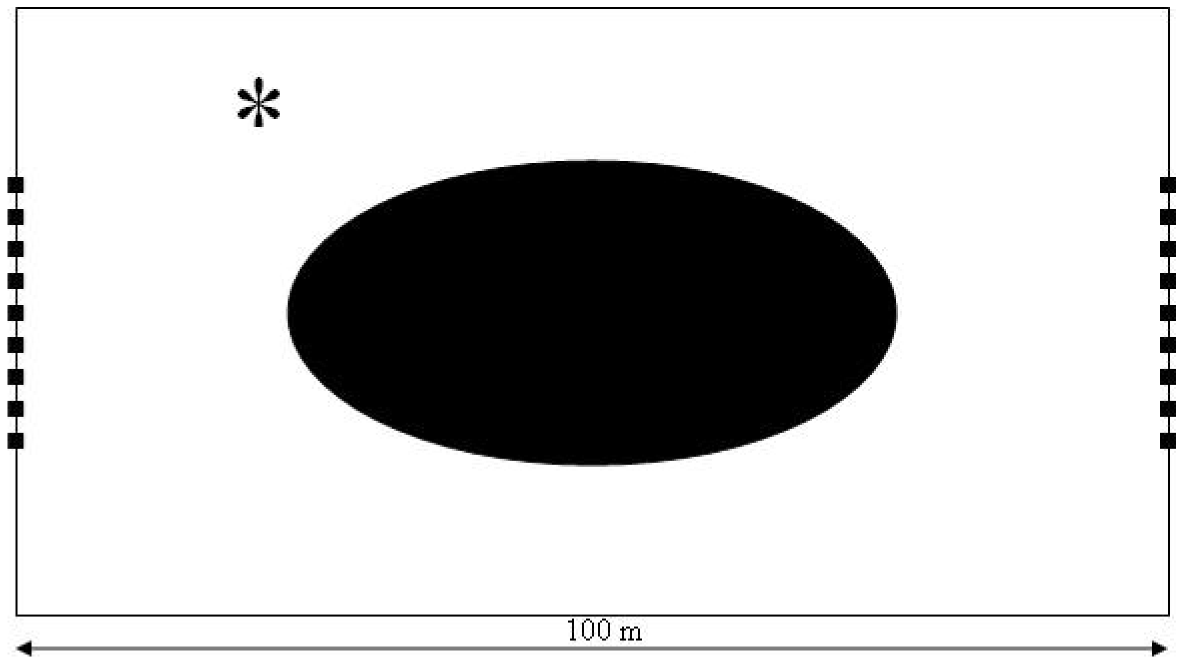
A sand filter has its base at 0 meters and is 10 meters high. It is the same from top to bottom. A plan view, to-scale diagram of it is shown below. There is an impermeable pillar in the center of the filter. Reservoirs on the left and right are separated from the sand by a screen that only crosses a portion of the reservoir wall. The head in the inlet reservoir on the left is 20 m and the outlet reservoir on the right is 12m. Properties of the sand are: $K=1x10^{-3}$ m/s $S=1x10^{-3}$ SY=0.2. Draw and label a flow net. Calculate the discharge through the system using units of meters and seconds. What is the head at the location of the * at the top of the tank? What is the pressure at that location?



- equipotential lines parallel constant head boundaries
- flow lines parallel no-flow boundaries
- streamlines are perpendicular to equipotential lines
- equipotential lines are perpendicular to no-flow boundaries
- form squares by intersecting stream and equipotential lines

Try this before next class

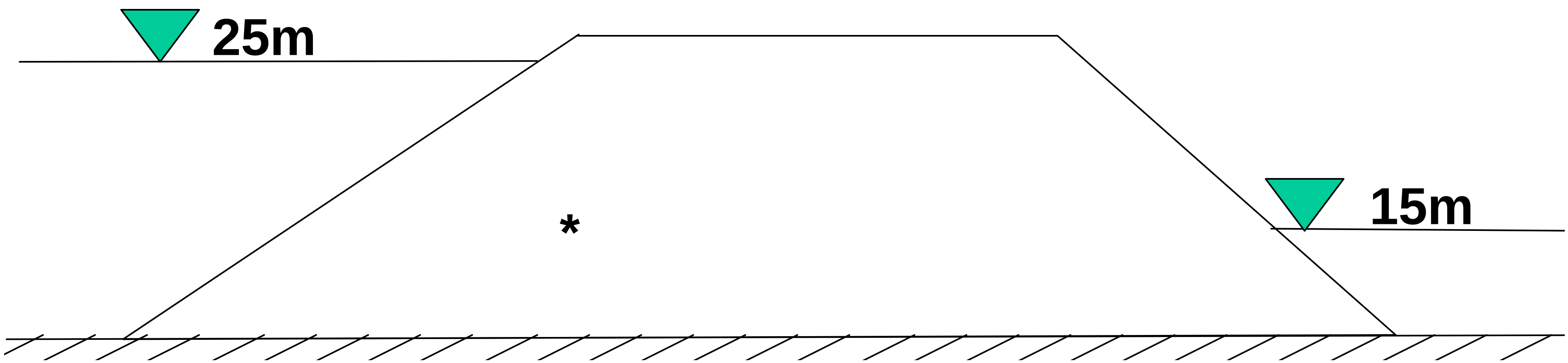
K = 0.53m/day

Draw the flow net

Calculate Q

What is the maximum gradient?

What are the head and pressure at the *?



We can use the flow net to identify areas where critical gradients may occur and determine the magnitude of the gradient at those locations

- equipotential lines parallel constant head boundaries
-- flow lines parallel no-flow boundaries
-- streamlines are perpendicular to equipotential lines
- equipotential lines are perpendicular to no-flow boundaries
- form squares by intersecting stream and equipotential lines

What is the flux under the sheet pile wall if K=2ft/day?
Will piping occur?

$$Q = q_A n_f = KH \frac{n_f}{n_d}$$