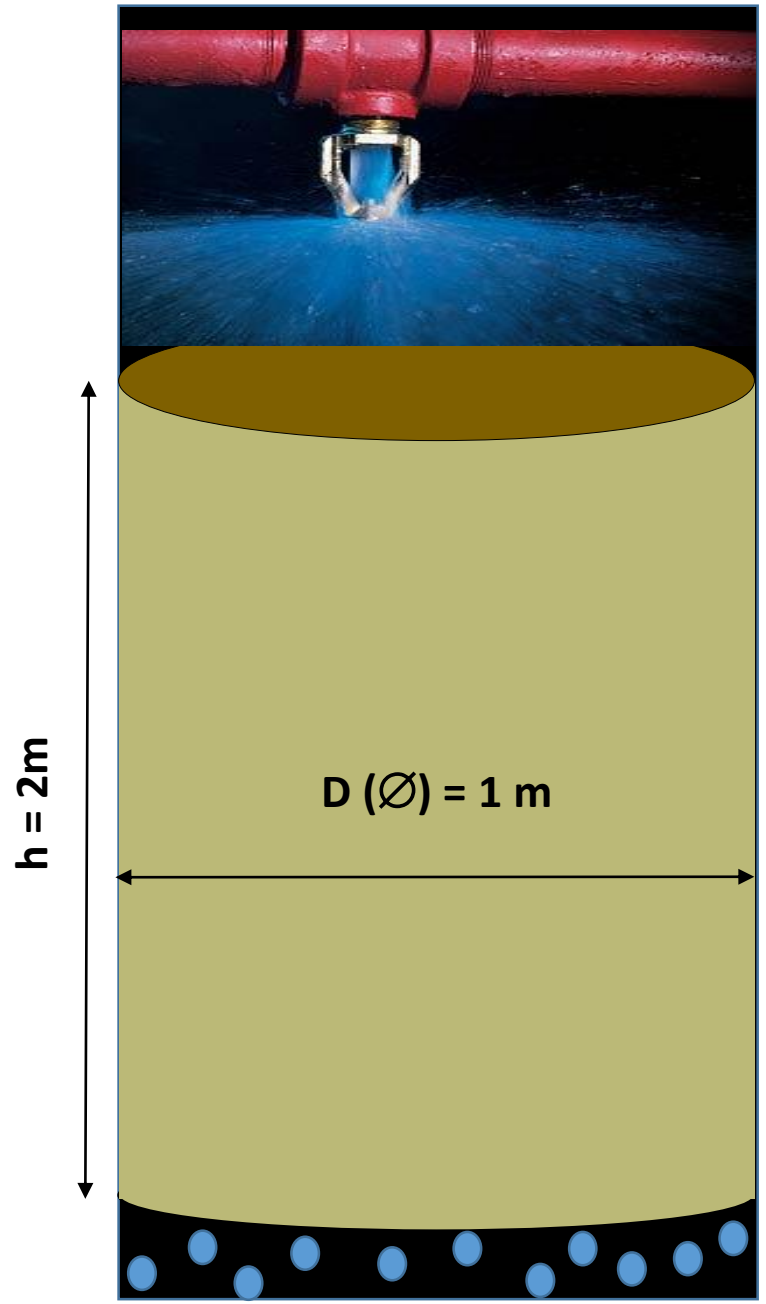
Calculate, how long does it take to obtain 100 m^3 of filtered water through the given setup:

The filter (for dimensions see the fig.) is filled with a mixture of ground lime stone and quartz sand. The hydraulic characteristics were measured by the standard methods (retention curve on sand tank and in pressure apparatus) – see table.

Saturated hydraulic conductivity (Ks) of the material is **220 cm/d**.
Initial conditions: uniform h_{init}= -600 cm
Boundary conditions:
- top: sprinkler with intensity 4.2 mm/h
- bottom: water drips freely out from the filter, determine the correct BC

Top 50 cm contain a solute (conservative tracer), concentration of 10 mg/cm^3 of soil.
Transport characteristics:
- Bulk density 1.5 g/cm3
- Dispersivity: 15 cm
- Molecular diffusion coefficient in water: 4 cm^2/d

h (cm)	θ
1	0.407
5	0.350
10	0.261
20	0.161
35	0.110
50	0.091
75	0.077
100	0.071
300	0.060
1000	0.0572
10000	0.057



Prepare a report:
- brief task description
- methodology
- retention curve + van Genuchten's parameters
- description of Hydrus input parameters
- Results:
  - plot cumulative outflow from the filter and the tracer breakthrough curve in the middle of the filter
  - How long does it take before a steady state flow is obtained?
  - How long does it take to obtain 100 m^3 of filtered water?
  - How much tracer stays in the filter after 6 days?
  - When is 95% of the solute washed out from the filter?