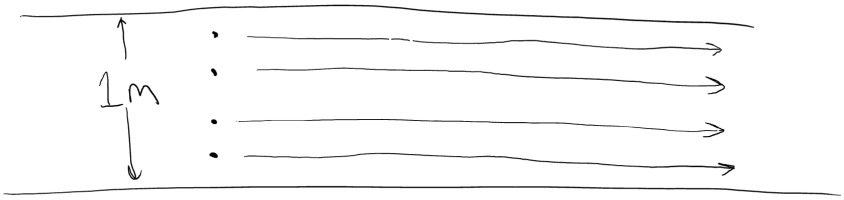
P426 Readings
Week 02

1.

Sketch of ink droplets flow down-stream at equal velocities.

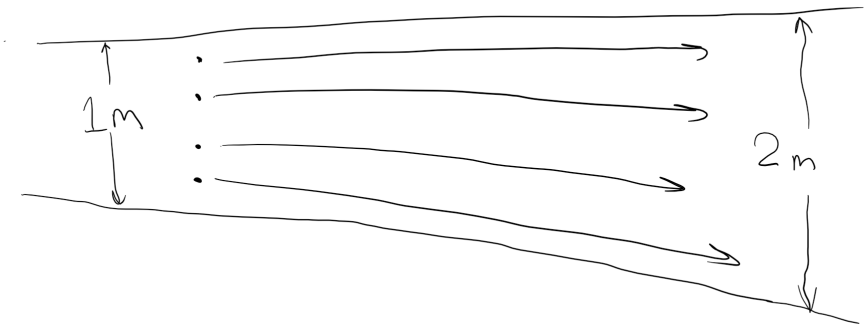


Without any acceleration or friction it requires no energy to keep the velocity of the water constant.

With friction and steady velocity, the most likely source of energy would come from the difference in elevation from up-channel to down-channel. Well, both the elevation and the Earth's gravitational field to be explicit.

2.

Sketch of stream that gradually widens.

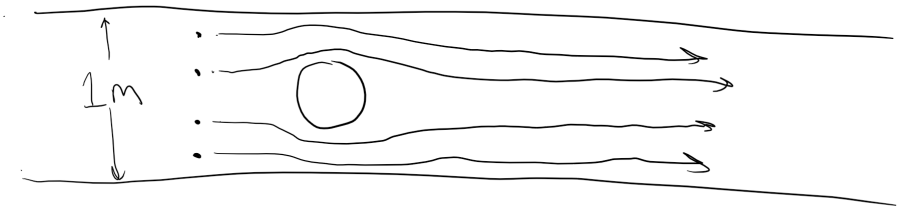


Fluid will flow to take the shape of its container, so there is some cross-channel (sideways) velocity. Because of this, the ink streaks will flow apart.

Momentum is conserved between any two points up and down the channel; there is more mass down-channel than up-channel, so velocity is lower down-channel.

3.

Sketch of stream with cylinder.



A shear force is acting on the fluid by the cylinder, causing deformation.