**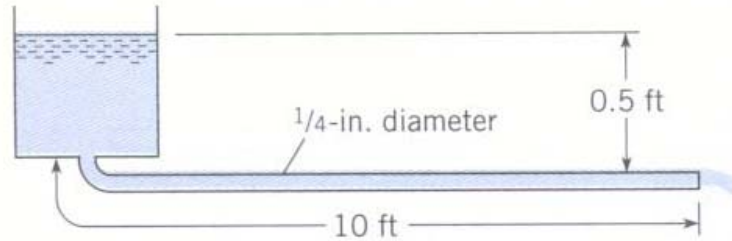10.8** Kerosene (S = 0.80 and $T = 68°F$) flows from the tank shown and through the 3/8-in.-diameter (ID) tube. Determine the mean velocity in the tube and the discharge. (The dynamics viscosity of Kerosene is $4 \times 10^{-5}$ lbf-s/ft$^2$ )
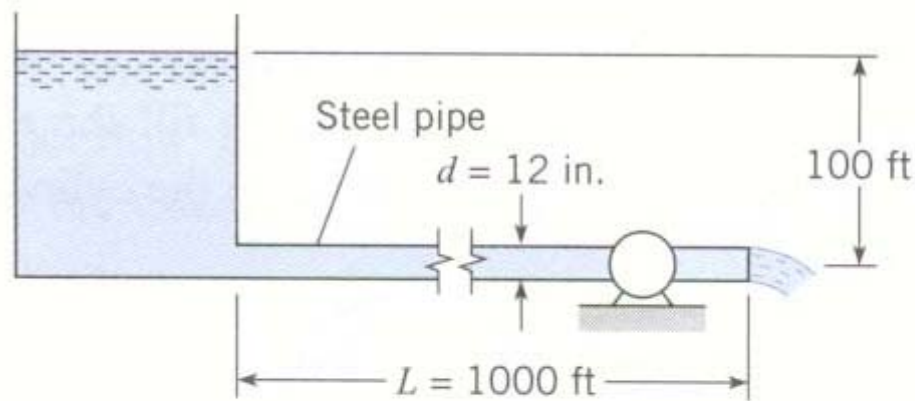


PROBLEM 10.8

**10.34** Glycerin at 20°C flows at 0.6 m/s in the 2-cm commercial steel pipe. Two piezometers are used as shown to measure the piezometric head. The distance along the pipe between the standpipes is 1 m. The inclination of the pipe is 20°. What is the height difference $\Delta h$ between the glycerin in the two standpipes?
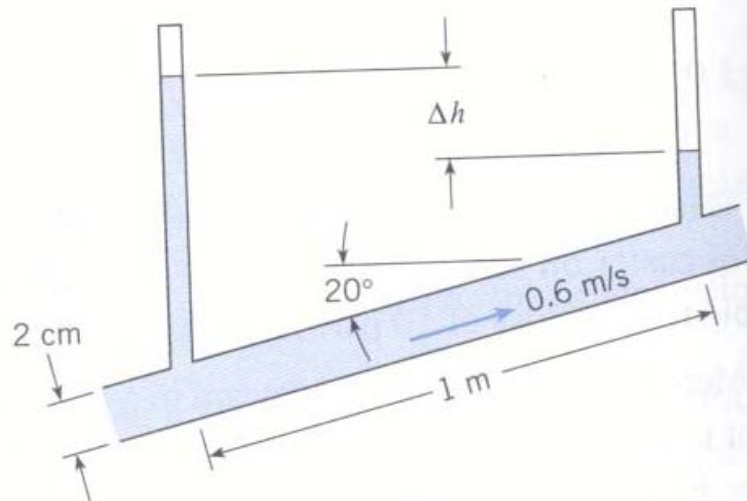


PROBLEM 10.34

**10.44** A water turbine is connected to a reservoir as shown. The flow rate in this system is 5 cfs. What power



Steel pipe
$d = 12$ in.

100 ft

$L = 1000$ ft

PROBLEM 10.44

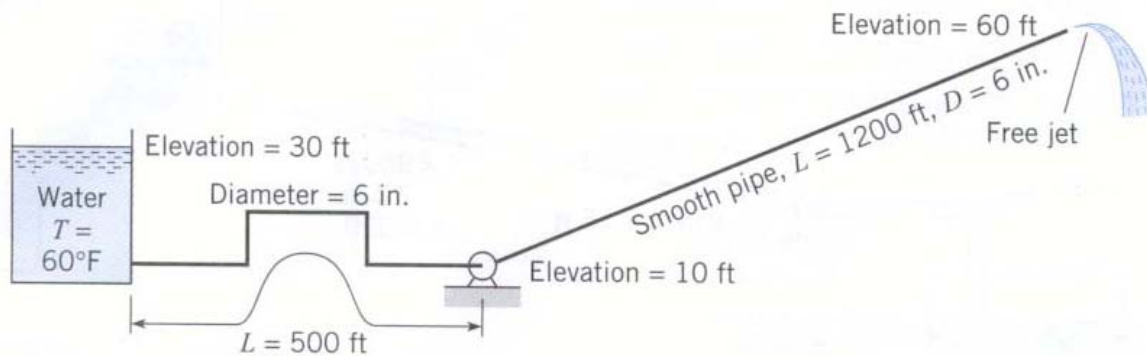can be delivered by the turbine if its efficiency is 80%? Assume a temperature of 70°F.

**10.50** Water is pumped through a vertical 10-cm new steel pipe to an elevated tank on the roof of a building. The pressure on the discharge side of the pump is 1.6 MPa. What pressure can be expected at a point in the pipe 80 m above the pump when the flow is 0.02 m³/s? Assume $T = 20$°C.

**10.63** A fluid with $\nu = 10^{-6}$ m²/s and $\rho = 800$ kg/m³ flows through the 8-cm galvanized-iron pipe. Estimate the flow rate for the conditions shown in the figure.
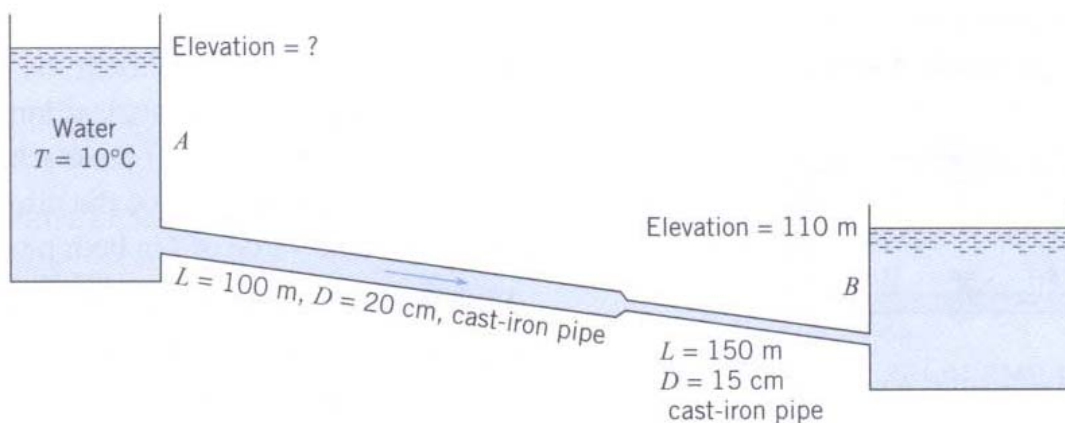


PROBLEM 10.63
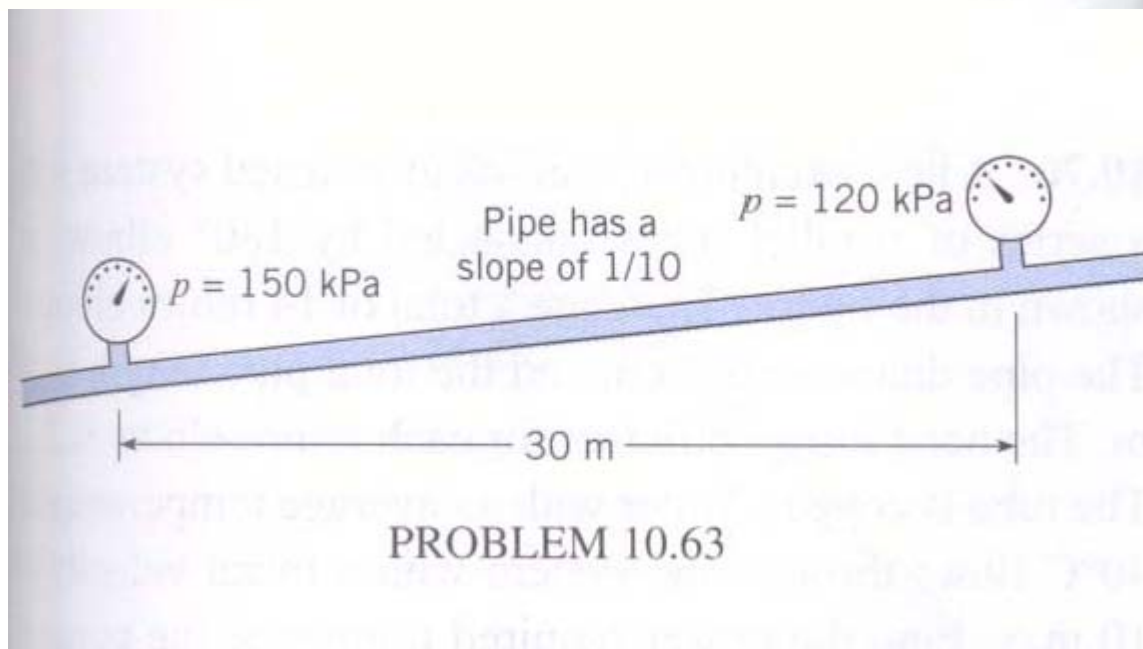
**10.67** What diameter of cast-iron pipe is needed to carry water at a rate of 10 cfs between two reservoirs if the reservoirs are 2 mi apart and the elevation difference between the water surfaces in the reservoirs is 20 ft?

**10.95** If the deluge through the system shown is 2.0 cfs, what horsepower is the pump supplying to the water? Draw the HGL and the EGL for the system, and determine the water pressure at the midpoint of the long pipe. The four bends have a radius of 12 in., and the 6-in. pipe is smooth. (The 4 bends are flanged bends.)

Elevation = 60 ft

Elevation = 30 ft

Water
$T = 60°F$

Diameter = 6 in.

Smooth pipe, $L = 1200$ ft, $D = 6$ in.

Free jet

Elevation = 10 ft

$L = 500$ ft

PROBLEM 10.95

**10.100** If the water surface elevation in reservoir $B$ is 110 m, what must be the water surface elevation in reservoir $A$ if a flow of 0.03 m³/s is to occur in the cast-iron pipe? Draw the HGL and the EGL, including relative slopes and changes in slope.

Elevation = ?

Water
$T = 10°C$

$A$

Elevation = 110 m

$B$

$L = 100$ m, $D = 20$ cm, cast-iron pipe

$L = 150$ m
$D = 15$ cm
cast-iron pipe

PROBLEM 10.100