Chapter 12

Problems & Exercises

1.

2.78 cm^3/s

3.

27 cm/s

5.

(a) 0.75 m/s

(b) 0.13 m/s

7.

(a) 40.0 cm^2

(b) 5.09×10^7

9.

(a) 22 h

(b) 0.016 s

11.

(a) 12.6 m/s

(b) 0.0800 m^3/s

(c) No, independent of density.

13.

(a) 0.402 L/s

(b) 0.584 cm

15.

(a) 127 cm^3/s

(b) 0.890 cm

17.

$$\begin{aligned} P &= \tfrac{\text{Force}}{\text{Area}}, \\ (P)_{\text{units}} &= \text{N}/\text{m}^2 = \text{N} \cdot \text{m}/\text{m}^3 = \text{J}/\text{m}^3 \\ &= \text{energy}/\text{volume} \end{aligned}$$

19.

184 mm Hg

21.

2.54×10^5 N

23.

(a) 1.58×10^6 N/m^2

(b) 163 m

25.

(a) 9.56×10^8 W

(b) 1.4

27.

1.26 W

29.

(a) 3.02×10^{-3} N

(b) 1.03×10^{-3}

31.

1.60 cm^3/min

33.

8.7×10^{-11} m^3/s

35.

0.316

37.

(a) 1.52

(b) Turbulence will decrease the flow rate of the blood, which would require an even larger increase in the pressure difference, leading to higher blood pressure.

39.

225 mPa $\cdot$ s

41.

0.138 Pa $\cdot$ s,

or

Olive oil.

43.

(a) 1.62×10^4 N/m^2

(b) 0.111 cm^3/s

(c)10.6 cm

45.

1.59

47.

2.95×10^6 N/m^2(gauge pressure)

51.

$N_{\mathrm{R}} = 1.99 \times 10^2 <$ 2000

53.

(a) nozzle: 1.27×10^5 , not laminar

(b) hose: 3.51×10^4, not laminar.

55.

2.54 « 2000, laminar.

57.

1.02 m/s

1.28×10^{-2} L/s

59.

(a) 13.0 m

(b) 2.68×10^{-6} N/m^2

61.

(a) 23.7 atm or 344 lb/in^2

(b) The pressure is much too high.

(c) The assumed flow rate is very high for a garden hose.

(d) $5.27 \times 10^6 > > 3000$, turbulent, contrary to the assumption of laminar flow when using this equation.

62.

1.41×10^{-3} m

64.

1.3×10^2 s

66.

0.391 s