

Answers

1. (b) (i) $(1100y + 250y^2)g$ (ii) 21.9 kN
2. (a) 720 pa
3. (a) $2V_0$ (b) $\frac{3}{2}\rho V_0^2$ (c) $\frac{4}{3}\pi R^2 \rho V_0^2$ (d) $\frac{7}{6}\pi R^2 \rho V_0^2$
4. (a) 1603 K (b) -207 kJ, -310 kJ, -517 kJ
5. (b) $\frac{(n-\gamma)}{(\gamma-1)(n-1)}R(T_2 - T_1)$
6. (a) 579 K, 2.81 MW (b) 764 K, 9.08 kg s⁻¹, 40.4%
(c) 747 K, 553 JK⁻¹s⁻¹
7. (a) 4Ω (b) $\frac{3m\Omega^2 R^2}{T}$
8. (a) $2\omega L$ (b) $4Q + 2FL$
9. (a) $F = \rho gvt + \rho v^2$ for $0 < t \leq L/v$ and $F = \rho Lg$ for $L/v < t$
(b) $z = t\sqrt{\frac{F}{\rho}} - \frac{t^2 g}{6}$
(c) $t = \frac{3}{g}\left(\sqrt{\frac{F}{\rho}} - \sqrt{\frac{F}{\rho} - \frac{2Lg}{3}}\right)$
(d) $F > \frac{2L\rho g}{3}$
10. (a) $A = \frac{L}{2}$, $b = \Omega$ (b) $\frac{1}{\Omega}\cosh^{-1}(2)$
11. (a) $f = \frac{100}{2\pi}$ (b) $0.1\sqrt{2}$ (c) 6.9 s
12. (b) $\omega^2 = \frac{5k \pm \sqrt{16k^2 + (\Delta k)^2}}{m}$
(c) $X_1 - X_2 = \frac{2Y \Delta k m \omega^2}{[(9k - m\omega^2)(k - m\omega^2) - (\Delta k)^2]}$