Cube Surface Area Problems

Keys for Similar Problems

1. **Solution for Problem 1:**
   - Given: $\frac{dv}{dt} = 30$ cm^3/sec, $r = 6$ cm.
   - $\frac{dr}{dt} = \frac{30}{4\pi \cdot 6^2} = \frac{30}{144\pi} = \frac{5}{24\pi}$ cm/sec.
   - $\frac{ds}{dt} = 8\pi \cdot 6 \cdot \frac{5}{24\pi} = \frac{240}{24} = 10$ cm^2/sec.
2. **Solution for Problem 2:**
   - Given: $\frac{dv}{dt} = 25$ cm^3/sec, $r = 4$ cm.
   - $\frac{dr}{dt} = \frac{25}{4\pi \cdot 4^2} = \frac{25}{64\pi} = \frac{25}{64\pi}$ cm/sec.
   - $\frac{ds}{dt} = 8\pi \cdot 4 \cdot \frac{25}{64\pi} = \frac{800}{64} = 12.5$ cm^2/sec.
3. **Solution for Problem 3:**
   - Given: $\frac{dv}{dt} = 15$ cm^3/sec, $r = 7$ cm.
   - $\frac{dr}{dt} = \frac{15}{4\pi \cdot 7^2} = \frac{15}{196\pi} = \frac{15}{196\pi}$ cm/sec.
   - $\frac{ds}{dt} = 8\pi \cdot 7 \cdot \frac{15}{196\pi} = \frac{840}{196} = 4.29$ cm^2/sec.
4. **Solution for Problem 4:**
   - Given: $\frac{dv}{dt} = 10$ cm^3/sec, $r = 8$ cm.
   - $\frac{dr}{dt} = \frac{10}{4\pi \cdot 8^2} = \frac{10}{256\pi} = \frac{5}{128\pi}$ cm/sec.
   - $\frac{ds}{dt} = 8\pi \cdot 8 \cdot \frac{5}{128\pi} = \frac{320}{128} = 2.5$ cm^2/sec.
5. **Solution for Problem 5:**
   - Given: $\frac{dv}{dt} = 35$ cm^3/sec, $r = 3$ cm.
   - $\frac{dr}{dt} = \frac{35}{4\pi \cdot 3^2} = \frac{35}{36\pi}$ cm/sec.
   - $\frac{ds}{dt} = 8\pi \cdot 3 \cdot \frac{35}{36\pi} = \frac{840}{36} = 23.33$ cm^2/sec.
6. **Solution for Problem 6:**
   - Given: $\frac{dv}{dt} = 50$ cm^3/sec, $r = 10$ cm.
   - $\frac{dr}{dt} = \frac{50}{4\pi \cdot 10^2} = \frac{50}{400\pi} = \frac{1}{8\pi}$ cm/sec.
   - $\frac{ds}{dt} = 8\pi \cdot 10 \cdot \frac{1}{8\pi} = 10$ cm^2/sec.