1. A stone A is dropped from rest from the edge of a cliff as shown. After one second, another stone B is dropped from rest. Determine:
   (a) the distance between the stones after another second (10)
   (b) the time interval between the instant A hits the water and the instant B hits the water (10)
   (c) the speed at which A and B hit the water (10)

2. Determine the maximum height on the wall to which the firefighter can project water from the hose, if the speed of the water at the nozzle is \( v_c = 16 \text{ m/s} \). (30)

3. Determine the constant speed of the passengers on the amusement-park ride if it is observed that the supporting cables are directed at \( \theta = 30^\circ \) from the vertical as shown. Each chair including its passengers has a mass of 80 kg. Also, what are the force components along the \( n \), \( t \), and \( b \) directions which the chair exerts on a 50-kg passenger during the motion? (40)

**Useful equations**

\[
\begin{align*}
    v &= \frac{dx}{dt} \\
    a &= \frac{dv}{dt} = \frac{d^2x}{dt^2} = \frac{dv}{dx}
\end{align*}
\]

Uniform rectilinear motion: \( x = x_0 + vt \)

Uniformly accelerated rectilinear motion: \( v = v_0 + at \), \( x = x_0 + v_0t + \frac{1}{2}at^2 \), \( v^2 = v_0^2 + 2a(x - x_0) \)

Acceleration components:

- Tangential & normal \( a_t = \frac{dv}{dt} \), \( a_n = \frac{v^2}{\rho} \)
- Radial and transverse \( a_r = \ddot{r} - r\dot{\theta}^2 \), \( a_\theta = r\ddot{\theta} + 2\dot{r}\dot{\theta} \)

**Other useful relations**

\[ \sin 2\theta = 2\sin \theta \cos \theta \]