1. A
2. B
3. C
4. B
5. D
6. (a) \( \vec{v}_i = v_x \hat{i} + v_y \hat{j} \)
\[ |\vec{x}_i| = \sqrt{v_x^2 + v_y^2} \]
\[ \beta = \tan^{-1} \frac{v_y}{v_x} \]
(b) \( \vec{v}_{top} = v_x \hat{i} \)
(c) \( \vec{a}_{top} = -g \hat{j} \) assuming “up” is positive
(d) \( \Delta t_{top} = \frac{v_y}{g} \)
(e) \( R = \frac{2v_x v_y}{g} \)

| Slowing down moving in (−) direction (A) | Uniform motion in negative direction |
| Reversing direction (B) | Speeding up at a decreasing rate |
| Speeding up in (+) direction | Slowing down suddenly (C) then at a decreasing rate |

7. Slowing down moving (+) direction (A) | Speeding up at a decreasing rate |
Reversing direction (B) | From (E), uniform motion in (+) direction |
Speeding up i (−) direction | then (A) slowing down at an increasing rate to zero |
Oscillating back and forth about the zero position |

8. Both A and B see both balls moving identically, but they each see the balls moving in different ways.
A sees both balls rising, slowing down, reversing direction at the same height at the same time, falling with increasing magnitude of velocity, and hitting the ground at the same instant.
B sees both balls falling as if released from rest, speeding up in the downward direction together and hitting the ground at the same instant.
Both A and B see the balls accelerate at the same rate, \( g \) in the downward direction. They see the balls hit the base of the cliff at the same instant.