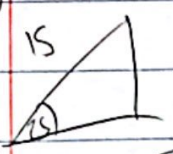
Problem Set 2.6 Randy Sim Period 6 Honors Physics

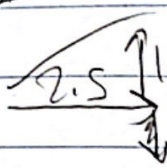
1)



North = $15\sin(25°) = \boxed{6.34\ m/s}$

East = $15\cos(25°) = \boxed{13.6\ m/s}$

2)

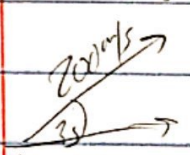


$\sqrt{2.5^2+1.5^2} = \boxed{2.92\ m/s}$

3) $\frac{300\ m}{100\ m/s} = 3s \quad \frac{15m}{s} \cdot 3s = \boxed{45m}$

4) $\frac{0.5m}{0.1\ m/s} = 5s \quad \frac{10m}{5s} = \boxed{2\ m/s}$

5)



vertical = $200\sin(35°) = 115\ m/s$

horizontal = $200(\cos(35°) = 164\ m/s$

6) horizontal acceleration is $0 m/s^2$

vertical acceleration is $-9.81 m/s^2$ (gravity)

7) It takes half the time for a projectile to reach its maximum height than to complete its flight.

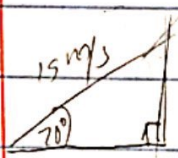
8) Vertical speed of A is greater than vertical speed of B

9) horizontal speed B = horizontal speed C

10) vertical acceleration A = vertical acceleration C.

11) horizontal acceleration A = horizontal acceleration B = 0

12)



a) $15\sin(70) = \boxed{5.13\ m/s}$

b) $V_i = 5.13\ m/s \quad V_f = 0 m/s \quad a = -9.81\ m/s^2 \quad t = ?$

$V_f = V_i + at \quad \frac{V_f - V_i}{a} = t \quad t = \frac{-5.13}{-9.81} = 0.523s$

$0.523s \cdot 2 = \boxed{1.05s}$

13) 24 m/s, 60°
a) $24\cos(60) = 12\ m/s$
b) $12\ m/s \cdot 2.12\ s = 25.5\ m$

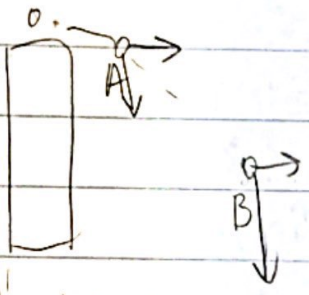
14) 12 m/s, 15 m/s
a) $v_i = 12\ m/s$ $v_f = 0\ m/s$ $a = -9.81\ m/s^2$ $t = ?$
$v_f = v_i + at$ $t = \frac{v_f - v_i}{a}$ $t = \frac{-12}{-9.81} = 1.22\ s$
b) $\tan^{-1}\left(\frac{12}{15}\right) = 38.7°$

15) d) (straight up, 90°)

16) B 17) B 18) Horizontal acceleration is 0.
Vertical acceleration is $-9.81\ m/s^2$

19) Initial vertical velocity of horizontally launched object is $0\ m/s$

20) a) $V_{Ay} < V_{By}$
b) $V_{Ax} = V_{Bx}$
c) A Same
d) same



21) time
$d = 10\ m$ $t = ?$ $t = 1.43\ s$
$v_i = 0\ m/s$ $d = v_i t + \frac{1}{2}at^2$ $1.43 \cdot 8 = 11.4\ m$
$a = 9.81\ m/s^2$ $t = \sqrt{\frac{2d}{a}}$ $t = \sqrt{\frac{20}{9.81}}$

22) $d = 15\ m$ | $a = -9.81\ m/s^2$ $d = ?$ $d = \frac{1}{2}(9.8)(3)^2$
$V_x = 5\ m$ | $v_i = 0\ m/s$ $d = v_i t + \frac{1}{2}at^2$ $d = 44.1\ m$
$t = 15/5 = 3\ s$ | $t = 3\ s$

23) time
$d = 15\ m$ $t = ?$
$v_i = 0\ m/s$ $d = v_i t + \frac{1}{2}at^2$ $t = \sqrt{\frac{30}{9.81}} = 1.75\ s$ | $\frac{40\ m}{1.75\ s} = 22.9\ m/s$
$a = -9.81\ m/s^2$ $t = \sqrt{\frac{2d}{a}}$

24) a), b), c), d), g) are true