

1. $A: <-15, 0>$

$B: <15.56, 15.56>$

$C: <11.59, 3.11>$

$R: <12.15, 18.67>$

Magnitude = $\sqrt{12.15^2 + 18.67^2}$

Magnitude = 22.27 N

Angle = $\tan^{-1}\left(\frac{18.67}{12.15}\right)$

Angle = 56.94°

2. $y = y_0 + \frac{1}{2}at^2 + y_1t$

$y - y_0 = \frac{1}{2}at^2$

$-32 = \frac{1}{2}(-9.8)t^2$

$t = 2.56$

$v = \frac{\Delta x}{\Delta t}$

$v = \frac{15}{2.56}$

$v = 5.86 \text{ m/s}$

3. $x_1 = \frac{1}{2}at^2$

$x_1 = \frac{1}{2}(8)(7)^2$

$x_1 = 196 \text{ m}$

$v = at$

$v = 8(7)$

$v = 56 \text{ m}$

$x_2 = vt_2$

$x_2 = 56(5)$

$x_2 = 280 \text{ m}$

$a_3 = \frac{\Delta v}{\Delta t}$

$a_3 = \frac{-56}{12}$

$a_3 = -4.67$

$x_3 = \frac{1}{2}(-4.67)(12)^2 + 56(12)$

$x_3 \approx 336$

$x = 196 + 280 + 336$

$x = 812 \text{ m}$

4. $g = \frac{v^2}{r}$

$\sqrt{gr} = v$

$v = \sqrt{9.8 \cdot 8}$

$v = 8.85 \text{ m/s}$

$$5. \quad v_{iy} = -3 \sin 20 \approx -1.02$$

$$\Delta y = \frac{1}{2} a t^2 + v_{iy} t$$

$$-7 = \frac{1}{2} (-9.8) t^2 - 1.02 t$$

$$t = 1.095 \text{ s}$$

$$x = v t$$

$$x = 3 \cos 20 \cdot 1.095$$

$$x = 3.09 \text{ m}$$

$$v_{fy} = v_{oy} + a t$$

$$v_{fy} = -3 \sin 20 - 9.8 (1.095)$$

$$v_{fy} = -11.75$$

$$v_f = \sqrt{11.75^2 + 3 \cos 20}$$

$$v_f = 12.08 \text{ m/s}$$

$$6. \quad x = v_o^2 \sin(2\theta)$$

$$x = \frac{17^2 \sin(2(55))}{9.8}$$

$$x = 27.71 \text{ m}$$

$$v = \frac{\Delta x}{\Delta t}$$

$$t = \frac{\Delta x}{v}$$

$$t = \frac{27.71}{17 \cos 55}$$

$$t = 2.84 \text{ s}$$

Ball is at max height at $\frac{t}{2}$

$$\frac{t}{2} = 1.42 \text{ s}$$

$$y = \frac{1}{2} (-9.8) (1.42)^2 + 17 \sin 55 (1.42)$$

$$y = 9.89 \text{ m max height}$$

7. Acceleration is greater at B because the direction is changing at a faster rate.

