

C I N E M Á T I C A

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|---|---|--|-----|----------|------------|-------|------------------|-----|-------|-------------------|-----|-----|-----------------|-----|-------|-----------------|-----|-------|-------------------|------------------|-------|------------------------|------------------|-------|-------------------------|------------------|-----|-------|-----|
| <p>Vector posición</p> $r = r_0 + v_0 t + \frac{1}{2} a t^2$ <p>Velocidad Media</p> $v_m = \frac{\Delta r}{\Delta t} = \frac{v - v_0}{t - t_0}$ <p>Componentes de la aceleración</p> $a = a_t + a_N$ | <p>Velocidad</p> $v = v_0 + a t$ <p>Aceleración Media</p> $a_m = \frac{\Delta v}{\Delta t} = \frac{v - v_0}{t - t_0}$ <p>$a_N = \frac{v^2}{R}$</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>r</td> <td>Posición</td> <td>Metros (m)</td> </tr> <tr> <td>r_0</td> <td>Posición inicial</td> <td>(m)</td> </tr> <tr> <td>v_0</td> <td>Velocidad inicial</td> <td>m/s</td> </tr> <tr> <td>v</td> <td>Velocidad final</td> <td>m/s</td> </tr> <tr> <td>v_m</td> <td>Velocidad media</td> <td>m/s</td> </tr> <tr> <td>a_m</td> <td>Aceleración media</td> <td>m/s²</td> </tr> <tr> <td>a_t</td> <td>Aceleración tangencial</td> <td>m/s²</td> </tr> <tr> <td>a_N</td> <td>Ac. normal o centrípeta</td> <td>m/s²</td> </tr> <tr> <td>R</td> <td>radio</td> <td>(m)</td> </tr> </table> | r | Posición | Metros (m) | r_0 | Posición inicial | (m) | v_0 | Velocidad inicial | m/s | v | Velocidad final | m/s | v_m | Velocidad media | m/s | a_m | Aceleración media | m/s ² | a_t | Aceleración tangencial | m/s ² | a_N | Ac. normal o centrípeta | m/s ² | R | radio | (m) |
| r | Posición | Metros (m) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| r_0 | Posición inicial | (m) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| v_0 | Velocidad inicial | m/s | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| v | Velocidad final | m/s | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| v_m | Velocidad media | m/s | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| a_m | Aceleración media | m/s ² | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| a_t | Aceleración tangencial | m/s ² | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| a_N | Ac. normal o centrípeta | m/s ² | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R | radio | (m) | | | | | | | | | | | | | | | | | | | | | | | | | | | |

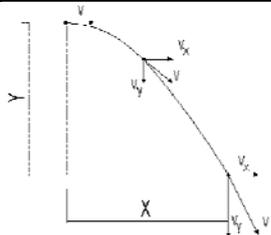
| | | |
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| <p>Movimiento rectilíneo uniforme (MRU)</p> $a = 0 \quad v = v_0 = cte \quad r = r_0 + v_0 t$ | | |
| <p>Movimiento rectilíneo uniformemente acelerado (MRUA)</p> $a = cte \quad v = v_0 + a t \quad r = r_0 + v_0 t + \frac{1}{2} a t^2$ | | |

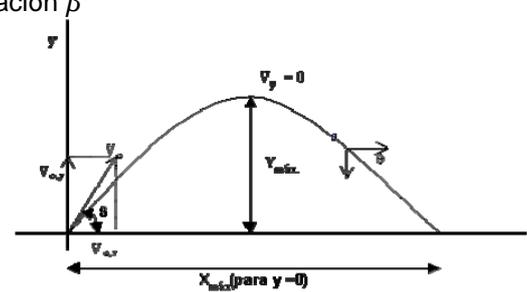
| | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|-----------|----------|----------------|-------------|------------------|-------|------------|---------------------------|-------|----------|-------------------------|-------|----------|---------------------|--------------------|-----|---------|---|-----|------------|-----------------|
| <p>Movimiento circular</p> <p>Vector posición</p> $\varphi = \varphi_0 + \omega_0 t + \frac{1}{2} \alpha t^2$ $\alpha = aR$ $v = \omega R = \frac{2\pi R}{T} = 2\pi R f$ | <p>Velocidad angular</p> $\omega = \omega_0 + \alpha t$ $a_N = \frac{v^2}{R} = \omega^2 R$ $T = 1/f$ | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>φ</td> <td>Posición</td> <td>Radianes (rad)</td> </tr> <tr> <td>φ_0</td> <td>Posición inicial</td> <td>(rad)</td> </tr> <tr> <td>ω_0</td> <td>Velocidad angular inicial</td> <td>Rad/s</td> </tr> <tr> <td>ω</td> <td>Velocidad angular final</td> <td>Rad/s</td> </tr> <tr> <td>α</td> <td>Aceleración angular</td> <td>Rad/s²</td> </tr> <tr> <td>T</td> <td>Periodo</td> <td>s</td> </tr> <tr> <td>f</td> <td>Frecuencia</td> <td>s⁻¹</td> </tr> </table> | φ | Posición | Radianes (rad) | φ_0 | Posición inicial | (rad) | ω_0 | Velocidad angular inicial | Rad/s | ω | Velocidad angular final | Rad/s | α | Aceleración angular | Rad/s ² | T | Periodo | s | f | Frecuencia | s ⁻¹ |
| φ | Posición | Radianes (rad) | | | | | | | | | | | | | | | | | | | | | |
| φ_0 | Posición inicial | (rad) | | | | | | | | | | | | | | | | | | | | | |
| ω_0 | Velocidad angular inicial | Rad/s | | | | | | | | | | | | | | | | | | | | | |
| ω | Velocidad angular final | Rad/s | | | | | | | | | | | | | | | | | | | | | |
| α | Aceleración angular | Rad/s ² | | | | | | | | | | | | | | | | | | | | | |
| T | Periodo | s | | | | | | | | | | | | | | | | | | | | | |
| f | Frecuencia | s ⁻¹ | | | | | | | | | | | | | | | | | | | | | |

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| <p>Movimiento circular uniforme (MCU)</p> $\alpha = 0 \quad \omega = \omega_0 = cte \quad \varphi = \varphi_0 + \omega_0 t$ | | |
| <p>Movimiento circular uniformemente acelerado (MCUA)</p> $a = cte \quad \omega = \omega_0 + \alpha t \quad \varphi = \varphi_0 + \omega_0 t + \frac{1}{2} \alpha t^2$ | | |

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| <p>Caída libre</p> $a = g \quad v = v_0 + g t \quad h = h_0 + v_0 t + \frac{1}{2} g t^2$ | | |
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| <p>Tiro Vertical</p> $a = -g \quad v = v_0 - g t \quad h = h_0 + v_0 t - \frac{1}{2} g t^2$ | | |
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| <p>Tiro horizontal</p> $a_x = 0 \quad v_{0x} = v_0 \quad x = v_{0x} t$ $a_y = g \quad v_{0y} = 0 \quad y = y_0 - \frac{1}{2} g t^2$ $v_{final} = \sqrt{v_{0x}^2 + v_y^2} = \sqrt{v_0^2 + (-gt)^2}$ |  |
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| <p>Tiro oblicuo Parabólico</p> <p>Lanzamos desde el suelo un proyectil con velocidad inicial v_0 e inclinación β</p> | | |  |
| $a_x = 0 \quad v_{0x} = v_0 \cos \beta = cte \quad x = v_0 t \cos \beta$ | | | |
| $a_y = 0 \quad v_{0y} = v_0 \sin \beta - g t \quad y = v_0 t \sin \beta - \frac{1}{2} g t^2$ | | | |
| <p>Velocidad final</p> $v_{final} = \sqrt{v_{0x}^2 + v_y^2}$ | <p>Alcance máximo</p> $x_{max} = v_{0x} t_{total}$ | <p>Altura máxima</p> $y_{max} = v_{0y} t + \frac{1}{2} g t^2$ | |