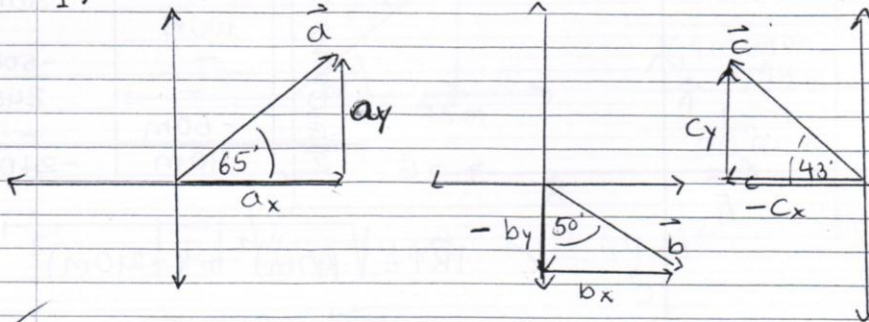


Capítulo 3

Actividad 3-1 (Pág 62)

①

1.



✓ $a_x = 60\text{ N} \cos 65^\circ = 25,36\text{ N}$
 $a_y = 60\text{ N} \sin 65^\circ = 54,38\text{ N}$

✓ $b_x = 80\text{ m} \sin 50^\circ = 61,28\text{ m}$
 $b_y = 80\text{ m} \cos 50^\circ = 51,42\text{ m}$

Nota: si se trabaja con el ángulo complementario:

$b_x = 80\text{ m} \cos 40^\circ = 61,28\text{ m}$
 $b_y = 80\text{ m} \sin 40^\circ = 51,42\text{ m}$

✓ $c_x = 900\text{ km} \cos 43^\circ = 658,22\text{ km}$
 $c_y = 900\text{ km} \sin 43^\circ = 614\text{ km}$

2.

	x	y
\vec{H}	$-78\text{ km} \cos 43^\circ$ $-57,04\text{ km}$	$78\text{ km} \sin 43^\circ$ $53,2\text{ km}$
\vec{J}	$150\text{ km} \cos 65^\circ$ $63,39\text{ km}$	$150\text{ km} \sin 65^\circ$ 136 km
\vec{K}	-	-180 km
\vec{I}	635 km	$9,2\text{ km}$

✓ $|\vec{R}| = \sqrt{(6,35\text{ km})^2 + (9,2\text{ km})^2}$

$|\vec{R}| = 11,18\text{ km}$

✓ $\theta = \tan^{-1} \left(\frac{9,2\text{ km}}{6,35\text{ km}} \right)$

$\theta = 55,38^\circ$

3.

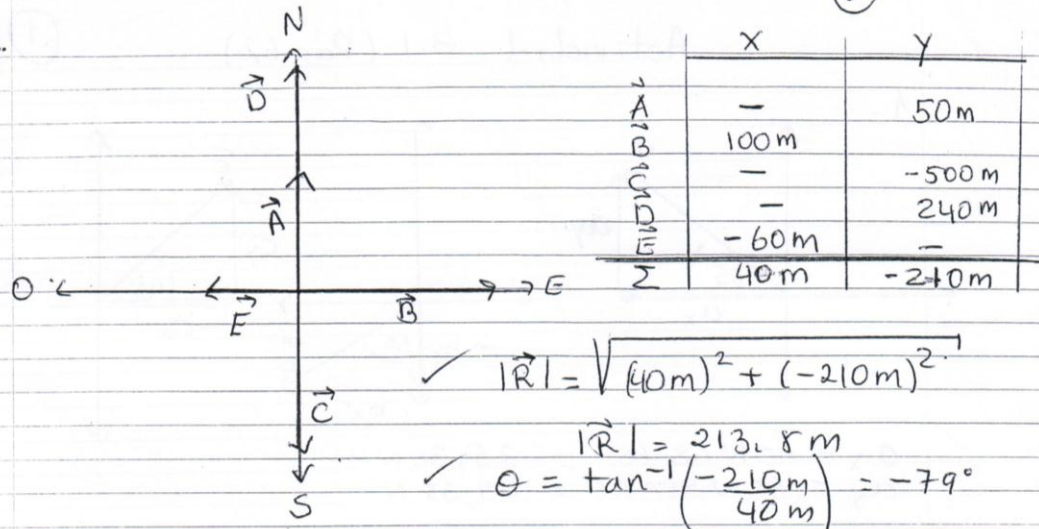
	x	y
\vec{a}	$-60\text{ N} \cos 60^\circ$ -30 N	$60\text{ N} \sin 60^\circ$ 52 N
\vec{b}	$80\text{ N} \cos 70^\circ$ $27,4\text{ N}$	$80\text{ N} \sin 70^\circ$ $75,2\text{ N}$
\vec{c}	$40\text{ N} \cos 45^\circ$ $28,28\text{ N}$	$-40\text{ N} \sin 45^\circ$ $-28,28\text{ N}$

✓ $|\vec{R}| = \sqrt{(25,68\text{ N})^2 + (98,92\text{ N})^2}$

$|\vec{R}| = 102,2\text{ N}$

✓ $\theta = \tan^{-1} \left(\frac{98,92\text{ N}}{25,68\text{ N}} \right)$

4



5. $\Sigma F = 5000\text{N} - 3500\text{N} = 1500\text{N}$ hacia arriba.

6.

	X	Y
\vec{n}	$150\text{N} \cos 35^\circ$ 122,87N	$150\text{N} \sin 35^\circ$ 86,04N
\vec{m}	$-90\text{N} \cos 30^\circ$ -77,94N	$90\text{N} \sin 30^\circ$ 45N
\vec{p}	$-70\text{N} \cos 20^\circ$ -65,78N	$-70\text{N} \sin 20^\circ$ -23,94N
\vec{r}	$125\text{N} \cos 45^\circ$ 88,39N	$-125\text{N} \sin 45^\circ$ -88,39N
Σ	67,54N	18,71N

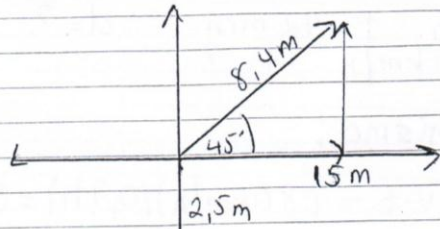
$$|\vec{R}| = \sqrt{(67,54\text{N})^2 + (18,71\text{N})^2}$$

$$|\vec{R}| = 70,08\text{N}$$

$$\theta = \tan^{-1}\left(\frac{18,71\text{N}}{67,54\text{N}}\right) = 15,5^\circ$$

③

7.



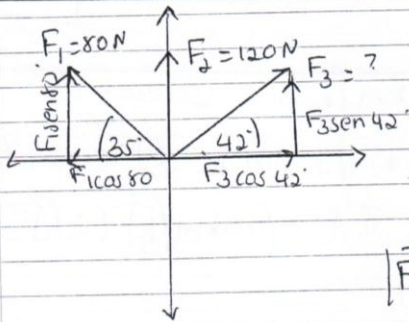
x	y
	-2,5 m
$8,4 \text{ m} \cos 45^\circ$	$8,4 \text{ m} \sin 45^\circ$
5,94 m	5,94 m
15 m	1,5 m
20,94 m	3,44 m

$$|\vec{R}| = \sqrt{(20,94 \text{ m})^2 + (3,44 \text{ m})^2}$$

$$|\vec{R}| = 21,22 \text{ m}$$

$$\theta = \tan^{-1} \left(\frac{3,44 \text{ m}}{20,94 \text{ m}} \right) = 9,33^\circ$$

8.



$$\sum F_x = 0$$

$$-F_1 \cos 80^\circ + F_3 \cos 42^\circ = 0$$

$$F_3 = \frac{F_1 \cos 80^\circ}{\cos 42^\circ}$$

$$|\vec{F}_3| = \frac{80 \text{ N} \cos 80^\circ}{\cos 42^\circ} = 18,7 \text{ N}$$

9.

	x	y
\vec{a}	$40 \text{ m} \cos 40^\circ$ 30,64 m	$40 \text{ m} \sin 40^\circ$ 25,71 m
\vec{b}	$20 \text{ m} \cos 45^\circ$ 14,14 m	$-20 \text{ m} \sin 45^\circ$ -14,14 m
\vec{c}	$8 \text{ m} \cos 60^\circ$ 4 m	$8 \text{ m} \sin 60^\circ$ 6,93 m
	48,78 m	18,5 m

$$|\vec{d}| = \sqrt{(48,78 \text{ m})^2 + (18,5 \text{ m})^2} = 52,17 \text{ m}$$

Actividad 3.2 (Pág. 73)

(4)

1. Datos: $v = 80 \text{ km/h}$ $t = 42 \text{ min}$ $d = ?$
 $v_{\text{viernes}} = 50 \text{ km/h}$ $t = ?$

✓ El trayecto es el mismo:

$$v = \frac{d}{t} \Rightarrow d = v \cdot t = (80 \text{ km/h})(0,7 \text{ h}) = 56 \text{ km}$$

$$t = 42 \text{ min} \times \frac{1 \text{ h}}{60 \text{ min}} = 0,7 \text{ h}$$

✓ $v = \frac{d}{t} \Rightarrow t = \frac{d}{v} = \frac{56 \text{ km}}{50 \text{ km/h}} = \boxed{1,12 \text{ h}}$ R/

2. $v = 1 \text{ km/año}$ $d = 10.000 \text{ km}$ $t = ?$

$$t = \frac{d}{v} = \frac{10.000 \text{ km}}{1 \text{ km/año}} = 10.000 \text{ años} = \boxed{100 \text{ siglos}}$$
 R/

3. Datos: $t = 2 \text{ h}$ $\vec{v} = 50 \text{ km/h N}$ ① recorrido

$d = 60 \text{ km}$ $\vec{v} = 60 \text{ km/h norte}$ ② recorrido.

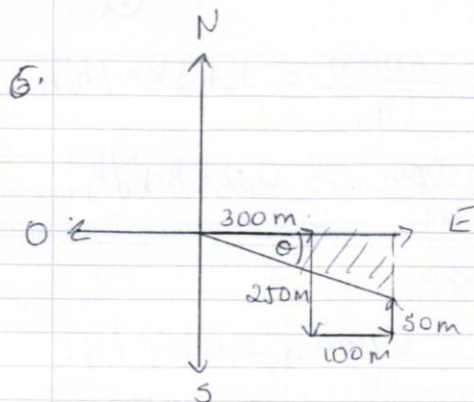
✓ 1° recorrido: $\vec{v} = \frac{\vec{d}}{t} \Rightarrow \vec{d} = \vec{v} \cdot t = (50 \text{ km/h})(2 \text{ h})$
 $\vec{d} = 100 \text{ km N}$

✓ 2° recorrido: $\vec{v} = \frac{\vec{d}}{t} \Rightarrow t = \frac{\vec{d}}{\vec{v}} = \frac{60 \text{ km}}{60 \text{ km/h}} = 0,92 \text{ h}$

✓ $v = \frac{d_1 + d_2}{t_1 + t_2} = \frac{100 \text{ km} + 60 \text{ km}}{2 \text{ h} + 0,92 \text{ h}} = \boxed{54,79 \text{ km/h}}$ R/

4. $\overset{A}{|} \xrightarrow{d=460 \text{ m}} \overset{B}{|} \xrightarrow{t=3 \text{ s}} \overset{C}{|}$
 $t = 3 \text{ min}$ $v = 3 \text{ m/s}$

✓ $3 \text{ min} \times \frac{60 \text{ s}}{1 \text{ min}} = 180 \text{ s}$ } $v = \frac{d_1 + d_2}{t_1 + t_2}$



5

b)

x	y
300m	-250m
100m	50m
400m	-200m

$$|\vec{d}| = \sqrt{(400\text{m})^2 + (-200\text{m})^2}$$

$$|\vec{d}| = 447,21\text{m}$$

$$\theta = \tan^{-1}\left(\frac{-200}{400}\right) = -26,56'$$

a) $d = 700\text{m}$

$$v = \frac{700\text{m}}{15\text{min}} = 46,7\text{m/min}$$

$$|\vec{v}| = \frac{447,21\text{m}}{15\text{min}}$$

$$|\vec{v}| = 29,81\text{m/min}$$

$$\theta = -26,56' - S$$

5. a) $d = 500\text{m}$ $|\vec{d}| = -300\text{m} + 200\text{m}$
 $\vec{d} = -100\text{m} = 100\text{m Oeste}$

b) $v = \frac{500\text{m}}{10\text{min}} = 50\text{m/min}$

$$\vec{v} = \frac{100\text{m}}{10\text{min}} = 10\text{m/min Oeste}$$

7. Rapidez media $v = \frac{d_1 + d_2}{t_1 + t_2} = \frac{255\text{m} + 175\text{m}}{10\text{min} + 8\text{min}}$

$$v = 23,89\text{m/min}$$

Velocidad media $\vec{v} = \frac{\vec{d}_1 + \vec{d}_2}{t_1 + t_2} = \frac{255\text{m} - 175\text{m}}{10\text{min} + 8\text{min}}$

②

⑥

$$v = 23,89 \frac{\text{m}}{\text{min}} \times \frac{1 \text{ km}}{10^3 \text{ m}} \times \frac{60 \text{ min}}{1 \text{ h}} = 1,43 \text{ km/h}$$

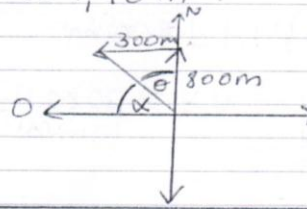
$$\vec{v} = 4,44 \frac{\text{m}}{\text{min}} \times \frac{1 \text{ km}}{10^3 \text{ m}} \times \frac{60 \text{ min}}{1 \text{ h}} = 0,27 \text{ km/h}$$

8. ✓ $d = 800 \text{ m} + 300 \text{ m} = 1100 \text{ m}$

✓ $v = \frac{d}{t} = \frac{1100 \text{ m}}{12 \text{ min}} \times \frac{1 \text{ km}}{10^3 \text{ m}} \times \frac{60 \text{ min}}{1 \text{ h}} = 5,5 \text{ km/h}$

✓ $\vec{d} = \sqrt{(800 \text{ m})^2 + (300 \text{ m})^2} = 854,40 \text{ m}$

$\theta = \tan^{-1}\left(\frac{300}{800}\right) = 20,56^\circ$



$\vec{d} = 854,40 \text{ m N} - 20,56^\circ - 0$

9.

$v_A = \frac{115 \text{ m}}{7 \text{ s}} = 16,43 \text{ m/s}$

$v_B = \frac{280 \text{ m}}{17 \text{ s}} = 16,47 \text{ m/s}$

Más rápido !!

10. a) ① $v = \frac{d}{t} \Rightarrow d = v \cdot t = (1200 \text{ cm/s})(9 \text{ s}) = 10800 \text{ cm}$

② $d = (480 \text{ cm/s})(7 \text{ s}) = 3360 \text{ cm}$

$d = (10800 \text{ cm} + 3360 \text{ cm}) \times \frac{10^{-2} \text{ m}}{1 \text{ cm}} = 141,6 \text{ m}$

b) $v_m = \frac{141,6 \text{ m}}{9 \text{ s} + 7 \text{ s}} = 8,85 \text{ m/s}$

11. $d = 3,25 \text{ km} \times \frac{10^3 \text{ m}}{1 \text{ km}} = 3250 \text{ m}$

$v = \frac{d}{t} \Rightarrow t = \frac{d}{v} = \frac{3250 \text{ m}}{340 \text{ m/s}} = 9,56 \text{ s}$

12. $d_{ladron} = d_{ciclista} \quad d = v \cdot t$

$d_{ladron} = v_l \cdot t$

$d_{ciclista} = v_c(t - 3 \text{ min})$

$20 \frac{\text{km}}{\text{h}} \times \frac{1 \text{ h}}{60 \text{ min}} \times \frac{10^3 \text{ m}}{1 \text{ km}} = 333,33 \text{ m/min}$

$22 \frac{\text{km}}{\text{h}} \times \frac{1 \text{ h}}{60 \text{ min}} \times \frac{10^3 \text{ m}}{1 \text{ km}} = 366,67 \text{ m/min}$

$v_l \cdot t = v_c(t - 3 \text{ min})$

$v_l \cdot t = v_c t - 3v_c \Rightarrow 3v_c = v_c t - v_l t$
 $3v_c = t(v_c - v_l)$

$t = \frac{3v_c}{v_c - v_l}$

$t = \frac{3(366,67 \text{ m/min})}{(366,67 \text{ m/min} - 333,33 \frac{\text{m}}{\text{min}})}$

$R/ \Rightarrow t = 33 \text{ segundos}$

Actividad 3.3 (pdg 77)

- I
- 1) $\vec{v}_{AO} = 20 \text{ km/h}$ Oeste
 - 2) $\vec{v}_{OB} = 130 \frac{\text{km}}{\text{h}}$ Este
 - 3) $\vec{v}_{BE} = 0$
 - 4) $\vec{v}_{EA} = 30 \text{ km/h}$ Este
 - 5) $\vec{v}_{FF} = 0$
 - 6) $\vec{v}_{BF} = 125 \text{ km/h}$ Este

II

- 1. b 2. a 3. c 4. d 5. a
- 6. b 7. a 8. d 9. a 10. c

Repaso de conceptos · (Página 82)

8

- I Parte (3)
- (1)
 - (2)
 - (8)
 - (6)
 - (10)
 - (9)
 - (5)

II Parte ·

1. p. 55
2. p. 56
3. p. 56.
4. p. 57

5. Semejanzas:

- Tienen unidades de longitud.

- La distancia equivale a la magnitud del desplazamiento en trayectorias rectilíneas.

Diferencias:

- La distancia es un escalar, y desplazamiento un vector.

- Su denotación es diferente.

6. Porque depende del marco de referencia.

7. Sí en la trayectoria cerrada.

8. Para trayectorias rectilíneas y en una misma dirección.

9. Rapidez · Solo muestra magnitudes.

10. No · Difieren en dirección.

11. a) Móvil: La señora ·
b) El auto ·

12. a) Tren b) Persona B c) 150 km/h Oeste ·

(9)

13. a) $\vec{V}_{GF} = 96 \text{ km/h Sur}$
 b) $\vec{V}_{PH} = 68,5 \text{ km/h Norte}$
 c) $\vec{V}_{CF} = 81 \text{ km/h Sur}$
 d) $\vec{V}_{BC} = 40 \text{ km/h Sur}$
 e) $\vec{V}_{CG} = 65 \text{ km/h Sur}$
 f) $\vec{V}_{FA} = 14 \text{ km/h Sur}$
 g) $\vec{V}_{AP} = 0$
 h) $\vec{V}_{HG} = 40 \text{ km/h Sur}$

III Parte

1. $\Sigma F_{\text{derecha}} = 24 \text{ N}$
 $\Sigma F_{\text{izquierda}} = 6 \text{ N} + F$

$$6 \text{ N} + F > 24 \text{ N}$$

$$F > 18 \text{ N} \checkmark$$

2. a) $\Sigma F_y = 0$
 $F_1 \cos 75^\circ - F_2 \cos 60^\circ = 0$

$$F_1 \cos 75^\circ = F_2 \cos 60^\circ$$

$$F_2 = \frac{F_1 \cos 75^\circ}{\cos 60^\circ} = \frac{150 \text{ N} \cos 75^\circ}{\cos 60^\circ} = 77,64 \text{ N}$$

b) $|\vec{F}_3| < F_1 \sin 75^\circ + F_2 \sin 60^\circ$

$$|\vec{F}_3| < 150 \text{ N} \sin 75^\circ + 77,64 \text{ N} \sin 60^\circ$$

$$|\vec{F}_3| < 212,13 \text{ N}$$

10

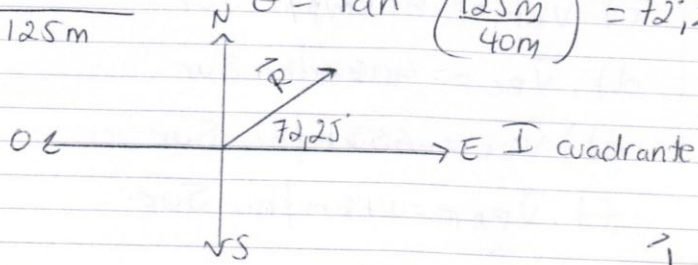
3.

X	Y
80m	200m
-	-75m
-40m	-
40m	125m

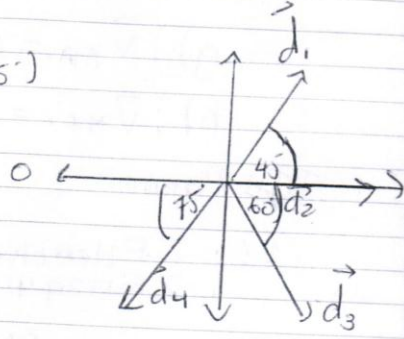
$$|\vec{R}| = \sqrt{(40m)^2 + (125m)^2}$$

$$|\vec{R}| = 131,24m$$

$$\theta = \tan^{-1} \left(\frac{125m}{40m} \right) = 72,25^\circ$$



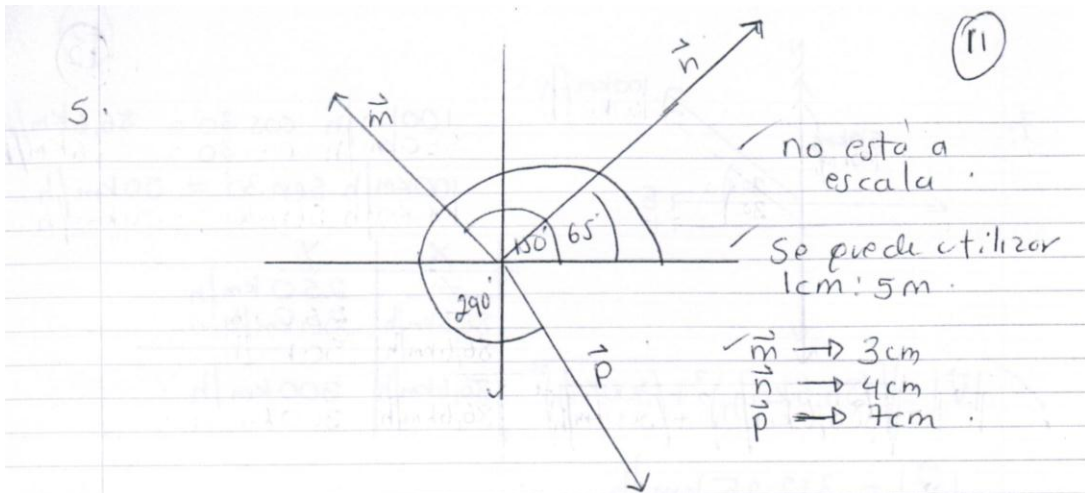
- 4.
- $\vec{d}_1 = 250m$ noroeste ($\theta = 45^\circ$)
 - $\vec{d}_2 = 300m$ este.
 - $\vec{d}_3 = 600m$ E-60-S
 - $\vec{d}_4 = 500m$ O-75-S



\vec{d}	X	Y
\vec{d}_1	$250m \cos 45^\circ$ 176,77m	$250m \sin 45^\circ$ 176,77m
\vec{d}_2	300m	-
\vec{d}_3	$600m \cos 60^\circ$ 300m	$-600m \sin 60^\circ$ -519,6m
\vec{d}_4	$-500 \cos 75^\circ$ -129,41m	$500m \sin 75^\circ$ 482,96m
	647,36m	140,13m

$$|\vec{R}| = \sqrt{(647,36m)^2 + (140,13m)^2} = 662,35m$$

$$\theta = \tan^{-1} \left(\frac{140,13m}{647,36} \right) = 12,21^\circ$$



6. Cueva A: 200 m noreste, 100 m norte, 110 m este.
150 m E-35-N.

Cueva B: 180 m noreste, 120 m norte, 90 m este.
180 m O-40-N.

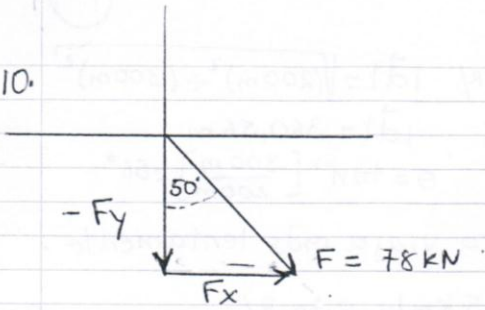
Cueva A.

X	Y	$\vec{R} = \sqrt{(374,32m)^2 + (327,42m)^2}$ $ \vec{R} = 497,31m$ $\theta = 41,2^\circ$
✓ 200 m cos 45° 141,42 m	200 m sen 45° 141,42 m	
✓ —	100 m	
✓ 110 m	—	
✓ 150 m cos 35° 122,9 m	150 m sen 35° 327,42 m	
Σ 374,32 m	327,42 m	

Cueva B

X	Y	$\vec{R} = \sqrt{(355,18m)^2 + (362,48m)^2}$ $ \vec{R} = 507,84m$ $\theta = 134,4^\circ$
✓ -180 m cos 45° -127,28 m	180 m sen 45° 127,28 m	
✓ —	120 m	
✓ -90 m	—	
✓ -180 m cos 40°	180 m sen 40°	

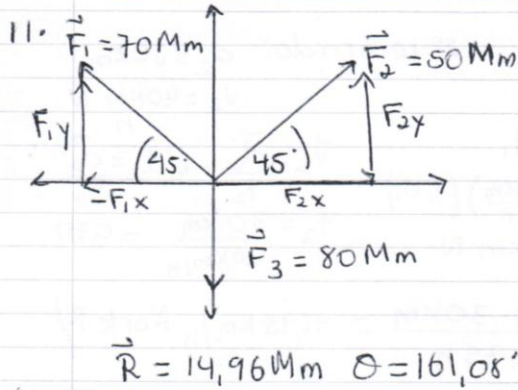
10.



$$F_y = 78 \text{ kN} \cos 50^\circ = 50,14 \text{ kN}$$

$$F_x = 78 \text{ kN} \sin 50^\circ = 59,75 \text{ kN}$$

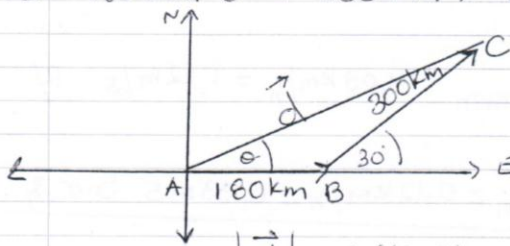
(13)



	x	y
F_1	-49,5	49,5
F_2	35,35	35,35
F_3	-	-80
Σ	-14,15	4,85

$$\vec{R} = 14,96 \text{ Nm} \quad \theta = 161,08^\circ$$

12. 180 km O + 300 km E-30°-N



	x	y
\overline{AB}	180 km	-
\overline{BC}	$300 \text{ km} \cos 30^\circ$ 259,8 km	$300 \text{ km} \sin 30^\circ$ 150 km
Σ	439,8 km	150 km

$$|\vec{d}| = 464,7 \text{ km} \quad \theta = 18,8^\circ$$

$$\vec{d} = 464,7 \text{ km E} - 18,8^\circ - \text{N}$$

13.

$$\text{A-B: } d = 10 \text{ m} \\ t = 2 \text{ s}$$

$$\text{B-C: } d = 40 \text{ m} \\ v = 10 \text{ m/s}$$

$$v = \frac{d}{t} \rightarrow t = \frac{d}{v} = \frac{40 \text{ m}}{10 \text{ m/s}} = 4 \text{ s}$$

14) $d = 200\text{m} + 300\text{m} = 500\text{m}$ R/ $|\vec{d}| = \sqrt{(200\text{m})^2 + (300\text{m})^2}$
 $\vec{d} = 360,56\text{m}$ O-56°-S R/ $|\vec{d}| = 360,56\text{m}$
 $\theta = \tan^{-1} \left[\frac{300\text{m}}{200\text{m}} \right] = 56^\circ$

3) No lo alcanza, el cachorro viaja mds lentamente.

4) $v = 20\text{km/h} - 1,5\text{km/h} = 18,5\text{km/h}$ Este R/

15) 1º recorrido: $t_1 = 1,2\text{h}$ $v_1 = 50\text{km/h}$ N 2º recorrido: $d_2 = 30\text{km}$
 $v_2 = 40\frac{\text{km}}{\text{h}}$ N
 $\vec{v}_1 = \frac{\vec{d}_1}{t_1} \rightarrow \vec{d}_1 = \vec{v}_1 t_1$ $\vec{v}_2 = \frac{\vec{d}_2}{t_2} \rightarrow t_2 = \frac{d_2}{v_2}$
 $\vec{d}_1 = \left(\frac{50\text{km}}{\text{h}} \right) (1,2\text{h})$ $t_2 = \frac{30\text{km}}{40\text{km/h}} = 0,75\text{h}$
 $d_1 = 60\text{km}$ N $\vec{v}_m = \frac{d_1 + d_2}{t_1 + t_2} = \frac{60\text{km} + 30\text{km}}{1,2\text{h} + 0,75\text{h}} = 46,15\text{km/h}$ Norte R/

16) $d = 500\text{m} + 300\text{m} + 50\text{m} + 100\text{m} + 400\text{m} = 1350\text{m}$

$\vec{d} = 400\text{m}$ Sur

$v = \frac{d}{t} = \frac{1350\text{m}}{20\text{min}} = 67,5\text{m/min} = 4,05\text{km/h} = 1,12\text{m/s}$ R/

$\vec{v} = \frac{\vec{d}}{t} = \frac{400\text{m}}{20\text{min}} = 20\text{m/min} = 0,12\text{km/h} = 0,33\text{m/s}$ Sur R/

17) $d = 350\text{m} + 800\text{m} = 1150\text{m}$

$|\vec{d}| = \sqrt{(350\text{m})^2 + (800\text{m})^2} = 873,21\text{m}$

$\theta = \tan^{-1} \left[\frac{800\text{m}}{350\text{m}} \right] = 66,4^\circ$

$v = \frac{d}{t} = \frac{1150\text{m}}{2\text{min}} = 575\text{m/min} = 9,58\text{m/s}$

18) Primeros som: $v = \frac{d}{t} = \frac{50m}{20s} = 2,5m/s$ R/

Recorrido completo: $\vec{v} = \frac{\vec{d}}{t} = \frac{100m}{44s} = 2,27m/s$ R/

19) 1º recorrido: $v_1 = 25 km/h$ $t_1 = 10 min = 0,17h$
 $v_1 = \frac{d_1}{t_1}$ $d_1 = v_1 t_1 = (25 km/h) (0,17h)$
 $d_1 = 4,25 km$

2º recorrido: $v_2 = 80 km/h$ $t_2 = 20 min = 0,33h$
 $v_2 = \frac{d_2}{t_2}$ $d_2 = v_2 t_2 = (80 km/h) (0,33h)$
 $d_2 = 26,4 km$

3º recorrido: $v_3 = 55 km/h$ $t_3 = 12 min = 0,2h$
 $v_3 = \frac{d_3}{t_3}$ $d_3 = v_3 t_3 = (55 km/h) (0,2h)$
 $d_3 = 11 km$

$$v_m = \frac{4,25 km + 26,4 km + 11 km}{0,17h + 0,33h + 0,2h} = 59,5 km/h$$
 R/

$$d_T = 41,65 km$$
 R/

20) Justin: $d = 100m$ $t = 9,95s$ $v = \frac{100m}{9,95s} = 10,05m/s$

Yuliya: $d = 100m$ $t = 10,93s$ $v = \frac{100m}{10,93s} = 9,15m/s$

15

2.1) a) X : $v = 55 \text{ km/h} = 0,92 \text{ km/min}$

Y : $v = 42 \text{ km/h} = 0,70 \text{ km/min}$

✓ cada minuto hay una diferencia de 0,22 km

✓ En 15 minutos hay una diferencia de 3,3 km

- d = distancia recorrida por auto Y
- $d + 3,3$ = distancia recorrida por auto X
- t = tiempo recorrido por auto X
- $t + 15$ = tiempo recorrido por auto Y

X

Y

$v = \frac{d}{t} \rightarrow 0,92 \text{ km/min} = \frac{d + 3,3 \text{ km}}{t} \text{ (1)} \quad 0,7 \text{ km/min} = \frac{d}{t + 15 \text{ min}} \text{ (2)}$

✓ despejando "d" en términos de "t" de la ec. (1)

$d = 0,92t - 3,3 \text{ (3)}$

✓ sustituyendo en ec. (2)

$0,7 = \frac{0,92t - 3,3}{t + 15} \rightarrow 0,7(t + 15) = 0,92t - 3,3$

$\rightarrow 0,7t + 10,5 = 0,92t - 3,3 \rightarrow t = 62,73 \text{ min.}$

✓ sustituyen 't' en ec. (3)

$d = (0,92 \text{ km/min}) (62,73 \text{ min}) - 3,3 \text{ km}$

$d_y = 54,41 \text{ km} \quad d_x = 57,71 \text{ km R/}$

b) $0,92 \text{ km/h} = \frac{15 \text{ km}}{t_x} \rightarrow t_x = 16,30 \text{ min}$

$0,70 \text{ km/h} = \frac{15 \text{ km}}{t_y} \rightarrow t_y = 21,43 \text{ min}$

ventaja = 5,13 min R/

22) A	B	C
7 m/s	8,5 m/s	9 m/s

a) $v_A = \frac{d_A}{t}$	$v_B = \frac{d_B}{t}$	$v_C = \frac{d_C}{t}$
$t = \frac{d_A}{v_A}$	$t = \frac{d_B}{v_B}$	$t = \frac{d_C}{v_C}$
$t = \frac{2000 \text{ m}}{7 \text{ m/s}}$	$t = \frac{2000 \text{ m}}{8,5 \text{ m/s}}$	$t = \frac{2000 \text{ m}}{9 \text{ m/s}}$
$t = 2857 \text{ s}$	$t = 2353 \text{ s}$	$t = 2222 \text{ s}$
$t_A = 47,62 \text{ min}$	$t_B = 39,21 \text{ min}$	$t_C = 37,04 \text{ min R/}$

b) $t = 47,62 \text{ min} - 37,04 \text{ min} = 10,58 \text{ min R/}$

c) $v_A = \frac{d_A}{t}$ $d_A = v_A t = (7 \text{ m/s})(2353 \text{ s}) = 16471 \text{ m} = 16,47 \text{ km}$
 $d_B = 20 \text{ km}$

diferencia: $\Delta d = 20 \text{ km} - 16,47 \text{ km} = 3,53 \text{ km R/}$

23) $t = 12 \text{ min} = 0,2 \text{ h}$

$v_v = \frac{d_v}{t_v}$ $d_v = v_v t_v = (40 \text{ km/h})(0,2 \text{ h}) = 8 \text{ km}$

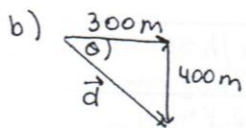
$v_M = \frac{d_M}{t_M}$ $d_M = v_M t_M = (45 \text{ km/h})(0,2 \text{ h}) = 9 \text{ km}$

$d_T = 17 \text{ km R/}$

24) a) $d = 200 \text{ m} + 380 \text{ m} + 200 \text{ m} + 300 \text{ m} + 380 \text{ m} + 480 \text{ m}$

$d = 1940 \text{ m}$ $t = 3 \text{ min} = 180 \text{ s}$

$v = \frac{d}{t} = \frac{1940 \text{ m}}{180 \text{ s}} = 10,78 \text{ m/s R/} * \text{ corregir en p\u00e1g 302}$



$|\vec{d}| = \sqrt{(300 \text{ m})^2 + (400 \text{ m})^2} = 500 \text{ m}$

$\theta = \tan^{-1} \left[\frac{400 \text{ m}}{300 \text{ m}} \right] = 53,13^\circ$

25. C = cachorro n = niño
 $\vec{v}_{nc} = 1 \text{ m/s}$ al sur

No lo alcanzará ya que el niño se aleja hacia el sur a razón de 1 m/s.

26. $\vec{v} = 18,5 \text{ km/h}$ este.

El observador considera tanto la velocidad del autobús como del pasajero que camina.

Trabajo extraclase. (Página 87)

I Parte: Selección única.

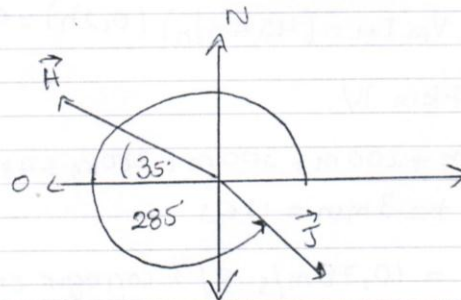
- 1a - 2d - 3c - 4d - 5b - 6c - 7a - 8c - 9a - 10c
- 11c - 12c - 13a - 14c - 15d - 16b - 17b - 18a - 19d
- 20c - 21d - 22c - 23b - 24a - 25c - 26b -

Notas:

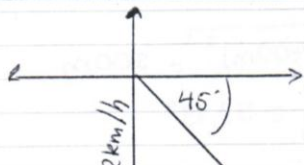
- 3. Subrayar: volumen, fuerza y temperatura.
- 6. Léase: la dirección del vector que se presenta....

II Parte.

1.



2.



X	Y
$25 \text{ km/h} \cos 45^\circ$	$25 \text{ km/h} \sin 45^\circ$
$17,68 \text{ km}$	$-17,68 \text{ km}$
	-12 km/h
$17,68 \text{ km}$	$-29,68 \text{ km/h}$

$$|\vec{v}| = \sqrt{(17,68 \text{ km/h})^2 + (-29,68 \text{ km/h})^2} = 34,54 \text{ km/h} \quad (19)$$

$$\theta = \tan^{-1}\left(\frac{-29,68}{17,68}\right) = -59,22^\circ$$

$$\vec{v} = 34,54 \text{ km/h } E-59,22^\circ-S$$

3. $F = 5000 \text{ m} \quad \theta = 250^\circ$

$$F_x = 5000 \text{ m} \cos 250^\circ = -1710 \text{ m}$$

$$F_y = 5000 \text{ m} \sin 250^\circ = -4698,46 \text{ m}$$

4. $F_x = -15 \text{ N}$

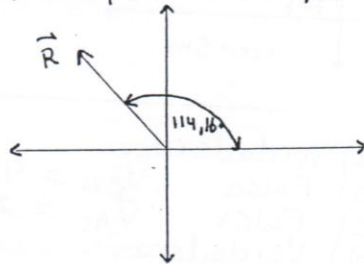
$$-F \cos 47^\circ = -15 \text{ N}$$

$$F = \frac{15 \text{ N}}{\cos 47^\circ} = 22,2 \text{ N } R/$$

5)

	X	Y
\vec{A}	-23	32,8
\vec{B}	-25,4	-15,9
\vec{C}	25	-
	-23,4	16,9

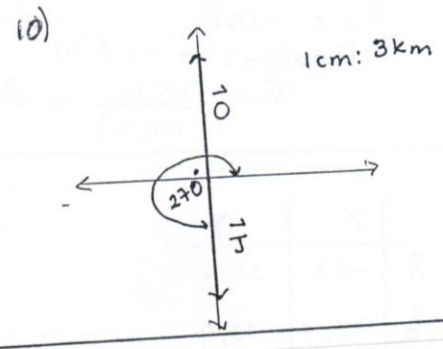
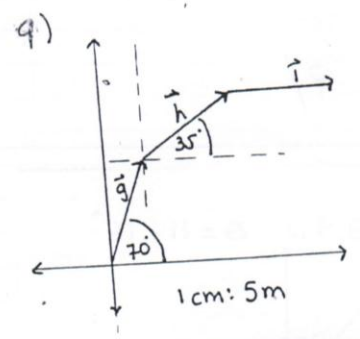
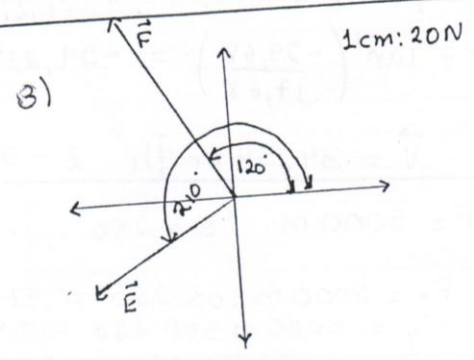
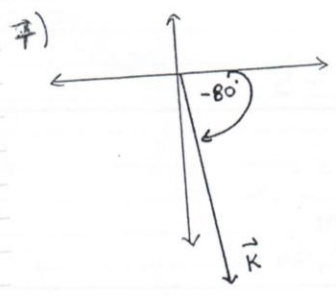
$$\vec{R} = 28,9 \text{ N} \quad \theta = 114,16^\circ$$



6) $\vec{m} = 2,5 \text{ cm} \times 50 \text{ N} = 125 \text{ N } O-42^\circ-S \quad \theta = 222^\circ$

$$\vec{h} = 3,4 \text{ cm} \times 50 \text{ N} = 170 \text{ N } E-11^\circ-S \quad \theta = 349^\circ$$

$$\vec{g} = 3,6 \text{ cm} \times 50 \text{ N} = 180 \text{ N } O-22^\circ-N \quad \theta = 158^\circ$$



- 11.
- a) Verdadero
 - b) Falsa $V_{CB} = 40 \text{ km/h}$ Norte
 - c) Falsa $V_{AC} = 20 \text{ km/h}$ Sur
 - d) Verdadera
 - e) Verdadera

12. I trayecto: $25 \text{ min} \times \frac{1 \text{ h}}{60 \text{ min}} = 0,42 \text{ h}$

$$v = \frac{d}{t} \quad d = v \cdot t = (90 \text{ km/h})(0,42 \text{ h}) = 37,8 \text{ km}$$

II trayecto: $v = \frac{d}{t} \quad t = \frac{d}{v} = \frac{2 \text{ km}}{40 \text{ km/h}} = 0,05 \text{ h}$

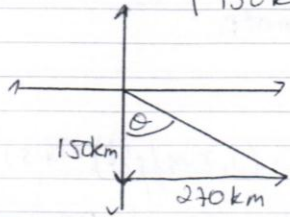
$$\vec{v}_m = \frac{\vec{d}_1 + \vec{d}_2}{t_1 + t_2} = \frac{37,8 \text{ km} + 2 \text{ km}}{0,42 \text{ h} + 0,05 \text{ h}} = 84,68 \text{ km/h}$$

R/

(21)

$$13. \quad |\vec{d}| = \sqrt{(150 \text{ km})^2 + (270 \text{ km})^2} = 308,9 \text{ km}$$

$$\theta = \tan^{-1} \left(\frac{270 \text{ km}}{150 \text{ km}} \right) = 61^\circ$$



$$\vec{d} = 308,9 \text{ km } S-61^\circ-E$$

14.

x	y
100m	-
-	300m
150m	-
250m	300m

$$|\vec{d}| = \sqrt{(250 \text{ m})^2 + (300 \text{ m})^2}$$

$$|\vec{d}| = 390,51 \text{ m}$$

$$\theta = \tan^{-1} \left(\frac{300 \text{ m}}{250 \text{ m}} \right) = 50,2^\circ$$

$$R/ \quad \vec{v} = \frac{390,51 \text{ m}}{15 \text{ min}} = 26,03 \text{ m/min } E-50,2^\circ-N$$

$$15. \quad AB: \quad v = \frac{d}{t} \quad t = \frac{d}{v} = \frac{600 \text{ m}}{6 \text{ m/s}} = 100 \text{ s}$$

$$BC: \quad v = \frac{d}{t} \quad d = v \cdot t = (8 \text{ m/s})(80 \text{ s}) = 640 \text{ m}$$

$$v_m = \frac{d_1 + d_2}{t_1 + t_2} = \frac{600 \text{ m} + 640 \text{ m}}{100 \text{ s} + 80 \text{ s}} = 6,89 \text{ m/s} \quad R/$$

Capítulo 4

22

Actividad 4.1

- ↓) Auto A: $a = 1,8 \text{ m/s}^2$ $v_i = 0$
 Camión B: $\vec{v} = 20 \text{ m/s}$ constante.

a) $t = 40 \text{ s}$.

Auto A: $d = v_i t + \frac{1}{2} a t^2 = \frac{1}{2} \cdot (1,8 \text{ m/s}^2) (40 \text{ s})^2 = 1440 \text{ m}$

Camión B: $\vec{v} = \frac{\vec{d}}{t} \Rightarrow \vec{d} = \vec{v} \cdot t = (20 \text{ m/s}) (40 \text{ s}) = 800 \text{ m}$.

R/ El auto recorrió una mayor distancia.

b) $d = 600 \text{ m}$ $v_i = 0$ $a = 1,8 \text{ m/s}^2$ $v_f = ?$

$$d = \frac{v_f^2 - v_i^2}{2a} \Rightarrow \sqrt{2ad + v_i^2} = v_f$$

$$v_f = \sqrt{2(1,8 \text{ m/s}^2)(600 \text{ m}) + 0} = 46,48 \text{ m/s} \quad \text{R/}$$

3) $t = ?$ $v_f = 60 \text{ km/h}$ $v_i = 0$ $a = 20 \text{ km/h}^2$.

$$a = \frac{v_f - v_i}{t} \Rightarrow t = \frac{v_f - v_i}{a} = \frac{60 \text{ km/h} - 0}{20 \text{ km/h}^2} = 3 \text{ horas} \quad \text{R/}$$

2) $v_i = 5 \text{ m/s}$ $h = 350 \text{ m}$ $g = 9,8 \text{ m/s}^2$.

a) $v_f = ?$ $\Rightarrow t = \frac{v_f - v_i}{g}$

$$v_f = t \cdot g + v_i = (7 \text{ s})(9,8 \text{ m/s}^2) + 5 \text{ m/s}$$

$$v_f = 73,6 \text{ m/s} \quad \text{R/}$$

b) $h = v_i t + \frac{1}{2} g t^2 = (5 \text{ m/s})(7 \text{ s}) + \frac{1}{2} \cdot 9,8 \text{ m/s}^2 \cdot (7 \text{ s})^2$

$$4) v_i = 0 \quad a = 20 \text{ m/s}^2$$

$$a) t = 15 \text{ s} \quad v_f = ?$$

$$a = \frac{v_f - v_i}{t} \Rightarrow v_f = a \cdot t + v_i$$

$$v_f = (20 \text{ m/s}^2)(15 \text{ s}) + 0 = 300 \text{ m/s}$$

$$b) d = v_i t + \frac{1}{2} a t^2 = \frac{1}{2} \cdot (20 \text{ m/s}^2)(15 \text{ s})^2 = 2250 \text{ m}$$

$$5) v_i = 0 \quad t = 5 \text{ s} \quad v_i = 72 \text{ km/h} = 20 \text{ m/s}$$

$$a) a = \frac{v_f - v_i}{t} = \frac{20 \text{ m/s} - 0}{5 \text{ s}} = 4 \text{ m/s}^2 \text{ R/}$$

$$b) d = v_i t + \frac{1}{2} a t^2 = \frac{1}{2} \cdot (4 \text{ m/s}^2)(5 \text{ s})^2 \quad d = 50 \text{ m R/}$$

$$c) a = \frac{v_f - v_i}{t} \quad v_f = a \cdot t + v_i = (4 \text{ m/s}^2)(9 \text{ s}) + 0$$

$$v_f = 36 \text{ m/s R/}$$

$$6) v_i = 72 \text{ km/h} = 20 \text{ m/s} \quad t = 2,5 \text{ s} \quad v_f = 90 \text{ km/h} = 25 \text{ m/s}$$

$$a) a = \frac{v_f - v_i}{t} = \frac{25 \text{ m/s} - 20 \text{ m/s}}{2,5 \text{ s}} \quad a = 2 \text{ m/s}^2 \text{ R/}$$

$$b) v_i = 90 \text{ km/h} = 25 \text{ m/s} \quad v_f = 0 \quad t = 5 \text{ s}$$

$$a = \frac{v_f - v_i}{t} = \frac{0 - 25 \text{ m/s}}{5 \text{ s}} \Rightarrow a = -5 \text{ m/s}^2 \text{ R/}$$

$$c) v_i = 25 \text{ m/s} \quad t = 4,5 \text{ s} \quad a = -5 \text{ m/s}^2$$

$$a = \frac{v_f - v_i}{t} \quad v_f = a \cdot t + v_i = (-5 \text{ m/s}^2)(4,5 \text{ s}) + 25 \text{ m/s}$$

$$v_f = 25 \text{ m/s R/}$$

(24)

7) $h = 80\text{ m}$ $g = 9,8\text{ m/s}^2$ $v_i = 0$

a) $h = v_i^2 t + \frac{1}{2} g t^2$

$t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2(80\text{ m})}{9,8\text{ m/s}^2}}$ $t = 4,04\text{ s R/}$

b) $t = \frac{v_f - v_i}{g}$ $v_f = v_i + g t$

$v_f = (4,04\text{ s})(9,8\text{ m/s}^2)$

$v_f = 39,6\text{ m/s R/}$

8) $v_i = 0$ $t = 6\text{ s}$ $g = 9,8\text{ m/s}^2$

a) $h = v_i^2 t + \frac{1}{2} g t^2 = \frac{1}{2} (9,8\text{ m/s}^2) (6\text{ s})^2 = 176,4\text{ m R/}$

b) $t = \frac{v_f - v_i}{g}$

$v_f = v_i + g t = (6\text{ s})(9,8\text{ m/s}^2)$

$v_f = 58,8\text{ m/s R/}$

9) $v_i = 100\text{ m/s}$ A $t = 4,0\text{ s}$ $v = 60\text{ m/s}$ $g = -9,8\text{ m/s}^2$

a) $h = \frac{v_f^2 - v_i^2}{2g} = \frac{0 - (100\text{ m/s})^2}{2(-9,8\text{ m/s}^2)} \Rightarrow h = 510,2\text{ m R/}$

b) $t = \frac{v_f - v_i}{g} = \frac{0 - 100\text{ m/s}}{-9,8\text{ m/s}^2}$ $t = 10,2\text{ s R/}$

c) $t = 2 \cdot (10,20\text{ s})$ $t = 20,40\text{ s}$

$$10) \quad v_f = 0 \quad t = 1,0s \quad g = -9,8m/s^2$$

$$a) \quad t = \frac{v_f - v_i}{g} \quad v_i = v_f - tg = -(1,0s)(-9,8m/s^2)$$
$$v_i = 9,8m/s \quad R/$$

$$b) \quad h = \frac{v_f^2 - v_i^2}{2g} = \frac{0 - 9,8m/s^2}{2 \cdot (-9,8m/s^2)} = 4,9m \quad R/$$