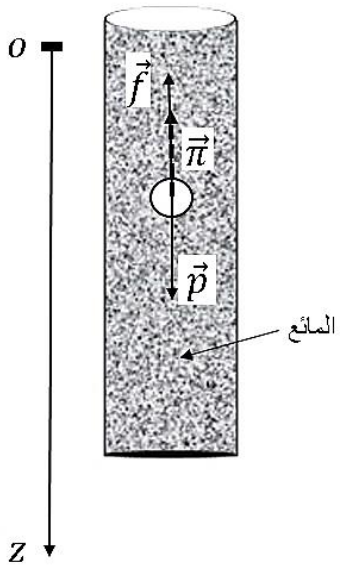
-1



- P $\vec{P} = m\vec{g}$
  - m -
  - g -
  - $\rho_s = \frac{m}{V}$ -
- π $\vec{\pi} = -\rho V\vec{g}$
  - ρ ▪
  - V ▪ (m^3)
- f
  - $f = kv$ ▪
  - $f = kv^2$ ▪

-2

▪

$$\sum \vec{F} = m\vec{a} \Longrightarrow \vec{P} + \vec{\pi} + \vec{f} = m\vec{a}$$

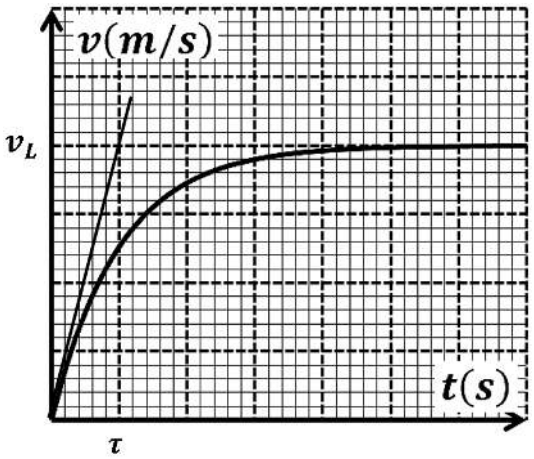
(oz)

$$P - \pi - f = ma \Longrightarrow mg - \rho Vg - kv = m\frac{dv}{dt}$$

$$\Longrightarrow mg - \rho Vg = m\frac{dv}{dt} + kv \Longrightarrow \frac{dv}{dt} + \frac{k}{m}v = g - \frac{\rho Vg}{m}$$

$$\Longrightarrow \frac{dv}{dt} + \frac{k}{m}v = g\left(1 - \frac{\rho V}{m}\right) \Longrightarrow \boldsymbol{\frac{dv}{dt} + \frac{k}{m}v = g\left(1 - \frac{\rho}{\rho_s}\right)}$$

•



▪ $\tau = \frac{m}{k}$ τ

▪ $\frac{dv}{dt} = 0$ v_L

$$\Longrightarrow \frac{k}{m}v_L = g\left(1 - \frac{\rho}{\rho_s}\right) \Longrightarrow \boldsymbol{v_L = \frac{mg}{k}\left(1 - \frac{\rho}{\rho_s}\right)}$$

▪ $v = 0$ a_0

$$\Longrightarrow \boldsymbol{a_0 = \frac{dv}{dt} = g\left(1 - \frac{\rho}{\rho_s}\right)}$$

▪ a_0

- $a_0 = g$
- $a_0 < g$

$$P - \pi = ma_0 \Longrightarrow \boldsymbol{\pi = P - ma_0}$$

-3

▪

$$\sum \vec{F} = m\vec{a} \Longrightarrow \vec{P} + \vec{\pi} + \vec{f} = m\vec{a}$$

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(oz)

$$P - \pi - f = ma \Longrightarrow mg - \rho V g - kv^2 = m\frac{dv}{dt}$$

$$\Longrightarrow mg - \rho V g = m\frac{dv}{dt} + kv^2 \Longrightarrow \frac{dv}{dt} + \frac{k}{m}v^2 = g - \frac{\rho V g}{m}$$

$$\Longrightarrow \frac{dv}{dt} + \frac{k}{m}v^2 = g\left(1 - \frac{\rho V}{m}\right)$$

$$\Longrightarrow \boldsymbol{\frac{dv}{dt} + \frac{k}{m}v^2 = g\left(1 - \frac{\rho}{\rho_s}\right)}$$

- $\frac{dv}{dt} = 0$ v_L
$$\Longrightarrow \frac{k}{m}{v^2}_L = g\left(1 - \frac{\rho}{\rho_s}\right) \Longrightarrow \boldsymbol{v_L = \sqrt{\frac{mg}{k}\left(1 - \frac{\rho}{\rho_s}\right)}}$$
- $v = 0$ a_0
$$\Longrightarrow a_0 = \frac{dv}{dt} = g\left(1 - \frac{\rho}{\rho_s}\right)$$
-

-
-

$$\sum \vec{F} = m\vec{a} \Longrightarrow \vec{P} = m\vec{a}$$

(oz)

$$P = ma \Longrightarrow mg = ma \Longrightarrow a = g \Longrightarrow \boldsymbol{\frac{dv}{dt} = g \Longrightarrow \frac{d^2z}{dt^2} = g}$$

$z_0 = 0 \quad v_0 = 0$ -

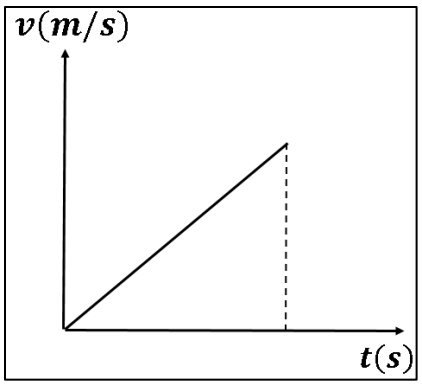
-

$$v = at + v_0 \Longrightarrow v = gt$$

-

$$z = \frac{a}{2}t^2 + v_0 t + z_0 \Longrightarrow z = \frac{g}{2}t^2$$

$${v_0}^2 - v^2 = 2gh$$

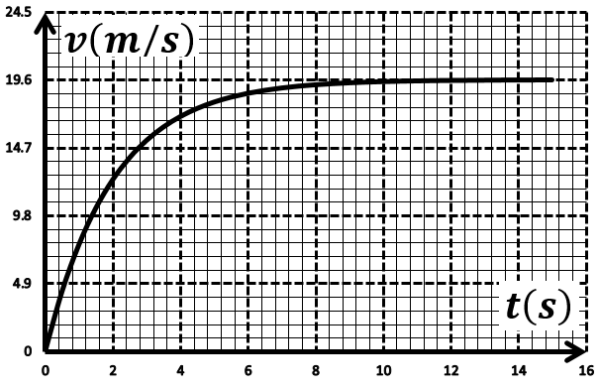


a -

h z -

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$v =$ (S)



$f(t)$

(S) 1

2

v_{lim}

t=0

(S) 3

(S) 4

v

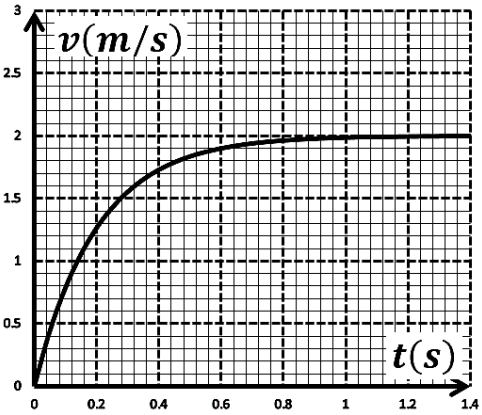
5

$g = 10\,m/s^2$ h m

$f = k.v^2$ -1

-

(Oz) -



g m k v_{lim}

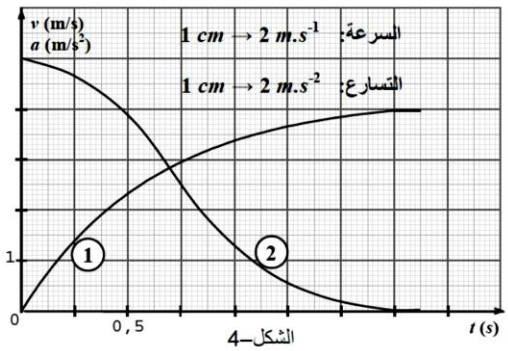
-2

v_{lim} -

$\frac{m}{k}$ k -

-3

$v(t)$ -4



$v_0 = 0\ m.s^{-1}$

r=1,5cm m=3g

$g=9,8\ m.s^{-2}$ $f=kv^2$ $V=(4/3).\pi r^3$ $\rho_{air}=1,3kg.m^{-3}$

1

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2

$v = f(t)$ $a = h(t)$ 3

$a(t)$

v_ℓ

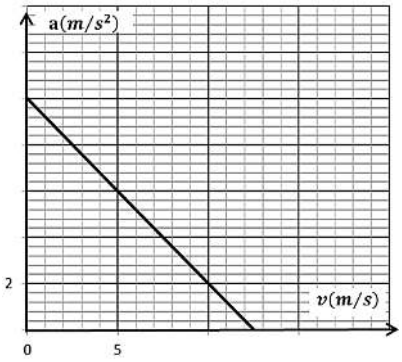
k $v_\ell = \sqrt{\frac{g}{k}(m - \rho_{air} V)}$

O $m = 100kg$

(a) $f = kv$

(v)

B A $\frac{dv}{dt} = Av + B$



(g)

(v_ℓ)

$\frac{k}{m}$

k

$0 \leq t \leq 7s$

2010 **5**

(Webcam) m *(S)*

(Avistep)

t(ms)	0	100	200	300	400	500	600	700	800	900
v(m.s^{-1})	0	0,60	0,90	1,02	1,08	1,10	1,12	1,13	1,14	1,14

1 cm → 0,1 s. 1 cm → 0,20 m.s^{-1} $v = f(t)$ *v* 1

v_{lim}

(S

t=0s *(S)*

(S) *V* ρ $\frac{dv}{dt} + Av = C\left(1 - \frac{\rho.V}{m}\right)$ *(S)* 2

(S)

v *(S)*

k $C = g$ $A = \frac{k}{m}$

k

m = 19g *g =10 N.Kg^{-1}*

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o $t = 0$ $m = 13g$ $D = 3cm$

(oz) $1500m$

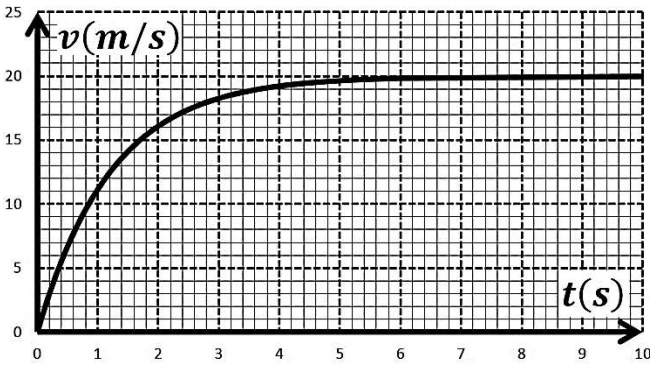
G -

-

$f = kv^2$ $\vec{f}$ $\vec{\pi}$ $\vec{P}$

k -

-



$\vec{\pi}$ -

-

$\frac{dv}{dt} = A - Bv^2$

v_l -

k v_l -

-

المعطيات: حجم الكرة: $V = \frac{4}{3}\pi r^3$، الكتلة الحجمية للهواء: $\rho = 1,3\,kg \cdot m^{-3}$ ، $g = 9,8\,m \cdot s^{-2}$.

2017 7

h

v k $f = kv^2$

$(t = 0)$ .1

$\vec{\Pi}$

v_l

k

a_0 .2

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.3

(

(

km/h $1000\ m$ (

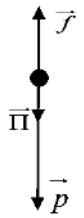
$a = g(t)$ $v = f(t)$ (

$m = 2.5\ kg$ $g = 9.80\ m.s^{-2}$ $\Pi = 3\ N$ $k = 1.32\ SI$

2017 **8**

V m

$t > 0$ t $t = 0$

3	2	1	المجموعة
			التمثيل المنجز

$\vec{f}$ $\vec{\Pi}$

(1

(

(

$t = 0$ a_0 (

(2

a_0

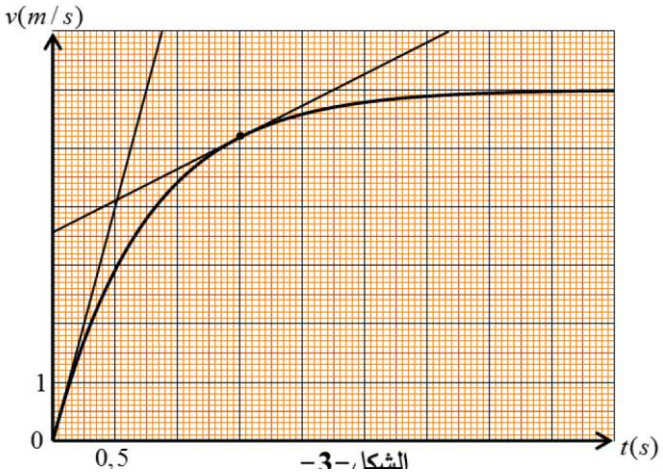
$t = 0$

v_{lim} (3

V g k m v_{lim} (4

k

$t = 1.5s$ (5

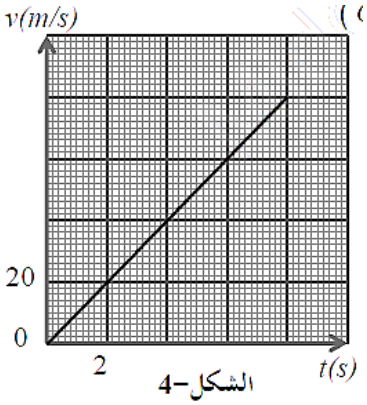


الشكل-3-

$m = 2.6g$ $g = 9.80\ m.s^{-2}$ $f = kv$

$V = 3.6 \times 10^{-4}\ m^3$ $\rho_{air} = 1.3kg.m^{-3}$

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الشكل-4

$m = 80kg$ G (S) -

$8s$ h

$(o\vec{k})$ $v(t)$

(S) -

h -

g -

$f = kv^2$ h -

β $\frac{dv}{dt} = g\left(1 - \frac{v^2}{\beta}\right)$ (S) -

m g k

β -

$t = 0$ (S) -

-

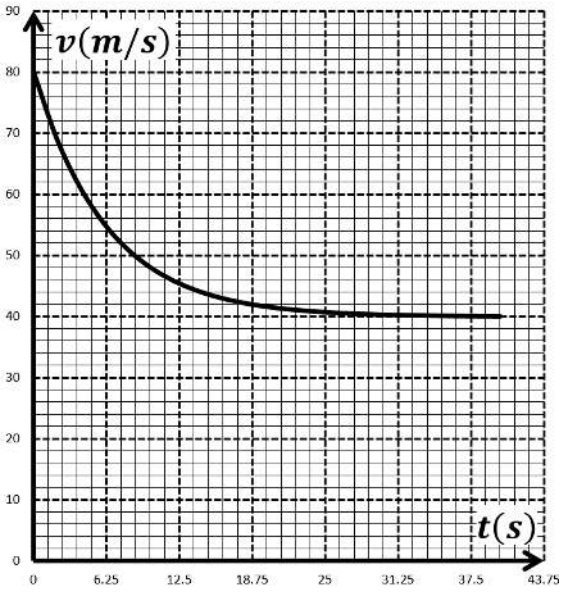
(S) v_{lim} -

(S) -

v_{lim} -

k -

$g = 9.8\,m/s^2$



-

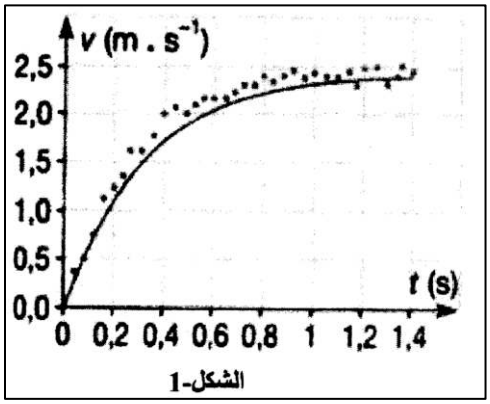
$f = k`v^2 \ldots\ldots\ldots(2)$ $f = kv \ldots\ldots\ldots(1)$

$k`$ k v f

-

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-



الشكل-1

-

ρ ρ_0 -

k g m -

$\frac{dv}{dt} + Bv = A$ -

B A

v_{lim} v -

B A -

B A $v = f(t)$ -

$g = 9{,}81 m.s^{-2}$ ، $\rho = 4{,}1 kg.m^{-3}$ ، $\rho_0 = 1{,}3 kg.m^{-3}$

V_b g

K $f = K\rho v^2$ ρ

$g = 9.8\, m/s^2$ $V_b = 9m^3$ ρ = 1.23 kg/m^3 _____ .

-

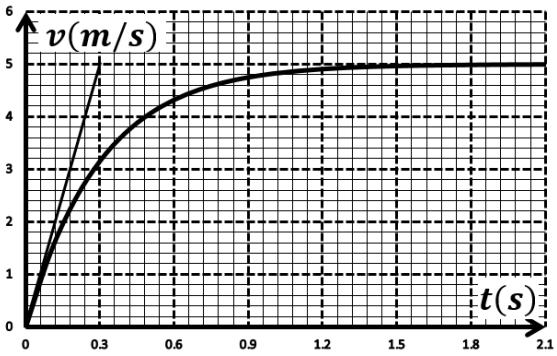
m -

-

m -

$m = 4.1kg$ -

_____ .



$\frac{dv}{dt} + Av^2 = B$ -

g K V_b ρ m B A

B -

v_l -

K -

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