

**2015/2016**

( )

10

1

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?" !

" "

90 .

$$\vec{r} \cdot \vec{v} = 0, \quad r_x \cdot v_x + r_y \cdot v_y = 0.$$

$$r_x = x, \quad r_y = y,$$

$$x \cdot v_x + y \cdot v_y = 0 \quad (1)$$

$$\begin{cases} x = v_0 \cos \alpha \cdot t \\ y = v_0 \sin \alpha \cdot t - \frac{gt^2}{2} \end{cases} \quad (2)$$

$$(x,y) \quad \begin{cases} v_x = v_0 \cos \alpha \\ v_y = v_0 \sin \alpha - gt \end{cases} \quad (1)$$

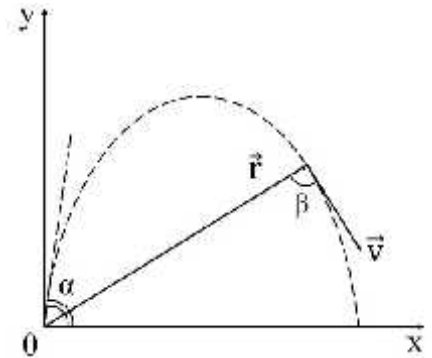
$$v_0^2 - \frac{3}{2} v_0 \sin \alpha \cdot gt + \frac{g^2 t^2}{2} = 0 \quad (3)$$

$$t_{1,2} = \frac{v_0(3 \sin \alpha \pm \sqrt{9 \cdot \sin^2 \alpha - 8})}{2g} \quad (4)$$

$$(4) \quad 9 \cdot \sin^2 \alpha - 8 < 0$$

$$\alpha < \arcsin \frac{2\sqrt{2}}{3} \quad (5).$$

$$: < \arcsin \frac{2\sqrt{2}}{3}$$



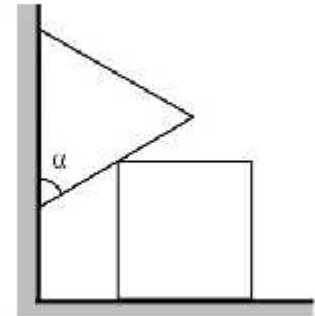
1	(1)	3
2	(2)	2
3	(3) (4)	3
4	(5)	2

10

2

m

M ( ).



2:

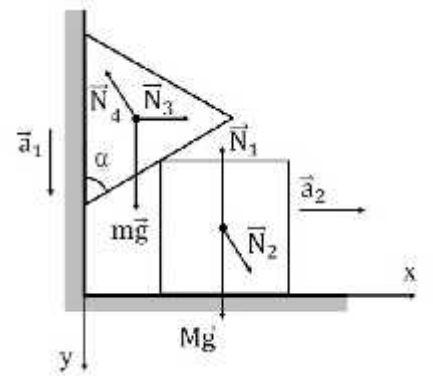
$$x = y \cdot \tan \alpha \quad (1)$$

a<sub>2</sub>

a<sub>1</sub>

$$a_2 = a_1 \cdot \tan \alpha \quad (2)$$

$M\vec{g}$   $m\vec{g}$ ,



$\vec{N}_1$   $\vec{N}_2$ ,

$\vec{N}_3$   $\vec{N}_4$

$$F \cos \alpha = M a_2 \quad (3)$$

$$m g - F \sin \alpha = m a_1 \quad (4)$$

(1),

(2) (3)

$$a = g \frac{m \cdot \sin \alpha \cdot \cos \alpha}{M \cdot \sin^2 \alpha + m \cdot \cos^2 \alpha}$$

$$: a = g \frac{m \cdot \sin \alpha \cdot \cos \alpha}{M \cdot \sin^2 \alpha + m \cdot \cos^2 \alpha}$$

2:

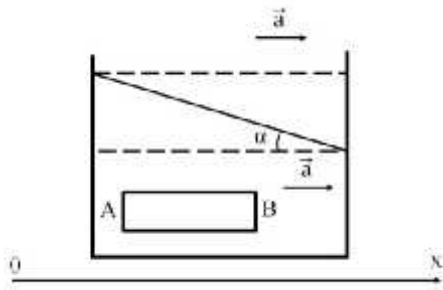
1		3
2		3
3	(3) (4)	2
4		2

$\vec{a}$ .

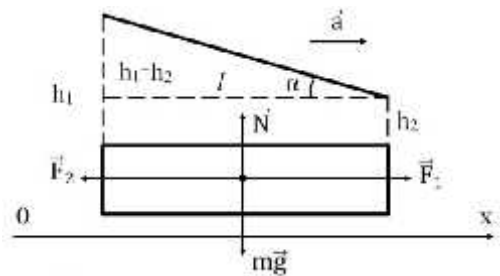
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3

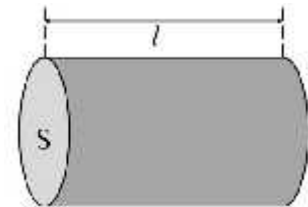
1. 2.  $F_1$   $F_2$  -  $F_1$   $F_2$  -  $F_1 > F_2$ ,  $F_1$   $F_2$  -



.1



.2



.3

$m\vec{a} = m\vec{g} + \vec{N} + \vec{F}_1 + \vec{F}_2$   
 ( .2):  
 $ma = F_1 + F_2$  (1)

F

$\Rightarrow F = F(h) = P \cdot S,$   
 $P = P_0 + \rho gh$   
 (1):

$ma = (P_0 + \rho gh_1) \cdot S - (P_0 + \rho gh_2) \cdot S$  (2)  
 $m = \rho \cdot V = \rho \cdot S \cdot l,$  (2)

$\rho \cdot S \cdot l \cdot a = S \cdot (P_0 + \rho gh_1 - P_0 - \rho gh_2) \Rightarrow \rho \cdot l \cdot a = \rho \cdot g \cdot (h_1 - h_2)$

$\frac{a}{g} = \frac{h_1 - h_2}{l}$  (3)

$\frac{h_1 - h_2}{l} = \text{tg } \alpha$

$\alpha = \text{arctg} \left( \frac{a}{g} \right)$  (4)

$\alpha = \text{arctg} \left( \frac{a}{g} \right)$



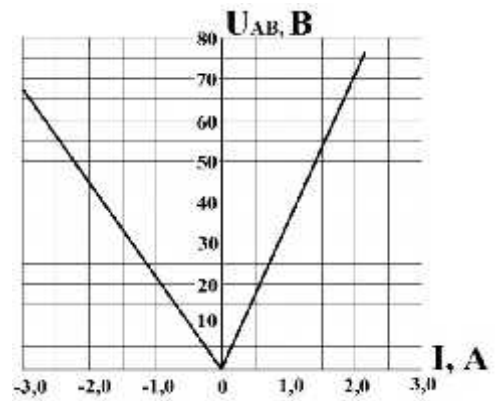
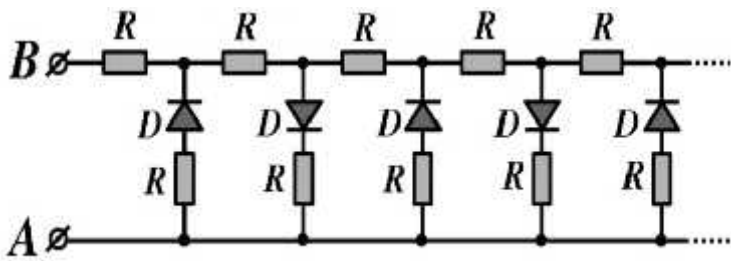
4:

1		3
2		2
3	(2)	2
4	n (3)	2
5	n	1

5

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R, D ( ),



.1

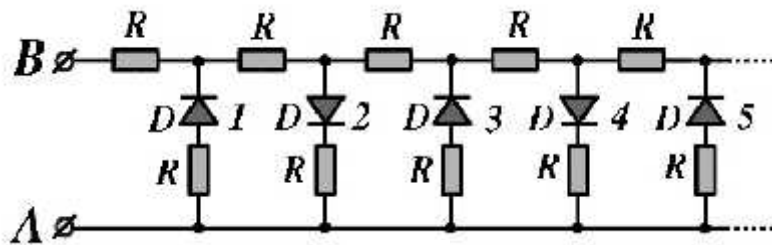
.2

" " , ( )  
 .2 ( )  
 ). R.

5

1:

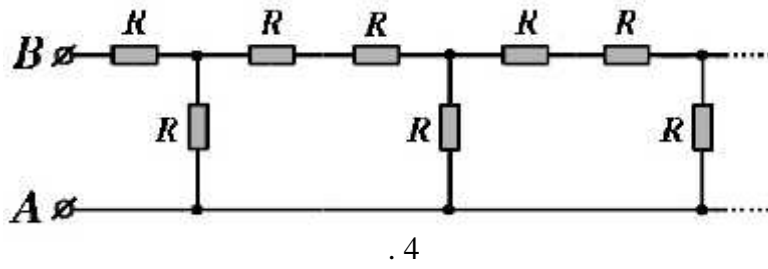
.3



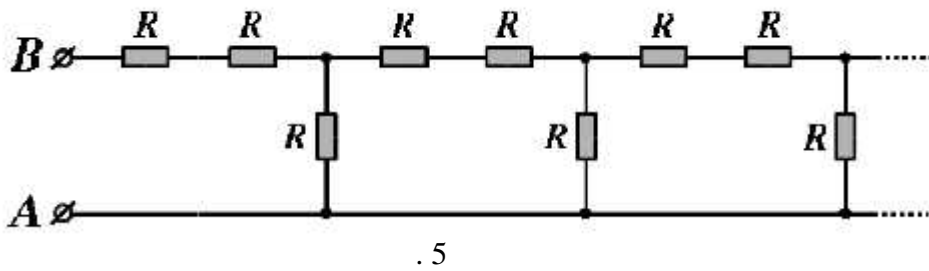
.3

$I < 0$

( . .4):



,  $I > 0$   $I < 0$   
 $R,$  .



$I < 0$   $R_<$   $I > 0$   $R_> = R_< + R.$   
 $U$   $I$

$$R \approx \frac{71 B}{2 A} - \frac{45 B}{2 A} \approx 13 \text{ Ом} .$$

2:

, , . 4. , , ,

(  $I > 0$  )  $R_>$  .

$$R_> = 2R + \frac{R \cdot R_>}{R + R_>}$$

$$R_> = R + R\sqrt{3}$$

$I < 0,$

$$R_< = R\sqrt{3}$$

$$U = I \cdot R$$

R 13 .

: 13

5, :

1	.4	3
2	.5	3
3	$R_{>} = R_{<} + R$	2
4	I U R	2

5, :

1	.4	3
2	.5	3
3	$R_{<}$	$R_{>}$ 2
4	I U R	2