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: 1.1; 1.2; 1.3; 1.4;

1.5; 1.6.

$$\vec{F} = \dots; W_n = \dots; \vec{E} = \vec{F} / Q_0; \varphi = W_n / Q_0,$$

$$\varepsilon_0 = 8,85 \cdot 10^{-12} \text{ / } -; \varepsilon = \dots; E = \frac{Q}{4\pi\varepsilon_0\varepsilon r^2}; \varphi = \frac{Q}{4\pi\varepsilon_0\varepsilon r},$$

$$\begin{aligned} &) E = 0 \quad r < R; \\ &) E = \frac{Q}{4\pi\varepsilon_0\varepsilon r^2} \quad r \geq R, \end{aligned}$$

$$\tau = \frac{dQ}{dl}; \quad \sigma = \frac{dQ}{dS}.$$

$$\begin{aligned} &) E = 0 \quad r < R; \\ &) E = \frac{\tau}{2\pi\varepsilon_0\varepsilon r} \quad r \geq R. \end{aligned}$$

$$E = \frac{\sigma}{2\varepsilon\varepsilon_0}.$$

$$\vec{E} = -\frac{d\varphi}{d\vec{r}}.$$

$$E = \frac{\varphi_1 - \varphi_2}{d},$$

$$A_{12} = Q_0(\varphi_1 - \varphi_2).$$

$$C = \frac{Q}{U},$$

$$C = \frac{\varepsilon \varepsilon_0 S}{d},$$

$$C = \frac{2\pi \varepsilon_0 \varepsilon L}{\ln(R_2 / R_1)},$$

$$C = 4\pi \varepsilon_0 \varepsilon \frac{R_1 R_2}{R_2 - R_1},$$

$$W = \frac{QU}{2} = \frac{CU^2}{2} = \frac{Q^2}{2C},$$

$$I = \frac{U}{R},$$

$$I = \frac{\varphi_1 - \varphi_2 \pm \varepsilon}{R + r},$$

$$I = \frac{\varepsilon}{R + r},$$

$$\sum I_i = 0; \quad \sum I_i R_i = \sum \varepsilon_i,$$

$$\sum I_i - \sum I_i R_i - \sum \varepsilon_i = 0,$$

$\mu_0 = 4 \cdot 10^{-7} \text{ / -}$

$$\vec{B} = \mu_0 \mu \vec{H},$$

\vec{B}

$$d\vec{H} = \frac{1}{4\pi} \cdot \frac{I \cdot [d\vec{l} \times \vec{r}]}{r^3},$$

$d\vec{H}$

$I; \vec{r}$

$d\vec{l}$

I

r_0

$$H = \frac{I}{2\pi r_0};$$

I

r_0

$$H = \frac{I}{4\pi r_0} (\cos \alpha_1 + \cos \alpha_2),$$

α_1

α_2

R

I

$$H = \frac{I}{2R};$$

$$H = \frac{IR^2}{2(R^2 + a^2)^{3/2}},$$

$H = I \cdot n_0 = \frac{IN}{l},$

N

l

n_0

$$\vec{F} = Q[\vec{v} \times \vec{B}],$$

Q

\vec{v}

\vec{B}

$$= B \cdot S \cdot \cos \alpha,$$

$S -$

;

\bar{B}

\vec{n}

$N -$

($\phi = N$)

$$\varepsilon_i = -\frac{d\phi}{dt}.$$

$$Q = -\frac{\Delta\phi}{R},$$

$R -$

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$L,$

$$W = \frac{LI^2}{2}.$$

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RC RL

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“ ” “ ” :

1.1; 1.2; 1.3; 1.4; 1.5; 1.6.

$$\vec{E} = \vec{F} / Q_0; \quad \varphi = W_n / Q_0,$$

$$E = \frac{Q}{4\pi\epsilon_0\epsilon \cdot r^2}; \quad \varphi = \frac{Q}{4\pi\epsilon_0\epsilon \cdot r},$$

$$\epsilon_0 = 8,85 \cdot 10^{-12} \text{ / -}$$

$$; \epsilon -$$

R

$$) E = 0 \quad r < R;$$

$$) E = \frac{Q}{4\pi\epsilon_0\epsilon \cdot r^2} \quad r \geq R,$$

Q -

$$\tau = \frac{dQ}{dl}; \quad \sigma = \frac{dQ}{dS}.$$

$$) E = 0 \quad r < R;$$

$$) E = \frac{\tau}{2\pi\epsilon_0\epsilon \cdot r} \quad r \geq R.$$

$$E = \frac{\sigma}{2\epsilon\epsilon_0}.$$

$$\vec{E} = -\frac{d\varphi}{d\vec{r}}.$$

$$E = \frac{\varphi_1 - \varphi_2}{d},$$

d -

φ_1 φ_2 .

Q_0

φ_1

φ_2

$$A_{12} = Q_0(\varphi_1 - \varphi_2).$$

$$C = \frac{Q}{U},$$

Q – , U –

$$C = \frac{\epsilon\epsilon_0 S}{d},$$

S – ; d –

$$C = \frac{2\pi\epsilon_0\epsilon L}{\ln(R_2/R_1)},$$

L – ; R_1 R_2 –

$$C = 4\pi\epsilon_0\epsilon \frac{R_1 R_2}{R_2 - R_1},$$

R_1 R_2 –

$$W = \frac{QU}{2} = \frac{CU^2}{2} = \frac{Q^2}{2C},$$

Q – , – ; U –

) :

$$I = \frac{U}{R},$$

I – , ; U – ; R –

) :

$$I = \frac{\varphi_1 - \varphi_2 \pm \epsilon}{R + r},$$

$\varphi_1 - \varphi_2$ – , ϵ – ; r – ;

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$$I = \frac{\epsilon}{R + r},$$

R – , r –

:

$$\sum I_i = 0 ; \quad \sum I_i R_i = \sum \epsilon_i,$$

$$\begin{aligned} \sum I_i &- & , & ; \\ \sum I_i R_i &- & & ; \\ \sum \varepsilon_i &- & , & \\ & . & & \end{aligned}$$

$$\vec{B} \quad \vec{H}$$

$$\vec{B} = \mu_0 \mu \vec{H} ,$$

$$\mu_0 = 4 \cdot 10^{-7} \quad / \quad -$$

$$; \mu -$$

$$- \quad - \quad :$$

$$d\vec{H} = \frac{1}{4\pi} \cdot \frac{I \cdot [d\vec{l} \times \vec{r}]}{r^3} ,$$

$$d\vec{H} -$$

$$I; \vec{r} -$$

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$$d\vec{l}$$

$$d\vec{l}$$

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$$r_0$$

$$H = \frac{I}{2\pi r_0} ;$$

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$$I \quad r_0$$

$$H = \frac{I}{4\pi r_0} (\cos \alpha_1 + \cos \alpha_2) ,$$

$$\alpha_1$$

$$\alpha_2 -$$

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$$R \quad I$$

$$;$$

$$H = \frac{I}{2R} ;$$

$$)$$

$$H = \frac{IR^2}{2(R^2 + a^2)^{3/2}} ,$$

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$$H = I \cdot n_0 = \frac{IN}{l} ,$$

$$N -$$

$$; l -$$

$$;$$

$$n_0 -$$

$$\vec{F} = Q[\vec{v} \times \vec{B}] ,$$

$Q -$, $\vec{B} .$, v
 \vec{B}

$S -$; $-$ $= B \cdot S \cdot \cos \alpha ,$ \vec{B} \vec{n}
 $($ $\phi = N$ $) :$

$N -$, .

$$\varepsilon_i = -\frac{d\phi}{dt} .$$

$R -$. $Q = -\frac{\Delta\phi}{R} ,$ $L,$
 $I,$

$$W = \frac{LI^2}{2} .$$

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$1.6,$ $\varepsilon_{max}.$

1.1

		Q_1	Q_2	l_1 /	l_2 /	l_1 / 2	l_2 / 2	R	l	r_1	r_2
1	1	+0.2	–	–	–	+2	+4	–	–	–	–
2	2	–3	+6	–	–	–	–	6	–	3	10
3	4	–	–	–6	–9	–	–	–	6	6	6
4	5	–	–	–	–	+10	+40	4	10	2	–
5	3	–	–	–2	+3	–	–	5	5	4	–
6	1	+0.2	–	–	–	–2	–3	–	–	–	–
7	2	+0.2	–	–	–	–	+3	10	–	1	20
8	4	–	–	+3	+4	–	–	–	5	3	4
9	5	–	–	–	–	–4	–9	6	12	3	–
10	1	+0.1	–	–	–	+2	–3	–	–	–	–
11	2	+0.1	–	–	–	–	–10	5	–	3	10
12	3	–	–	+1	+2	–	–	4	5	1	–
13	1	+0.4	–	–	–	–5	+3	–	–	–	–
14	2	+1	+5	–	–	–	–	8	–	5	10
15	4	–	–	+10	–5	–	–	–	10	10	10
16	5	–	–	–	–	–6	+8	2	5	1	–
17	4	–	–	–40	–30	–	–	–	5	4	3
18	1	+0.3	–	–	–	–4	–1	–	–	–	–
19	2	–2	–4	–	–	–	–	5	–	2	6
20	4	–	–	+8	+4	–	–	–	8	8	8
21	5	–	–	–	–	+4	–6	5	10	4	–
22	3	–	–	–3	–4	–	–	6	3	3	–
23	1	+0.1	–	–	–	+3	+1	–	–	–	–
24	2	–0.4	–	–	–	–	–8	8	–	5	10
25	4	–	–	–8	+6	–	–	–	5	4	3
26	1	–0.4	–	–	–	–2	+4	–	–	–	–
27	3	–	–	+2	–4	–	–	7	5	4	
28	2	–0.5	–	–	–	–	+9	10	–	5	15
29	5	–	–	–	–	–3	–8	4	18	6	–
30	4	–	–	+4	+6	–	–	–	10	4	6

1.2

		R_1	R_2	L	S_2	d	r		Q	U	E /	\cdot /	
1	1	4	6	-	-	-	5	-	-	-	-	$6 \cdot 10^6$	Q
2	3	-	-	-	100	5	-	-	2	-	-	-	ν
3	4	-	-	-	160	6	-	2,3	9	-	-	-	ν
4	2	1	2	25	-	-	1,5	-	4	-	-	-	ν
5	3	-	-	-	200	5	-	-	-	-	20	-	ν
6	1	1	3	-	-	-	2	-	0,8	-	-	-	ν
7	4	-	-	-	100	8	-	2,7	7	-	-	-	ν
8	3	-	-	-	200	10	-	-	-	200	-	-	ν
9	2	2	4	40	-	-	3	-	-	-	-	$2 \cdot 10^5$	u
10	1	4	5	-	-	-	4,5	-	-	300	-	-	ν
11	3	-	-	-	120	8	-	-	-	-	-	$8 \cdot 10^6$	Q
12	4	-	-	-	200	7	-	4	-	-	50	-	ν
13	1	2	3	-	-	-	2,5	-	-	-	-	10^7	u
14	2	1,5	2,5	30	-	-	2	-	-	100	-	-	ν
15	3	-	-	-	150	4	-	-	4	-	-	-	ν
16	2	2,5	3,5	45	-	-	3	-	-	-	-	10^5	Q
17	4	-	-	-	140	10	-	5	-	300	-	-	ν
18	1	2,5	3,5	-	-	-	3	-	2	-	-	-	ν
19	3	-	-	-	100	10	-	-	-	-	-	$9 \cdot 10^6$	u
20	2	1,5	3	35	-	-	2	-	5	-	-	-	ν
21	4	-	-	-	100	4	-	4,5	-	-	-	$2 \cdot 10^5$	Q
22	1	3	4	-	-	-	3,5	-	-	200	-	-	ν
23	2	2	3	30	-	-	2,5	-	-	200	-	-	ν
24	3	-	-	-	150	6	-	-	-	300	-	-	ν
25	4	-	-	-	120	5	-	3,5	-	-	-	$3 \cdot 10^5$	u
26	3	-	-	-	260	3	-	-	-	-	-	$2 \cdot 10^5$	u
27	2	1	3	10	-	-	2	-	-	400	-	-	Q
28	3	-	-	-	280	2	-	-	-	-	-	$3 \cdot 10^5$	Q
29	4	-	-	-	290	4	-	6	-	-	-	$2 \cdot 10^5$	u
30	1	5	9	-	-	-	7	-	-	250	-	-	Q

1.3

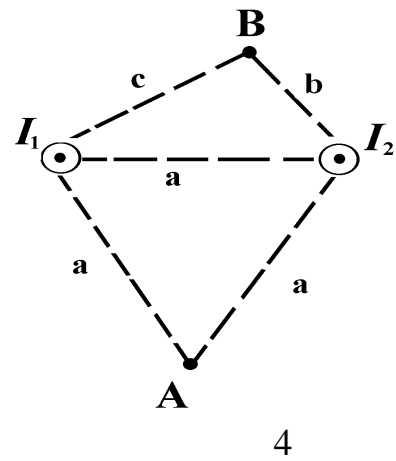
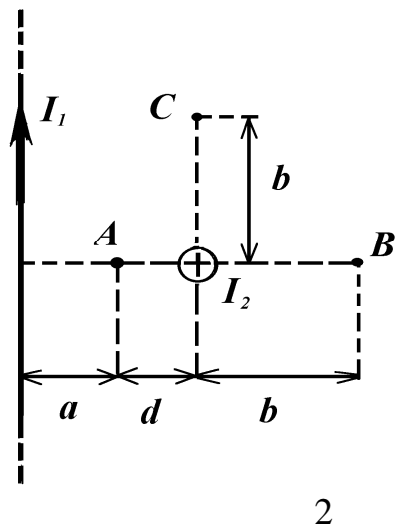
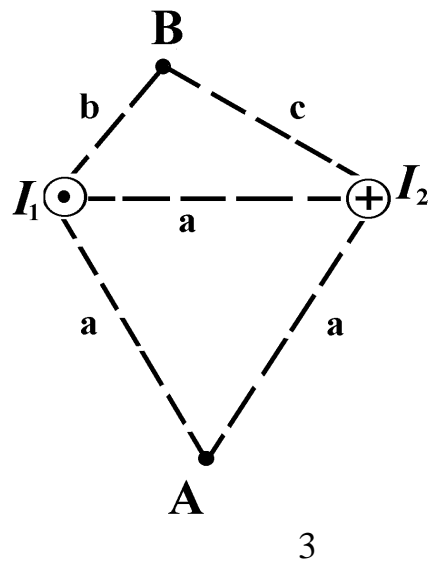
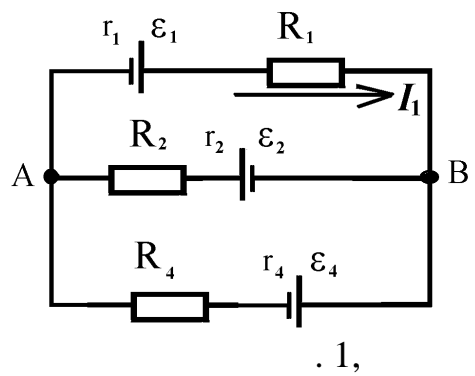
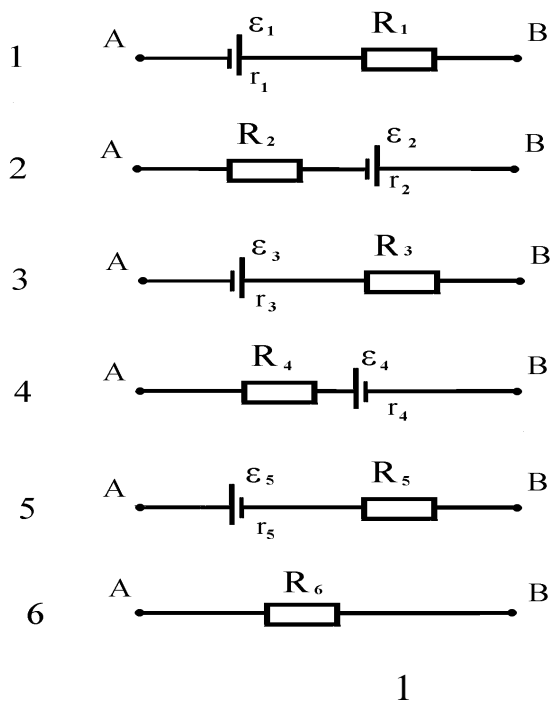
-	-	i	r _i	R _i	,	
1	1,2,3	₁ =11, ₂ =4, ₃ =6	r ₁ =r ₂ =r ₅ =0	R ₁ =25, R ₂ =50, R ₃ =10	-	1, 2, 3
2	4,5,6	₄ =9, ₅ =10	r ₄ =1, r ₅ =2	R ₄ =19, R ₅ =38	₆ =0,1	4, 5, 6
3	1,2,4	₁ =16, ₂ =5, ₄ =7	r ₁ =r ₂ =r ₄ =0	R ₂ =30, R ₄ =50	₁ =0,4	2, 4, R ₁
4	5,4,1	₁ =9, ₄ =6, ₅ =2	r ₁ =r ₄ =r ₅ =0	R ₄ =50, R ₅ =10	₁ =0,2	4, 5, R ₁
5	1,2,6	₁ =10, ₂ =8	r ₁ =2, r ₂ =1	R ₁ =8, R ₂ =19, R ₆ =60	-	1, 2, 6
6	3,2,1	₂ =4, ₃ =5	r ₁ =r ₂ =r ₅ =0	R ₁ =30, R ₂ =40, R ₃ =20	₁ =0,1	2, 3, 1
7	1,4,6	₁ =8, ₄ =2	r ₁ =2, r ₄ =1	R ₁ =18, R ₄ =39, R ₆ =80	-	1, 4, 6
8	1,4,2	₂ =11, ₄ =7	r ₁ =r ₂ =r ₄ =0	R ₁ =50, R ₂ =20, R ₄ =30	₁ =0,1	2, 4, 1
9	2,1,3	₁ =9, ₂ =8, ₃ =1	r ₁ =r ₂ =r ₅ =0	R ₁ =50, R ₂ =20, R ₃ =10	-	1, 2, 3
10	4,1,5	₄ =4, ₅ =2	r ₁ =r ₄ =r ₅ =0	R ₁ =25, R ₄ =50, R ₅ =10	₁ =0,4	4, 5, 1
11	1,3,2	₂ =16, ₃ =3	r ₁ =r ₂ =r ₅ =0	R ₁ =70, R ₂ =20, R ₃ =10	₁ =0,1	2, 3, 1
12	6,4,1	₁ =3, ₄ =7	r ₁ =2, r ₄ =1	R ₁ =78, R ₄ =39	₆ =0,1	1, 4, R ₆
13	5,4,1	₄ =4, ₅ =14	r ₁ =r ₄ =r ₅ =0	R ₁ =90, R ₄ =20, R ₅ =40	₁ =0,1	4, 5, 1
14	4,6,5	₄ =10, ₅ =5	r ₄ =2, r ₅ =1	R ₄ =33, R ₅ =19	₆ =0,3	4, 5, R ₆
15	1,6,4	₁ =4, ₄ =3	r ₁ =2, r ₄ =1	R ₁ =18, R ₄ =9, R ₆ =60	-	1, 4, 6
16	4,1,6	₁ =2, ₄ =12	r ₁ =3, r ₄ =2	R ₁ =97, R ₄ =18	₆ =0,1	2, 4, R ₆
17	4,1,5	₁ =22, ₄ =8, ₅ =4	r ₁ =r ₄ =r ₅ =0	R ₁ =25, R ₄ =50, R ₅ =10	-	1, 4, 5
18	2,1,6	₁ =20, ₂ =6	r ₂ =1	R ₁ =82, R ₂ =29, R ₆ =10	₁ =0,2	2, 6, r ₁
19	2,3,1	₁ =19, ₂ =4, ₃ =5	r ₁ =r ₂ =r ₅ =0	R ₂ =20, R ₃ =10	₁ =0,2	2, 3, R ₁
20	4,1,6	₁ =13, ₄ =1	r ₄ =1	R ₁ =27, R ₄ =24, R ₆ =40	₁ =0,3	4, 6, r ₁
21	2,1,4	₁ =12, ₂ =9, ₄ =5	r ₁ =r ₂ =r ₄ =0	R ₁ =30, R ₂ =60, R ₄ =20	-	1, 2, 4
22	2,1,6	₁ =8, ₂ =6	r ₁ =3	R ₁ =27, R ₂ =9, R ₆ =25	₂ =0,1	1, 6, r ₂
23	5,1,4	₁ =19, ₄ =6, ₅ =2	r ₁ =r ₄ =r ₅ =0	R ₄ =50, R ₅ =10	₁ =0,2	4, 5, R ₁
24	1,6,2	₁ =18, ₂ =15	r ₁ =2, r ₂ =1	R ₁ =58, R ₂ =9, R ₆ =30	-	1, 2, 6
25	4,1,2	₂ =4, ₄ =2	r ₁ =r ₂ =r ₄ =0	R ₁ =50, R ₂ =20, R ₄ =80	₁ =0,2	2, 4, 1
26	1,6,5	₁ =8, ₅ =6	r ₁ =2, r ₅ =3	R ₁ =8, R ₅ =12, R ₆ =10	-	1, 5, 6
27	2,4,5	₂ =8	r ₁ =2, r ₄ =1, r ₅ =5	R ₂ =18, R ₄ =14, R ₅ =25	₄ =0,2, ₅ =0,3	2, 4, 5
28	3,6,4	₃ =36, ₄ =9	r ₃ =2, r ₄ =1	R ₃ =16, R ₄ =8	₆ =0,5	4, 3, R ₆
29	3,1,5	₃ =40, ₅ =30	r ₁ =r ₅ =2, r ₃ =5	R ₃ =35, R ₁ =28, R ₅ =28	₁ =0,7	5, 3, 1
30	2,3,4	₂ =20, ₄ =40, ₃ =10	r ₂ =10, r ₄ =15, r ₃ =5	R ₂ =110, R ₄ =105	₃ =0,2	4, 2, R ₃

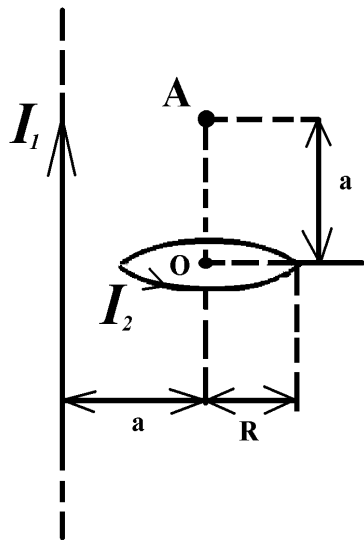
1.4

				b_1	b_2	R_1	R_2	b_3	R_3
1	1	2		3	4	-	1	-	-
2	3	7		10	-	4	-	-	-
3	1	3		4	4	-	10	-	-
4	3	10		9	-	3	-	-	-
5	2	5		10	2	2	5	-	-
6	1	2		12	8	-	1	2	-
7	4	11		8	5	2	-	-	-
8	1	4		8	6	-	5	3	4
9	2	6		2	10	5	6	-	-
10	3	8		10	-	3	-	-	-
11	1	4		5	3	-	8	-	-
12	4	12		3	2	4	-	-	-
13	2	6		6	5	6	8	-	-
14	3	9		8	-	2	-	-	-
15	4	13		10	5	5	3	-	-
16	1	2		16	12	-	2	4	-
17	3	7		5	-	3	-	-	-
18	2	6		15	4	4	5	-	-
19	4	11		4	3	1	-	-	-
20	1	3		6	8	-	5	3	4
21	3	8		12	-	2	-	-	-
22	2	5		8	10	3	4	-	-
23	4	12		6	5	3	-	-	-
24	3	9		6	-	1	-	-	-
25	4	13		8	2	10	5	-	-
26	1	2		2	6	-	5	3	-
27	2	6		3	7	5	9	-	-
28	3	10		5	-	10	-	-	-
29	1	3		3	5	-	5	3	4
30	2	5		2	6	7	9	-	-

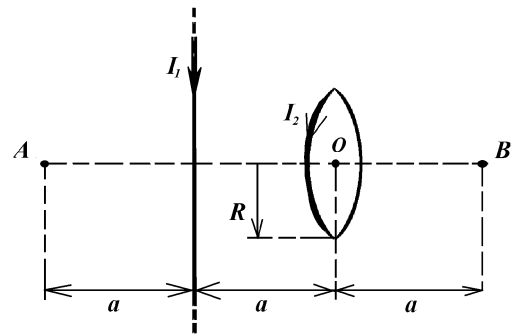
1.5

		<i>m,</i> ...	<i>Q</i>	,	<i>U,</i>	<i>v,</i> /		<i>R,</i>	<i>h,</i>	<i>T,</i>	
1	2	1		-	5	-	-	5	-	-	
2	1	4	-	100	-	0,2	-	4	7	-	<i>Q</i>
3	3	1		200	-	-	-	-	-	-	<i>T</i>
4	2	7		-	3	-	-	8	-	-	
5	1	-	-	2	-	9	-	2	10	-	<i>m</i>
6	3	4	-	400	-	-	-	-	-	652	<i>Q</i>
7	1	1		-	-	0,5	-	2	10	-	
8	2	4	-	100	2	-	-	9,11	-	-	<i>Q</i>
9	3	7		300	-	-	-	-	-	-	<i>T</i>
10	1	-	-	3	-	30	-	5	17	-	<i>Q/m</i>
11	2	-		200	0,9	-	-	2,17	-	-	<i>m</i>
12	1	4	2	500	-	-	-	3	9	-	<i>v</i>
13	2	-	-	3	0,8	-	-	3,18	-	-	<i>Q/m</i>
14	3	-	-	2	-	-	-	-	-	17,9	<i>m</i>
15	1	1		100	-	-	-	6	10	-	<i>v</i>
16	2	4	2	100	4	-	-	-	-	-	<i>R</i>
17	3	7	2	-	-	-	-	-	-	760	
18	1	1		400	-	2	60 ⁰	-	-	-	<i>R; h</i>
19	2	7	2	200	1	-	-	-	-	-	<i>R</i>
20	3	-	-	150	-	-	-	-	-	869	<i>Q/m</i>
21	1	7	-	400	-	0,3	-	5	13,5	-	<i>Q</i>
22	2	-	-	5	0,5	-	-	1,5	-	-	<i>m</i>
23	3	-	-	200	-	-	-	-	-	326	<i>Q/m</i>
24	1	7	2	500	-	0,6	45 ⁰	-	-	-	<i>R; h</i>
25	2	4		300	-	-	-	5	-	-	<i>U</i>
26	1	3	-	400	-	0,2	-	0,5	1,57	-	α, Q
27	1	2	2	300	-	-	-	1,4	6,3	-	α, T
28	2	3	-	100	-	-	-	6	-	-	<i>U</i>
29	1	4	-2	-	-	-	-	2	12,5	0,25	$\alpha,$
30	3	2	2	-	-	-	-	-	-	30	<i>v</i>

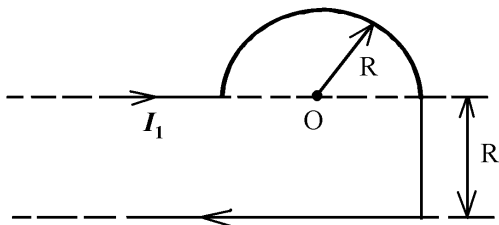




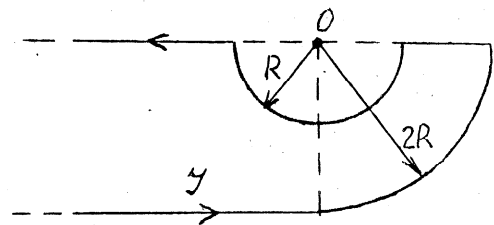
5



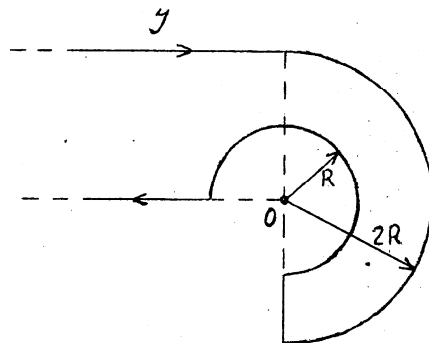
6



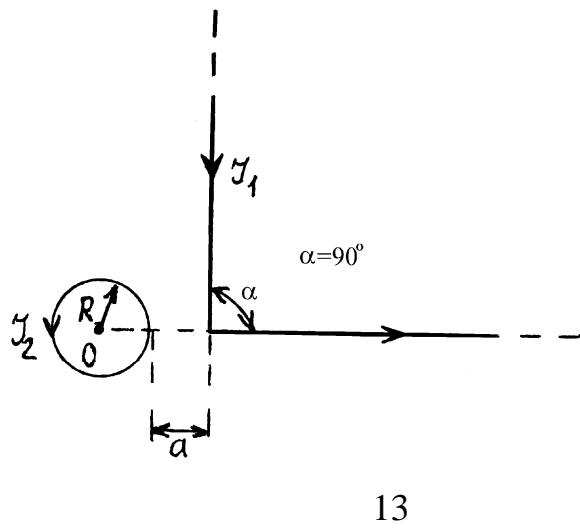
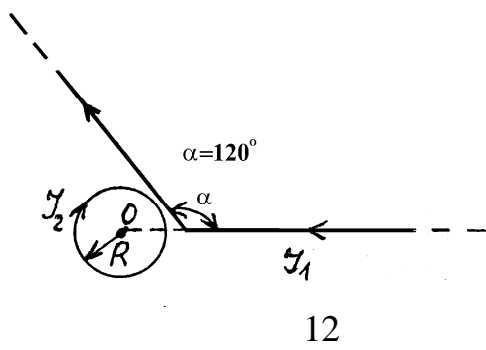
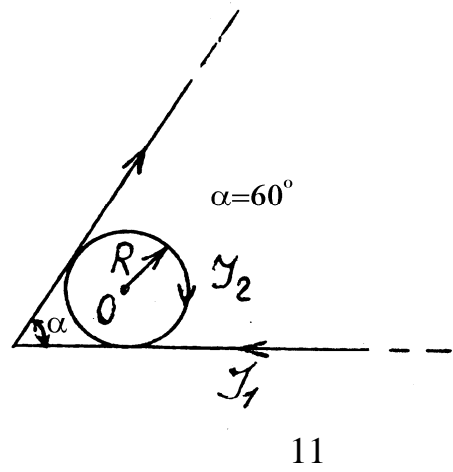
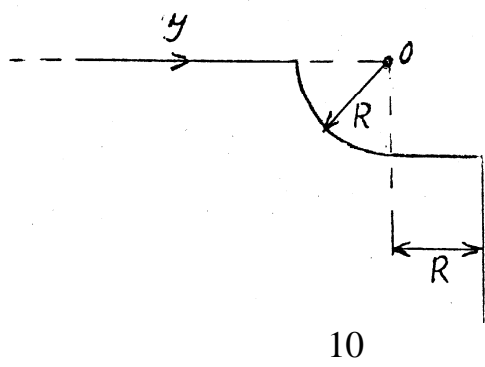
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- 1 - : , 1996.
- 2 . . . “ ”. - : . , 1988.
- 3 . . . “ ”. - : . , 1989.
- 4 - : , 1990.
- 5 - : . , 1989.
- 6 - : , 1997, . I; 1978, . II; 1979, . III.
- 7 - : , 1985.
- 8 - : , 1981.
- 9 - : , 1979.

	3, 14
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