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ФИО: Алейник Станислав Николаевич

Должность: Ректор

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МИНИСТЕРСТВО СЕЛЬСКОГО ХОЗЯЙСТВА РОССИЙСКОЙ ФЕДЕРАЦИИ
ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ
ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ
«БЕЛГОРОДСКИЙ ГОСУДАРСТВЕННЫЙ АГРАРНЫЙ УНИВЕРСИТЕТ
ИМ. В.Я.ГОРИНА»

Кафедра технической механики и конструирования машин
(наименование кафедры)

УТВЕРЖДЕН

на заседании кафедры

« 06 » 05 2024 г., протокол № 11-23/24

Заведующий кафедрой

Колесников А.С. Колесников
(подпись)

ФОНД ОЦЕНОЧНЫХ СРЕДСТВ

ПО УЧЕБНОЙ ДИСЦИПЛИНЕ

Техническая механика
(наименование дисциплины)

23.02.07 Техническое обслуживание и ремонт двигателей,
систем и агрегатов автомобилей
(код и наименование специальности)

специалист
Квалификация (степень) выпускника

п. Майский 2024 г.

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4	1.4		01,02, 03,06, 1.1, 3.3
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1	3.1	01,02, 03,06, 1.1, 3.3	,
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2	4.2	01,02, 03,06, 1.1, 3.3	,
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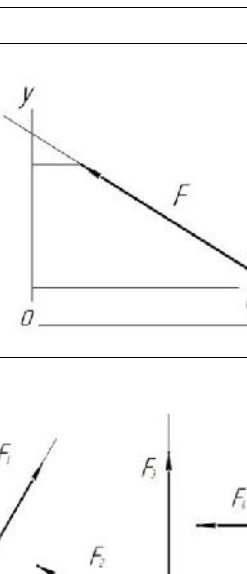
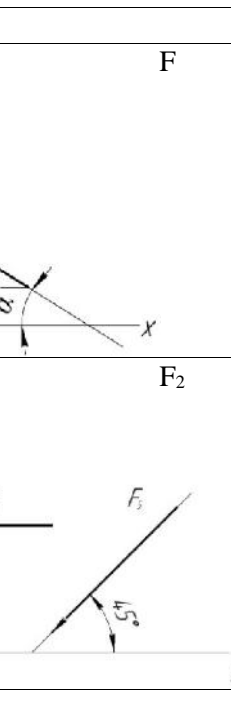
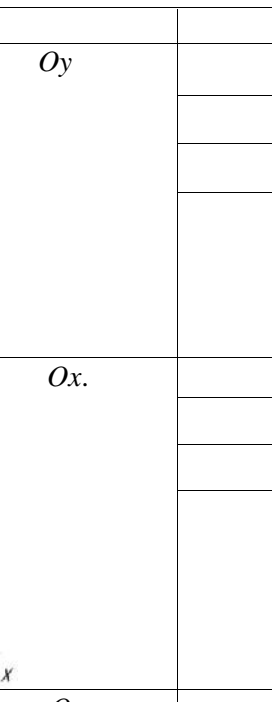
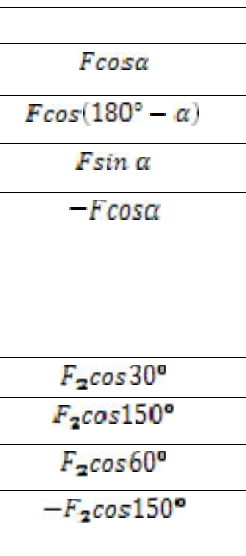
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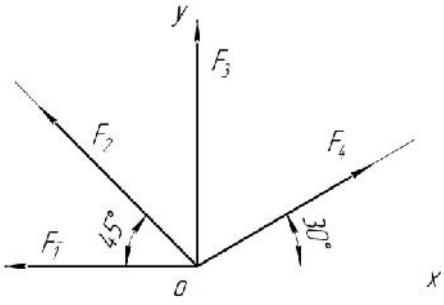
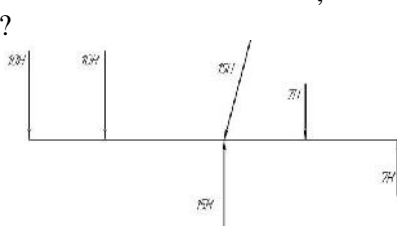
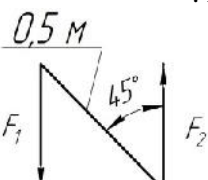
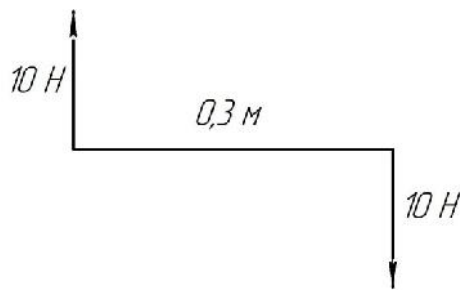
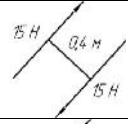

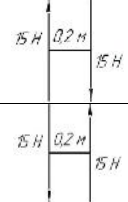
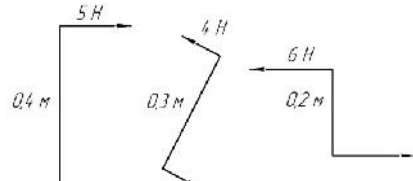
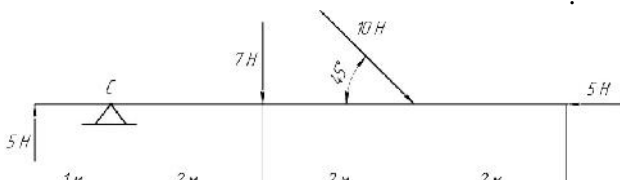
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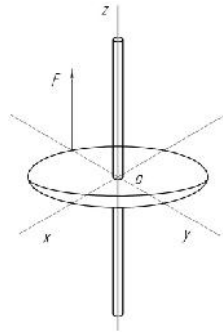
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4. -
4.1
4.1.1

1.	F	Oy	$F \cos \alpha$
			$F \cos(180^\circ - \alpha)$
			$F \sin \alpha$
			$-F \cos \alpha$
2.	F_2	Ox	$F_2 \cos 30^\circ$
			$F_2 \cos 150^\circ$
			$F_2 \cos 60^\circ$
			$-F_2 \cos 150^\circ$
3.	$F_1=28$, $F_2=15$, $F_3=8$, $F_4=24$, $F_5=30$.	Oy ,	2,5
			14
			18,5
			60,5
4.	Ox , $F_x=-21$, $F=30$.	Ox ,	30°
			45°
			135°
			150°
5.	$F_1=30$, $F_2=10$, $F_3=15$, $F_4=24$.	Ox .	-1
			-16,3
			34
			79

	
<p>6. ?</p> 	<p>7 ; 7</p> <p>7 ; 10</p> <p>10 ; 10</p> <p>15 ; 15</p>
<p>7. $F_1 = F_2 = 100$</p> 	<p>0,35</p> <p>- 35,35</p> <p>50</p> <p>- 70,7</p>
<p>8.</p> 	  
<p>9.</p> 	<p>- 0,4</p> <p>0,4</p> <p>- 0,8</p> <p>0,8</p>
<p>10.</p> 	<p>7</p> <p>47</p> <p>19</p> <p>77</p>
<p>11. ?</p>	<p>3</p> <p>6</p> <p>4</p> <p>2</p>
<p>12. Oy.</p>	<p>0</p>

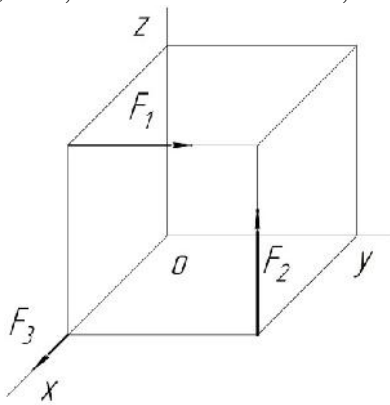
0,4 ; F=5 .



5 .
2 .
1 .

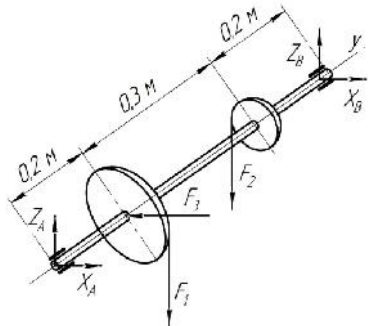
13.
F₁=12 , F₂=5 , F₃=3 ;

0,5 .



12 .
2,5 .
3,5 .
7,4 .

14. X_B, F₁=48 ; F₂=96 ; F₃=15 .

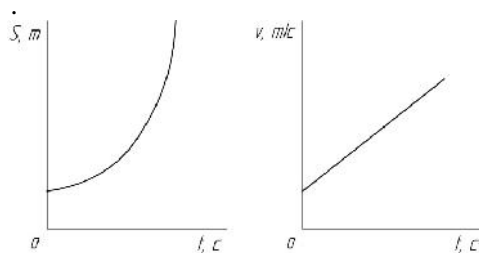


10,7
4,3
12,1
15,2

15.



16.



$$S = vt$$

$$S = S_0 + \frac{at^2}{2}$$

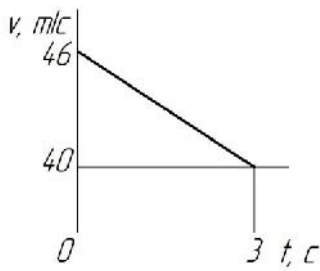
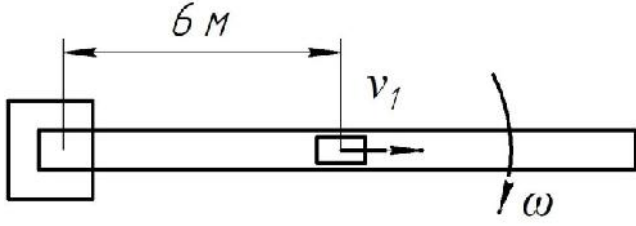
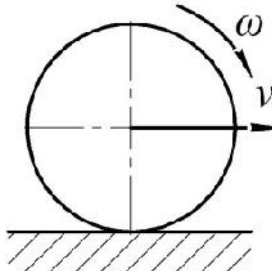
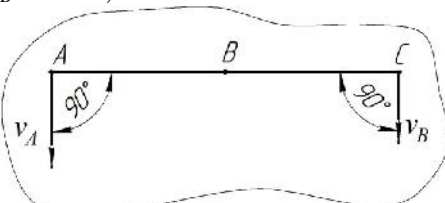
$$S = S_0 + vt + \frac{at^2}{2}$$

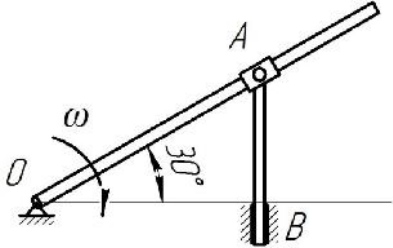
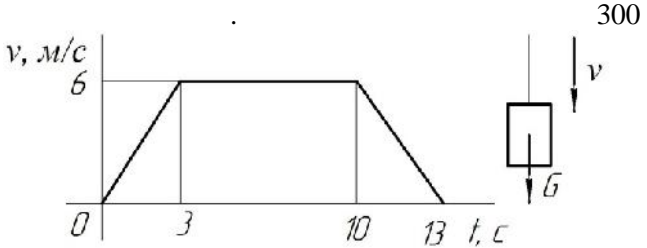
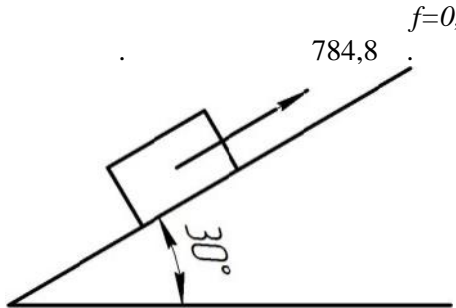
$$S = vt - \frac{at^2}{2}$$

17.

$$a=1,44 / s^2$$

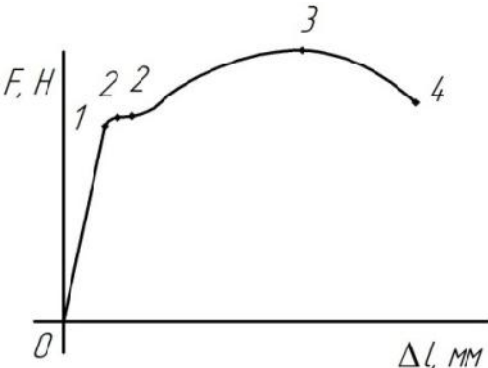
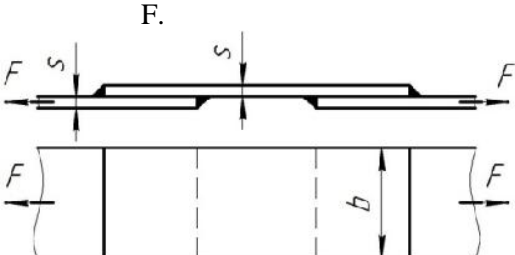
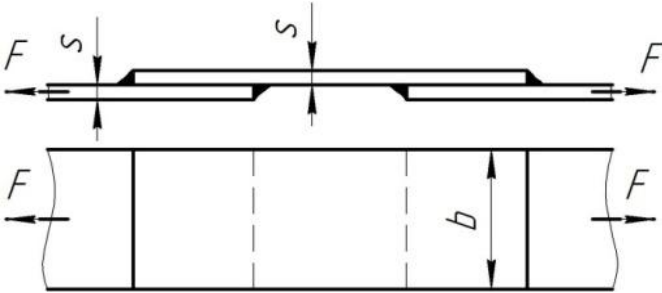
$$a=0,12 / s^2$$

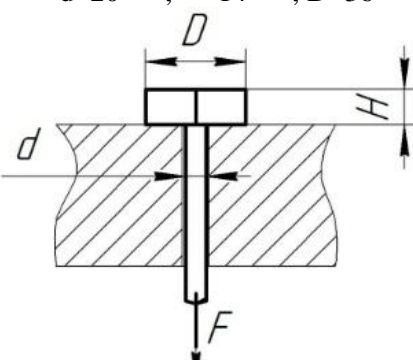
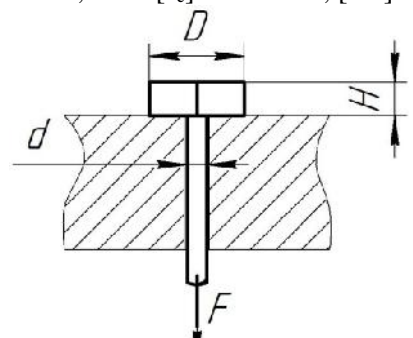
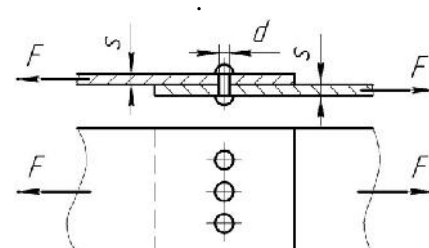
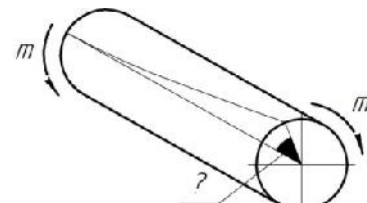
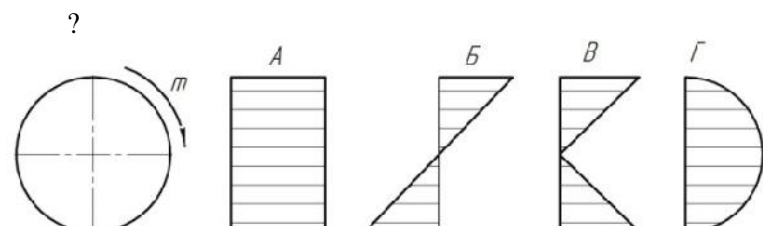
$S = 12t$ $r = 100$, $t = 5 \text{ c/}$	$a = 0,6 / ^2$ $a = 0,36 / ^2$
18. 	$t = 6$ $t = 12$ $t = 23$ $t = 43$
19. , $45 /$, 10	105 125 $22,5$ 225
20. , 420 12 $72 /$,	$15 /$ $20,5 /$ $35 /$ $54 /$
21. $2 /$ $0,25 /$ 	$1,2 /$ $2 /$ $2,5 /$ $4,25 /$
22. $30,8 /$ 650 	$5 /$ $10 /$ $15 /$ $20 /$
23. , $V_A = 75 /$, $V_B = 75 /$, = 	$45 /$ $50 /$ $62,5 /$ $75 /$
24. $10 /$, $= 0,2$	$2 /$ $2,3 /$ $1 /$ $8,6 /$

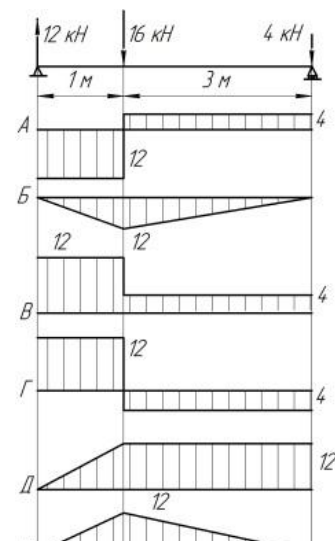
	
25. 12 / 6 . 5	5 10 15 20
26. $m_1=30$ $m_2=90$.	1 : 2 1 : 3 3 : 1 4 : 1
27. 	600 2343 2943 3300
28. $f=0,15$. $S=1,36t^2$. 	117,72 217,6 392,4 711,9
29. 1500 . 100 . 72 / .	611,6 888,4 1500 2111,6
30. 680 15 .	10200 100062 0 125000
31. 3 . 1,5 . 0,8.	270 216 4500 3600
32. 300 0,85. 120 / 1	1,884 2,216 4,5 18
33. 8 100 / . 0,8.	80 . 64 . 46 .
34.	2,59

3,6	120	1	.	43,2
				7,2
				27,3
35.			?	
36.				OA
				AB
				BC
				OD
37.			?	N
				Q_y
				M_z
				M_x
38.				5
				15
				13
				22
39.			?	
40.				
41.				70
				130
				110
				200

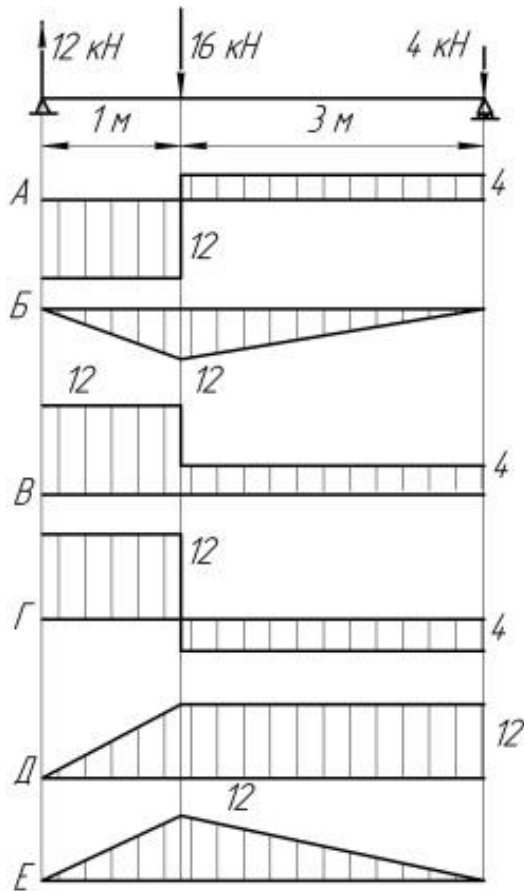
<p>42.</p>	<p>110</p> <p>220</p> <p>80</p> <p>140</p>
<p>43.</p> <p>[] = 160 ?</p>	<p>= []</p> <p>> []</p> <p>< []</p>
<p>44.</p> <p>$l_1=0,4 ; l_2=0,6 ; l_3=0,4 ; l_4=0,2$</p>	<p>0,42</p> <p>0,22</p> <p>0,62</p>

<p>45.</p> 	<p>0,66</p> <p>01</p> <p>12</p> <p>23</p> <p>22</p>
<p>46.</p> <p style="text-align: center;">?</p>	<p style="text-align: center;">y</p>
<p>47.</p>	<p>$\sigma = \frac{N}{A} = [\sigma]$</p> <p>$\sigma = \frac{N}{A} \geq [\sigma]$</p> <p>$\sigma = \frac{N}{A} \leq [\sigma]$</p> <p>$\sigma = \frac{N}{A} > [\sigma]$</p>
<p>48.</p> <p>; $F_{\max}=20$; $A=50$ ², $A -$, : $F =12$; $F =14$</p>	<p>280</p> <p>470</p> <p>560</p> <p>620</p>
<p>49.</p> <p>$=800$; $=1000$; $[s]=2,5$; $s -$, : $=320$; $=720$;</p>	<p>$> []$</p> <p>$< []$</p> <p>$= []$</p>
<p>50.</p> <p>$s=10$; $b=120$</p> 	<p>420 ²</p> <p>600 ²</p> <p>840 ²</p> <p>1680 ²</p>
<p>51.</p> 	<p>$\tau = \frac{Q}{A}$</p> <p>$\sigma = \frac{F}{A}; F = Q$</p> <p>$\tau = \frac{M}{W}$</p> <p>$\sigma = \frac{N}{A}$</p>

<p>52.</p> <p>F, $d=20$; $r=14$; $D=36$.</p> 	<p>468 ²</p> <p>224 ²</p> <p>1331 ²</p> <p>703 ²</p>
<p>53.</p> <p>F, $[\sigma]=100$, $[\tau]=240$.</p> 	<p>22,40</p> <p>84,3</p> <p>168,7</p> <p>70,3</p>
<p>54.</p> <p>$F=80$; $[\sigma]=100$; $[\tau]=240$; $d=17$; $r=50$; $z=3$. $[\sigma]$, $[\tau]$ -</p> 	<p>$<[\sigma]$</p> <p>$=[\sigma]$</p> <p>$>[\sigma]$</p>
<p>55.</p> <p>?</p> 	<p>γ</p> <p>l</p>
<p>56.</p> <p>$\tau = ? \cdot \gamma$</p>	<p>μ</p> <p>E</p> <p>G</p> <p>W_p</p>
<p>57.</p> <p>?</p> 	

58.	3 9 9 27
59. 230	40 6,75 18 21,25 32,75
60.	1 - 1. 42 35 60 95
61. -3.	3 0 $-m_1 - F_1(z_2 - 2)$ $-m_1 - F_1(z_2 - 2) + F_2(z_2 - 4)$ $-m_1 - F_1(z_2 - 4) + F_2(z_2 - 4)$
62.	. $m_1=15$ 55 100 25 3
63.	

64.



65.

66.

85 , 1,5 ,

35,3

70,6

140,2

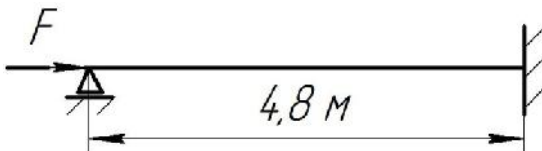
162,4

67.

$2 \cdot 10^5$

20,

- 4. =



197

165,8

663,3

49,3

4.2

4.2.1

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R

R

1	$F_1=18$, $F_2=10$, $F_3=6$, $F_4=8$	y F_2
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2	$F_1=28$, $F_2=12$, $F_3=4$, $F_4=5$	
3	$F_1=21$, $F_2=15$, $F_3=16$, $F_4=10$	
4	$F_1=12$, $F_2=14$, $F_3=11$, $F_4=18$	
5	$F_1=7$, $F_2=12$, $F_3=31$, $F_4=18$	
6	$F_1=15$, $F_2=10$, $F_3=9$, $F_4=8$	
7	$F_1=21$, $F_2=10$, $F_3=7$, $F_4=7$	
8	$F_1=16$, $F_2=15$, $F_3=9$, $F_4=8$	
9	$F_1=14$, $F_2=19$, $F_3=18$, $F_4=10$	
10	$F_1=22$, $F_2=14$, $F_3=33$, $F_4=7$	
11	$F_1=22$, $F_2=21$, $F_3=3$, $F_4=12$	
12	$F_1=15$, $F_2=11$, $F_3=28$, $F_4=4$	
13	$F_1=12$, $F_2=19$, $F_3=18$, $F_4=7$	
14	$F_1=17$, $F_2=17$, $F_3=8$, $F_4=9$	
15	$F_1=29$, $F_2=19$, $F_3=28$, $F_4=4$	
16	$F_1=15$, $F_2=17$, $F_3=8$, $F_4=19$	
17	$F_1=10$, $F_2=11$, $F_3=28$, $F_4=10$	
18	$F_1=25$, $F_2=11$, $F_3=28$, $F_4=10$	
19	$F_1=28$, $F_2=11$, $F_3=24$, $F_4=31$	
20	$F_1=35$, $F_2=21$, $F_3=28$, $F_4=14$	
21	$F_1=5$, $F_2=22$, $F_3=18$, $F_4=14$	

n_1 / , n_2 / , 2 , 40 45,

[] = 415 .

1	2,	5
	n_1 /	1300
	n_2 /	300
2	2,	6
	n_1 /	1400

	$n_2, /$	400
3	2,	7
	$n_1, /$	1500
	$n_2, /$	500
4	2,	2
	$n_1, /$	1400
	$n_2, /$	200
5	2,	2,8
	$n_1, /$	1200
	$n_2, /$	250
6	2,	5,5
	$n_1, /$	1000
	$n_2, /$	150
7	2,	4,4
	$n_1, /$	1450
	$n_2, /$	180
8	2,	7,3
	$n_1, /$	1500
	$n_2, /$	600
9	2,	5,1
	$n_1, /$	1600
	$n_2, /$	800
10	2,	6,7
	$n_1, /$	1800
	$n_2, /$	300
11	2,	1,5
	$n_1, /$	1030
	$n_2, /$	320
12	2,	6,6
	$n_1, /$	1550
	$n_2, /$	500
13	2,	8,8
	$n_1, /$	2500
	$n_2, /$	500

14	2,	9,3
	$n_1, /$	2100
	$n_2, /$	700
15	2,	8,2
	$n_1, /$	1600
	$n_2, /$	800
16	2,	4,7
	$n_1, /$	1000
	$n_2, /$	200
17	2,	8,6
	$n_1, /$	1200
	$n_2, /$	600
18	2,	7,4
	$n_1, /$	1250

	$n_2, /$	250
19	2,	8,1
	$n_1, /$	2550
	$n_2, /$	550
20	2,	7,9
	$n_1, /$	1800
	$n_2, /$	850
21	2,	3,6
	$n_1, /$	1200
	$n_2, /$	650

1		$P_I=5$
		$n_I=1440 /$ $=2,50$
2		$P_I=4$
		$n_I=1400 /$ $=2,00$
3		$P_I=3$
		$n_I=1300 /$ $=2,20$
4		$P_I=2$
		$n_I=1200 /$ $=1,80$
5		$P_I=2,5$
		$n_I=1000 /$ $=2,50$
6		$P_I=6$
		$n_I=800 /$ $=2,30$
7		$P_I=3$
		$n_I=750 /$

		=1,50
8		$P_I=2,8$
		$n_I=1500 /$ =1,70
9		$P_I=2,2$
		$n_I=1100 /$ =2,50
10		$P_I=4,1$
		$n_I=1800 /$ =2,30
11		$P_I=3,5$
		$n_I=1150 /$ =1,50
12		$P_I=2,8$
		$n_I=1600 /$ =1,30
13		$P_I=3,8$
		$n_I=900 /$ =3,30
14		$P_I=1,5$
		$n_I=1100 /$ =2,50
15		$P_I=4,2$
		$n_I=1800 /$ =2,30
16		$P_I=3,1$
		$n_I=1750 /$ =1,50
17		$P_I=2,9$

		$n_I=1350 /$
		$=1,70$
18		$P_I=1,9$
		$n_I=1150 /$
		$=2,50$
19		$P_I=3,1$
		$n_I=1520 /$
		$=2,30$
20		$P_I=3,2$
		$n_I=1180 /$
		$=1,50$
21		$P_I=2,4$
		$n_I=1650 /$
		$=1,30$

4.3

4.3.1

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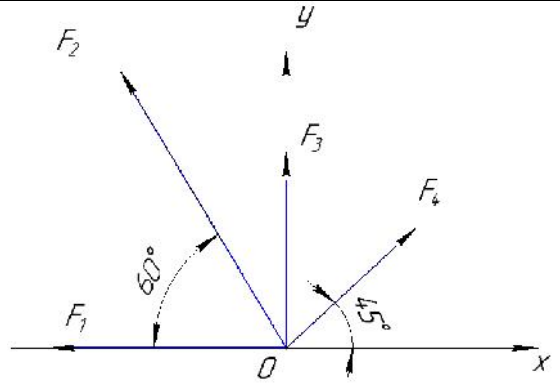
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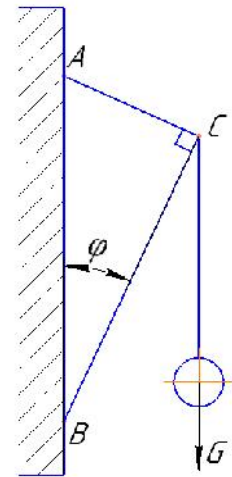
4.3.2.

1. $F_1=18$, $F_2=10$, $F_3=6$, $F_4=8$,



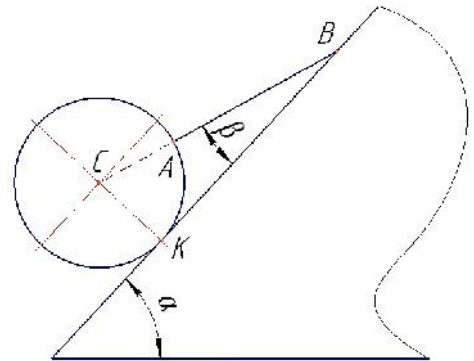
2. $G = 450$, $\varphi =$

5°



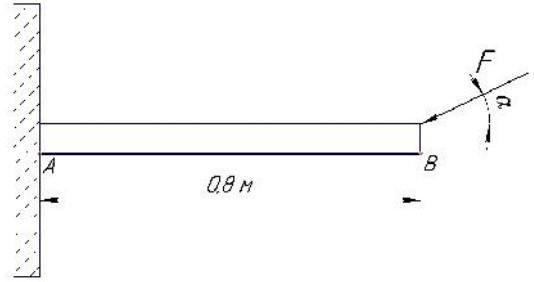
3. $\alpha=45^\circ$, $\beta=30^\circ$ (R) .

R .



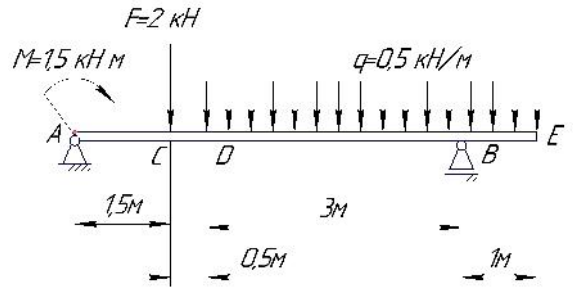
4. $F = 4$, 2.10.

$\sum (F_k) = 0$. $r = 30^\circ$.
 $\sum F_x = 0$; $\sum F_y = 0$;

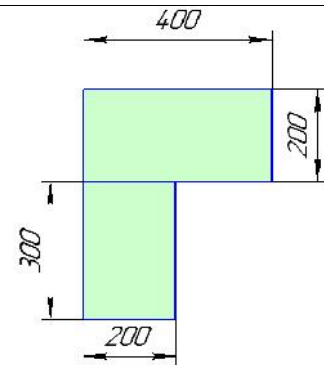


5. 2.12,

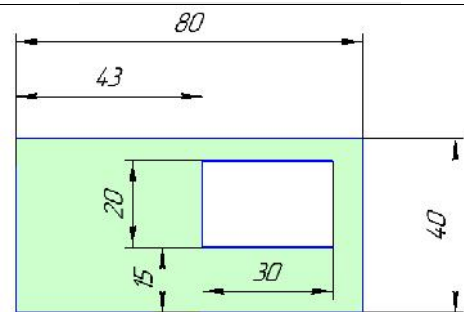
$\sum (F_k) = 0$; $\sum (F_k) = 0$; $\sum F_x = 0$.



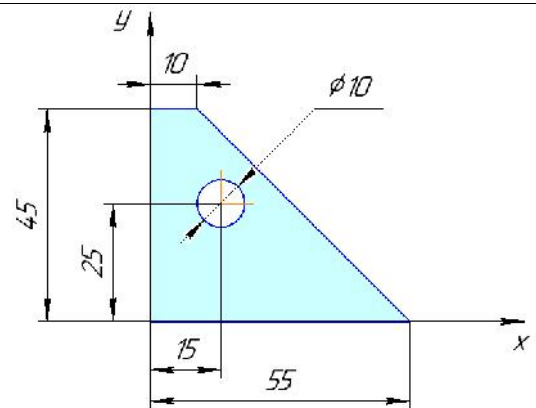
6.



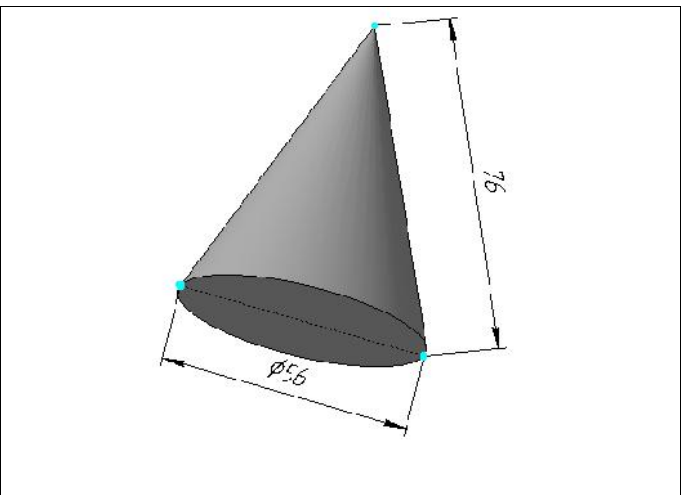
7.



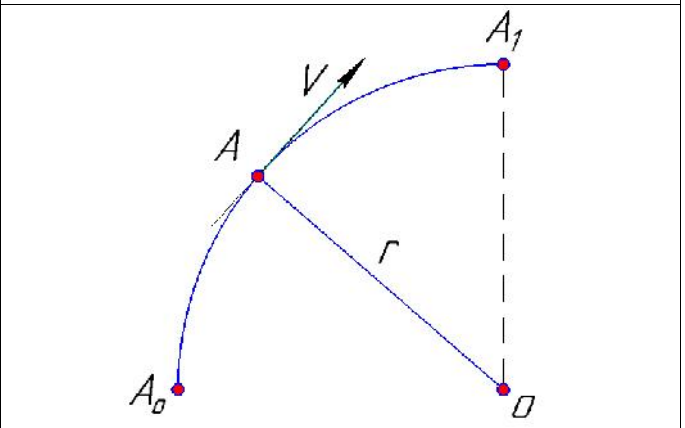
8.



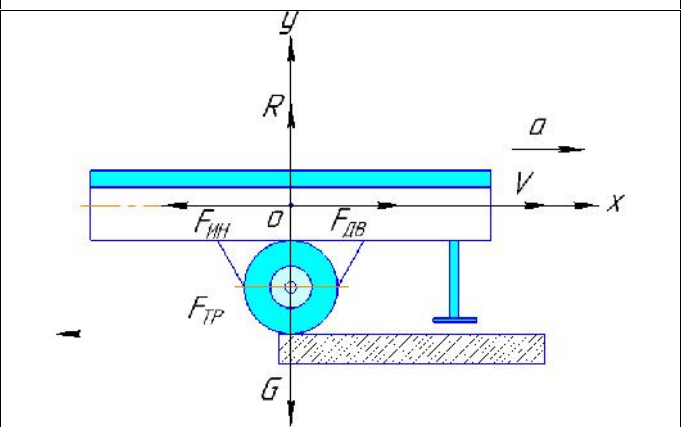
9. $l = 76$ $d = 56$ ()



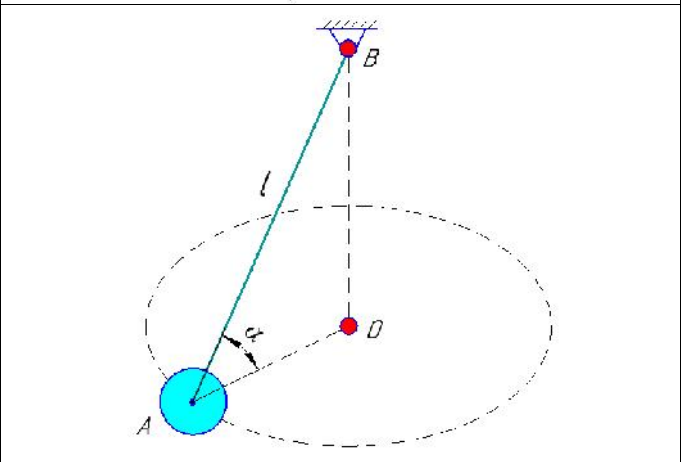
10. $S = f \cdot t^2$

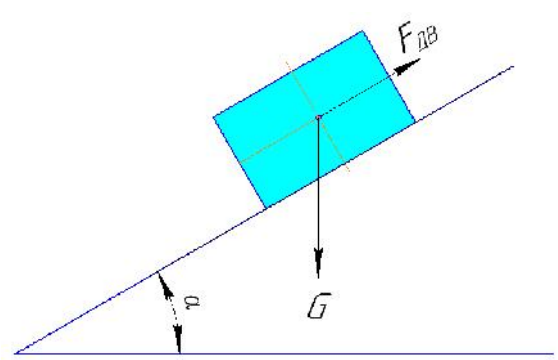
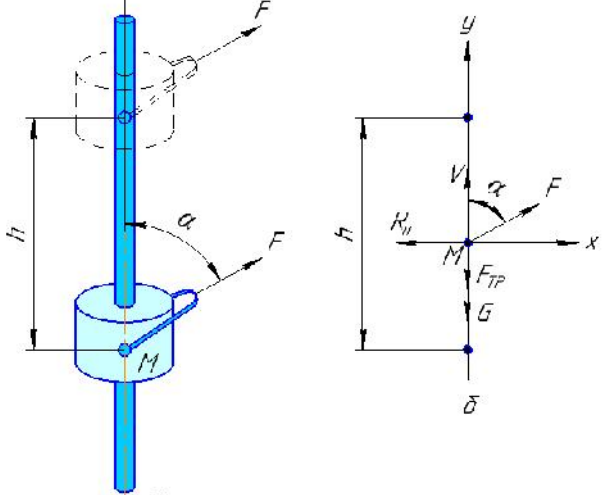
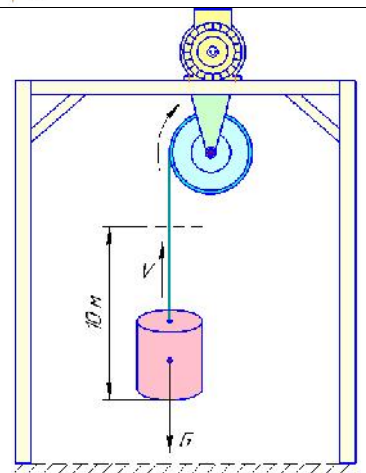
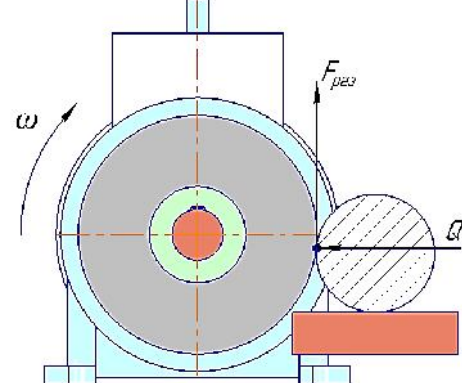


11. F ()



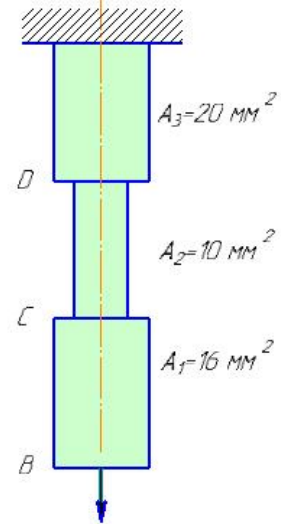
12. $l = 0,5$ $m = 0,2$ $\alpha = 30^\circ$



<p>13. 3500 (), $f = 0,15$.</p>	
<p>14. $m = 40$ (), $\alpha = 18^\circ$ F (), $f = 0,2$.</p>	
<p>15. 2,5 $\eta = 0,75$. 3 (10).</p>	
<p>16. 1,5 (6.4). 60 . 100 / 0,28 .</p>	

17.

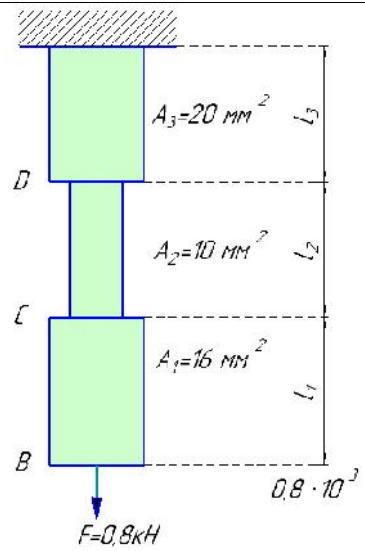
$$F = 0,8 \quad = 0,8 \cdot 10^3 \quad (\quad , \quad , \quad) .$$



18.

$$F = 0,8 \quad = 0,8 \cdot 10^3 \quad (\quad , \quad , \quad) .$$

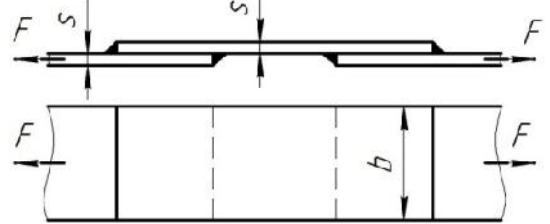
$$l_1 = l_2 = l_3 = 200 \quad , \quad = 2 \cdot 10^5 \quad .$$



19.

$$s=10 \quad ; \quad b=120 \quad .$$

F .

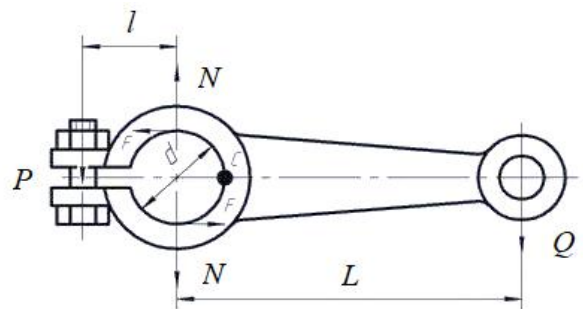


20.

$$Q = 300 \quad L = 500 \quad ;$$

$d = 40 \quad .$

$$f=0,2; \quad l=40$$



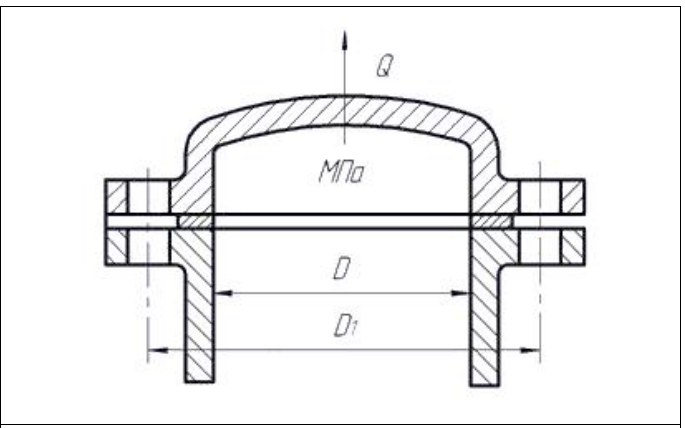
12

21.

$D = 200$

$= 1,2$

141 2 (16).



22.

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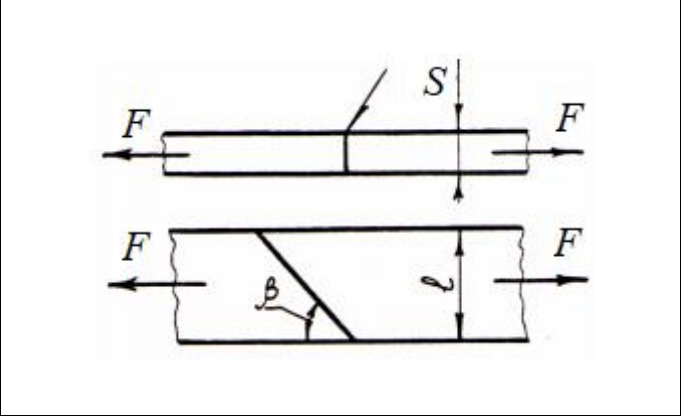
$l = 100$;

$S = 5$;

$= 20^\circ$;

3 ;

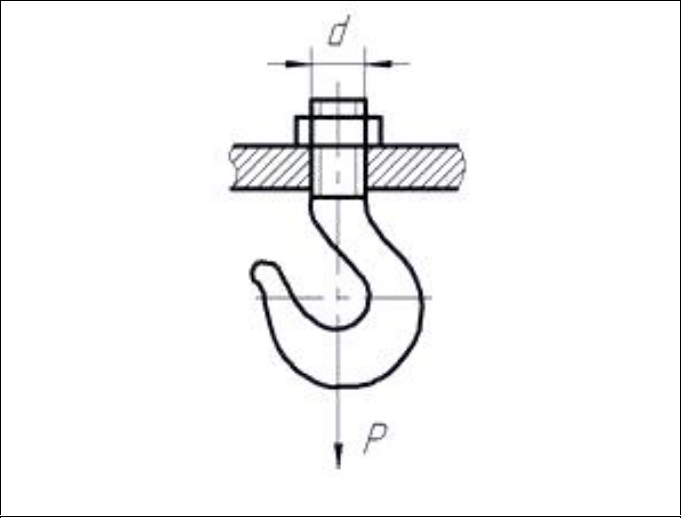
$[] = 70$.



23.

$= 100$.

$30, [] = 125$.

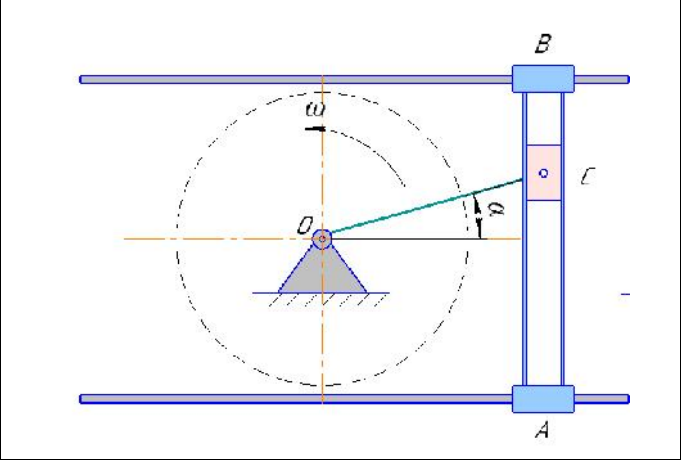


24.

$= 30$

$= 12$ /

$\alpha = 30^\circ$.



25.

$m=100$,

$d=1$

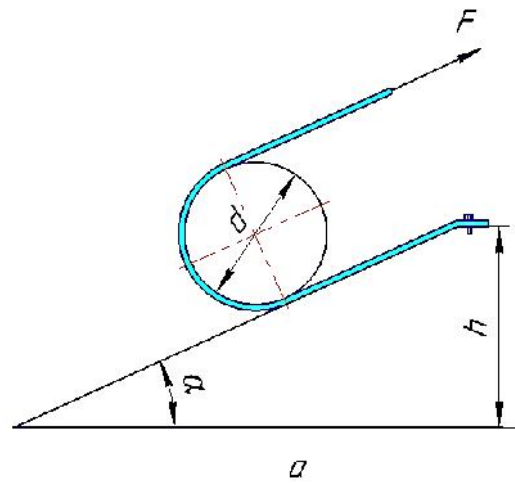
$h=2$

$F,$

$F,$

$\alpha= 30^\circ,$

$f_k = 0,3$.



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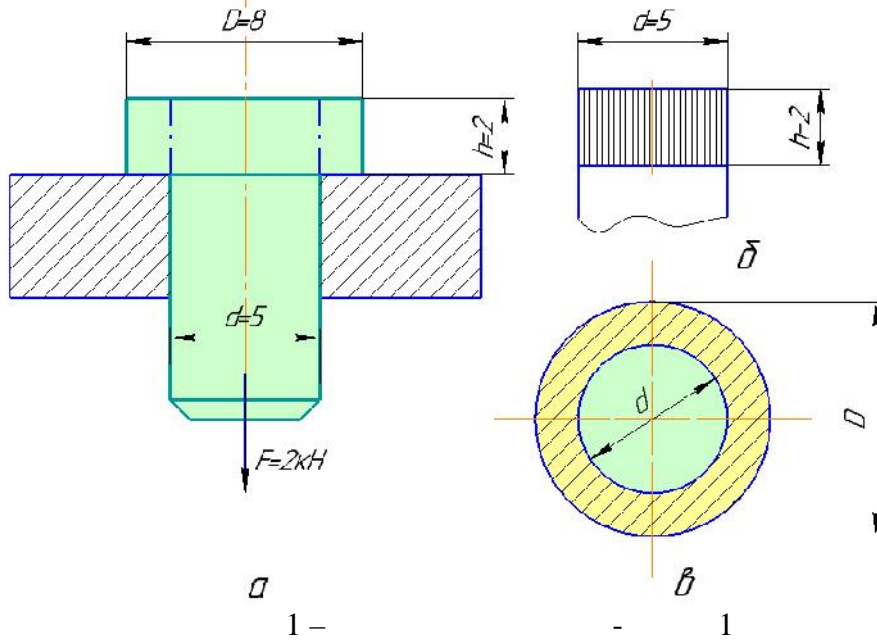
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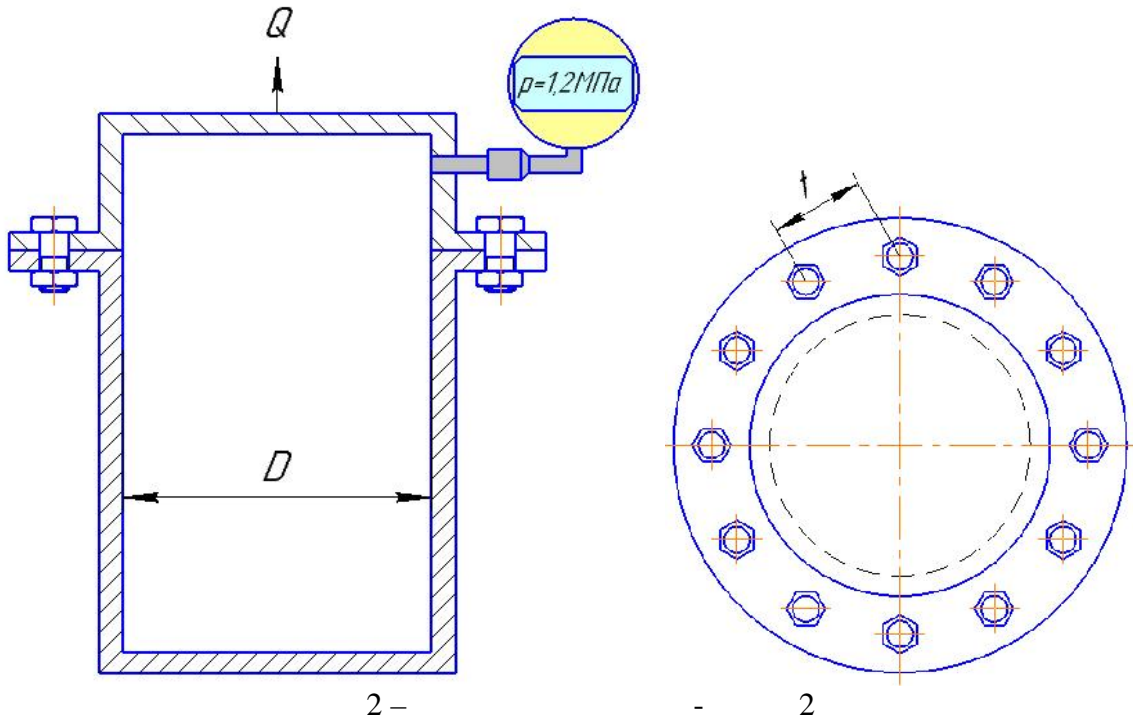
1. _____

, $[\sigma] = 110 \text{ / } ^2$, $[\tau] = 60 \text{ / } ^2$ $[\sigma] = 120 \text{ / } ^2$



2.

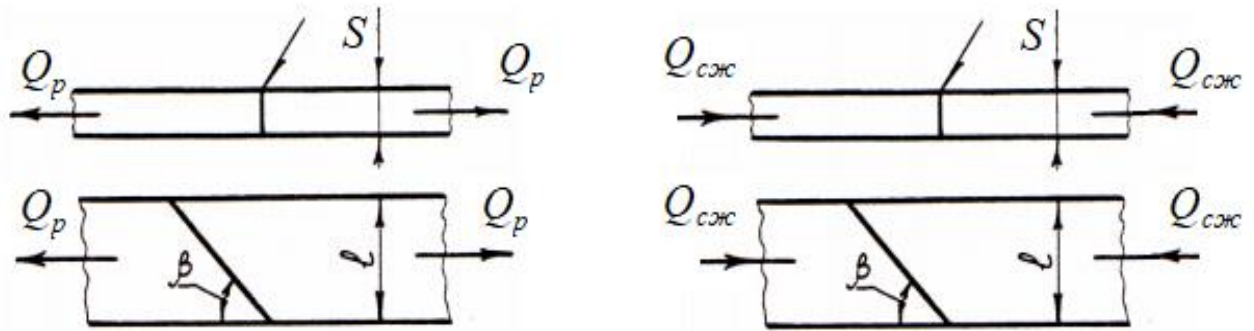
_____ , $D =$
 $= 1,2$,
 200 .



3.

3.
 Q Q

3. $l = 100$; $S = 5$;
 $\beta = 20^\circ$.



3 -

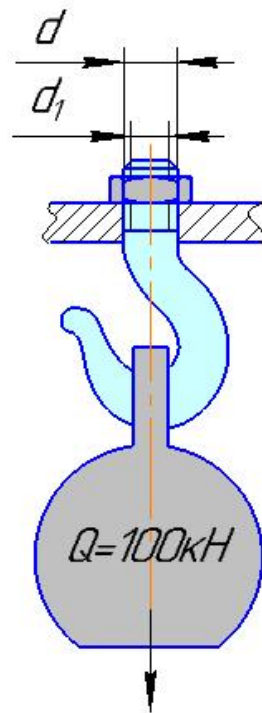
3

_____ ,

 _____ Q_{max} _____ Q_{max} _____ .

4. _____
 _____ $Q = 100$. _____ , _____ (4). _____
 _____ (_____) _____ , _____ 30. _____

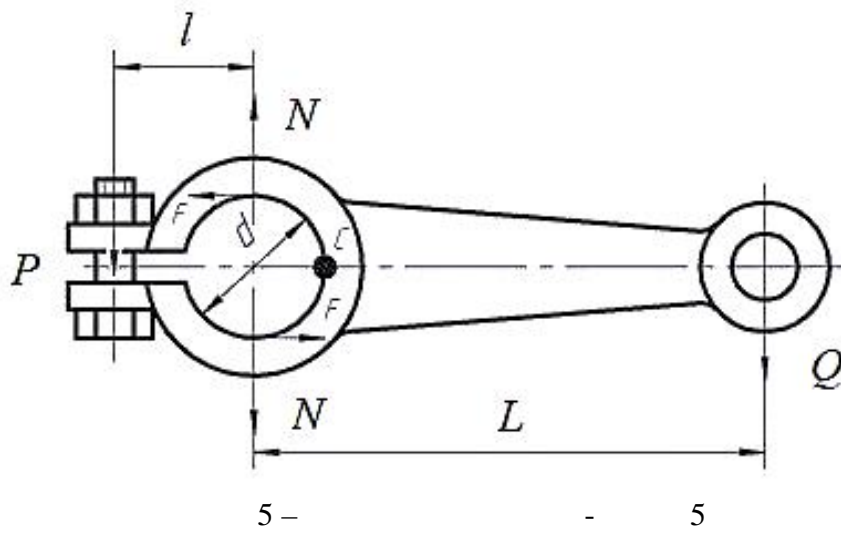
$30 [] = 125$.



4 -

4

5. $Q = 300$ $L = 500$
 $d = 40$
 (16.2). _____
 _____ $f = 0,2$, _____ $l = 40$ _____



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4. () .
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- F ,
 $F_x=0$; $F_y=F$; $F_x=-F$ $F_y=0$;
 $F_x=F_y$; $F_x=-F_y$.

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1. ... (... ; ... ; ... ; ...)). - ISBN 978-5-16-015658-3.

1. ... (... ; ... ; ... ; ...)). - ISBN 978-5-16-012916-7. - URL: <https://znanium.com/read?id=394918>

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1.

23.02.03 - : 35.02.07 - ; 35.02.08 - ; 35.02.06 - / ; : . . . , . . . : , 2017. - 44 .
http://lib.belgau.edu.ru/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&I21DBN=IBIS_FULLTEXT&P21DBN=IBIS&Z21ID=&S21CNR=5

2.

35.02.07 - ; 23.02.03 - ; 35.02.08 - ; 35.02.06 - / ; : . . . , . . . : , 2018. - 84 . http://lib.belgau.edu.ru/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&I21DBN=IBIS_FULLTEXT&P21DBN=IBIS&Z21ID=&S21CNR=5