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∴ ∴ :

" ∴ ", 2011, 177 .

AutoCAD.

I

() .

H (

2.301

(0, 1, 2, 3, 4)

0 1189 841

1 2.

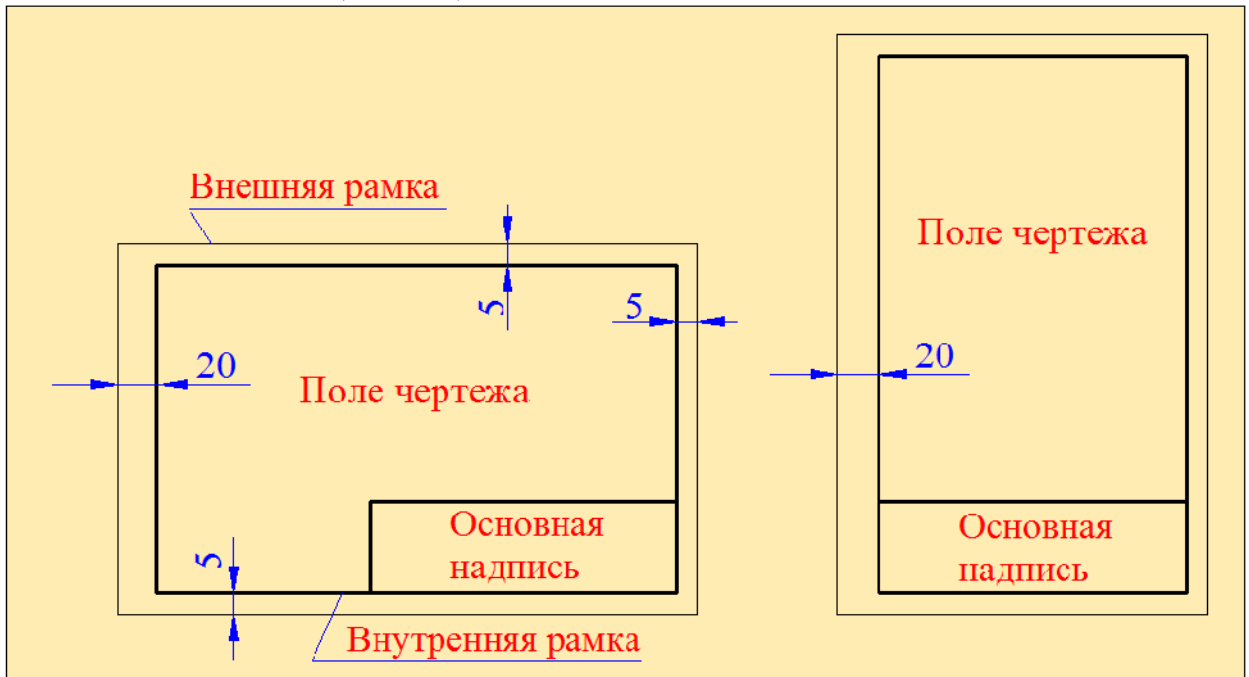
$\pm(1,5\dots3,0)$

20 , 5 .

1.1

Обозначение формата	Размеры сторон формата, мм
A0	841x1189
A1	594x841
A2	420x594
A3	297x420
A4	210x297

(.1.1).



.1.1

1.2

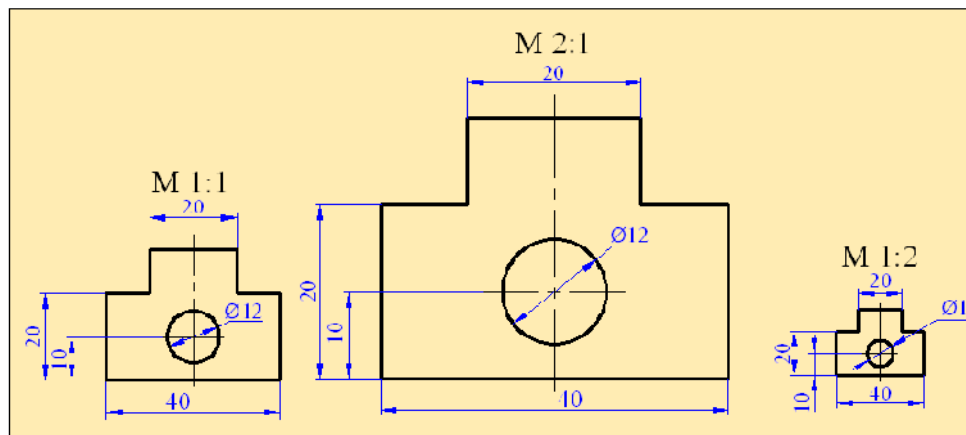
1:1, 2:1, 1:2

1:1, 2:1, 1:2 . . .

(1.2).

1.2

Масштабы уменьшения	1:2	1:2,5	1:4	1:5	1:10	и др.
Натуральная величина	1:1					
Масштабы увеличения	2:1	2,5:1	4:1	5:1	10:1	и др.



.1.2

2.303,

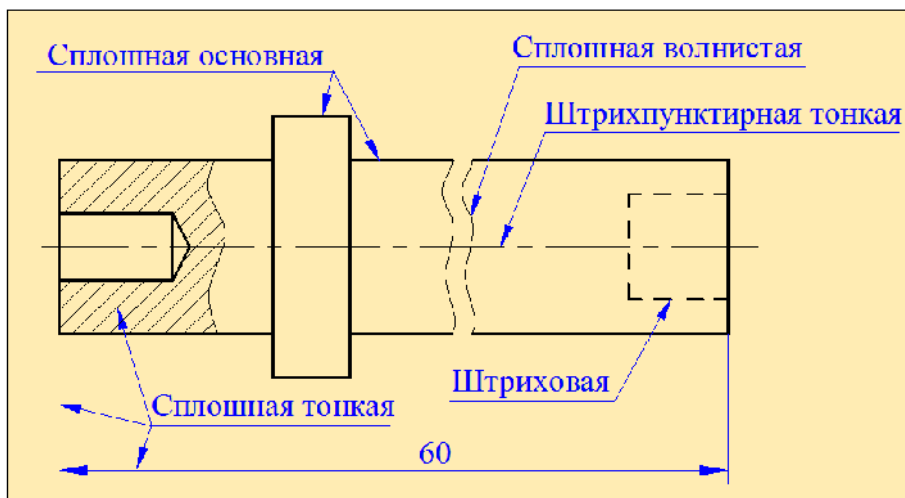
1.3.

1.3

№	Наименование	Изображение	Толщина, мм
1	Сплошная основная		$S=0,6...1,5$
2	Сплошная тонкая		$S/3...S/2$
3	Сплошная волнистая		$S/3...S/2$
4	Штриховая		$S/3...S/2$
5	Штрихпунктирная тонкая		$S/3...S/2$
6	Штрихпунктирная утолщённая		$S/2...2/3S$
7	Разомкнутая		$S...1,5S$
8	Сплошная тонкая с изломом		$S/3...S/2$
9	Тонкая штрихпунктирная с двумя точками		$S/3...S/2$

1. S
0,6...1,5
 2. $S/3$ $S/2.$
 3. $S/3$ $S/2.$
 4. $S/3$ $S/2.$
1...2 $2...8$ $S/3$ $S/2.$
 5. $S/2.$ () $3...5$ $5...30$ $S/3$
5
 6. 12
 7. $3...4$ $S/2$ $2/3S.$ $3...8$
 8. $8...20$ S $1,5S.$
 9. $S/3$ $S/2.$
- 5...30 $S/3$ $S/2.$ $4...6$ $15...20$

1.3



.1.3

(.1.1).

2.104.



.1.4

4,

(.1.8).

(, .),

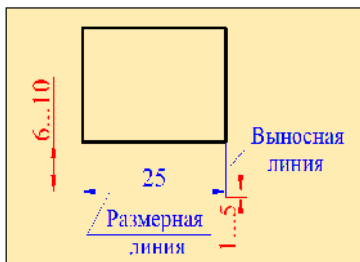
: 4° , $4^\circ 30'$, $4^\circ 30'20''$.

6...10

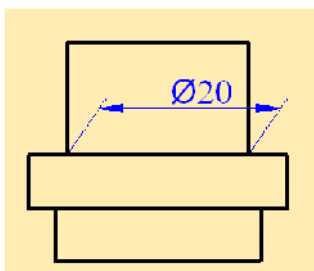
6...10
1...5
(.1.5).

(.1.6).

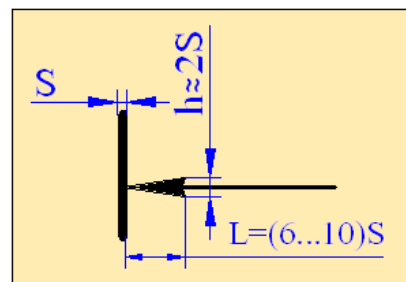
1.7.



. 1.5



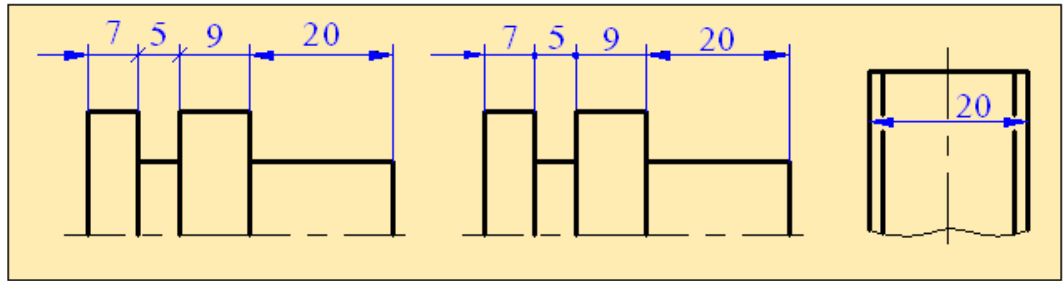
. 1.6



. 1.7

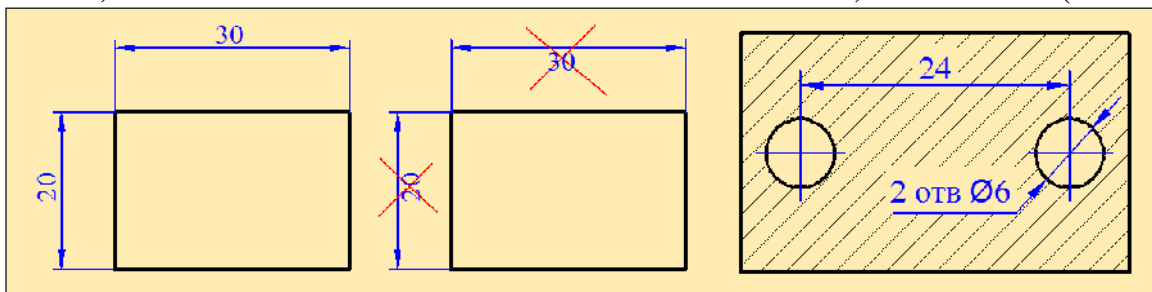
45°
(.1.8, ,).

(.1.8,).



.1.8

(.19).

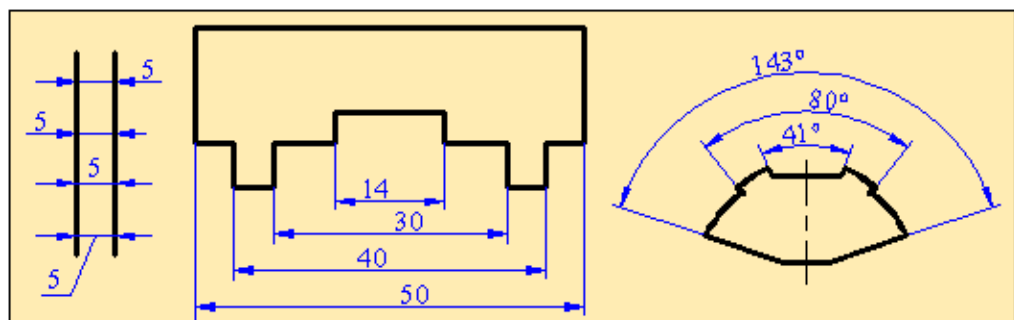


.1.9

1

(.1.10,).

(.1.10 ,).



.1.10

«Ø».

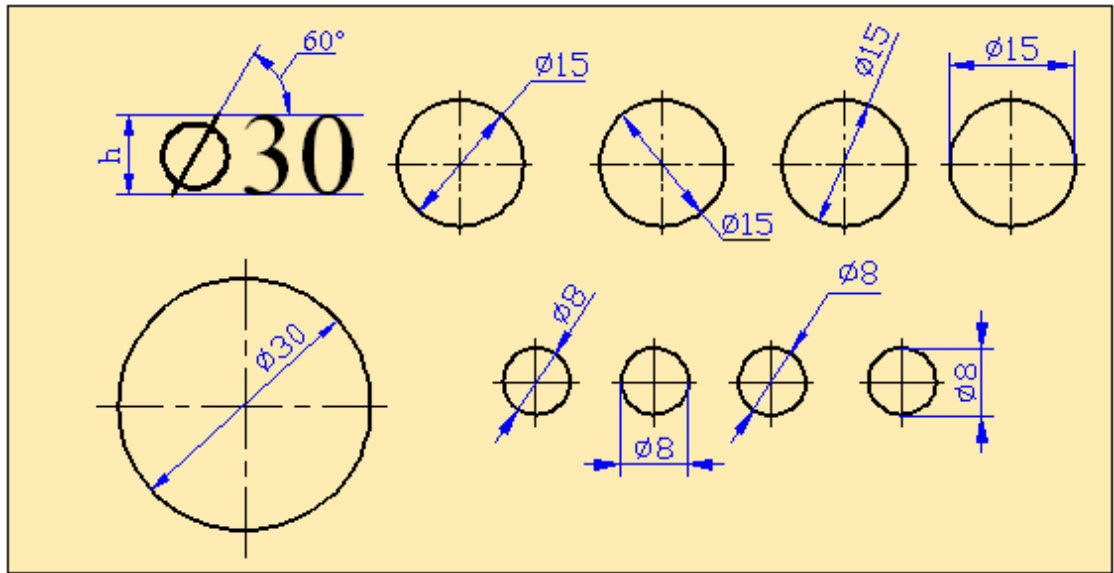
(h), 7/10 h. 1.11 60°.

10 ,

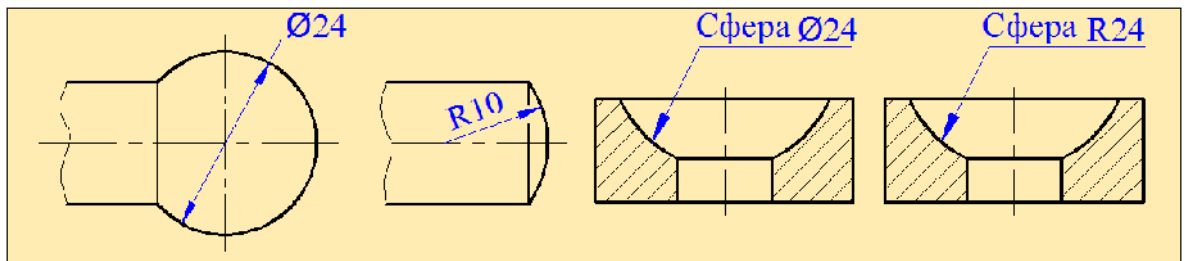
10

« »

(.1.12).



.1.11

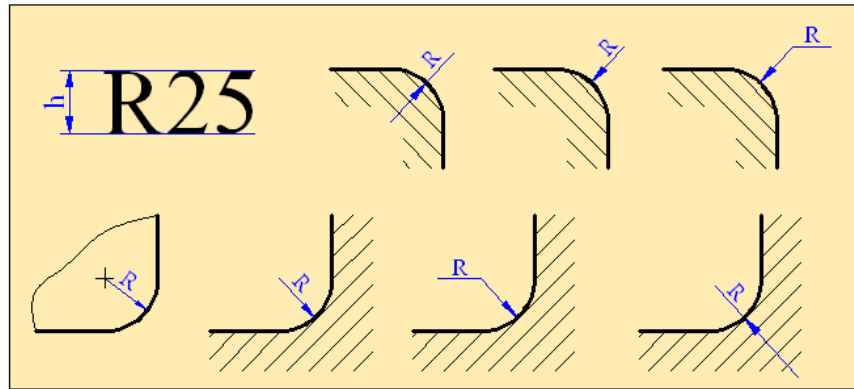


.1.12

180°,

180°,

«R» (.1.13).



.1.13

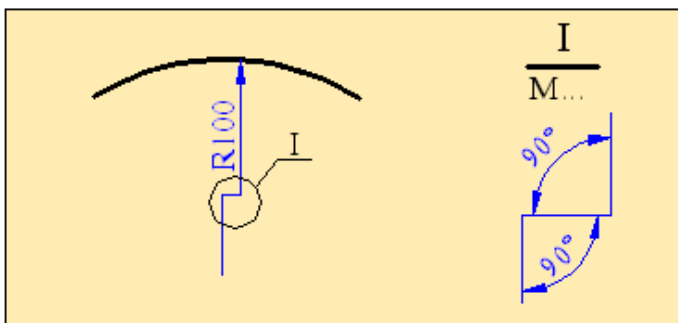
90°.

(.1.14).

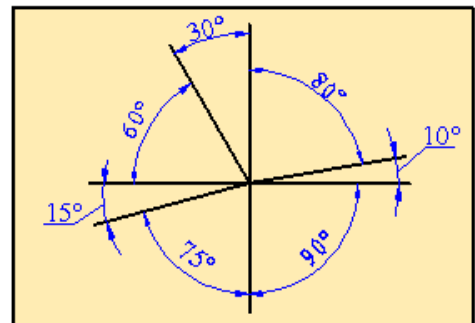
4

« ».

(.1.15).



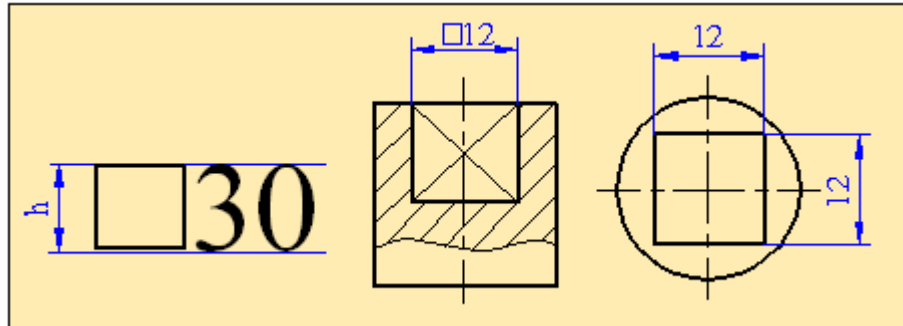
.1.14



.1.15

« ».

1.16).



.1.16

2.307

△»,

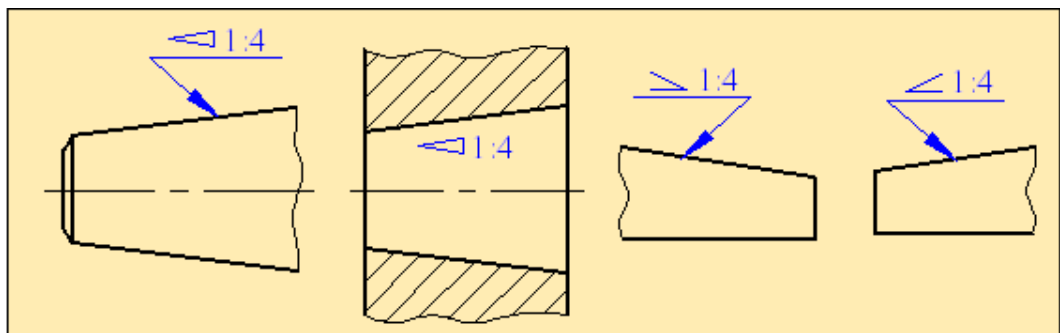
« .1.17).

2.307

«∠»,

(: 1:5, 2:7 . .).

(.1.18).



.1.17

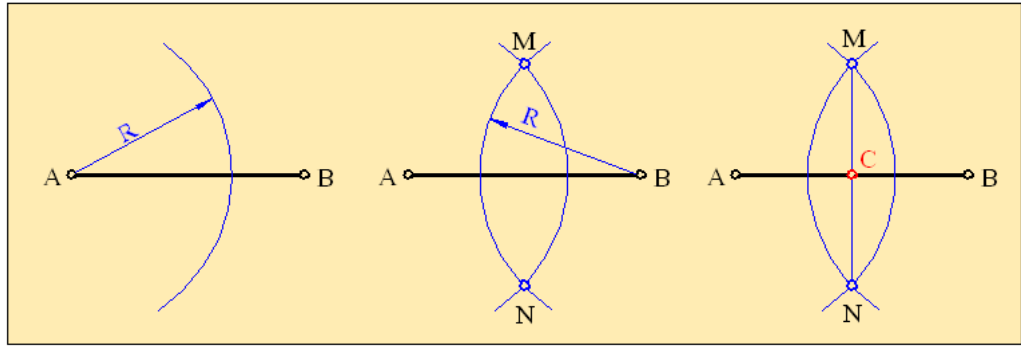
.1.18

(.1.19,).

() ,

N (. 1.19,).

(.1.19,).

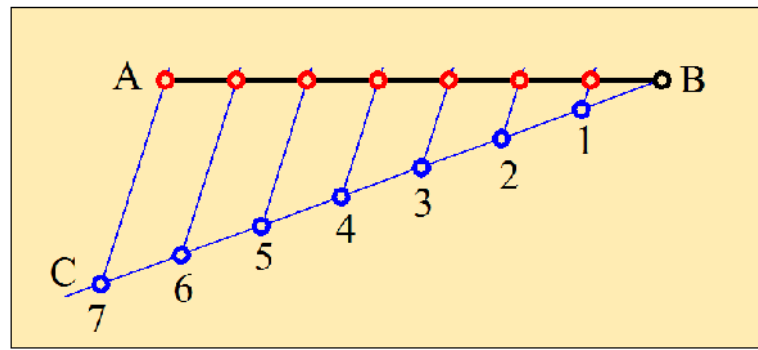


.1.19

(.1.20).

1, 2, 3 ...7.

7



.1.20

(.1.21).

R

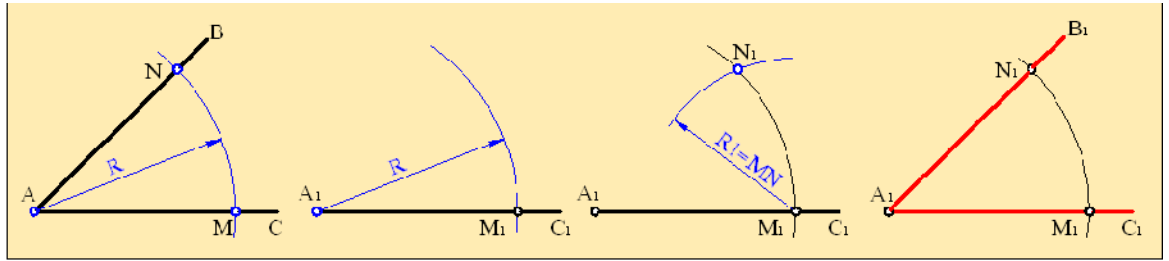
(.1.21,).

1 (.1.21,)

R

N

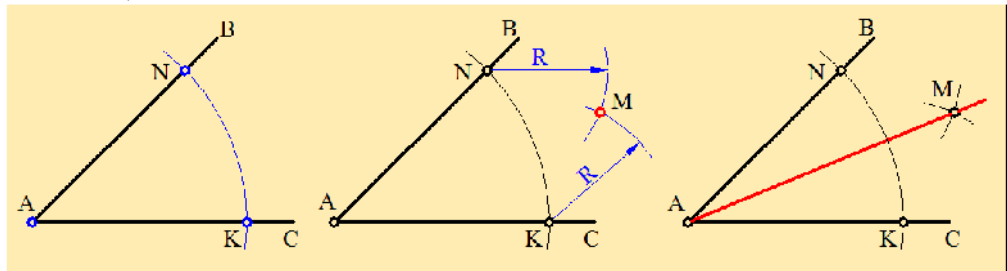
$$R_1 = N_1 \quad (1.21)$$



.1.21

(.1.22).

N (.1.22,).



.1.22

(.1.22,).

(.1.22,).

R

(.1.23).

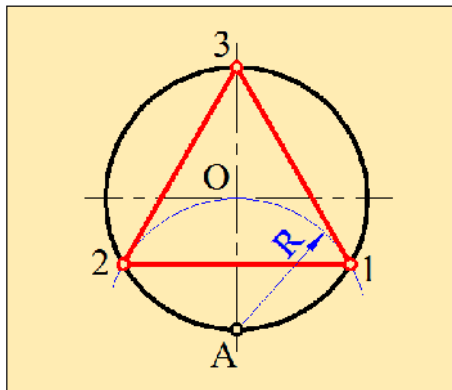
1 2.

(.1.24).

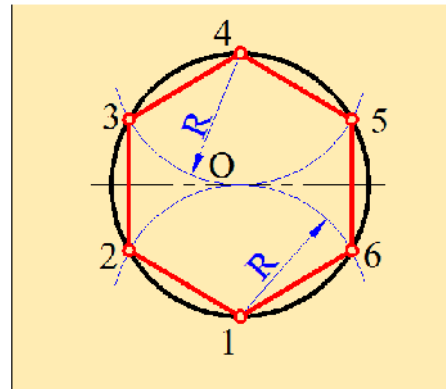
1 4 ,

()

2, 3, 5 6.



.1.23



.1.24

D

(.1.25,).

1.

$R_1=1$

(.1.25,).

$R_2=1$,

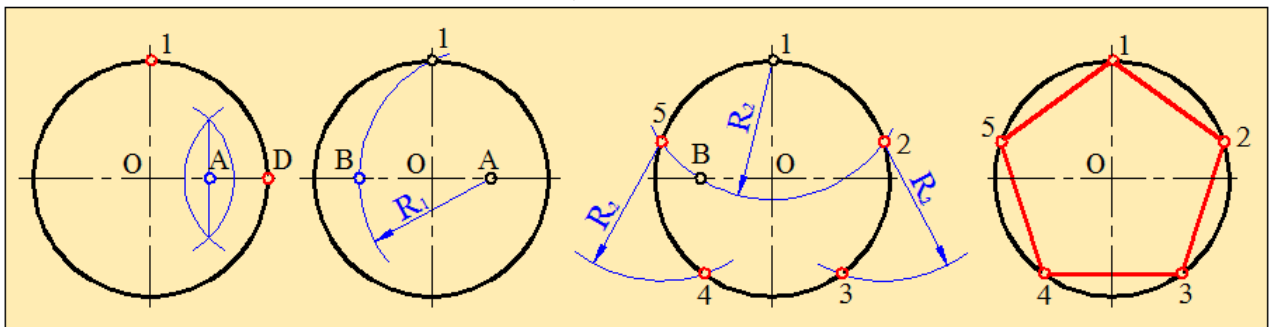
1
2

5.

3 4 (.1.25,).

R_2 ,

.1.25 ,



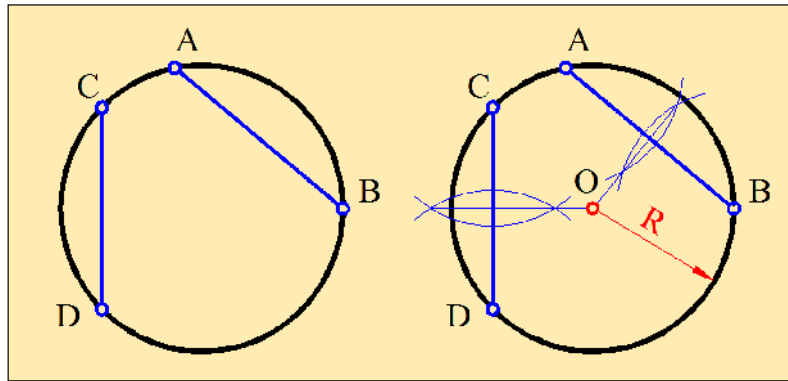
.1.25

D (.126,).

).

(.126,).

R.



.126

H .127

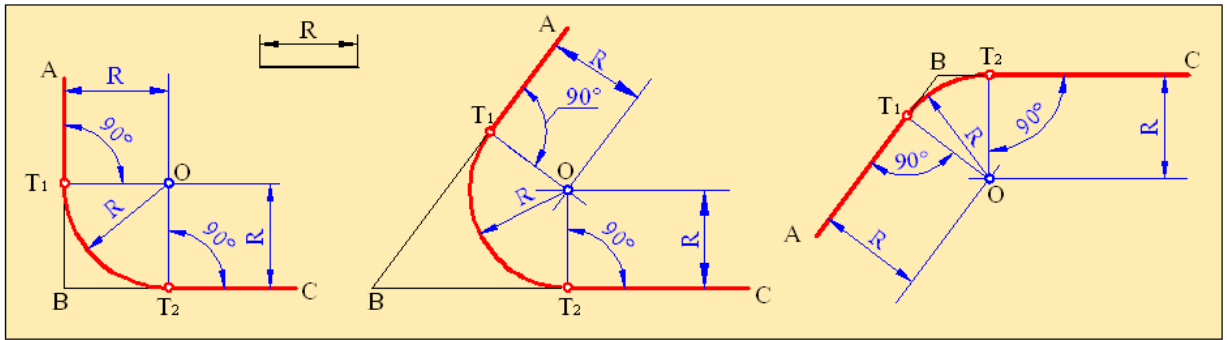
(.127,),

(.127,)

R

(.127,).

R



)

)

)

. 1.27

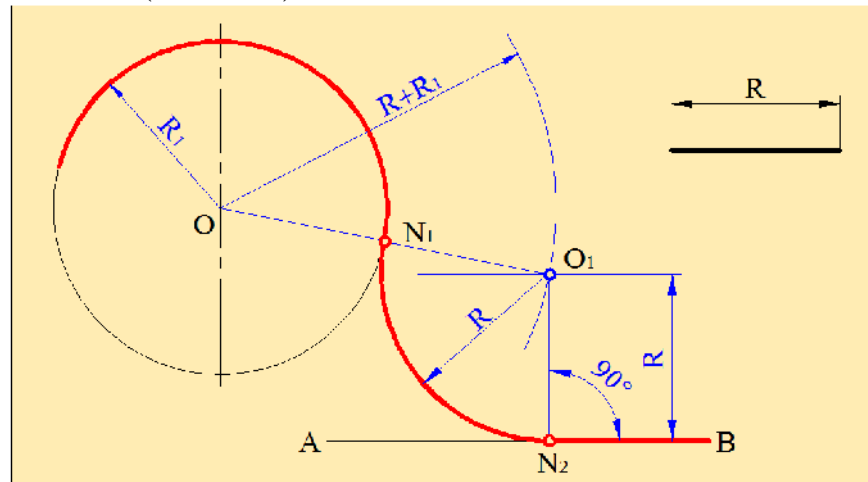
— 1 2

R,

1 2.

R₁

R (.1.28).



.1.28

R+R₁

R

— 1.

N₁.

1

N₂.

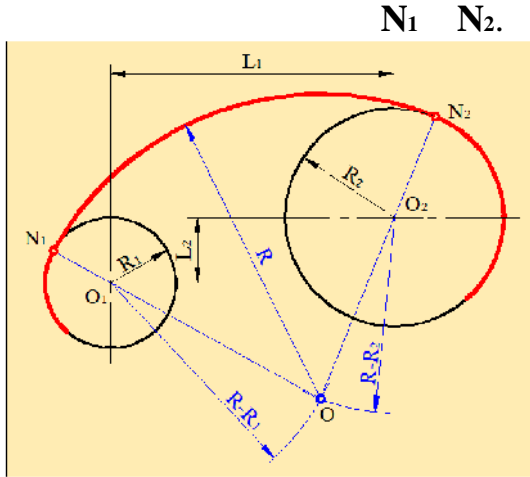
1

R₁,

N₁ N₂.

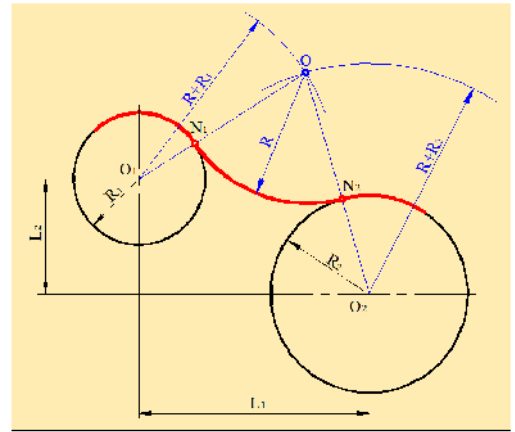
R_1 R_2
 R_2 (.1.29).

N_1 N_2 .



.1.29

$R - R_1,$ $R - R_2,$
 R .



.1.30

R_1 R_2
 R (.1.30).

$R + R_2$

N_1 N_2 .

N_1 N_2 .

1.31

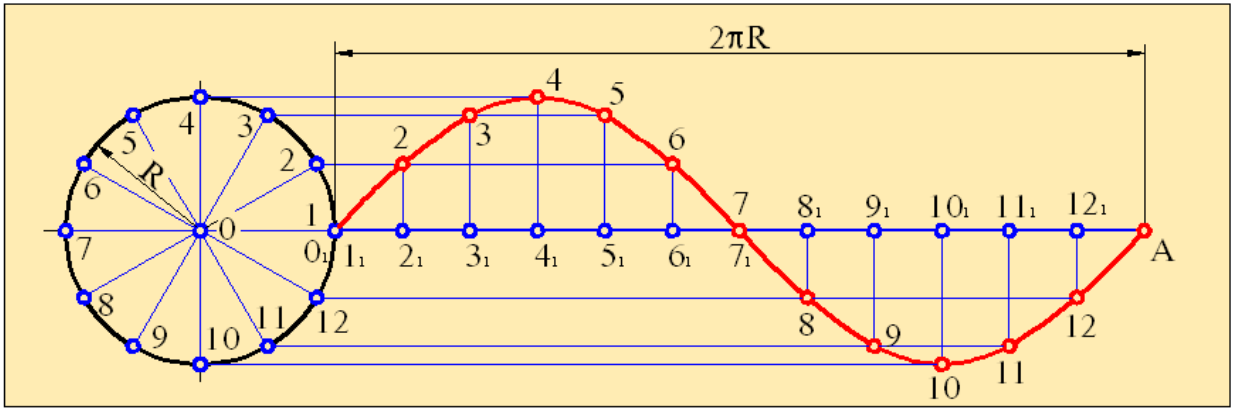
R

12).

1 ,

12

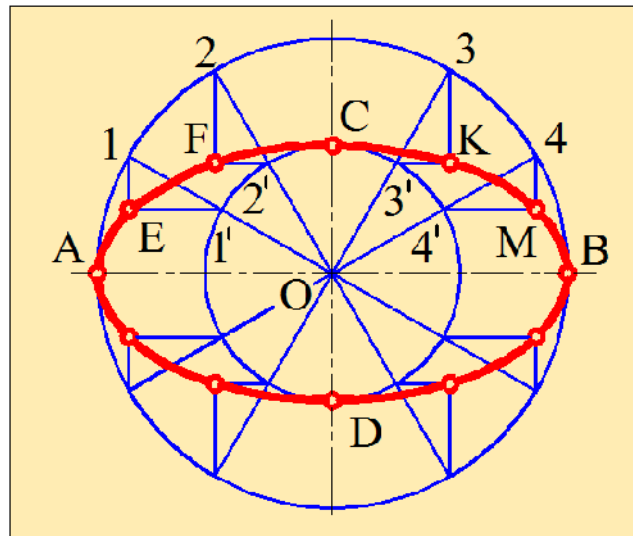
(L=2 R).



.131

(. 1.32).

— , , **D**.



.132

, 12

(1, 2, 3, 4..., 1', 2', 3', 4'...).

D,

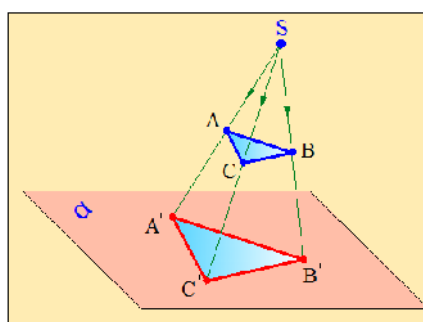
(**E**, **F**,

K, ...),

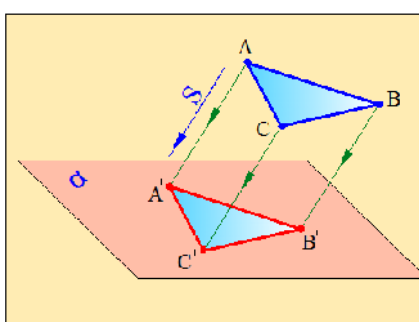
, , **D**

II

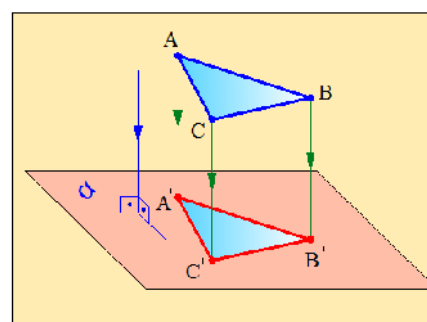
(.2.1).



.2.1



.2.2



.2.3

.2.2

(.2.3).

(.2.4).

: (), (F) ()
 (.2.4,) ,
F () ,
 () **Y**, **F**
 () **Z**.

”

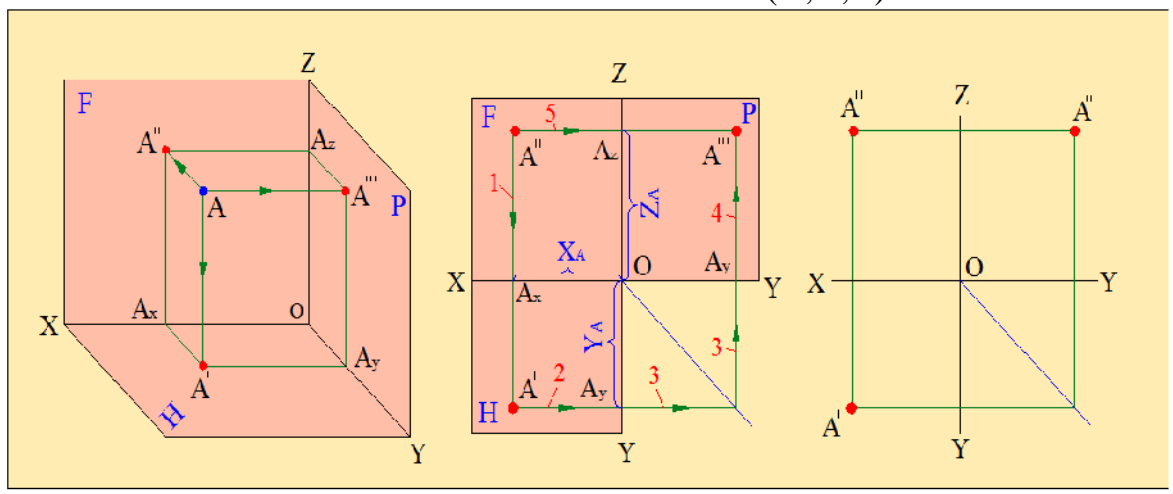
(.2.4,).

F,
Z 90°.

”
 ’
 ’ z.
 ””
 Z

”
 ’
 ’
 Z.
 ”

(,Y,Z).



)
)
)
 .2.4

Y
 F.
 Z
 ”
 ’
 Z (.2.4,).
 ’
 ”
 Z.
 ”
 ”
 Y.
 ’

.2.4, .

F

(.2.5).

(.2.6).

1.

()

2.

(**B**),

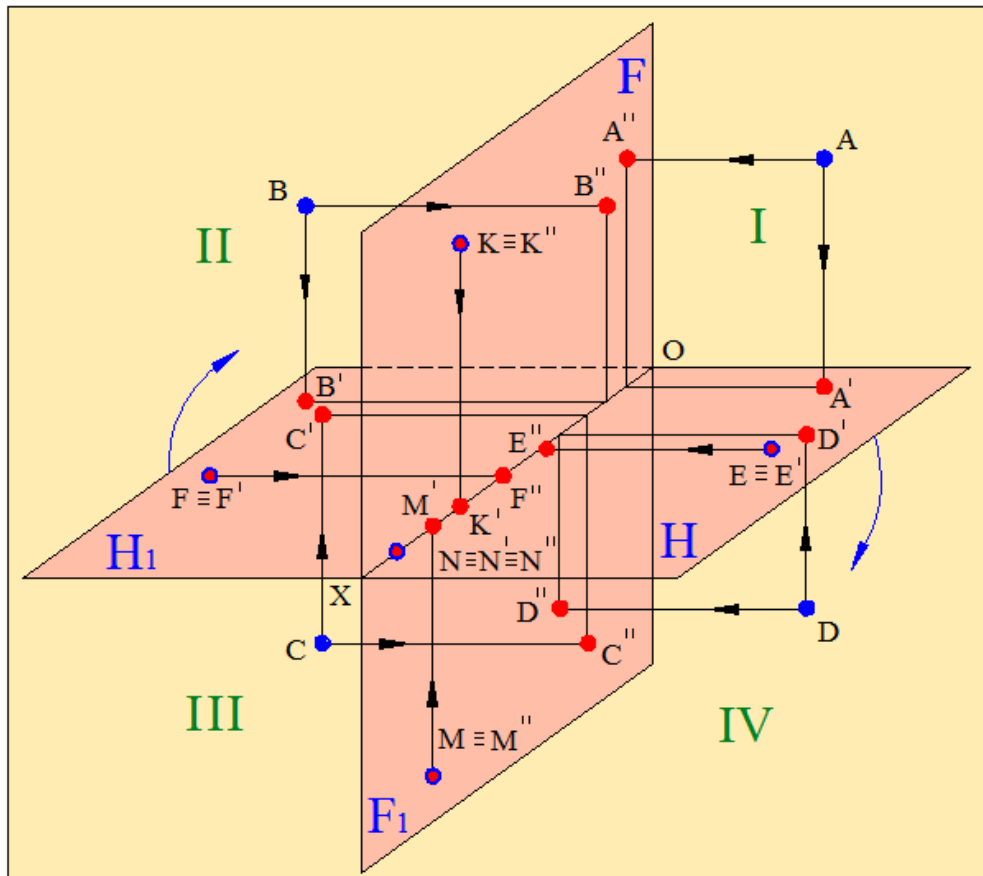
3.

(**C**),

4.

V

(**D**),



.2.5

5.

(**E**),

– (' , ' , " " , " " " ").

()

(

).

1.

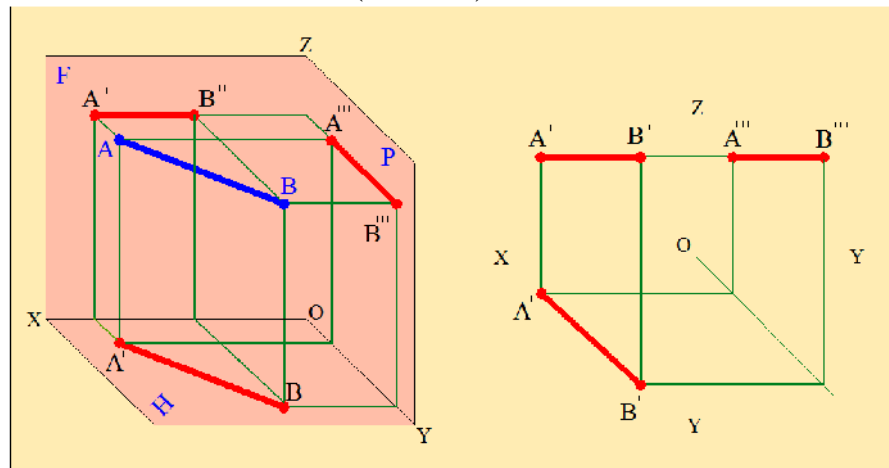
(.2.7).

Y.

Y

2.

(.2.8).



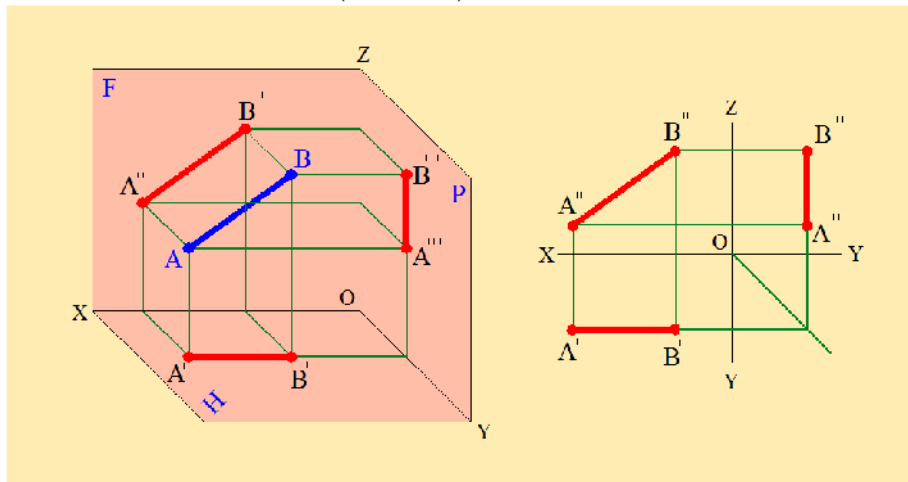
.2.7

Y.

Z

3.

(.2.9).



.2.8

4.

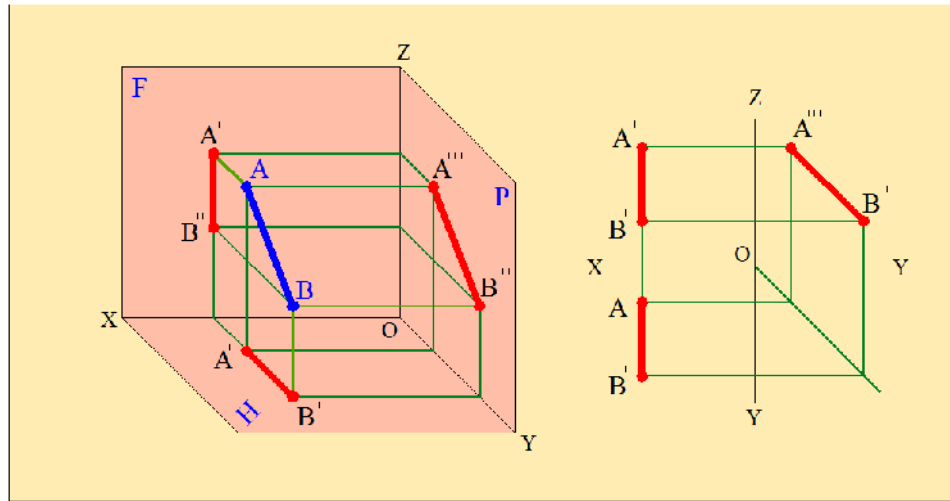
(.2.10).

Y

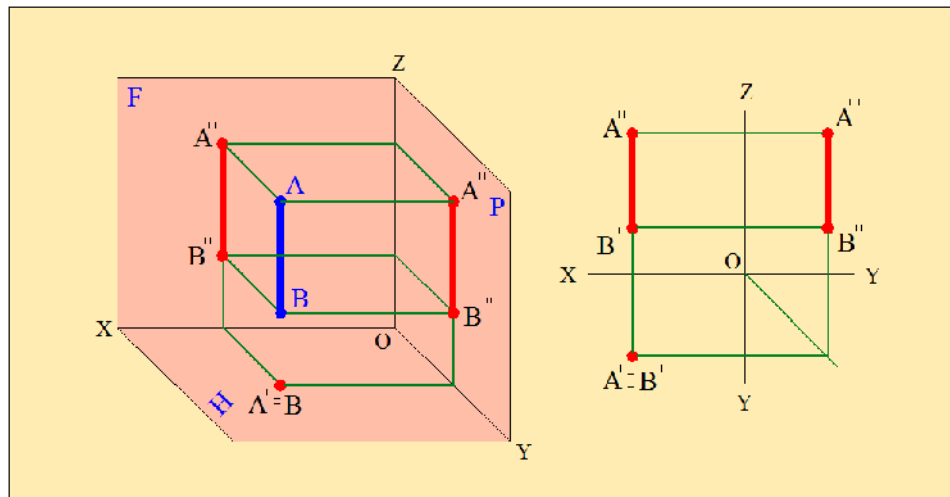
5.

(.2.11).

Z.



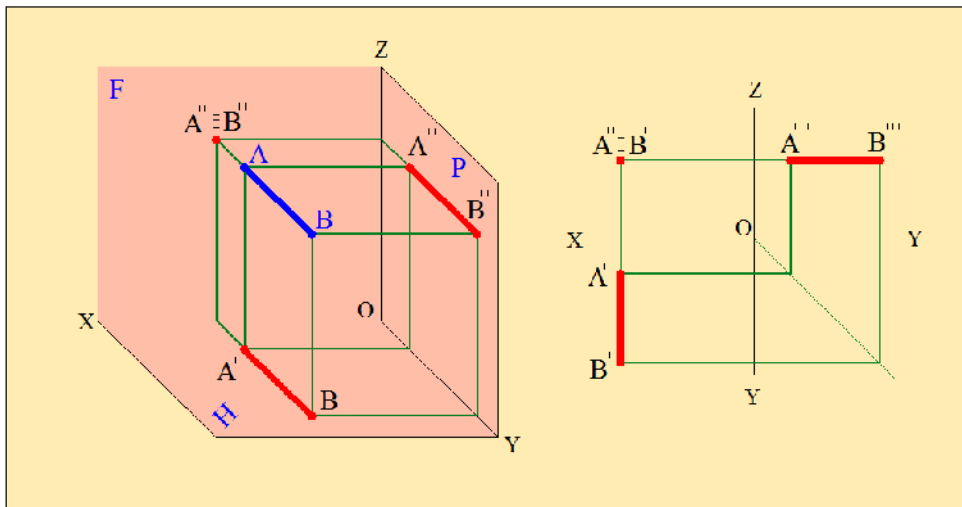
.2.9



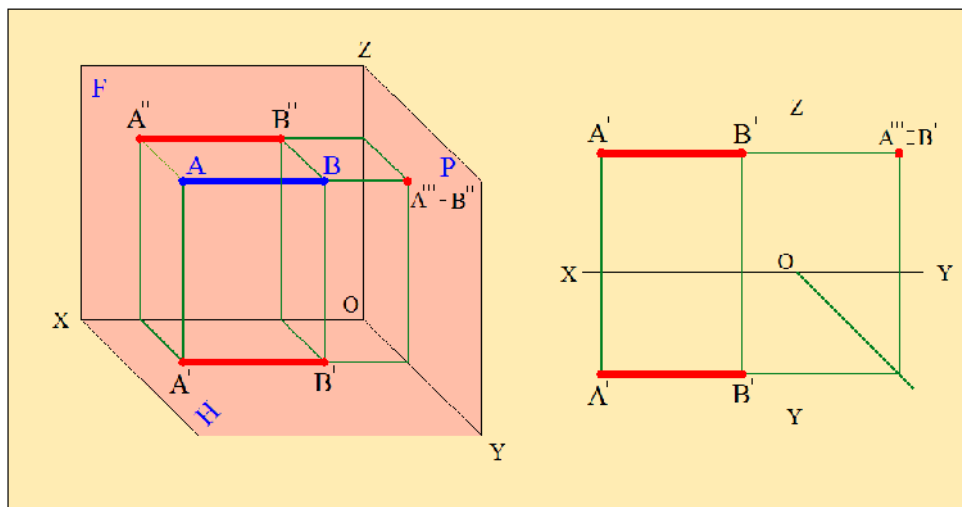
.2.10

6.

(.2.12).



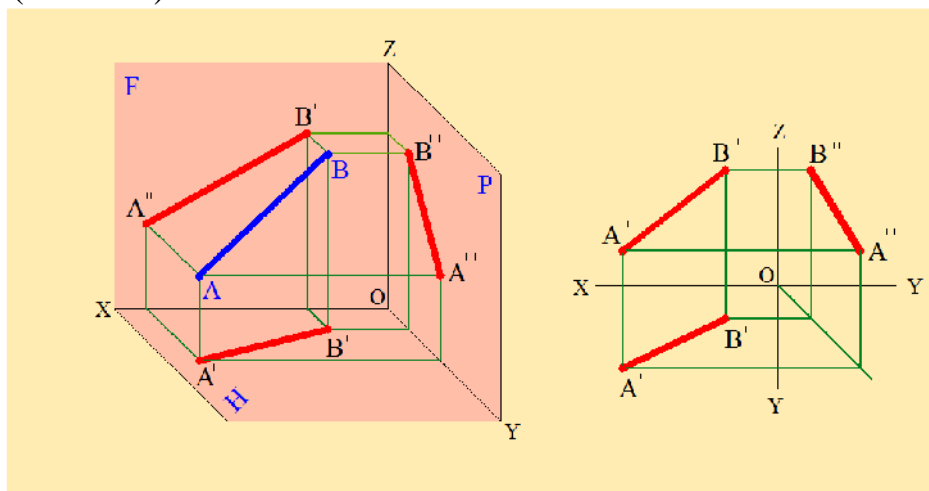
.2.11



.2.12

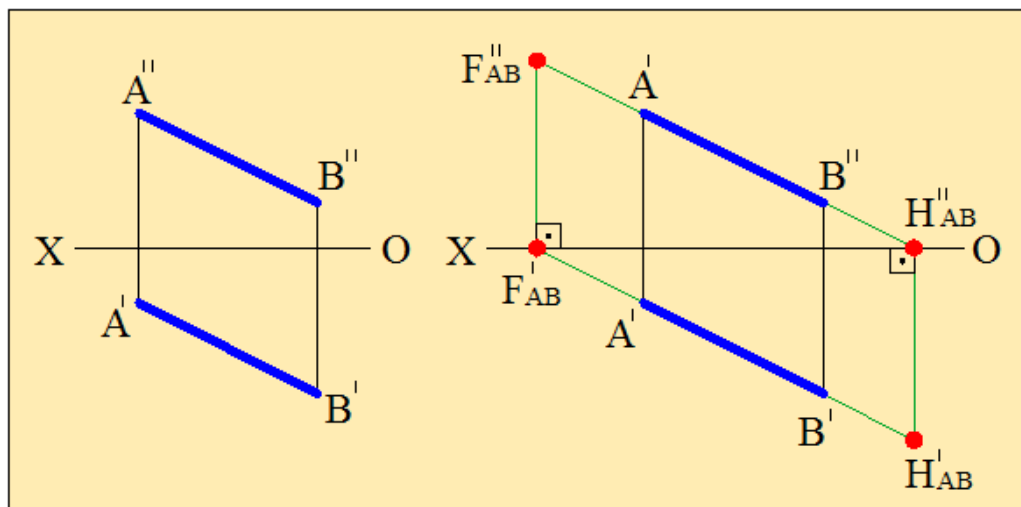
7. ,

(.2.13).

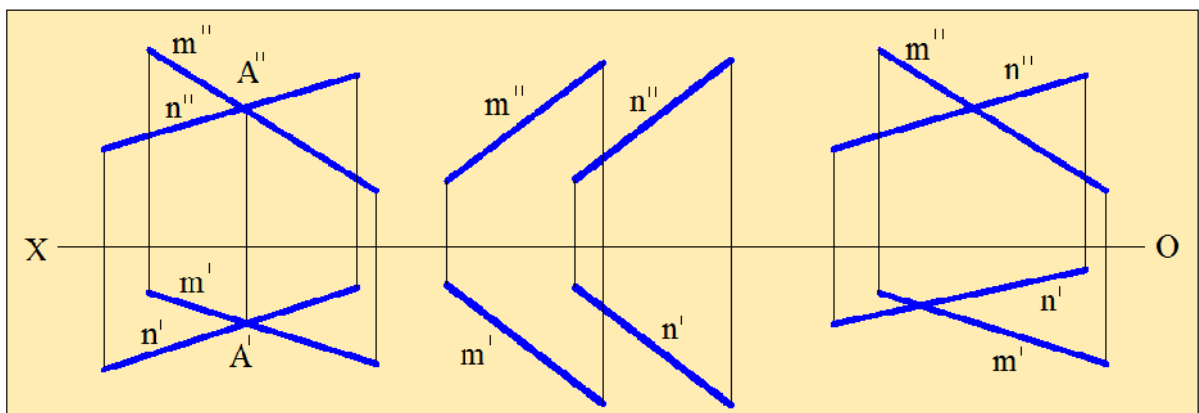


.2.13

(.2.14)



.2.14

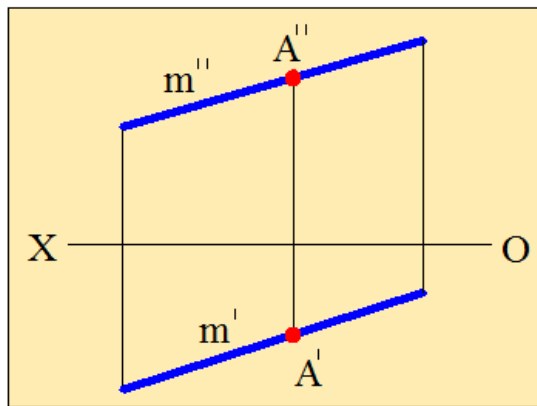


.2.15

2.15,).

(.2.15,).

(.2.15,).



.2.16

2.16

(" ").

(.2.17).

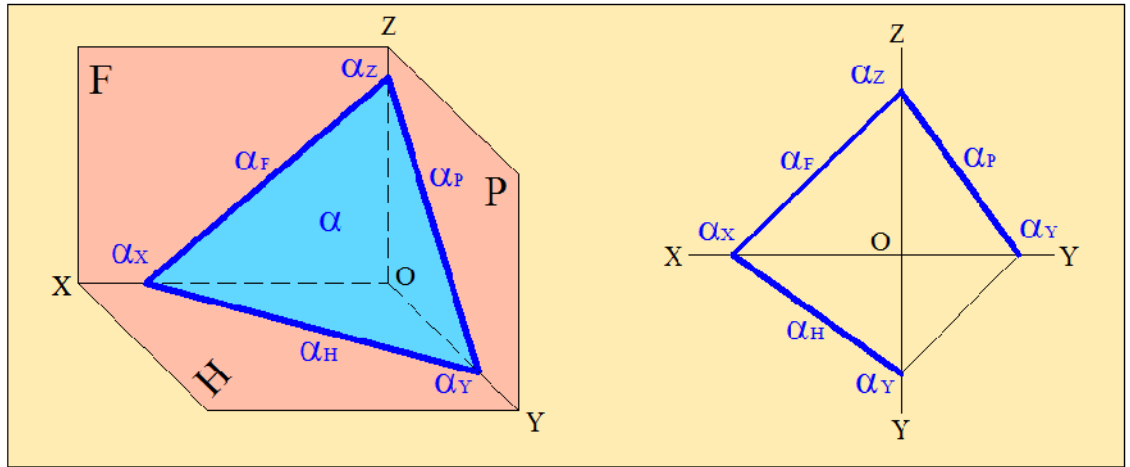
$Z = Z$.

B'

Z.

- $Z = Z - Z$.

(.2.19).



.2.19

H— 4;
 F— ;
 P— ;
 , Y, z— .

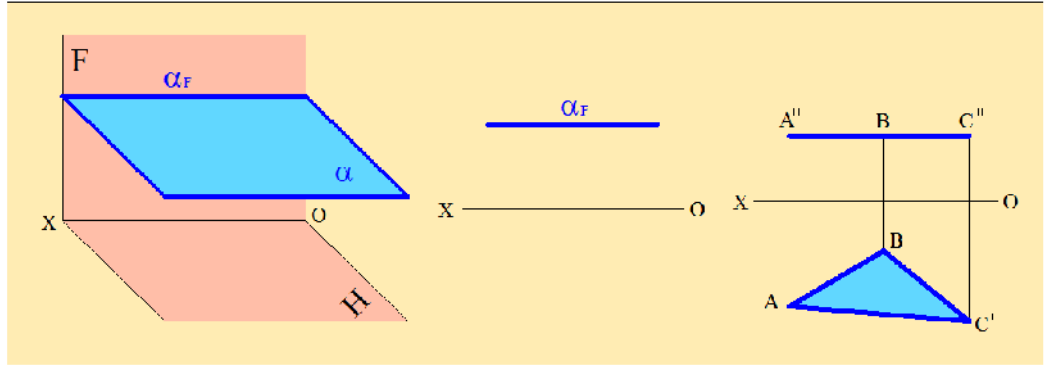
1. (), (), ().
 (.2.20,).

.2.20,

2.20,

F

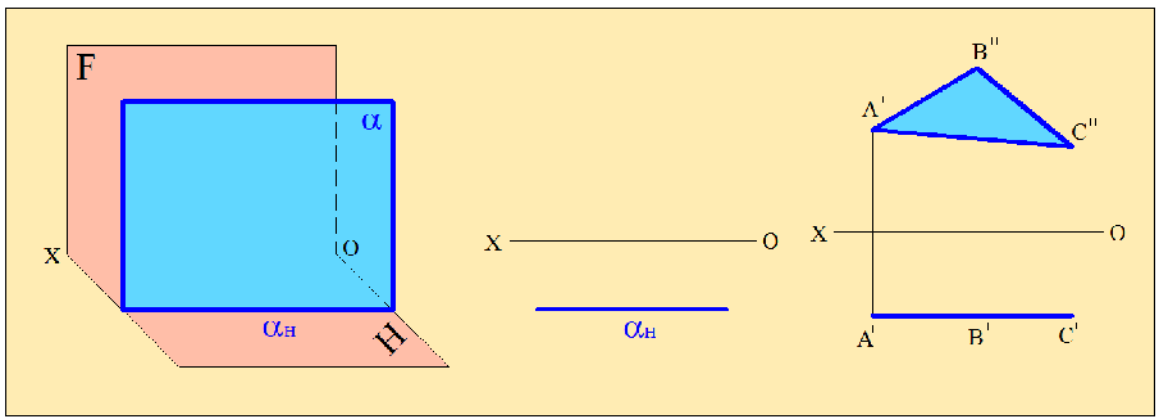
(), (), (), (), ()



) .220)

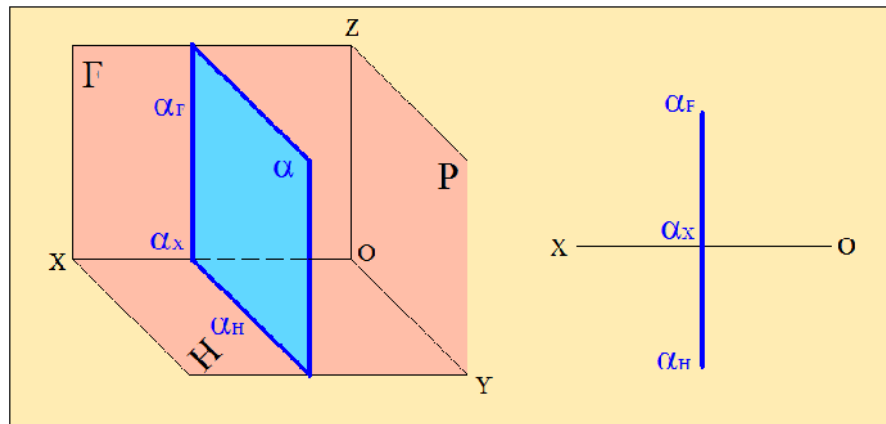
2. (.221,)

2.21, 2.21, ()



) .221)

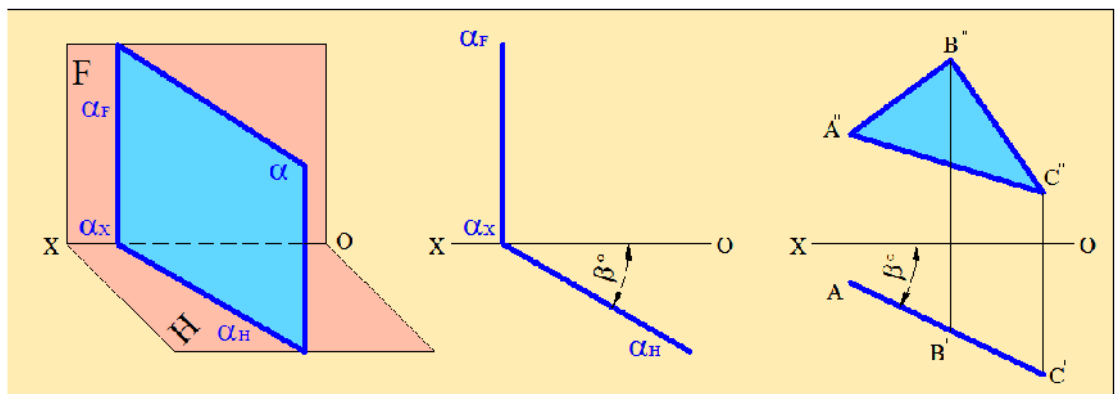
3. (.222,)



))

.2.22

4. ,
 (.2.23,).
 2.23,)
 .2.23,

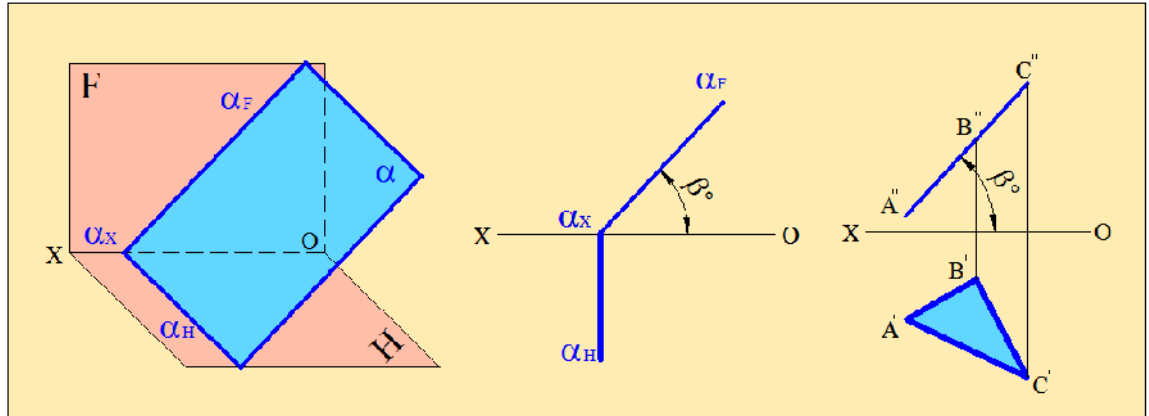


)))

.2.23

5. ,
 2.24,).
 (.2.24,)

.2.24,



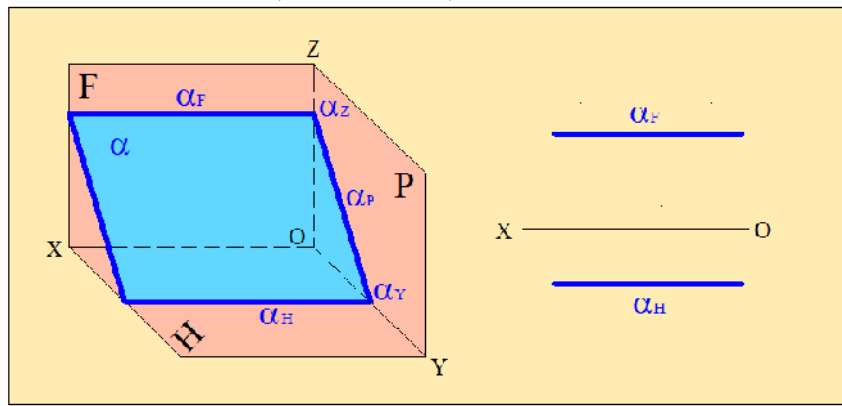
)))

.2.24

6.

, , (.2.25,).

(.2.25,).

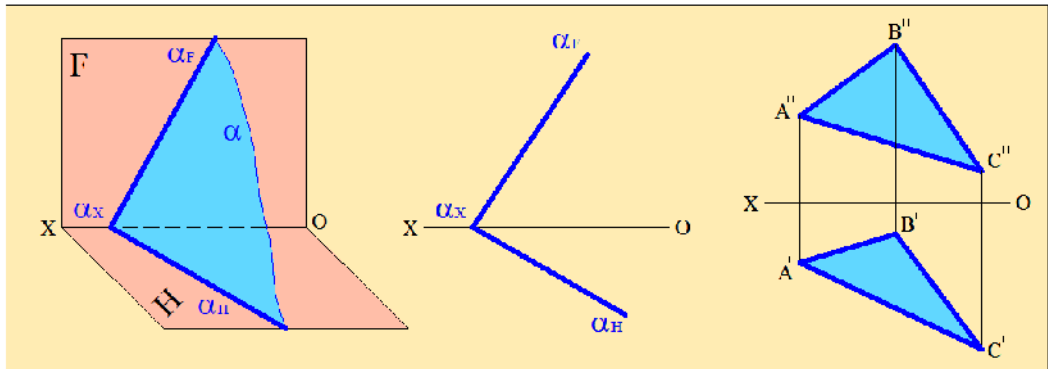


))

.2.25

7.

, , (.2.26,).



)))

. 2.26

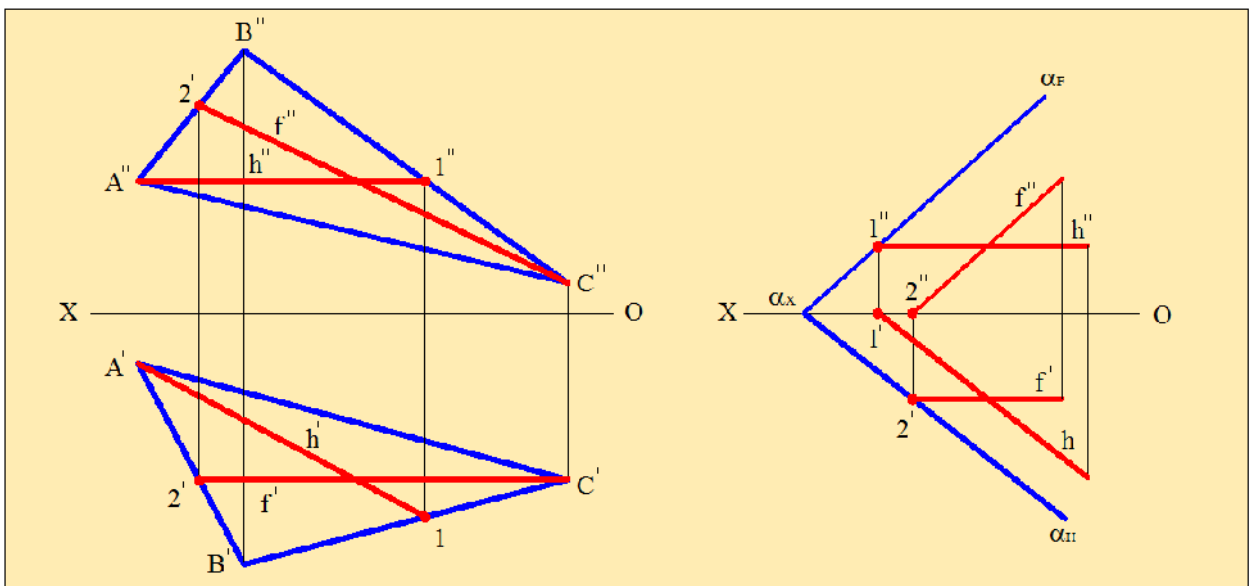
2.26,
2.26, -

()

()

2,27,

h'' -
- 1' f' f'' h''
1'' h' 1'



)

.2.27

)

(.2.27,).

F

$1''$
 h'' ,

$1'$

h'

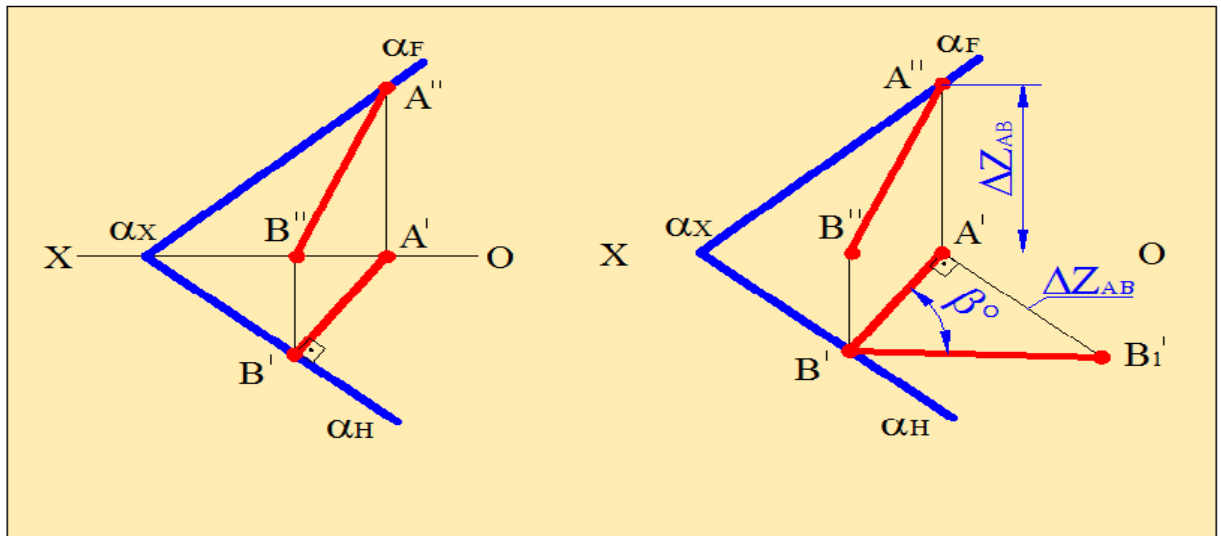
f'

f''

(.2.28,).

F,

(.2.28,)

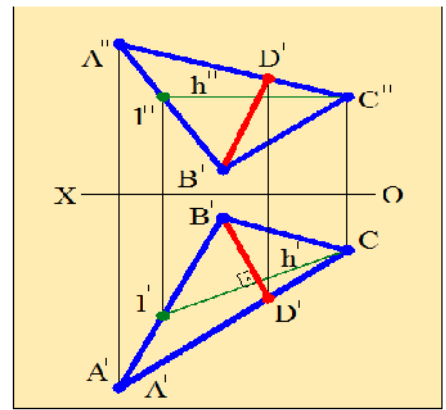


.2.28

2. 29

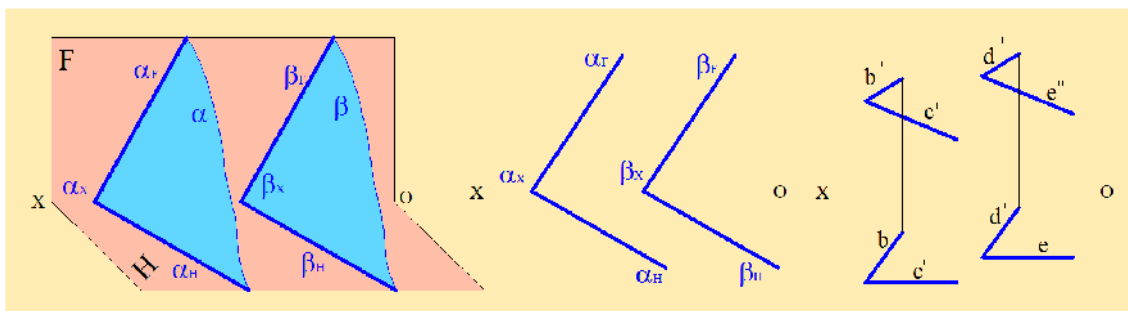
().

$- h' \quad h''.$
 $h',$
 $D',$ $'D'$
 $"D".$



.2.29

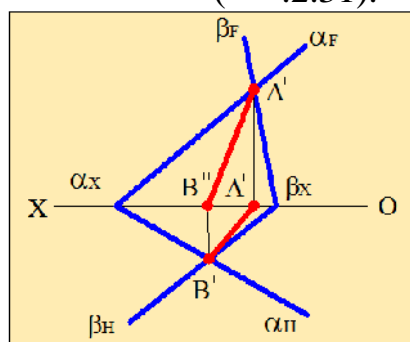
(.2.30).



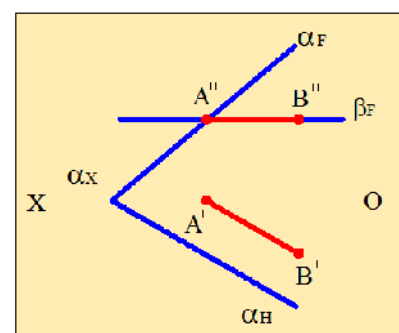
.2.30

1.

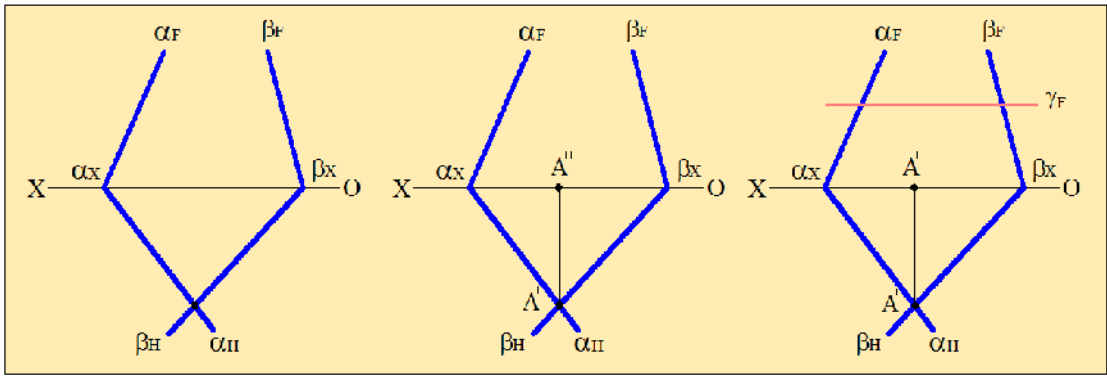
(.2.31).



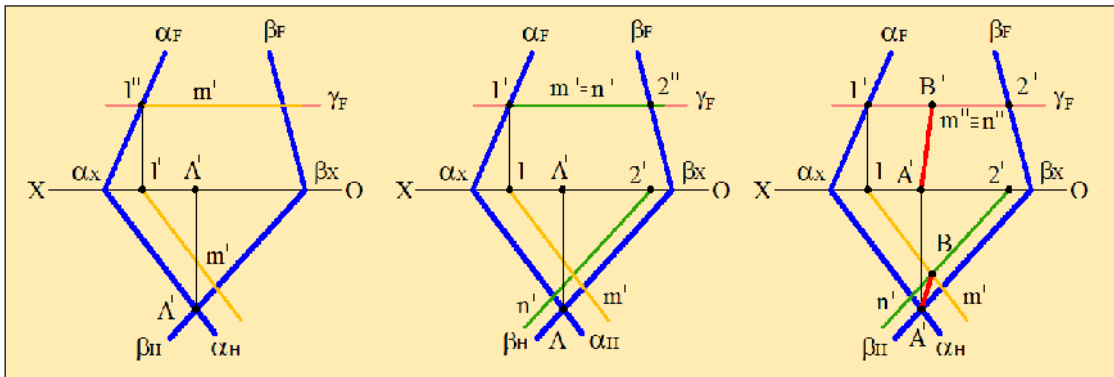
.2.31



.2.32



)))



)))

.2.35

2.35,)

' (.

(.2.35,).

(.2.35,)
n', n'').

(.2.35,) -

m (m', m'') n (

(.2.35,).

1.

() .

2.

3.

m

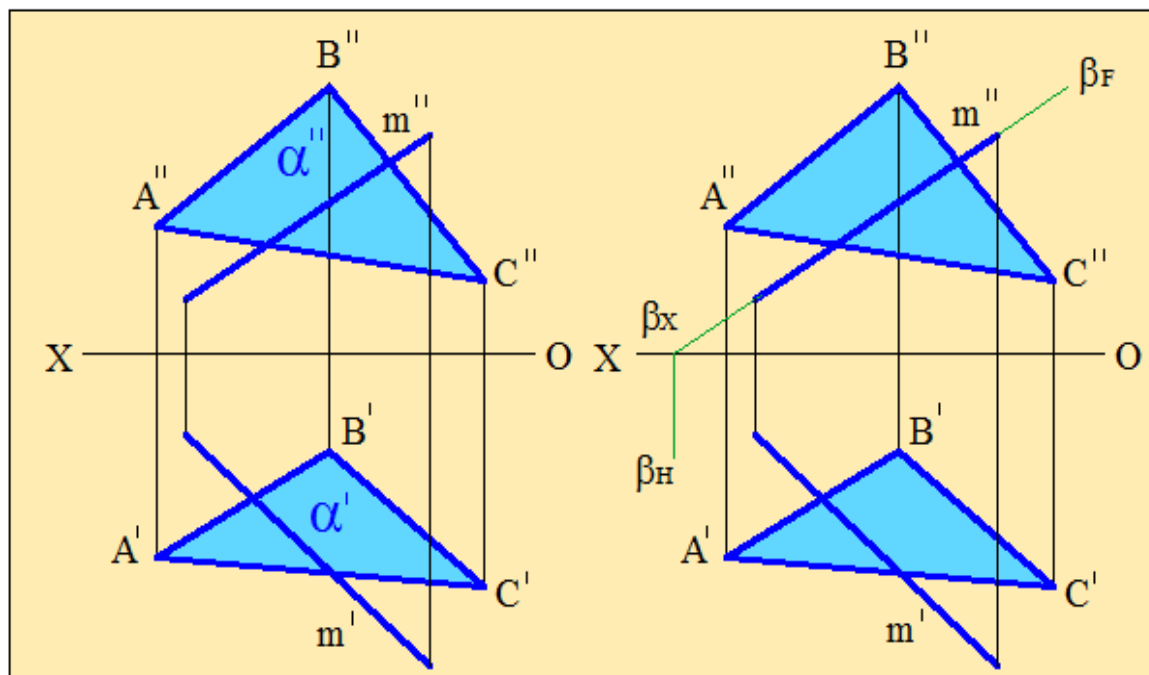
(.2.36,).

(.2.36,).

1'2' 1''2'' (.

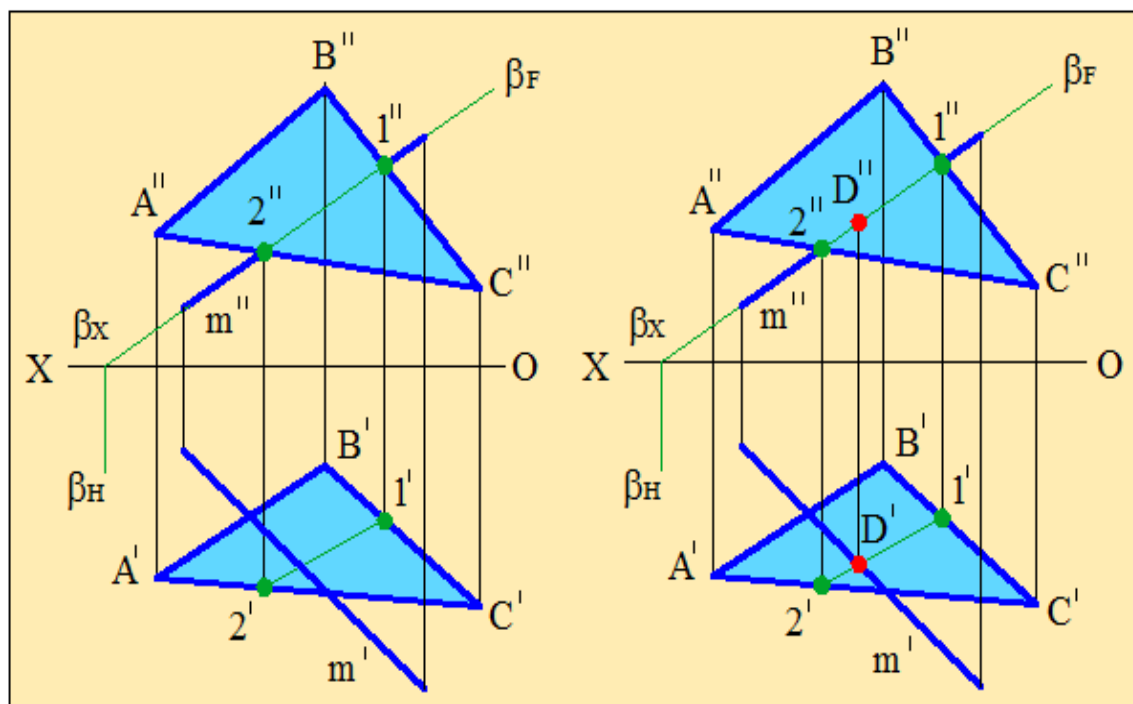
2.36,).

- D' D'' (.2.36,).



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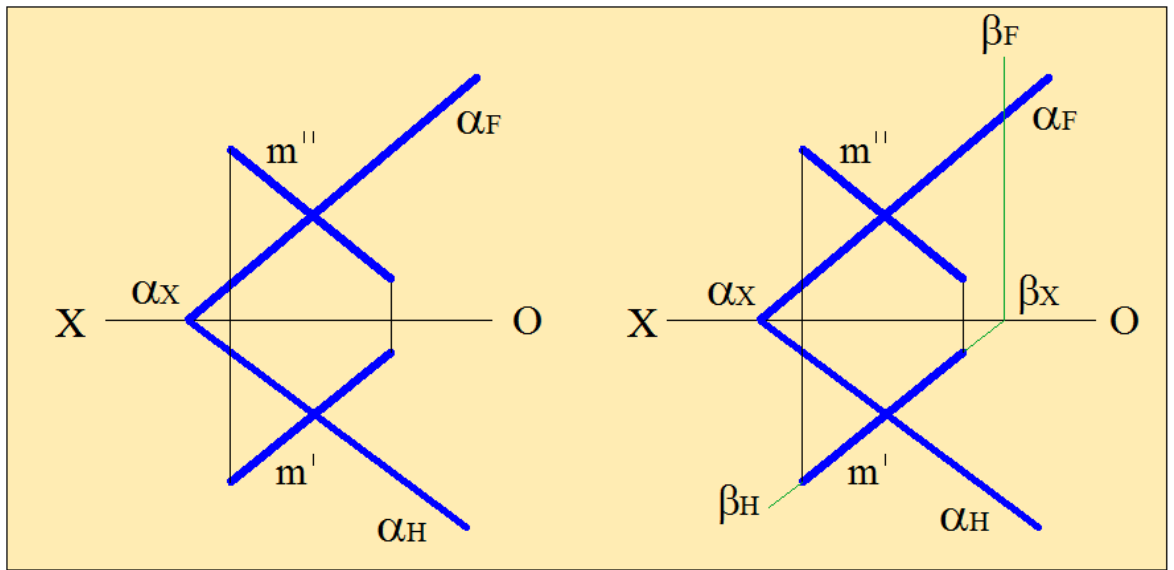
)

.2.36

m

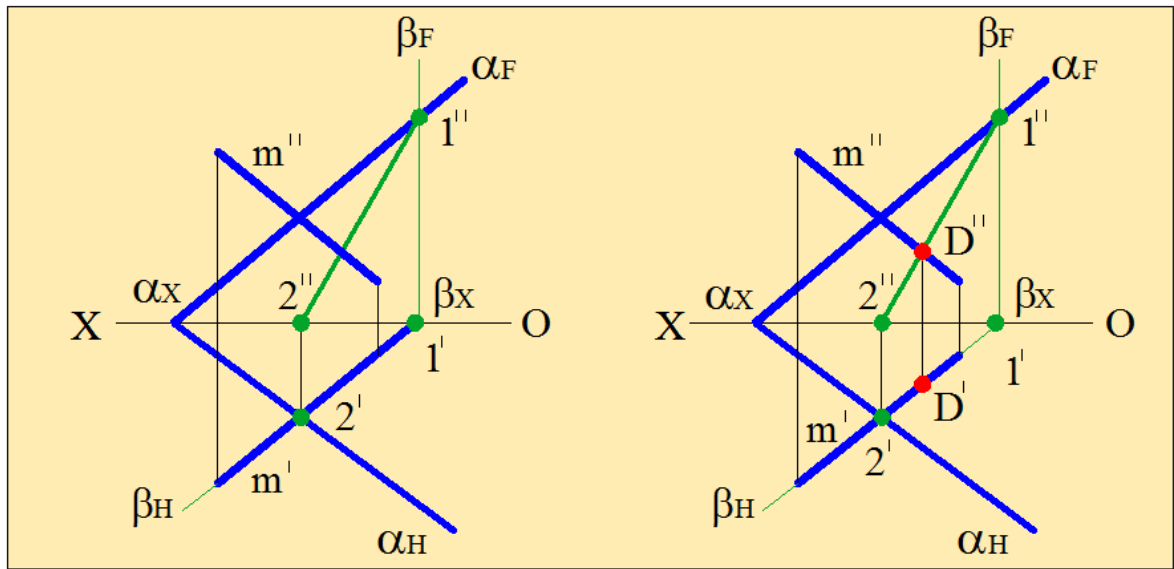
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(.2.37).



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.2.37

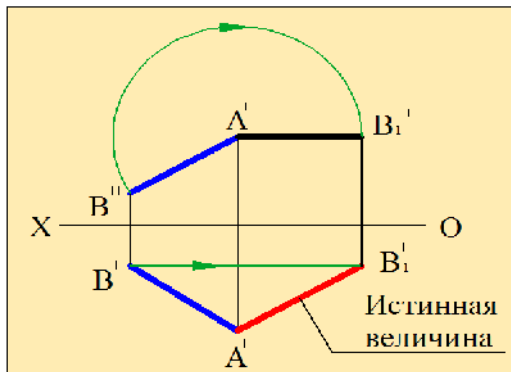
(.238).

— " "

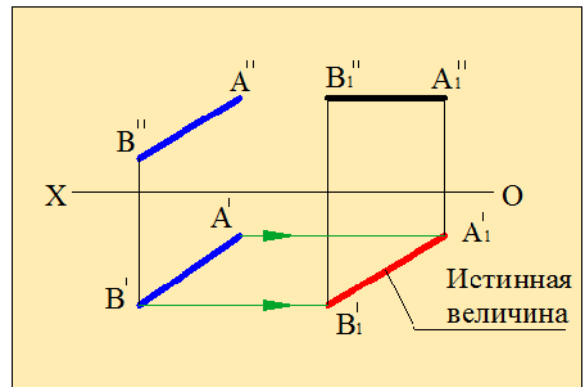
" 1"
' 1,

(.239)

— " 1 " 1.
' 1 1'



.238

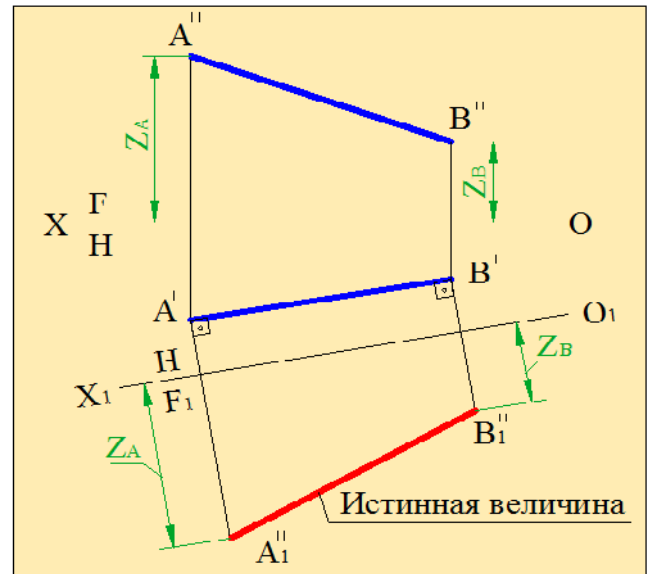


.239

(.2.40)

1, **F.**

1,



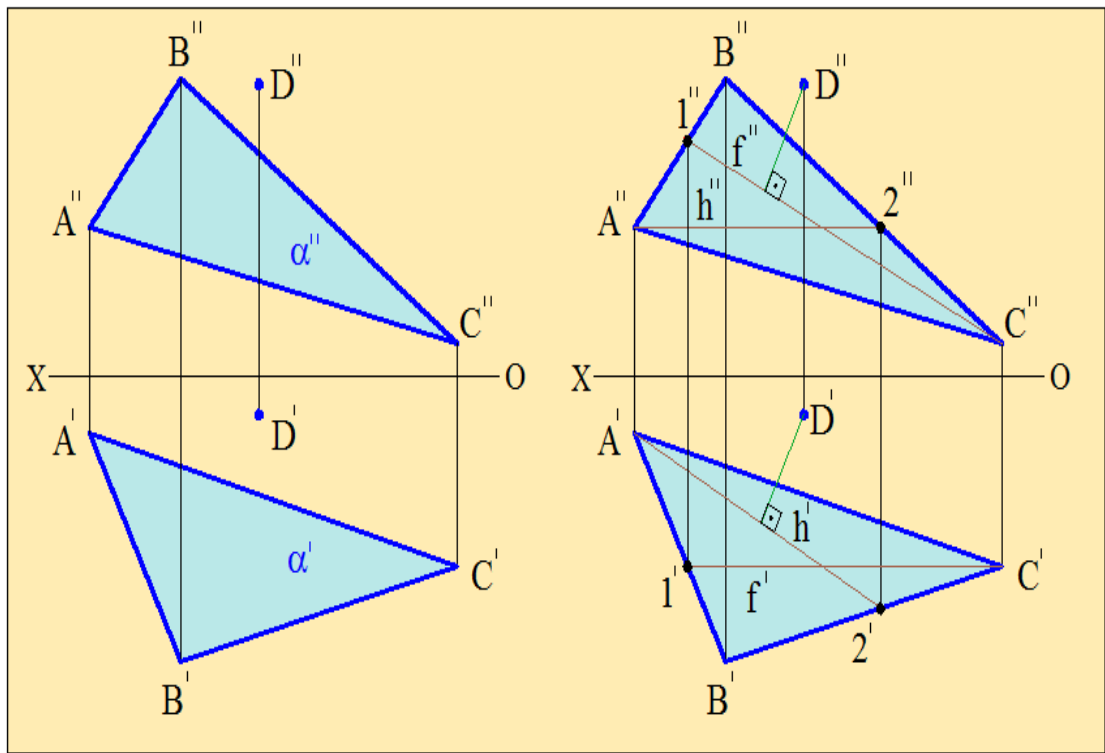
.2.40

Z **Z**
1'' 1''.

()

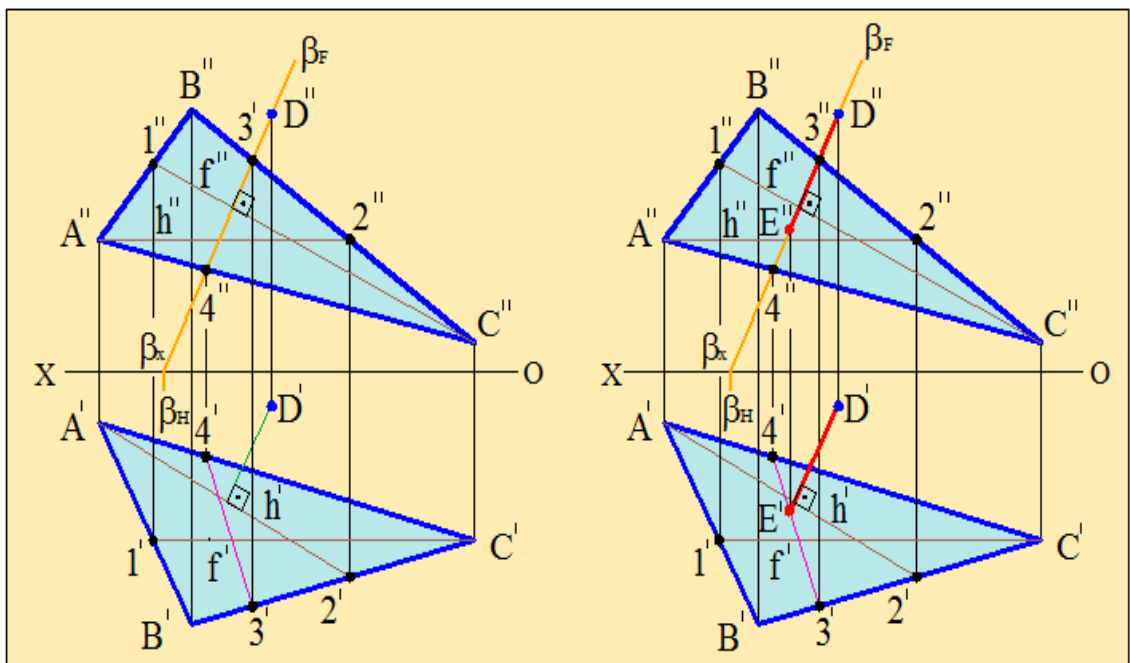
1.

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. 2.41

, (.2.42,).

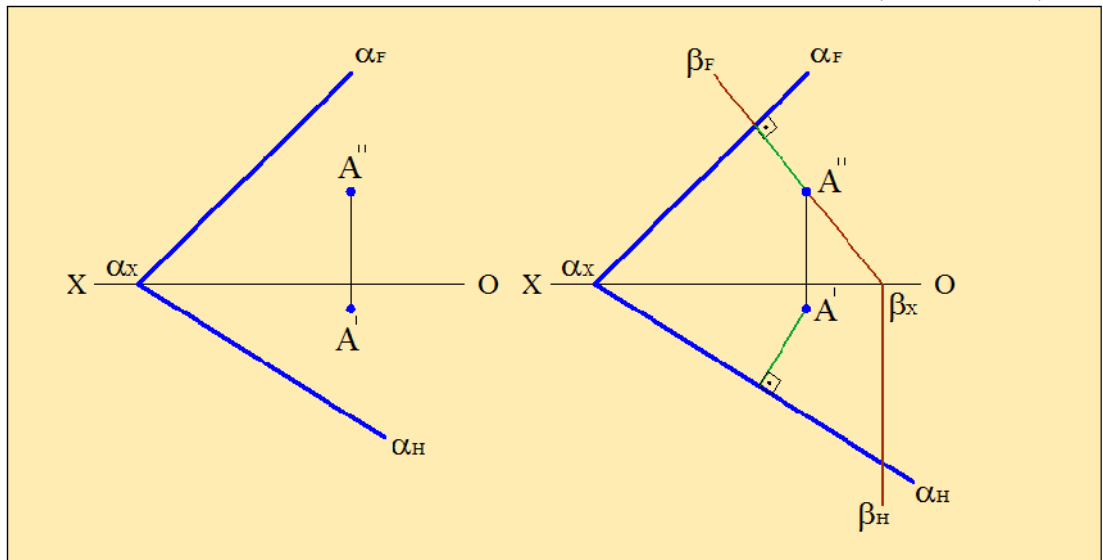
,
" F.

(.2.42,).
- 1'2' 1''2'' (.2.42,).

1'2'

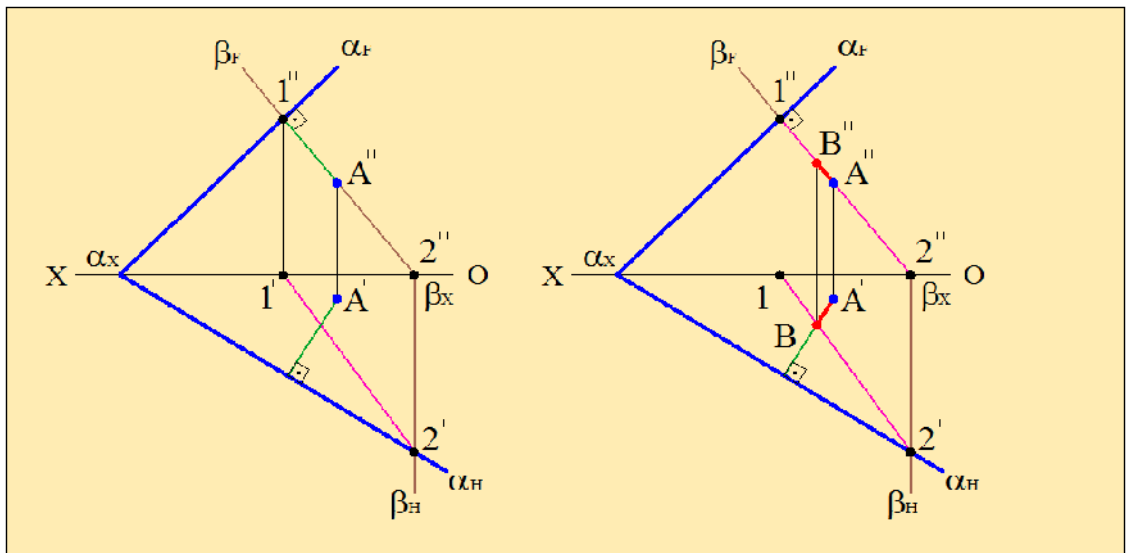
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(.2.42,).



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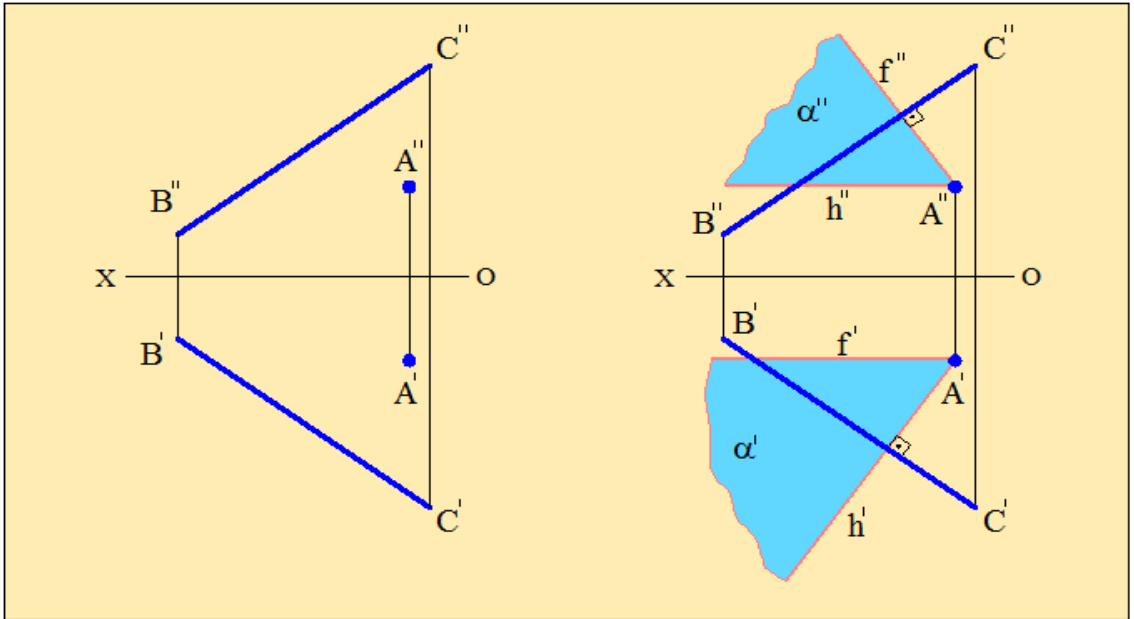
)

)

.2.42

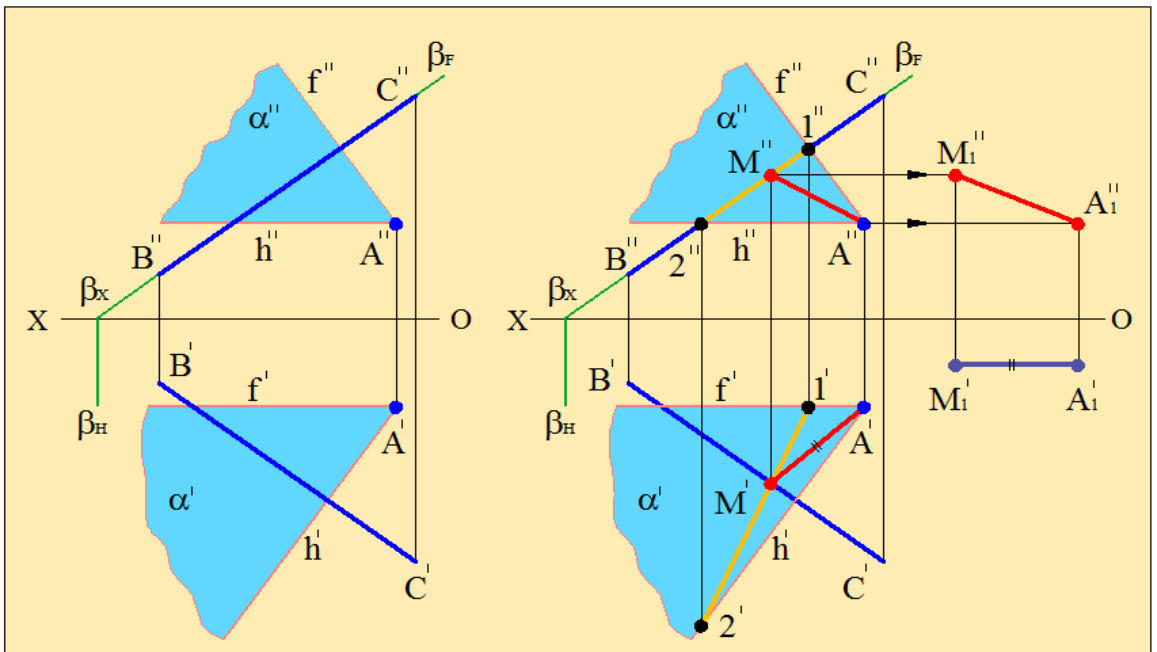
1.

(.243,).



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.243

(.243,).

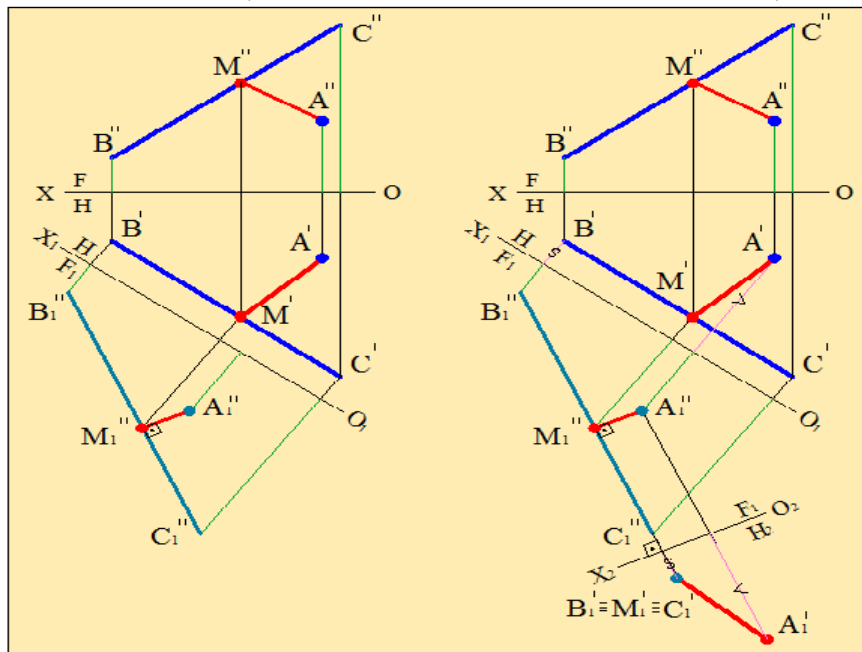
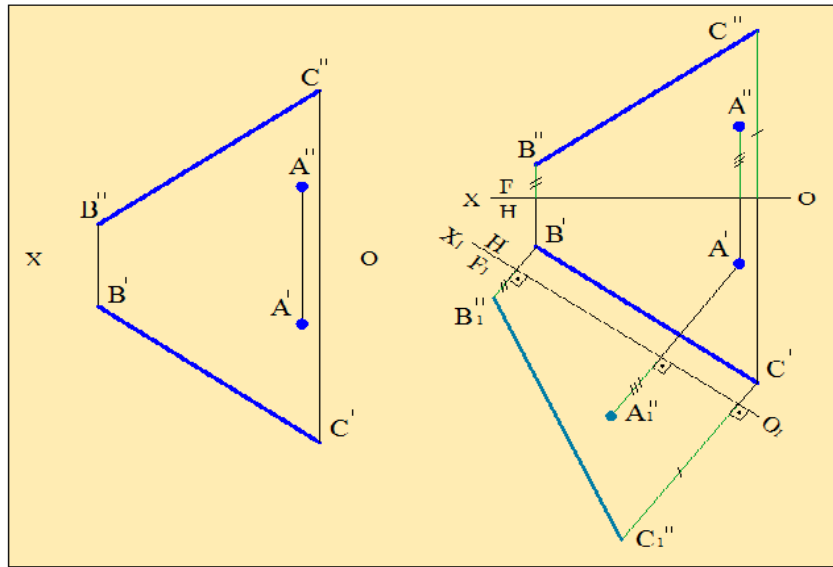
(.243,).

$1'2'$ $1''2''$ (.243,).

$1'2'$
''

(.243,).

($1''$ $1''$)



.244

2.
(.244,)

1.

$1''$ $1''$ $1''$.
(.244,).

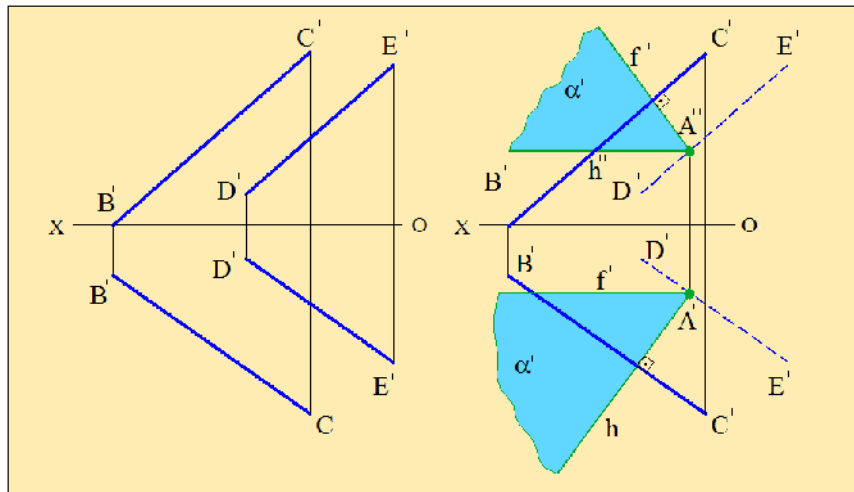
$1''$ $1''$

$1''$.
' '' (.244,).

$1''$ $1''$,

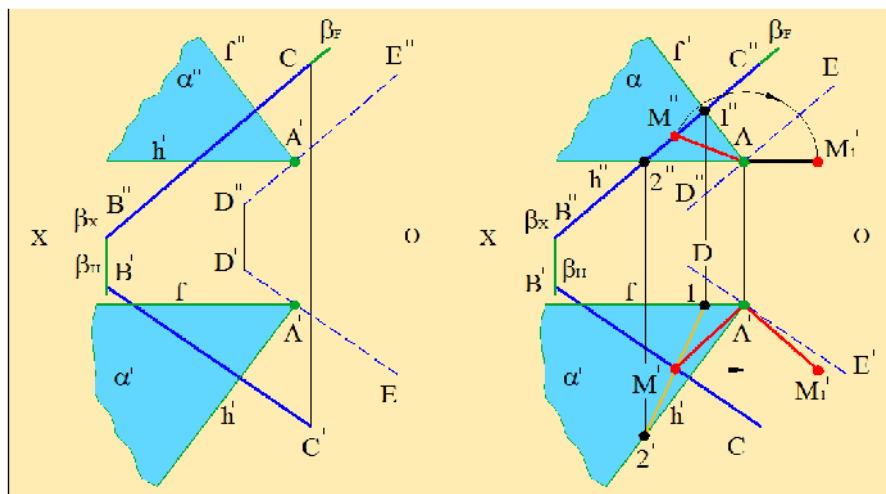
, , '' ''

(.244,).



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.245

2.45,

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(.245, , ,).

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(.246).

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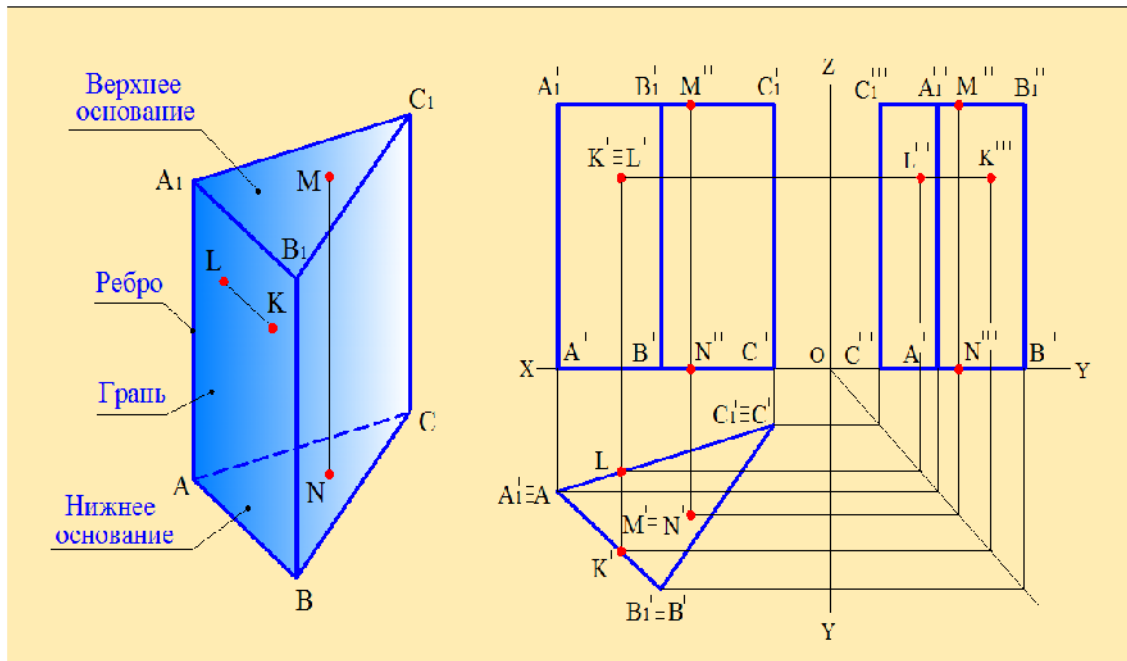
,

" " "

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1' 1' 1'

1'' 1'' 1''



.2.46

N.

(" N'')

N

" N'''

L,

1 1

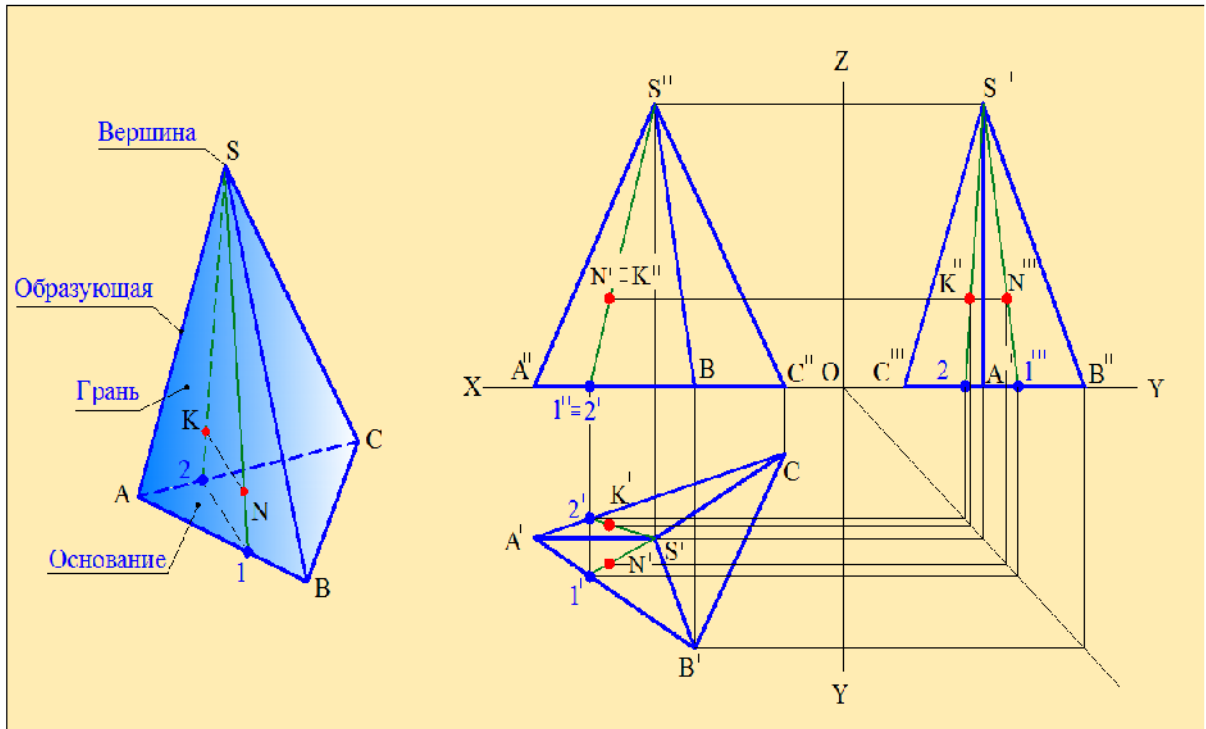
1 1

1 1.

F,

"
L"
"" L""

(.2.47).



.2.47

S.

(S),

(,)

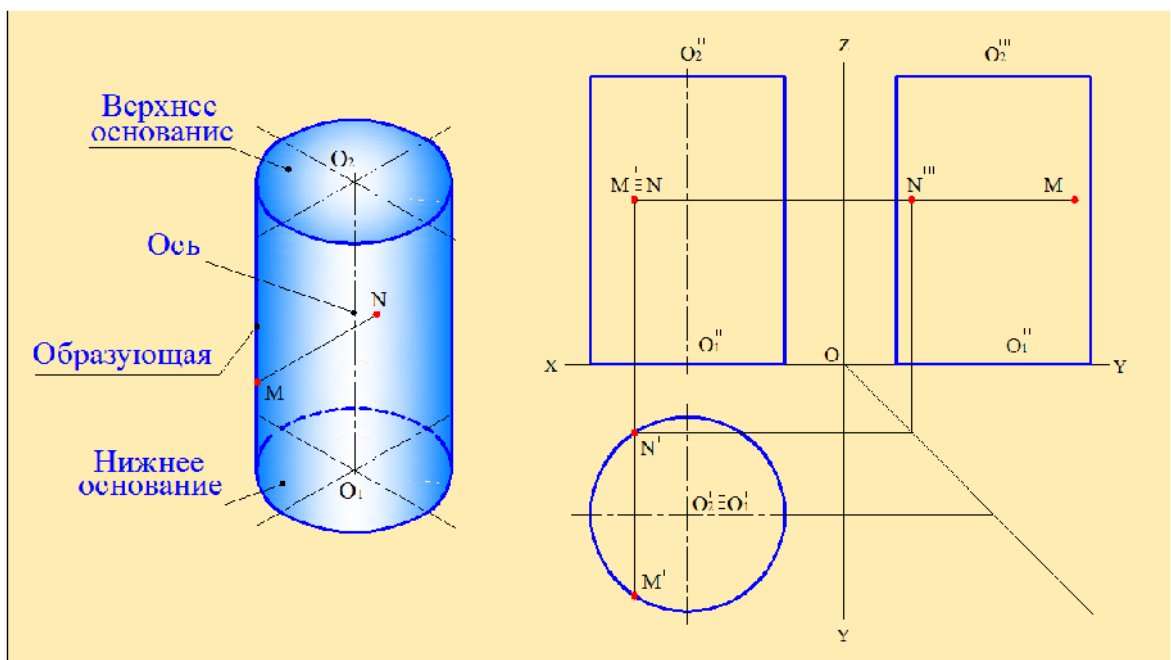
S, S, S
S S S
S

S 1S, N, S S, N
2S , S ,

()

N,

(.248).



.248

$N(N'')$

(N''')

(N''', N''')

$N,$

$Y,$

R_1 (2.49).

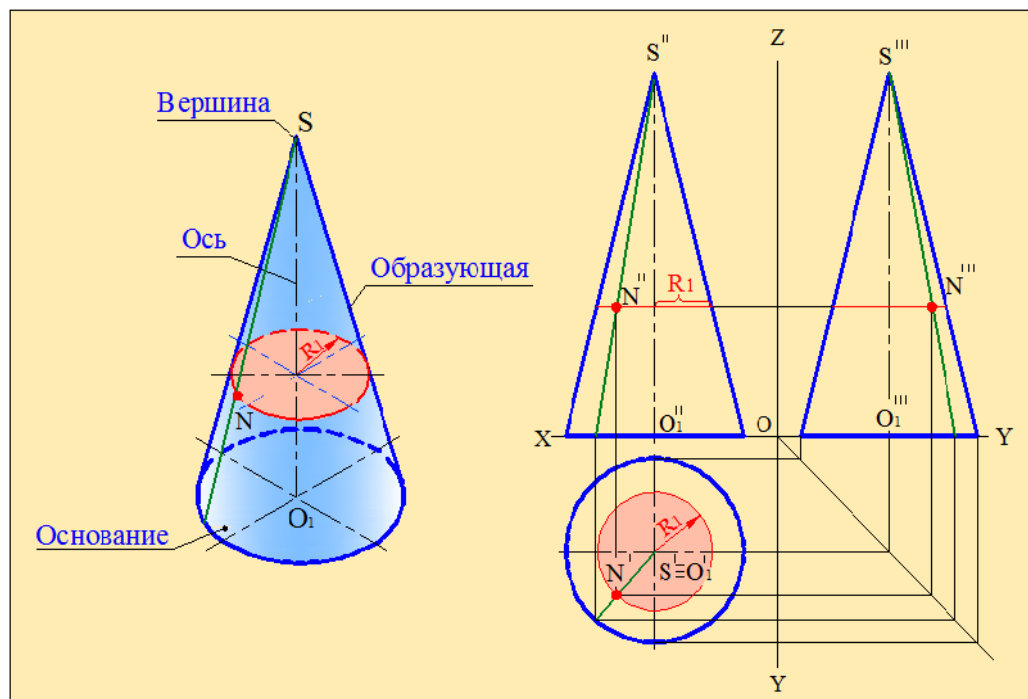
$Y.$

$(S' S'').$

$(S'' S''').$

$Y.$

2.49,

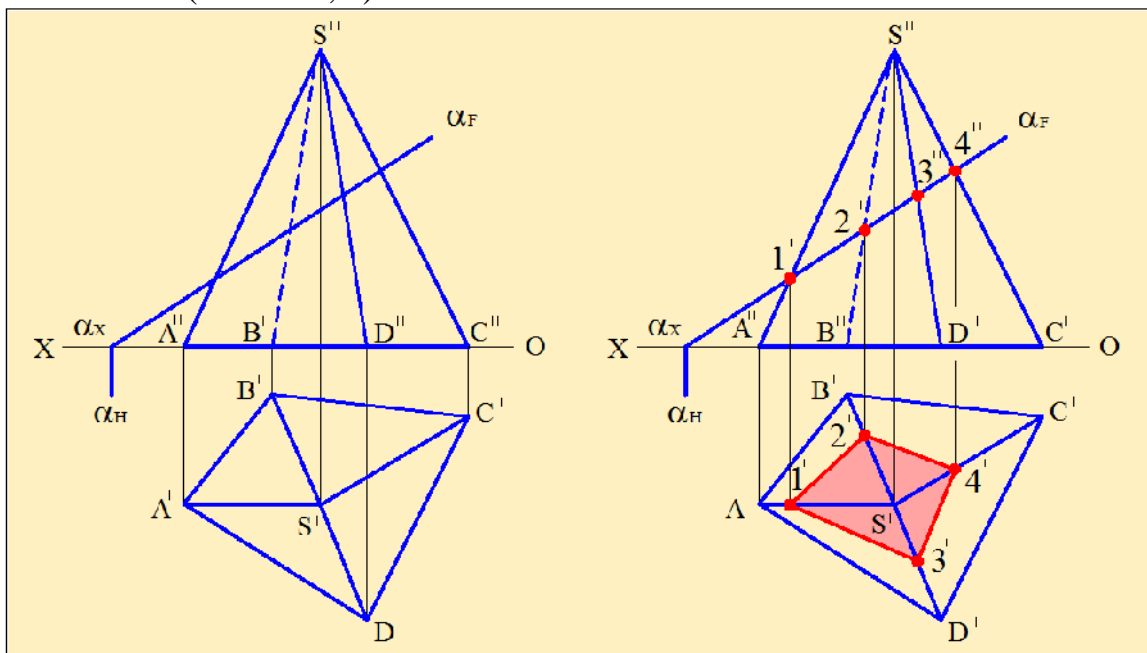


.2.49

N.
 N'
 N''' N
 N'' S'' N
 R₁.
 R₁.
 N'' N
 N'''

ABCDS

(.2.50,).



.2.50

('S', B'S', D'S' C'S')

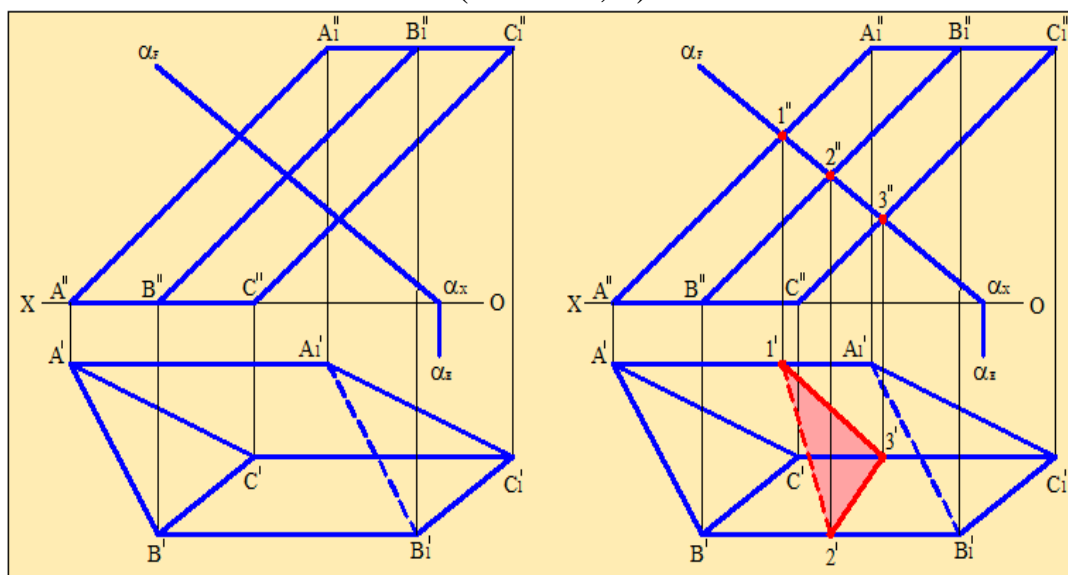
- c

1'', 2'', 3'', 4''.

- 1', 2', 3' 4'.

1'2'3'4'

(.2.50,).



.2.51

2.51

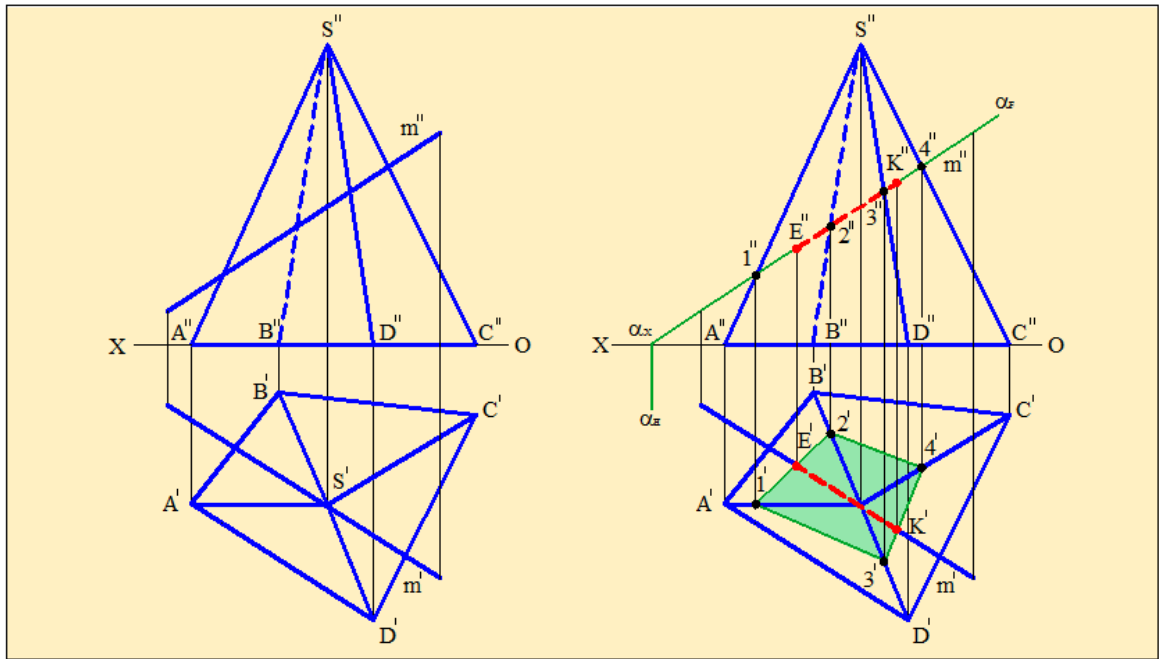
- 1.
- 2.
- 3.

.2.52

ABCD

m.

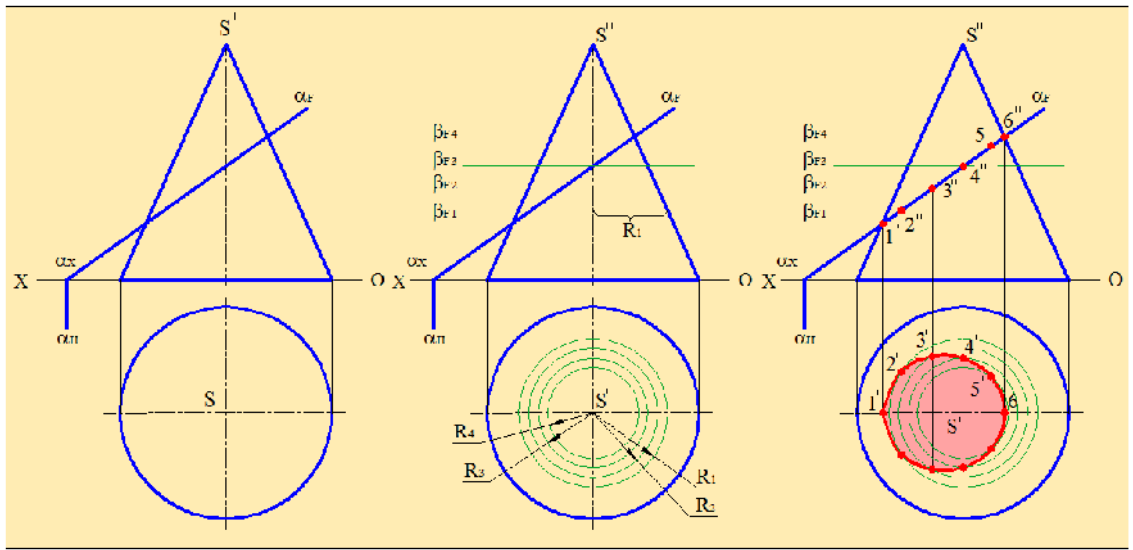
1' 2' 3' 4'



.2.52

m'

(.2.53,).



)))

.2.53

1'' 6'' (. 2. 53,).

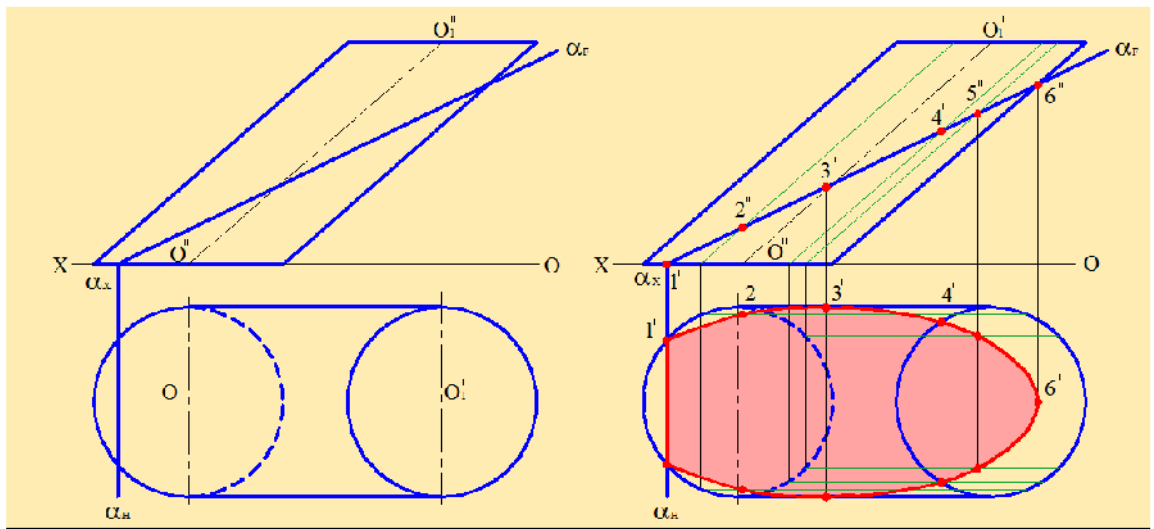
(.2.53,). 1 , 2, 3 4 R1.

R1).

2''.

1 - 2'.

3'', 4'', 5'' 3', 4', 5'.



))

.2.54

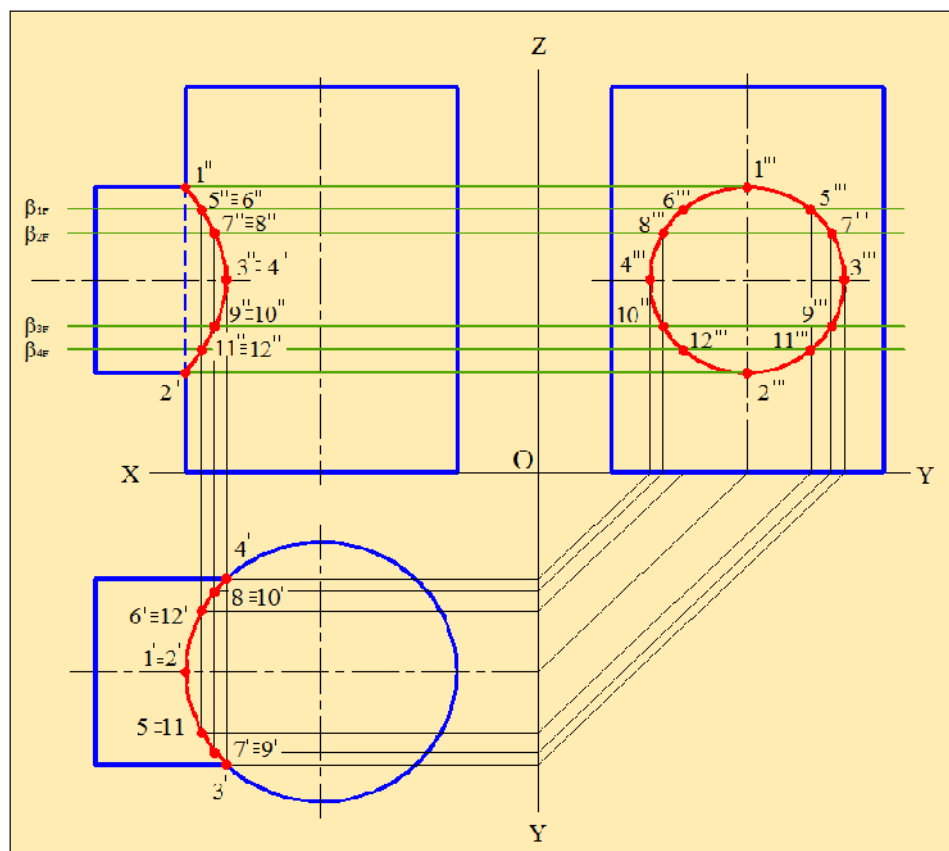
(.254,).

– 1", 3" 6".

– 2", 4" 5".

(.254,).

2.55



.2.55

2, 3 4.

1, 2, 3 4.

1,

1.

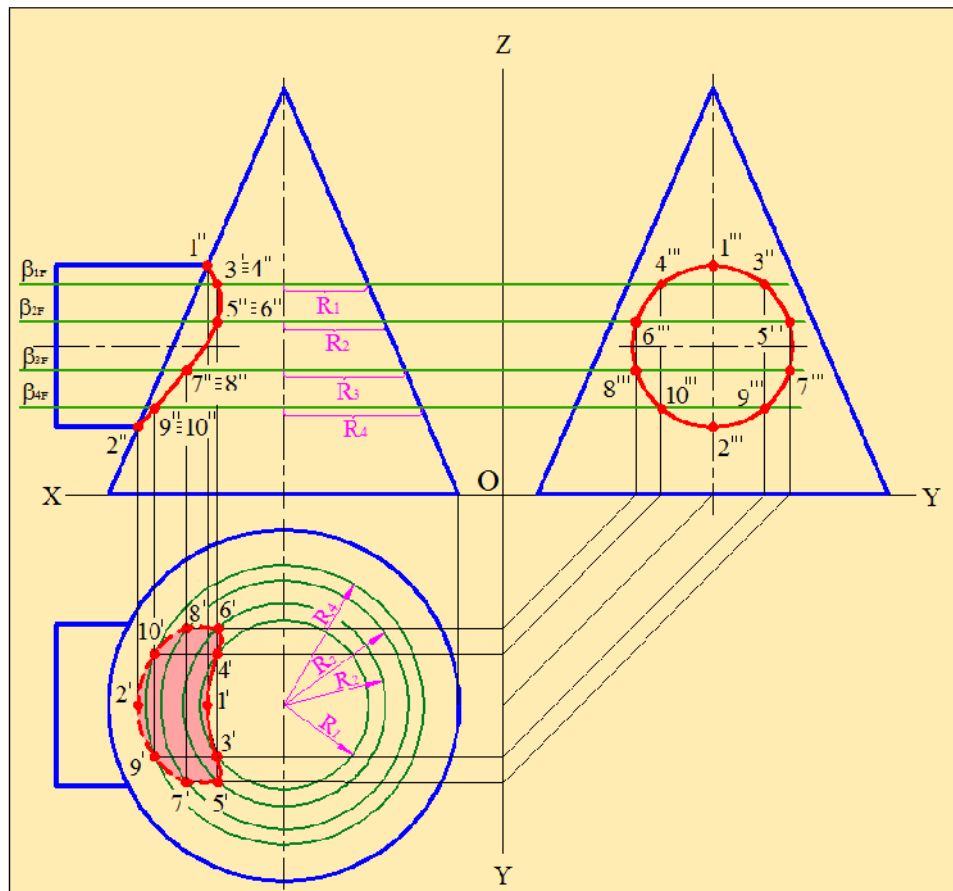
5''' 6'''.

- 5' 6'.

- 5'' 6''.
7, 8, 9, 10, 11 12.

(.256).

1 2 -



. 2.56

1, 2, 3 4.
R1,

1

3''' 4'''.
- 3' 4'

R1.

3" 4".

1

5, 6, 7, 8, 9 10.

III

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(, ,)

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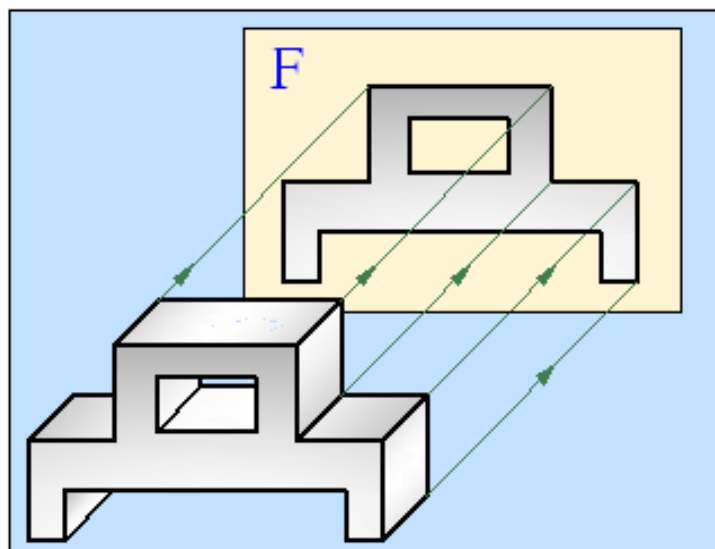
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.3.1.

F.

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F



.3.1

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F.

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1.

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2.

3.

4.

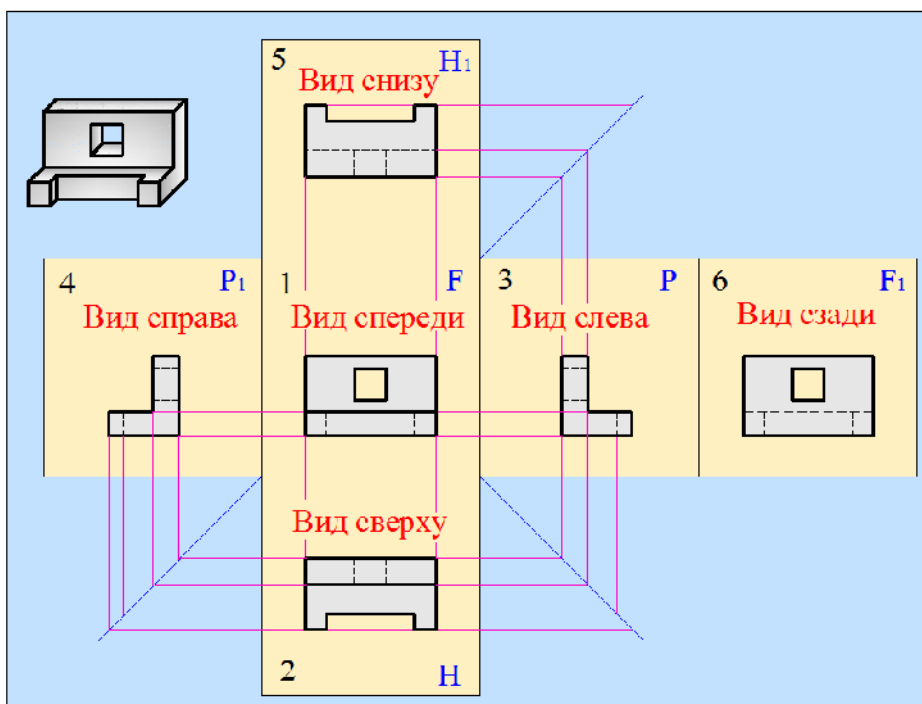
.3.1

()

6

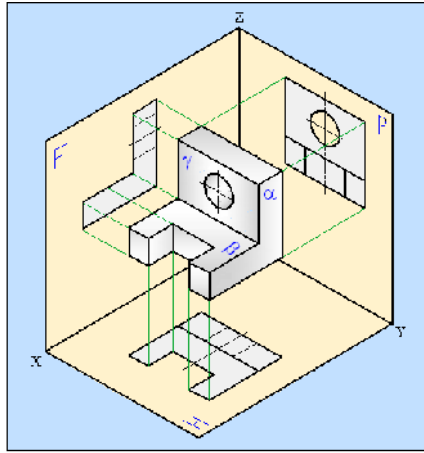
4.

.3.2

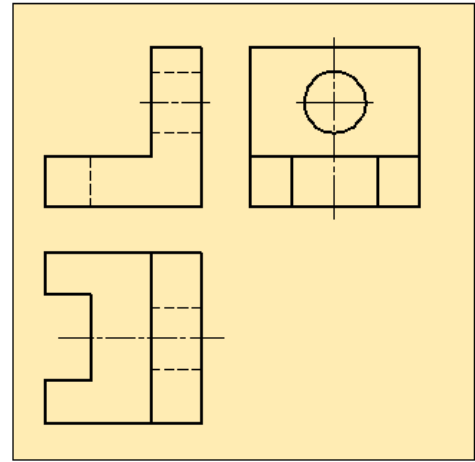


.3.2

; 4 - ; 5- ; 6- ; 1- (); 2- ; 3-



.3.3



.3.3.

.3.4,

(.3.4,).

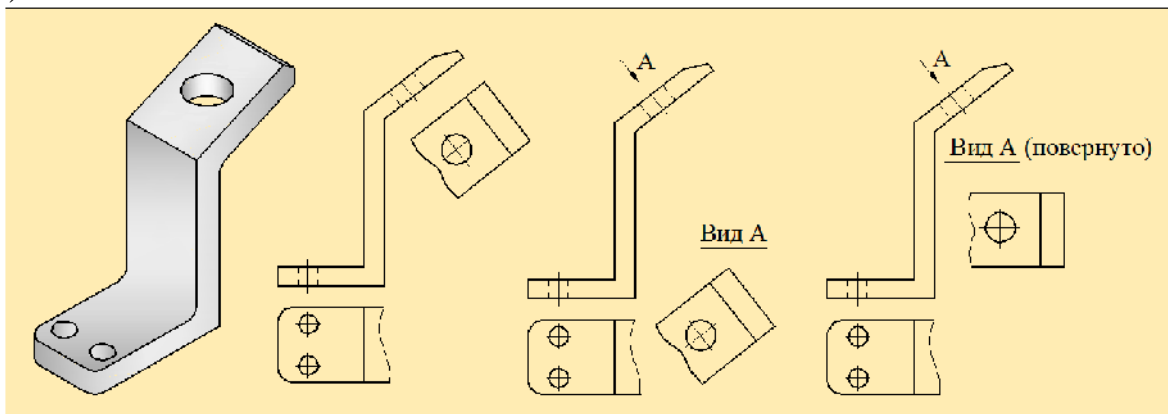
(, , ...),

(3.4,).

« _____ ».

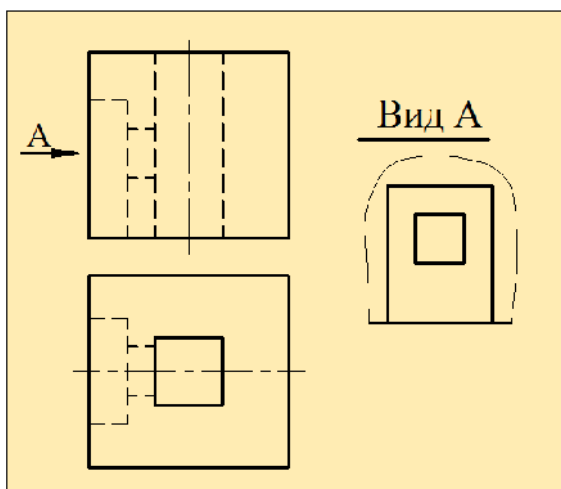
« _____ (_____) » (_____)

3.4,).



))))

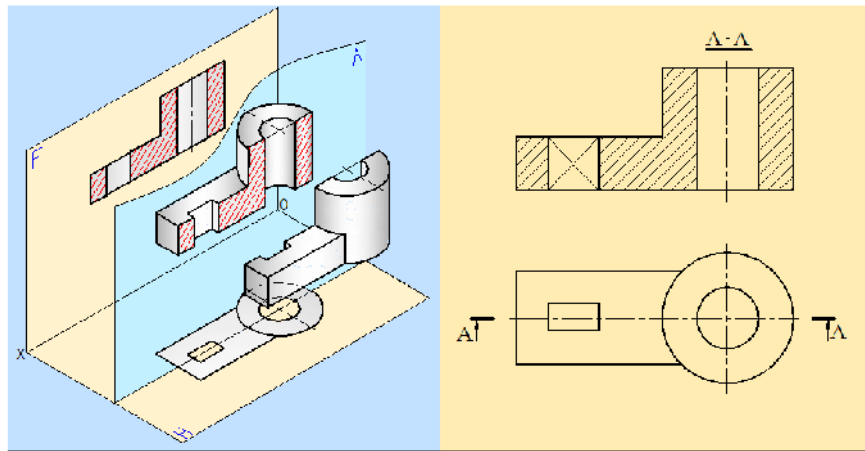
.3.4



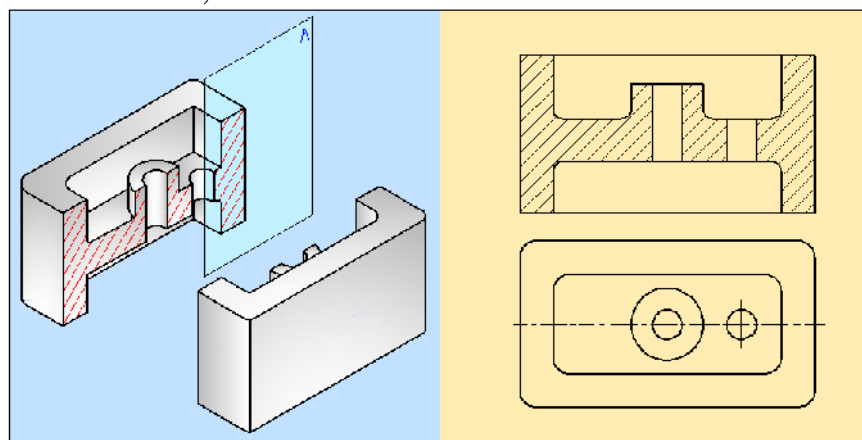
.3.5

.3.5

.3.6



.3.6

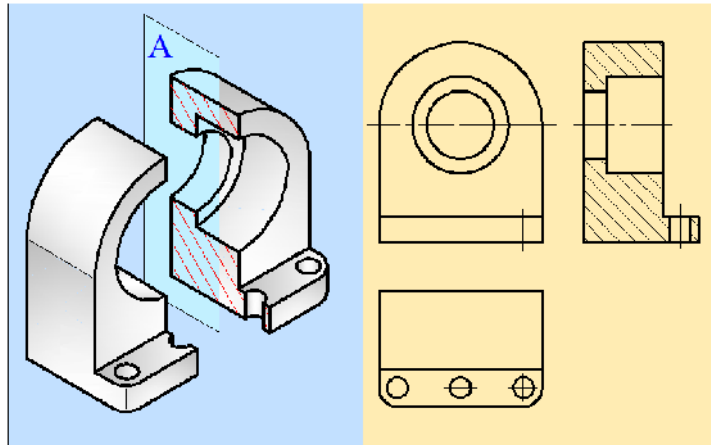


.3.7

.3.7

F,

.3.8



.3.8

.3.9

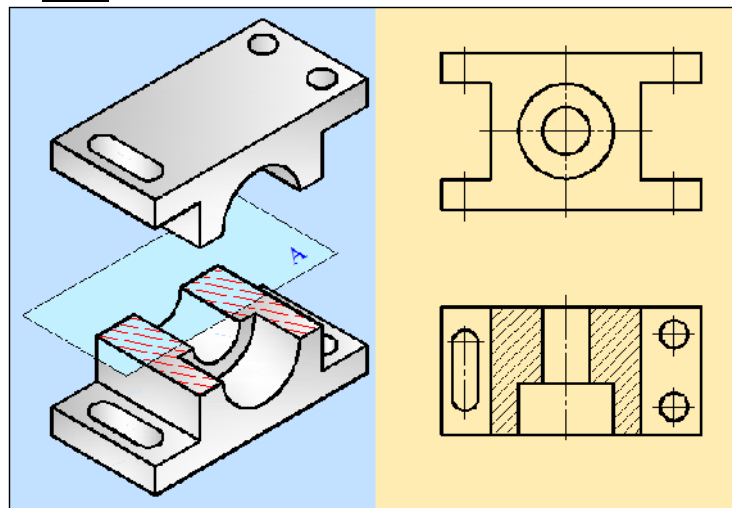
(. 3.6 – 3.9).

1,5

2...3

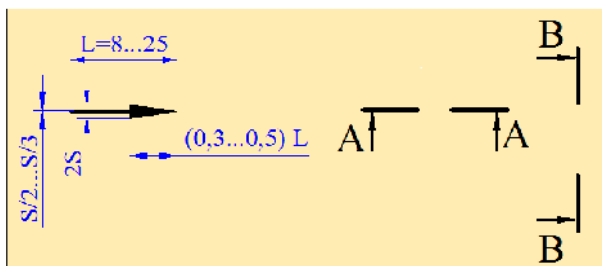
(. 3.10).

« - ».

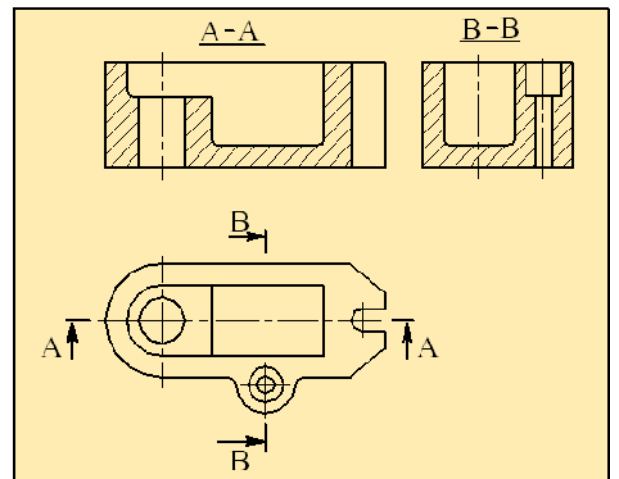


.3.9

.3.11

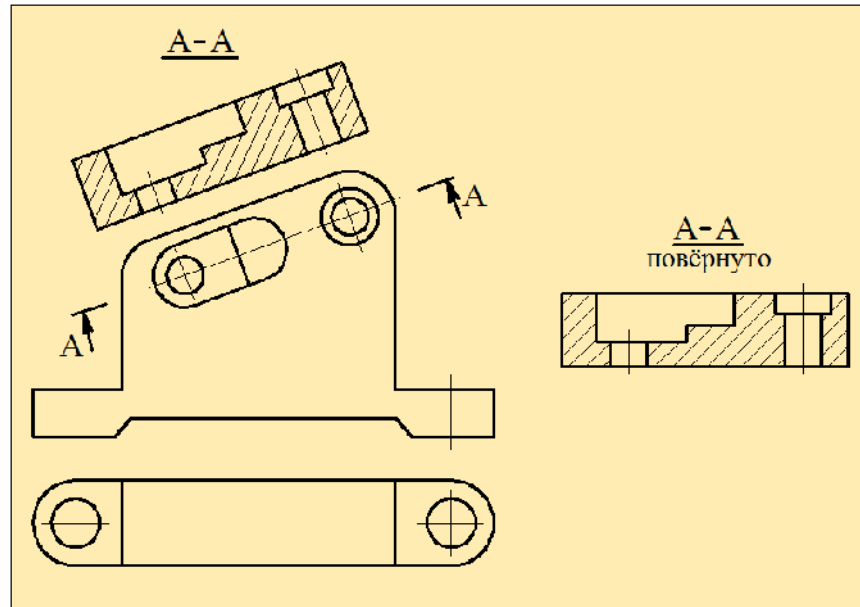


.3.10



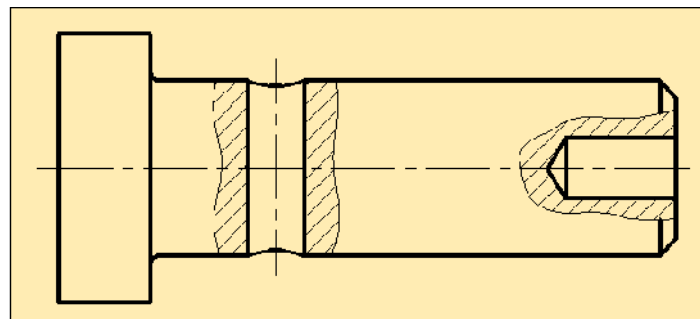
.3.11

.3.12



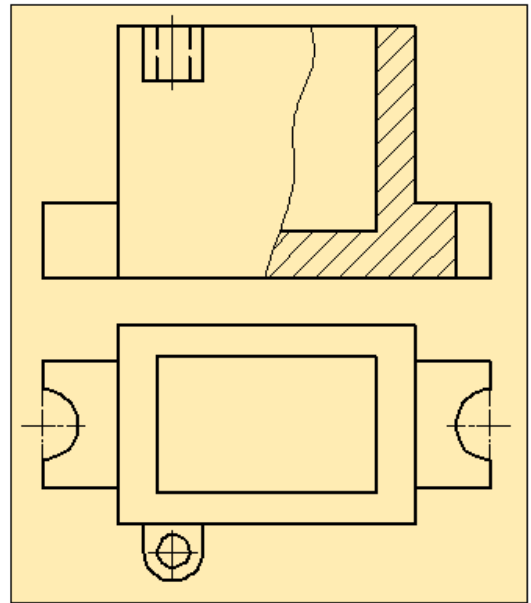
.3.12

« - ».



.3.13

.3.13

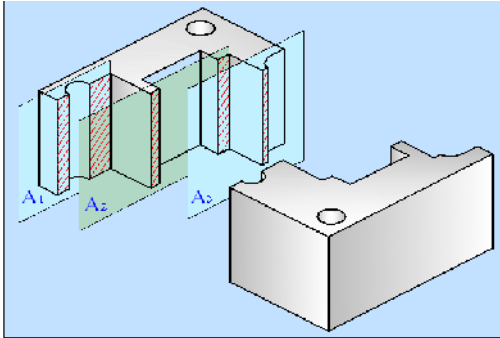


.3.14

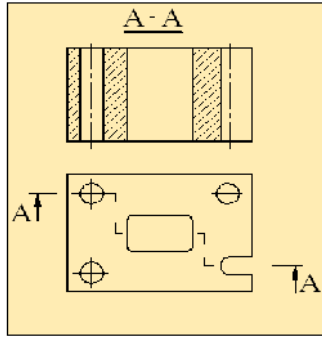
(.3.14).

.3.15

3.16

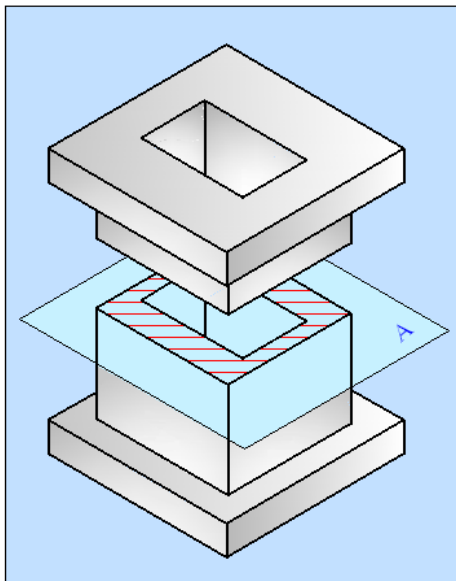


.3.15

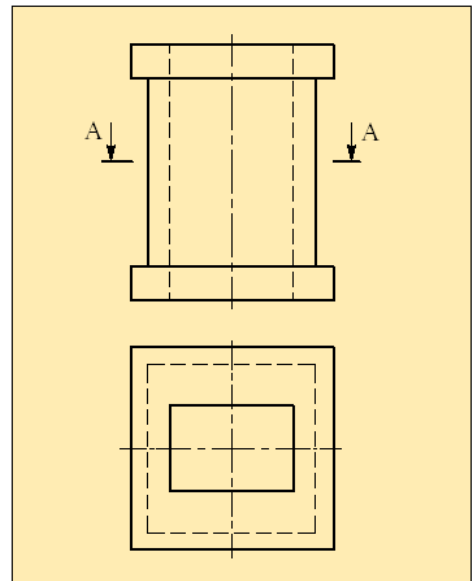


.3.16

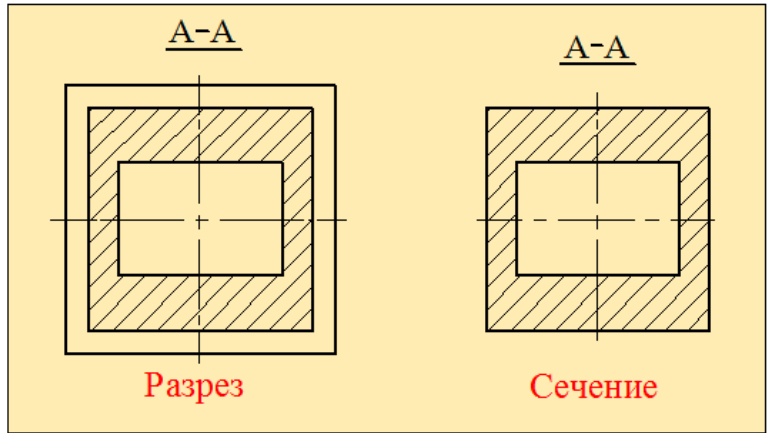
.3.17



.3.18



.3.17



.3.18

.3.19 3.20

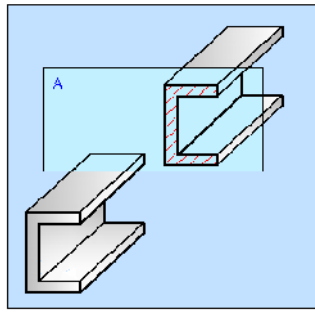
(. 3.19).



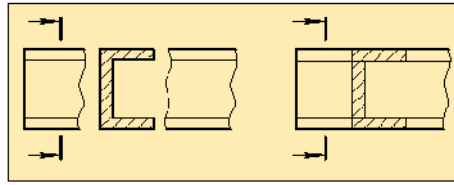
. 3.19

(. 3.20,).

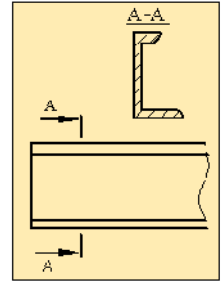
- (. 3.20,).



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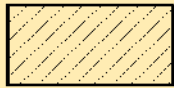
. 3.20

45°

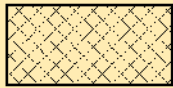
2...10

1,5

. 3.21



Металлы



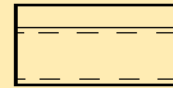
Неметаллические материалы



Древесина



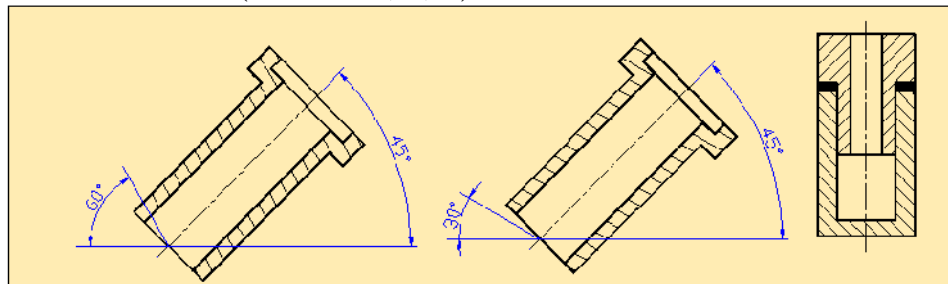
Стекло



Жидкость

. 3.21

30° 60° (. 3.22, ,) 45°



)

)

)

. 3.22

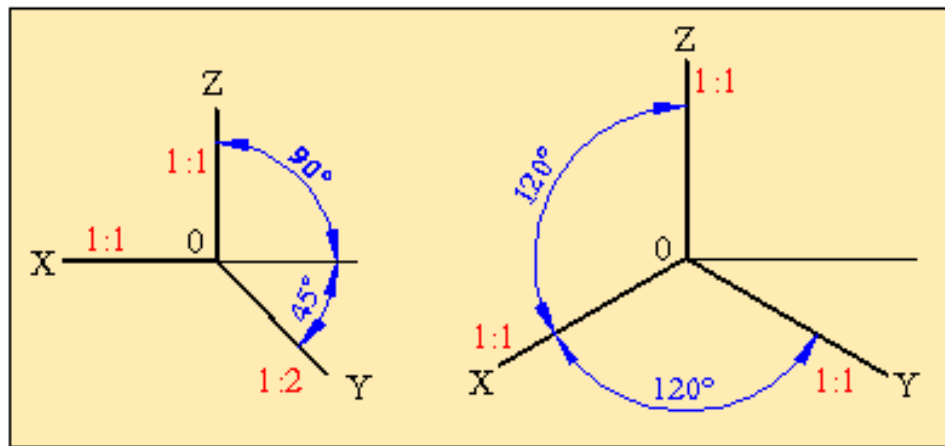
• • • , • • • ,
• • • , • • •
• • • , • • •
(. 3.22,).² , •

45°. (.4.1). Z- Y : = z = 1, =0,5

45°, 45° 90°.

120°, = = z = 0,82.

1 (.4.1).



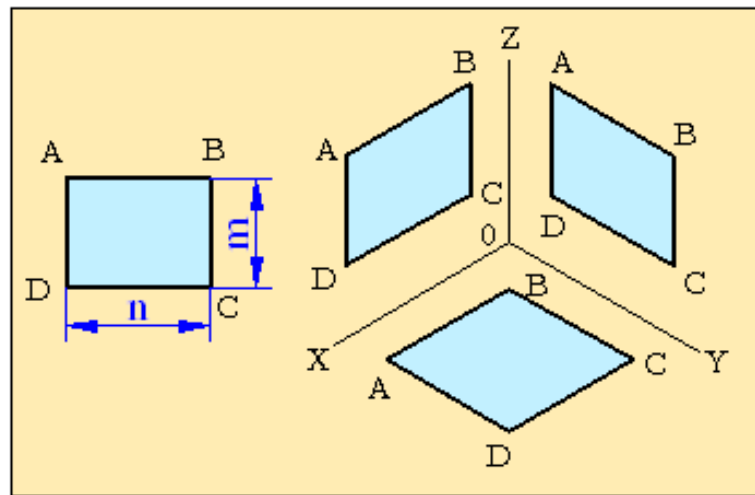
.4.1

(,). ,

, Y Z

.4.2

- 1. **Z**
- 2. **n,**
- 3. **m,**
- 4. **D**



.4.2

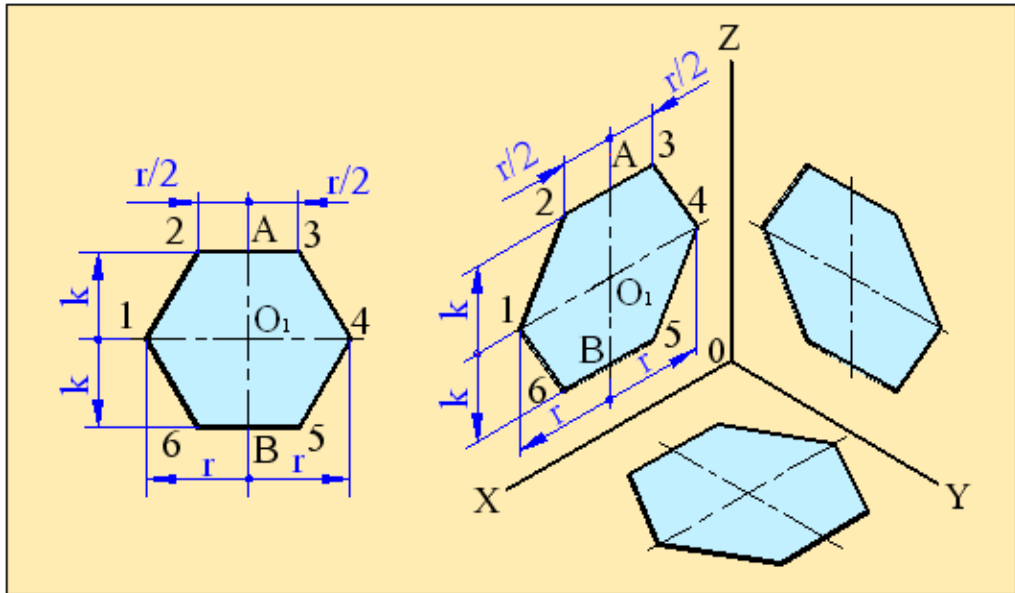
Y Z.

.4.3

r.

, Y Z.

1. Z , Z - 1.
 2. , , Z 1
 3. , $1\ 4$, r Z 1
 4. , k Z 1
- $r/2$ $2, 3, 5\ 6$



.4.3

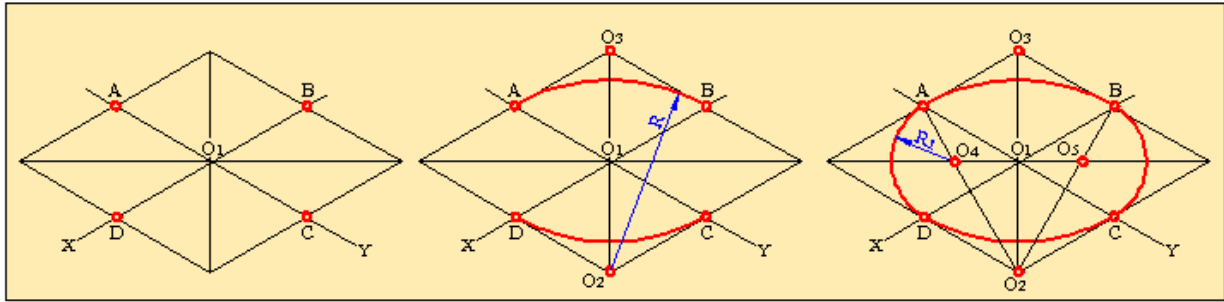
1,22D 0,71D (D -

).

1. $R = 1$ (.4.4,).
 D Y D

2. $R = 2$ (.4.4,).
 D $R = 3D$

3. $R_1 = 4$ (.4.4,).
 $R_1 = 5$



.4.4

Z

Y

(.4.5).

Z.

1.

Y

Y.

2.

n.

Y

3.

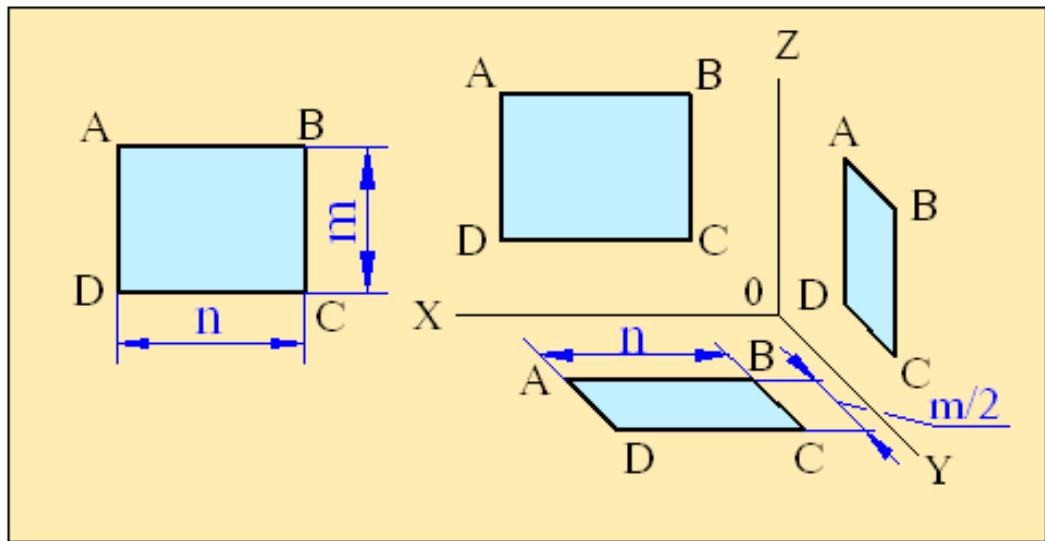
m/2.

4.

Y

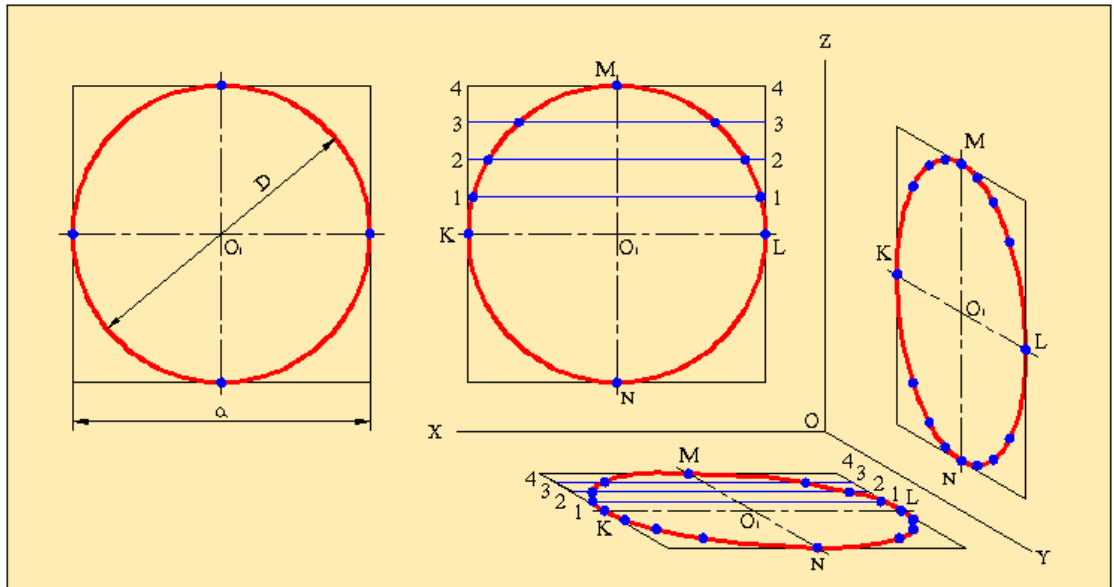
D.

D



.4.5

.4.6

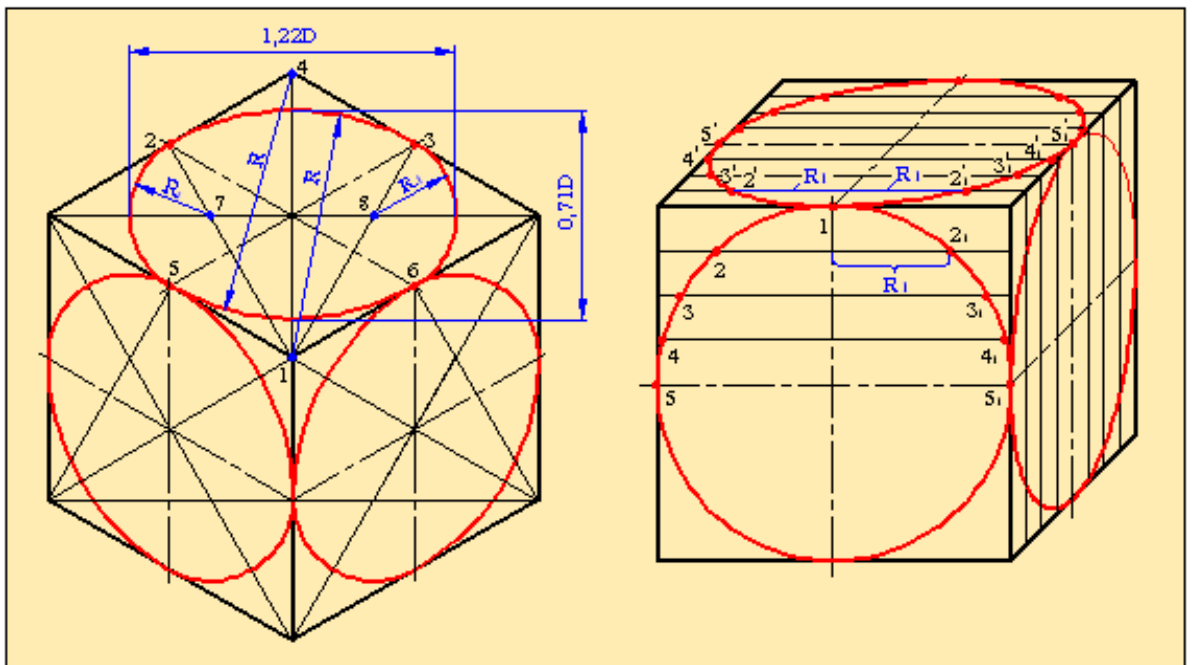


.4.6

1. **Y**
 2. , N, K L.
 3. 1
 4. 1
- L.**

5.

(.4.7).



.4.7

.4.8

.4.9.

1.

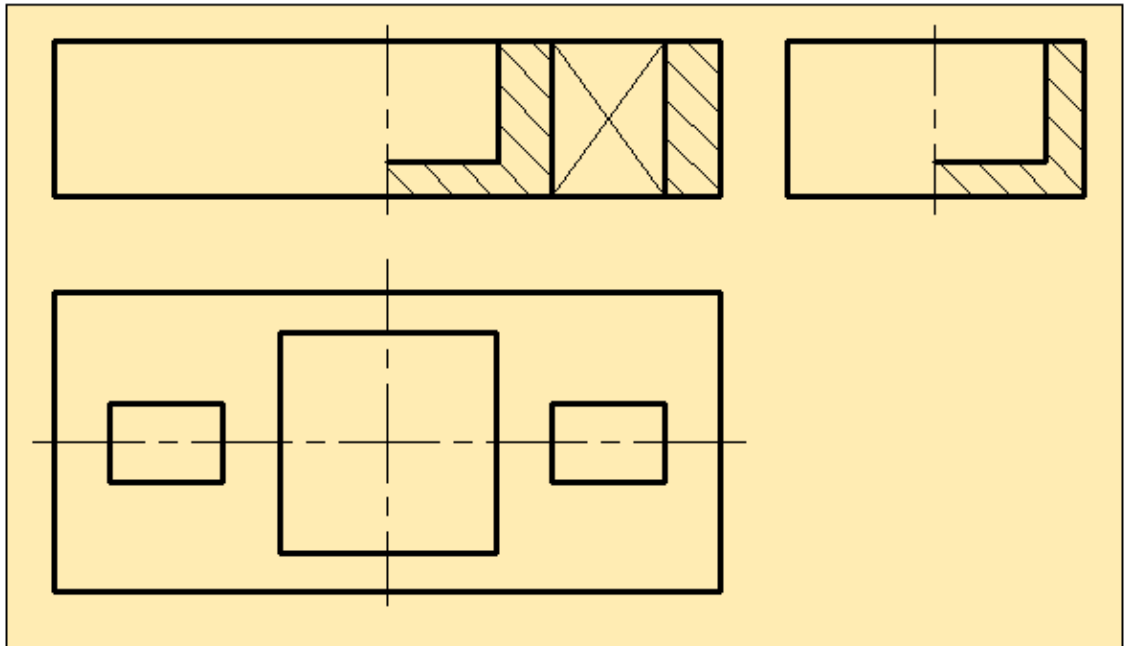
Z
Z Y

(.4.9,).

2.

Z

(
Y.

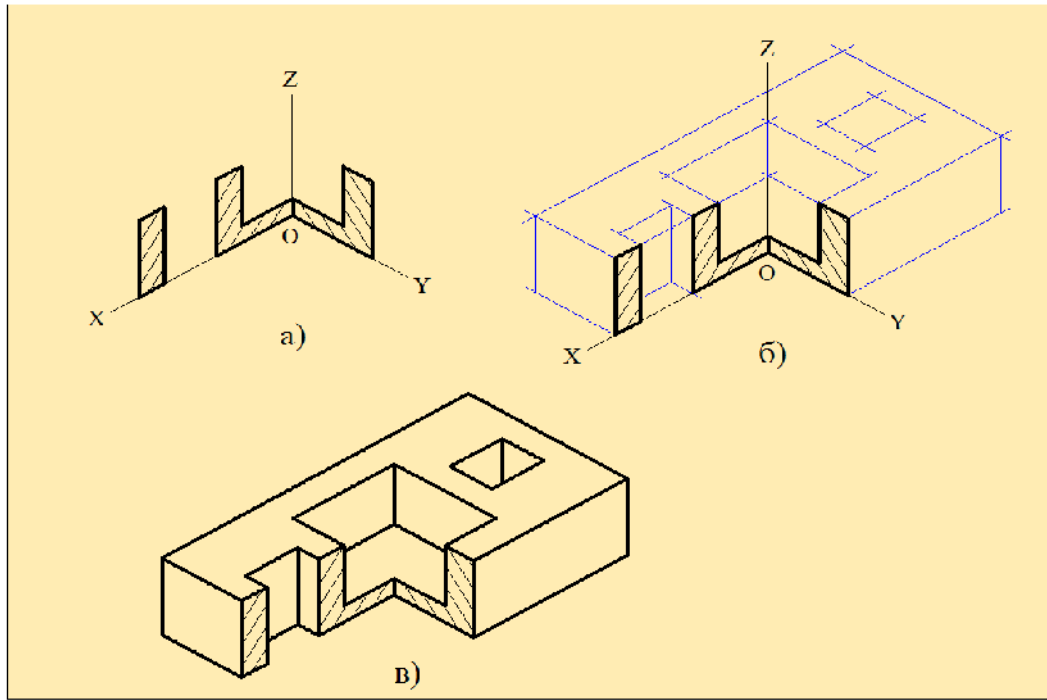


.4.8

3.

Z Y

(



.4.9

4.

5.

,

Y.

6.

,

(.4.9,).

7.

(.4.9,).

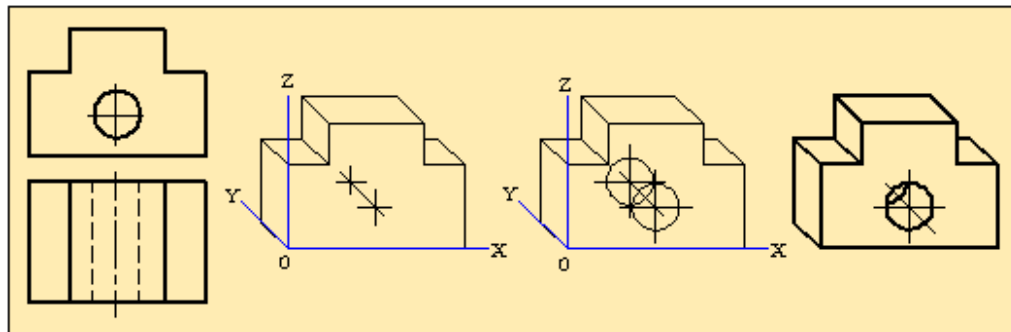
(.4.10).

1.

Z

2.

Y.



.4.10

3.
Z,
 4.

Y

5.

45°.

.4.11

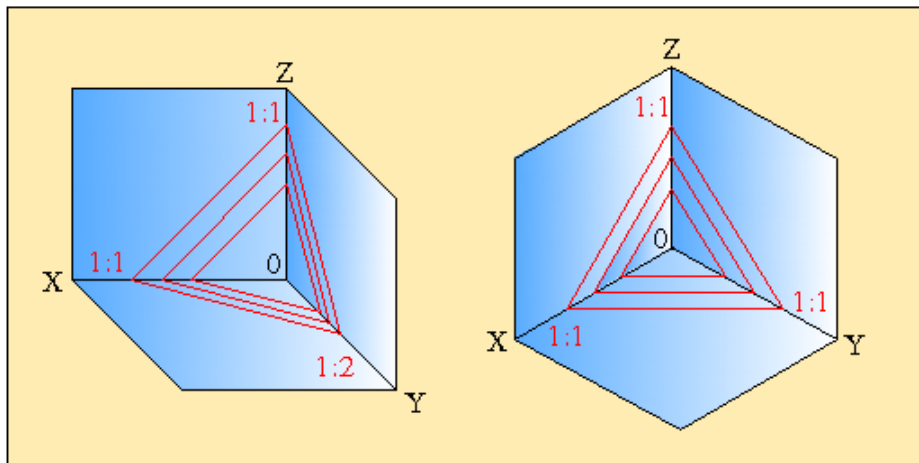
Y
Z

Y

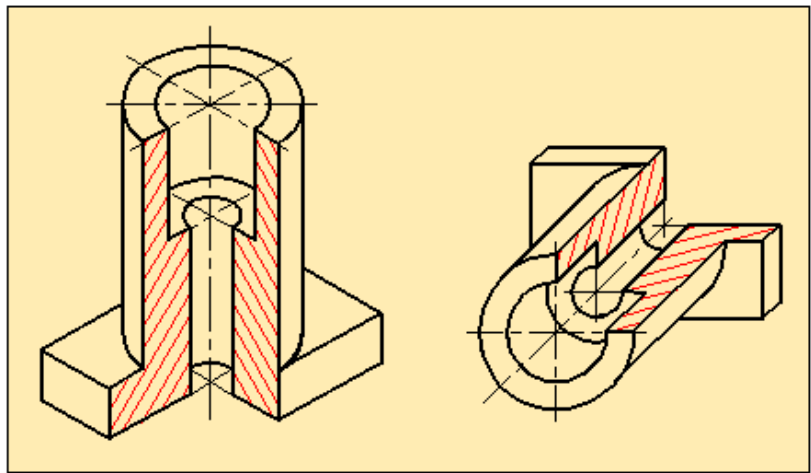
(.4.11,).

, **Y Z**

(.4.11,).



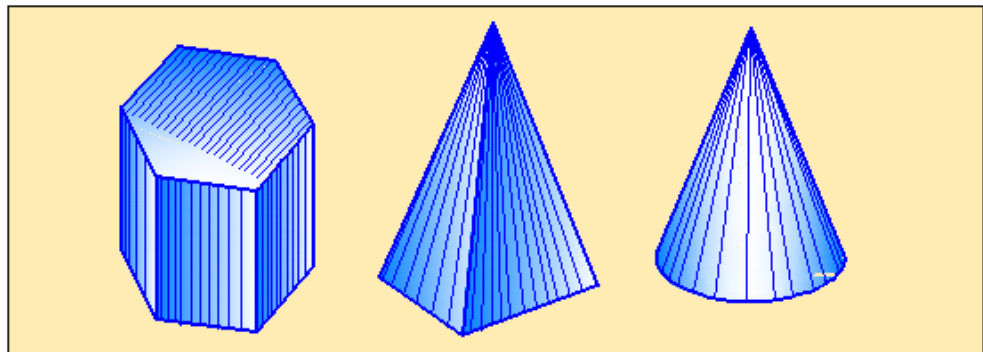
.4.11



.4.12

.4.12

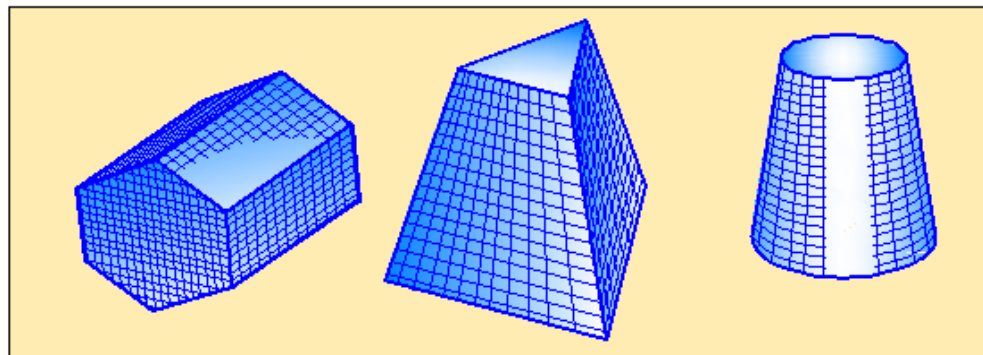
(.4.13).



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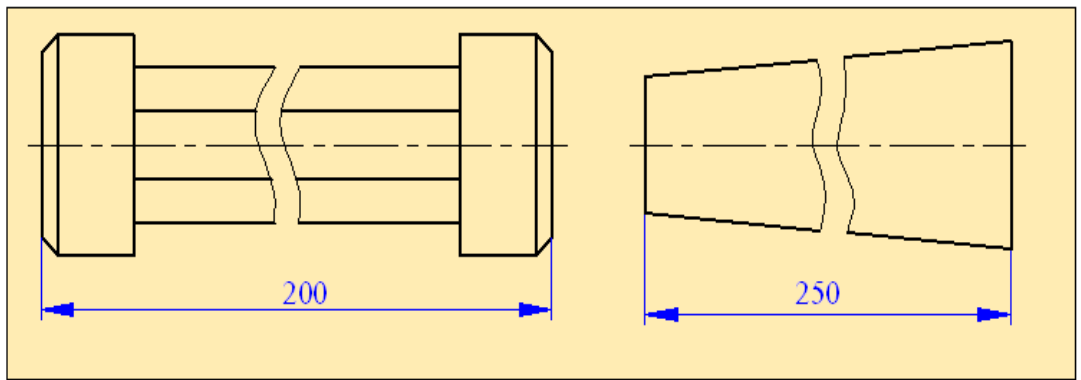
)

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.4.13

1. (.5.1,)
(.5.1,)



)

.5.1

)

2.

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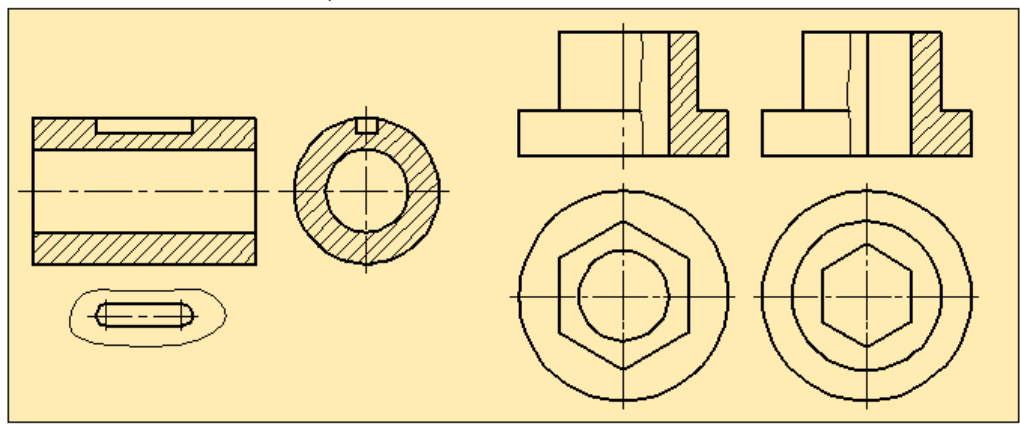
(.5.2).

4.

.5.3

()

8.



.5.7

.5.8

.5.7
)

(

9.

(.5.8).

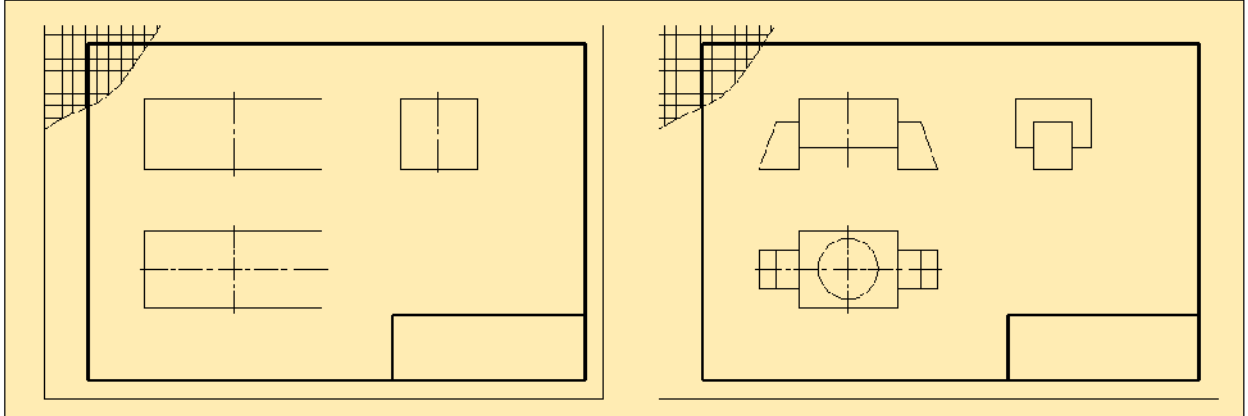
(.5.9):

1.

(.5.9,).

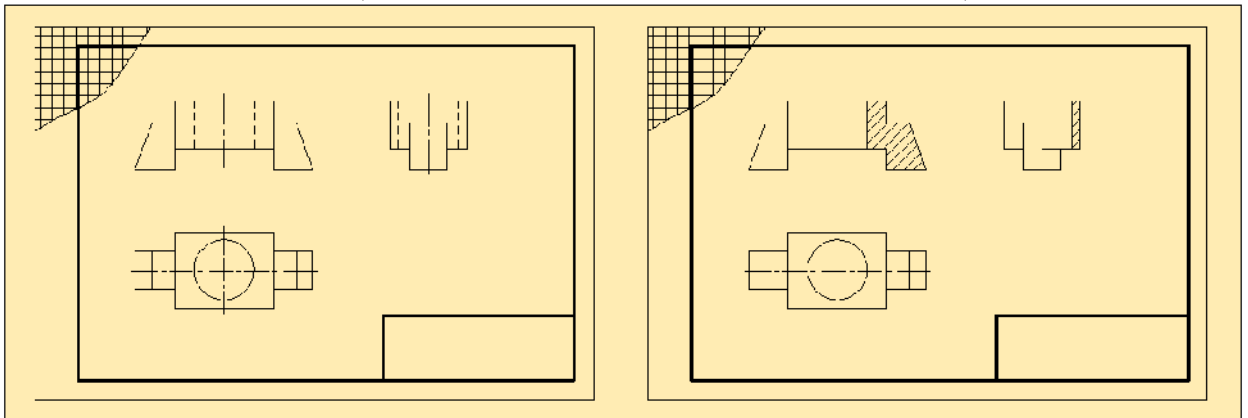
2.

(.5.9,).



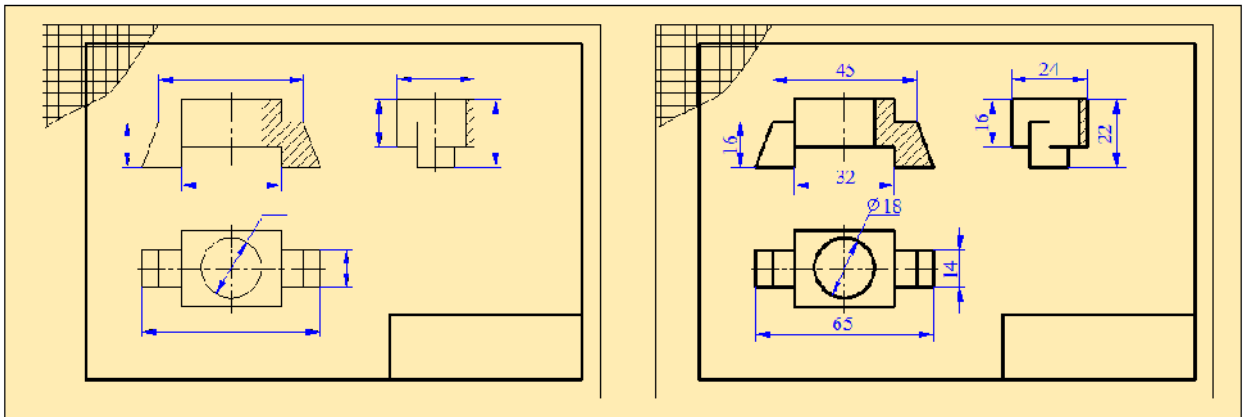
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.5.9

3.
(.5.9,).

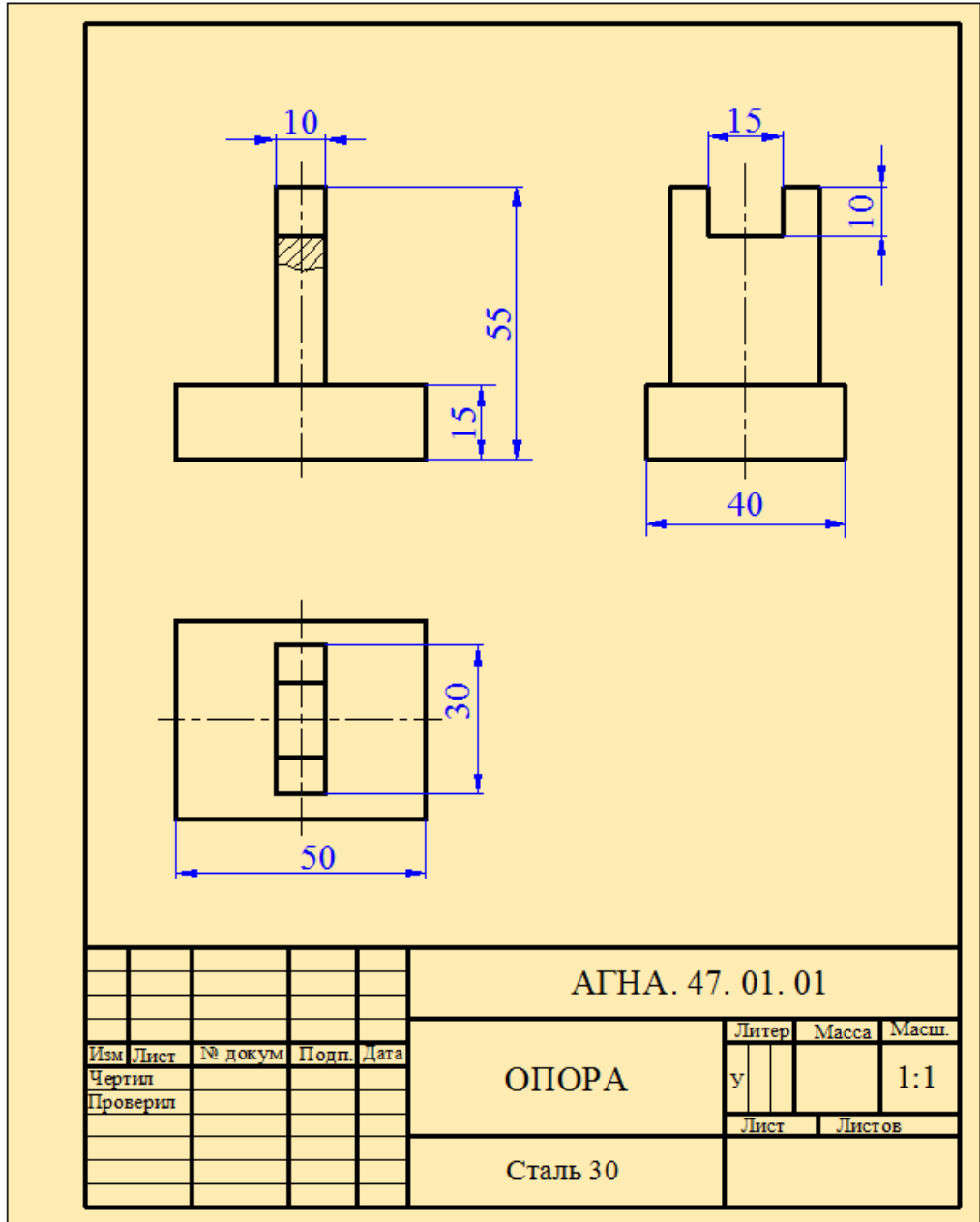
4.

(.5.9,).

5.
6.

(.5.9,).

(.5.9, e).



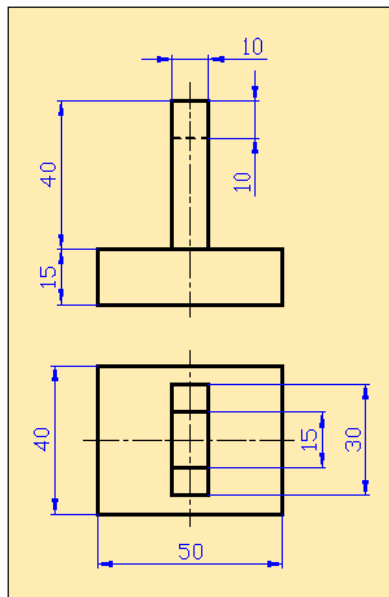
.5.10

(.5.10).

.5.11

(, , , , ,) .

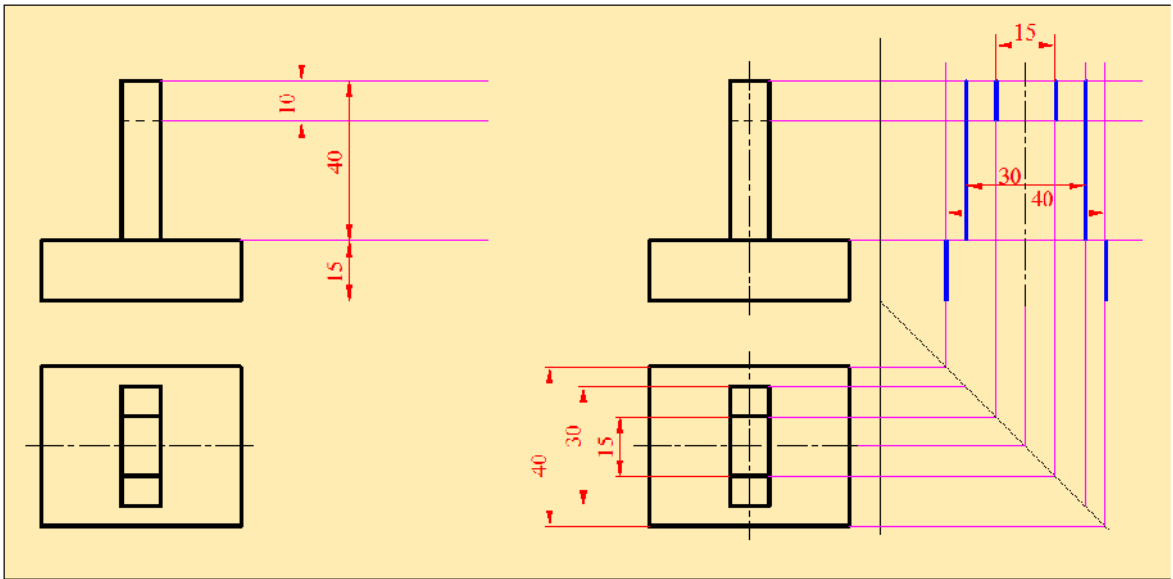
50 , 40 15 .
: 30 , 10 15 , 40 .



.5.11

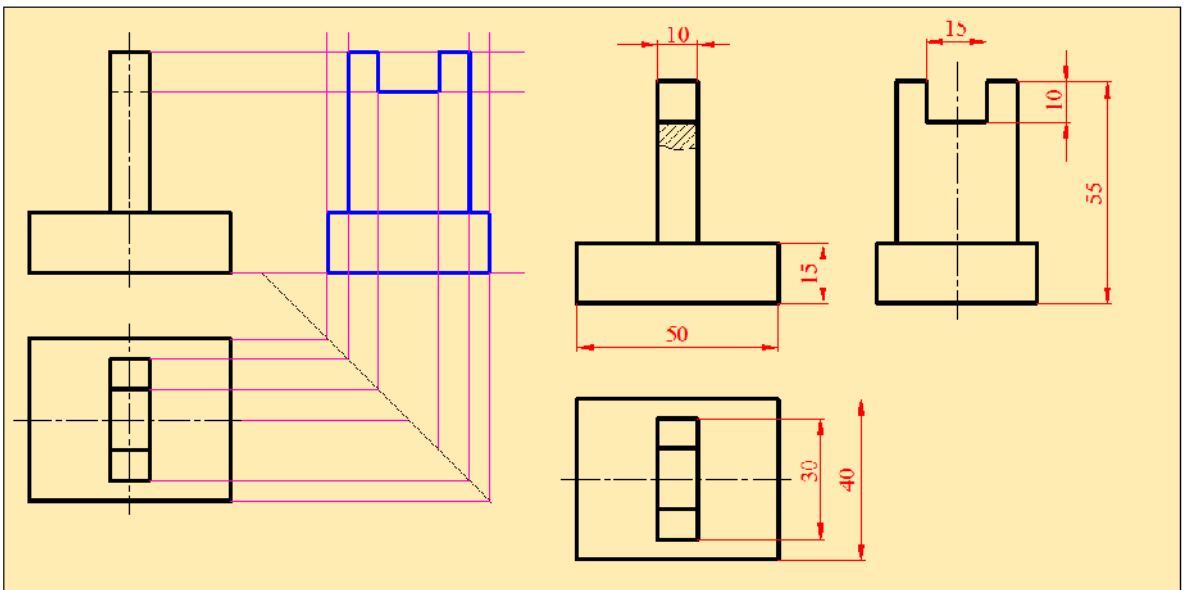
.5.12

1. ,
(.5.12,).



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)

)

.5.12

2.

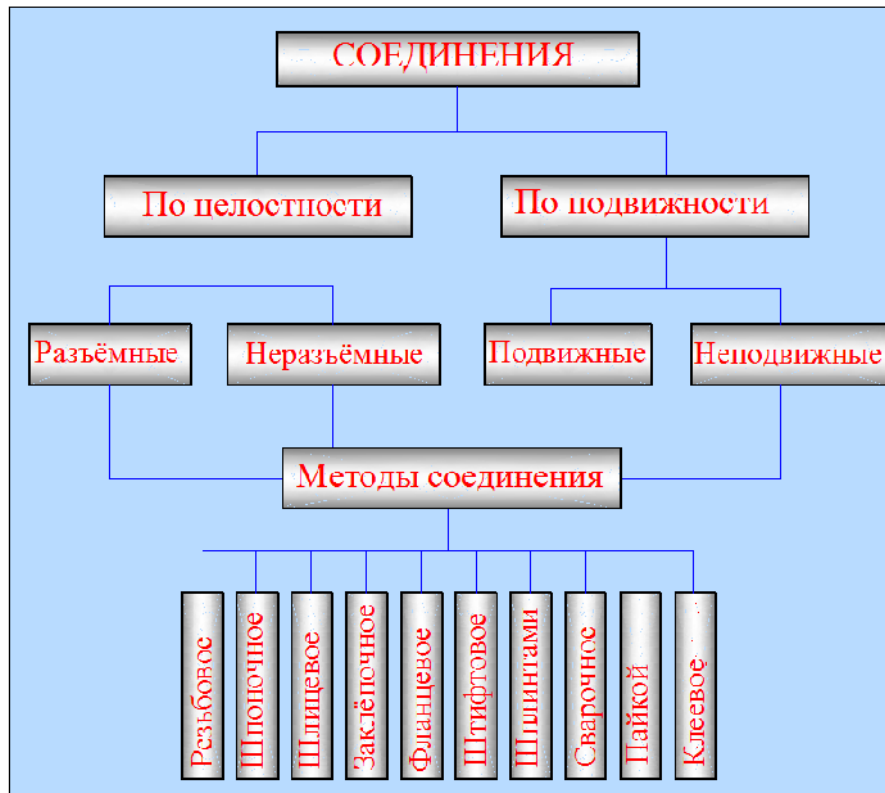
3.

(.5.12,).

4.

(.5.12,).

.6.1

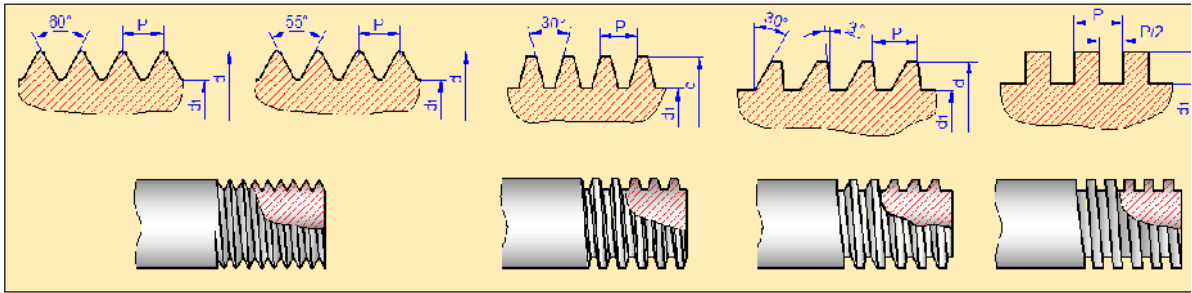


. 6.1

65-85%

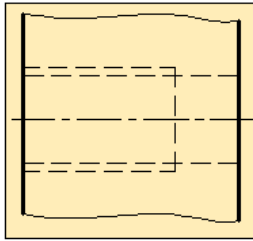
1. (,).
 2. (,).
 3. (,).
 4. (,).
 5. (,).
 6. (,).
- (d1) () (d) ().

6.2 - 30°, 60°, - 55°.

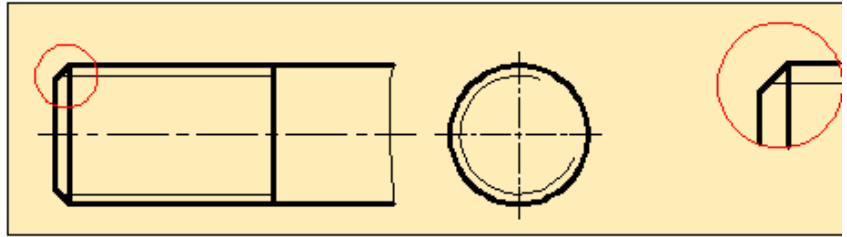


.6.2

(.6.6).



.6.5



.6.6

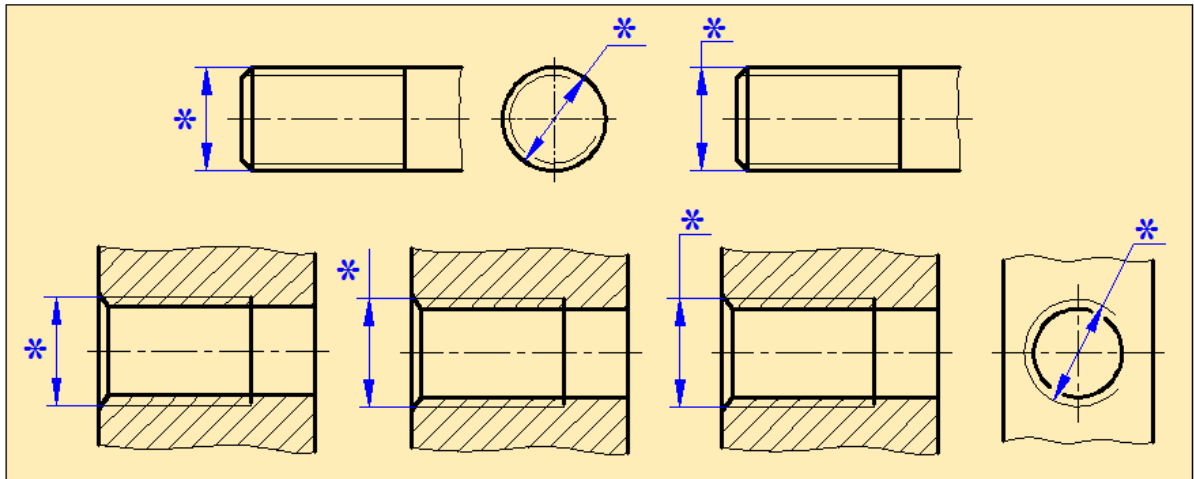
.6.7

40

1,5

40 1.5

(*)



.6.7

(.6.8).

$G\frac{3}{4}$
 $\frac{3}{4}$.1

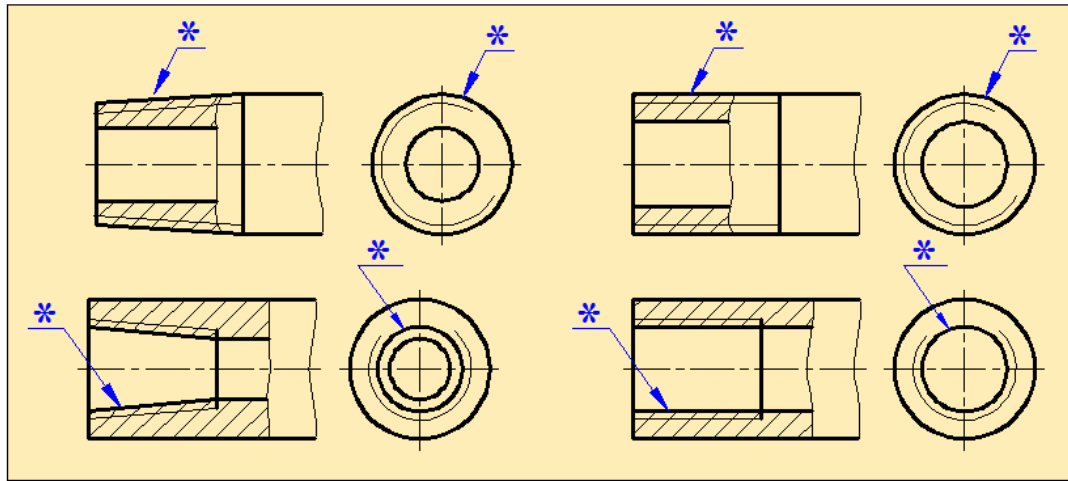
25,4

()

, $\frac{1}{2}$

$\frac{3}{4}$.

()



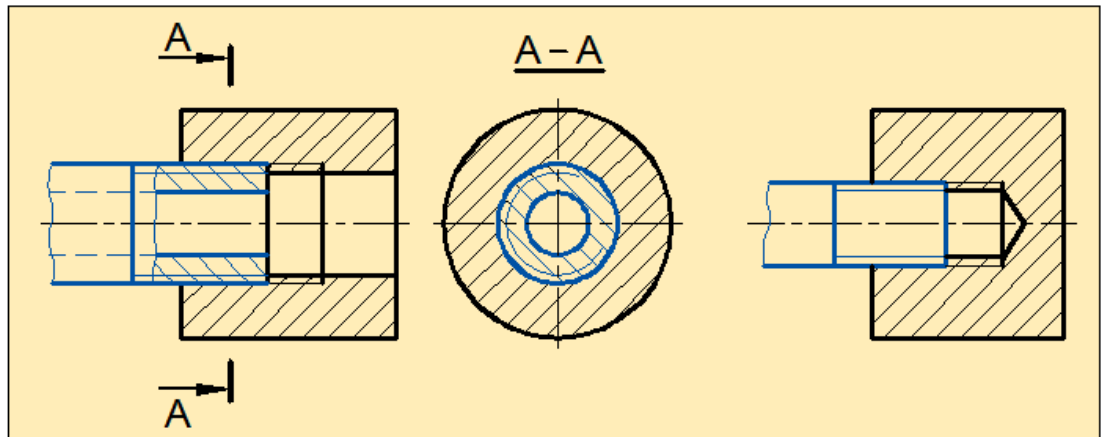
.6.8

6.1

6.1

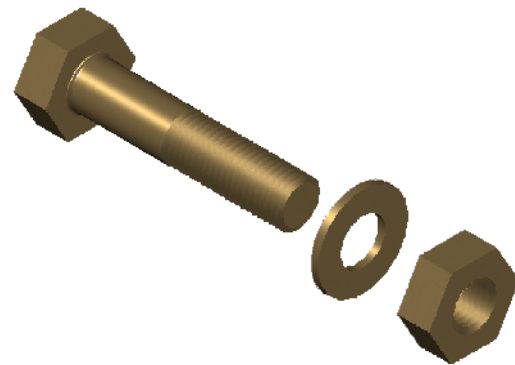
	42		42 1,5
	50 12		32 6
	3/4		1/2

(.6.9).



.6.9

(.6.10)



.6.10

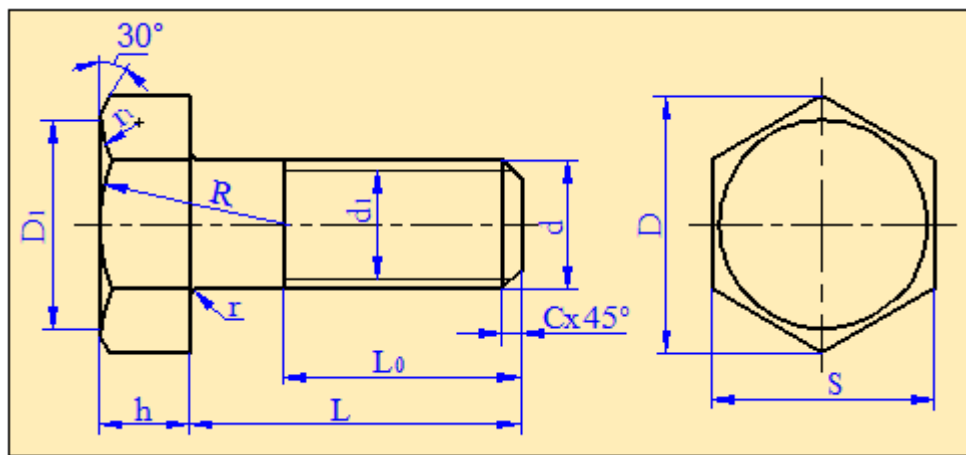
.6.2

6.2

Диаметр резьбы d , мм	8	10	12	16	20	30	42
Шаг резьбы P , мм	1,25	1,5	1,75	2	2,5	3,5	4,5
Размер под ключ S , мм	13	17	19	24	30	46	65
Диаметр головки болта D , мм	14,2	18,7	20,9	26,5	33,3	50,9	72,1
Высота головки болта h , мм	5,5	7	8	10	13	19	26

M 16 70 7798-70; 2 M 20 -1,5 70 7798-70.

.6.11

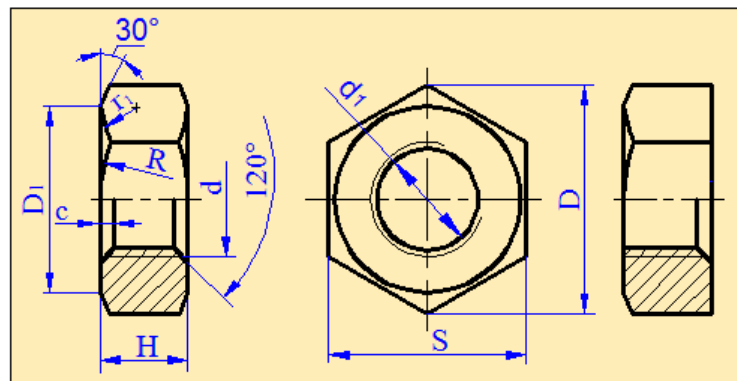


.6.11

$d_1 = 0,85d$;
 $r_0 = 2d + 6$; $r_1 = 0,15d$; $h = 0,7d$; $D = 2d$; $R = 1,5d$; $D_1 = 0,9$; $r = 1 \dots 3$;

2 -

(.6.12).



.6.12

.6.3

Номинальный диаметр резьбы d, мм	Шаг резьбы P, мм		S	D	H
	Крупный	Мелкий			
6	1	-	10	10,9	5
8	1,25	1	13	14,2	6,5
10	1,5	1,25	17	18,7	8
12	1,75	1,25	19	20,9	10
14	2	1,5	22	24,3	11
16	2	1,5	24	26,5	13
18	2,5	1,5	27	29,9	15
20	2,5	1,5	30	33,3	16

$$D_1 = (0,9 \div 0,95) S; \quad H = 0,8 d; \quad C = 0,15d; \quad R = 1,5d \quad d_1 = 0,85 d.$$

(1), , 16 (5915-70;), 2 20 1,25 5915-70.

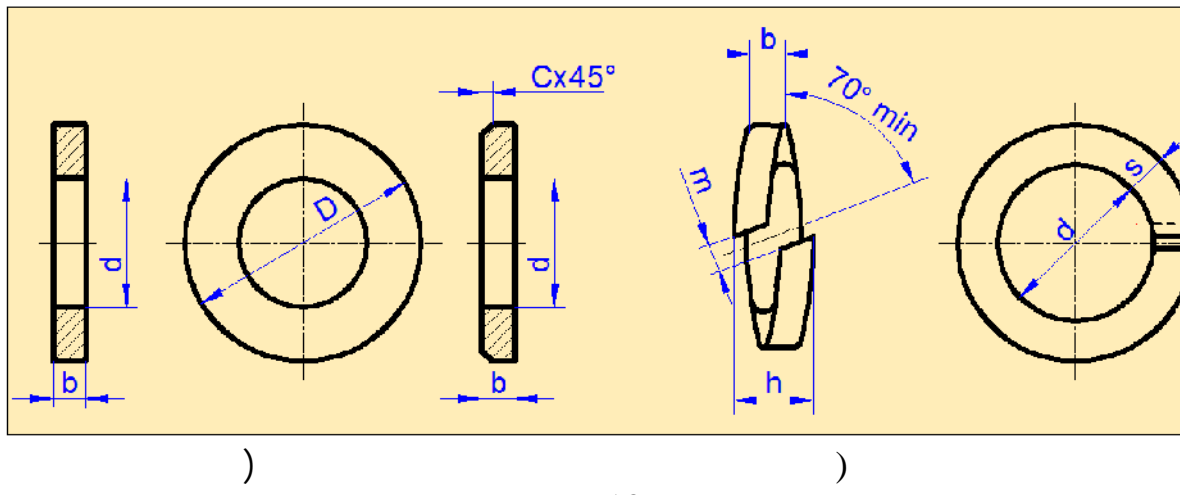
2 – (.6.13,).

(.6.13,).

$$D = 2,2 d$$

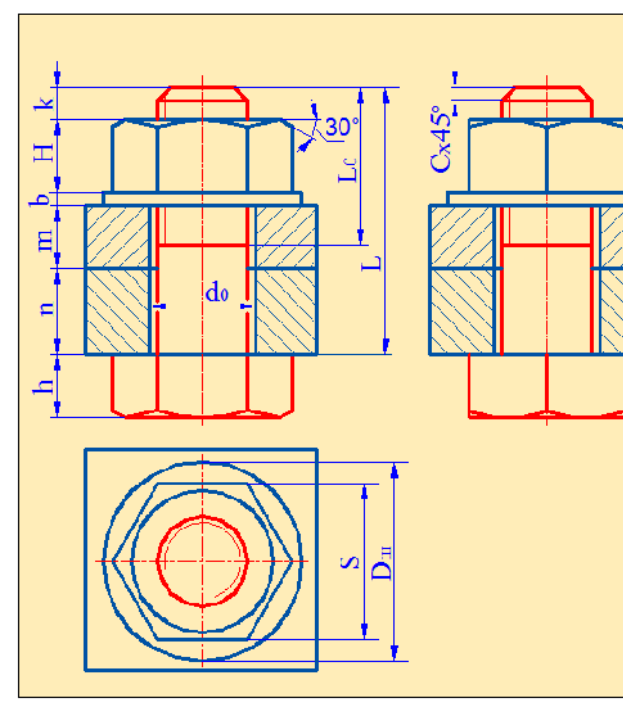
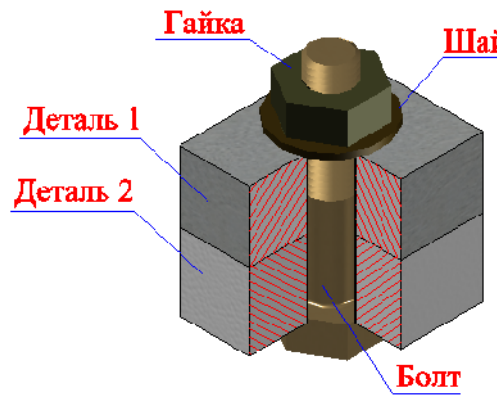
$$d = 1,1d.$$

$$b = 0,15 d; \quad (d)$$



.6.13

11371-78; 2.12 11371-78. 12

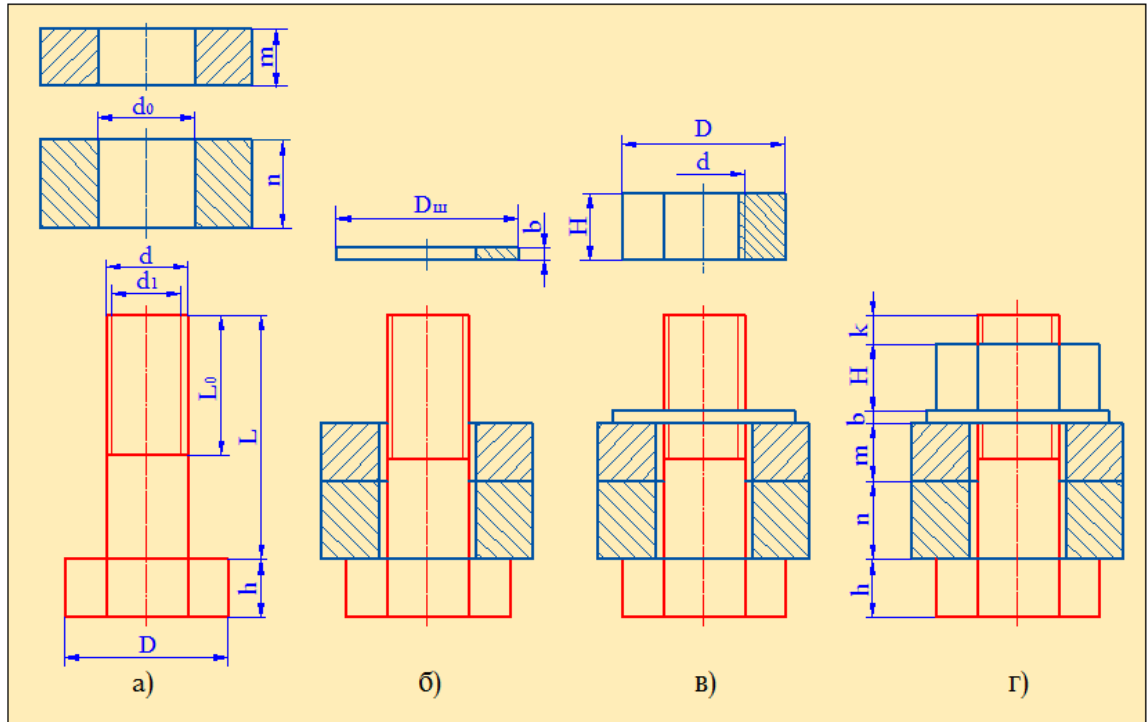


.6.14

()

2 ,

.6.15



.6.15

d0

(.6.15,)

(.6.15,)

(.6.15,)

.6.15,

= (0,25...0,5) d.

6.4
20

Диаметр описанной вокруг шестиугольника окружности	$D = 2d = 2 \cdot 20 = 40 \text{ мм}$
Высота головки болта	$h = 0,7d = 0,7 \cdot 20 = 14 \text{ мм}$
Длина резьбовой части болта	$L_0 = 2d + 6 = 2 \cdot 20 + 6 = 46 \text{ мм}$
Высота гайки	$H = 0,8d = 0,8 \cdot 20 = 16 \text{ мм}$
Наружный диаметр шайбы	$D_{ш} = 2,2d = 2,2 \cdot 20 = 44 \text{ мм}$
Высота шайбы	$b = 0,15d = 0,15 \cdot 20 = 3 \text{ мм}$
Диаметр отверстия под болт в деталях	$d_0 = 1,1d = 1,1 \cdot 20 = 22 \text{ мм}$
Внутренний диаметр шайбы	$D_0 = 1,1d = 1,1 \cdot 20 = 22 \text{ мм}$
Выход стержня болта за пределы гайки	$k = 0,3d = 0,3 \cdot 20 = 6 \text{ мм}$

.6.4

20 .

= 12

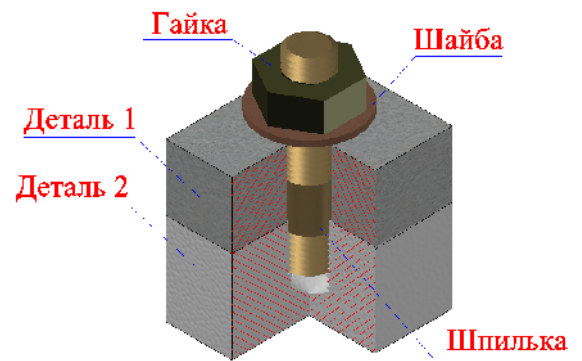
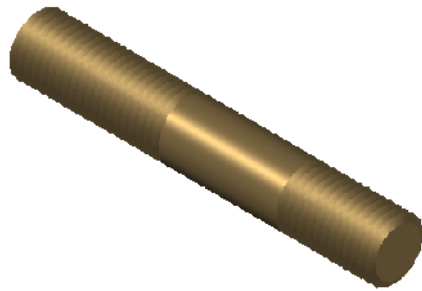
= 17 ,

$$L = + + + + = 12 + 17 + 3 + 16 + 6 = 54 .$$

$$L = 55$$

.6.16,

.6.16,



.6.16

22032-76 : (10 70), 22032-76; 10 1,25 70

.6.17

(.6.17,)

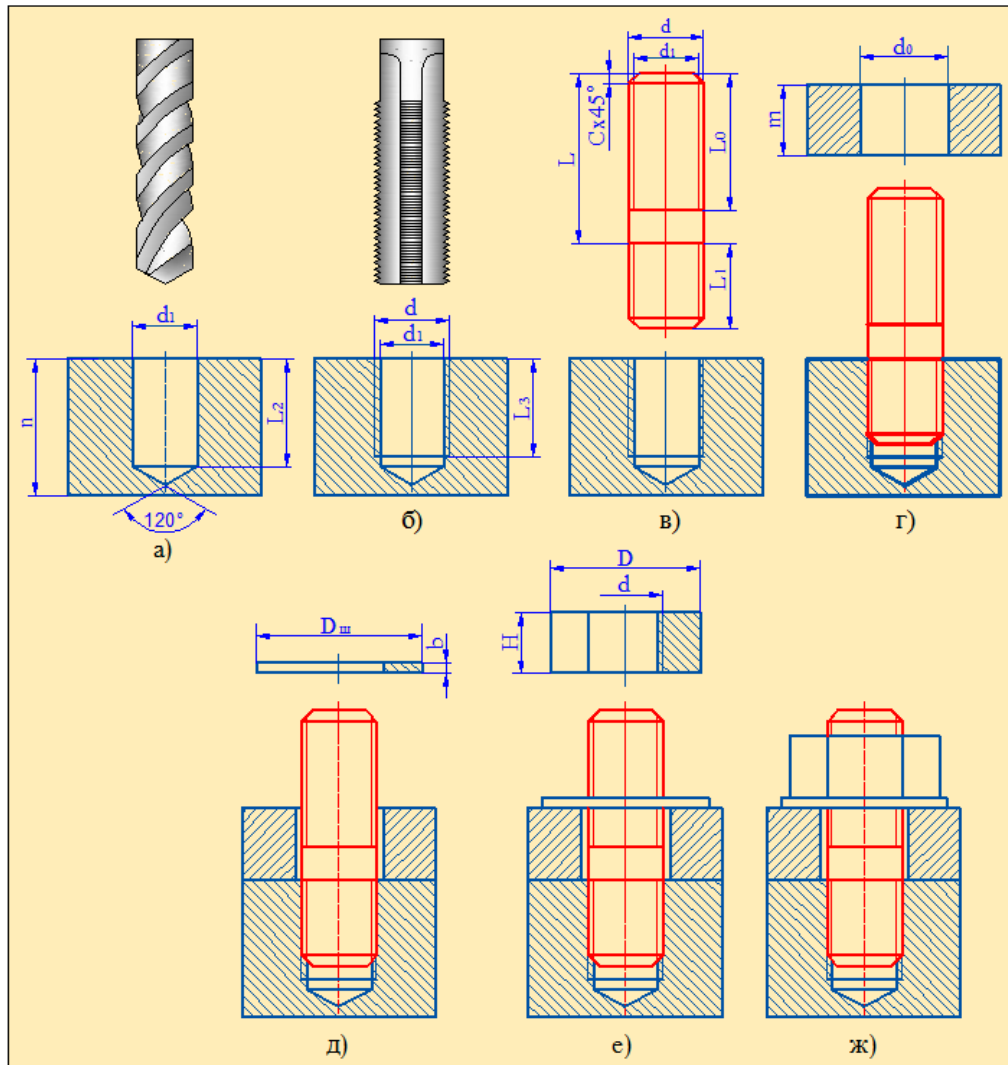
$$_1 = 0,85 ,$$

$$_2 = _1 + 0,5d. 120^\circ.$$

— (.6.17,).

$$_3 = _1 + 2 ,$$

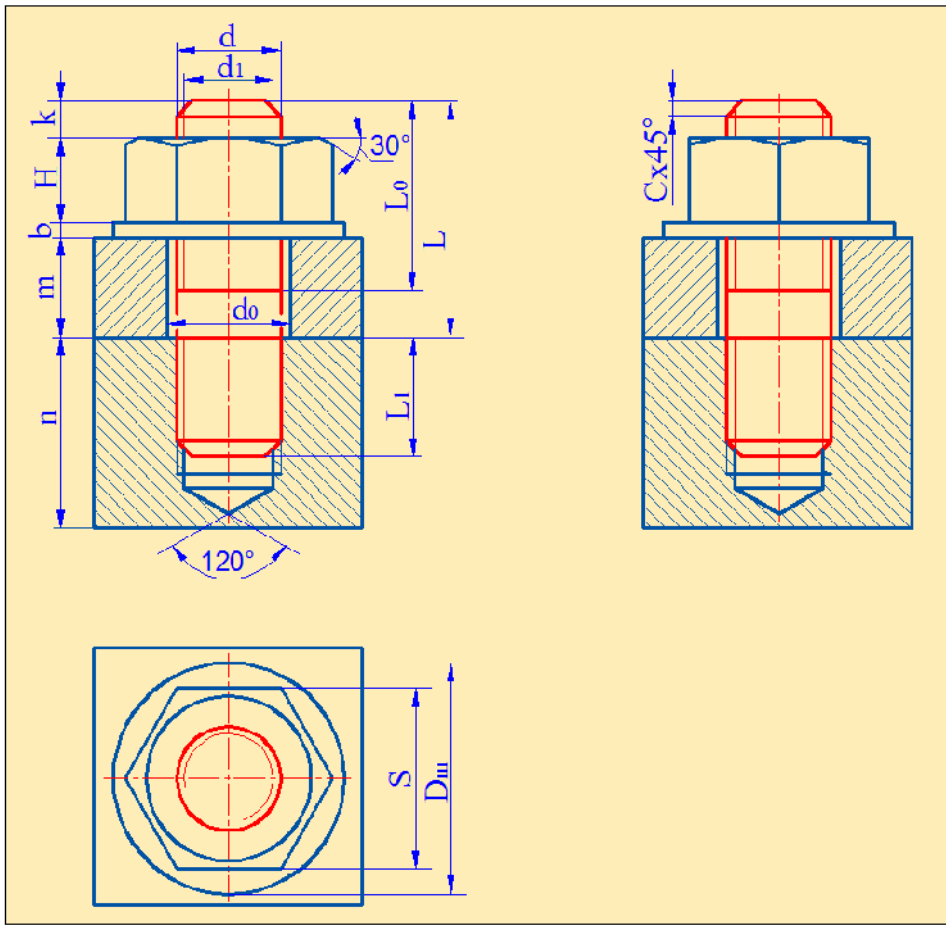
(.6.17, ,).



.6.17

$\alpha_0 = 1 + (1 \dots 2)$.
 (.6.17, , ,).

$\alpha_1 = 1,6$,
 $\alpha_1 = 2,5$.
 $\alpha = 0,15$ - ; $\alpha = 0,85$ -
 $\alpha = (0,25 \dots 0,5)$ -
 .6.18



.6.18

—) () ()

(.6.19,), (.6.19,),
(.6.19,)

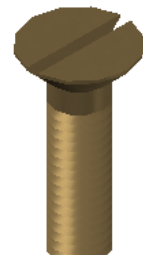


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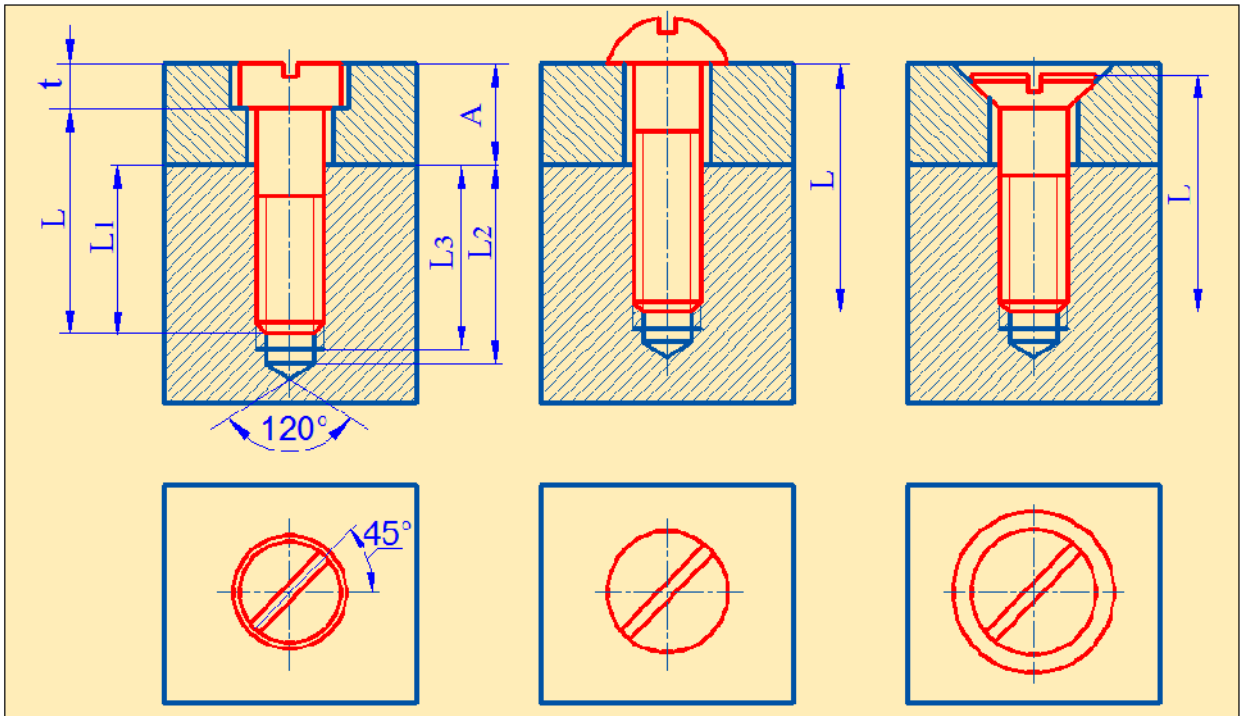
)

.6.19



)

6.20



)

)

)

.6.20

$$L_2 = L_1 + 6d;$$

$$L_1 = (1...2) d.$$

$$L_3 = L_1 + 2P$$

45°

(.6.20).

(

1

: 10 50
10 1491-80.
1491-80.

10 50
10

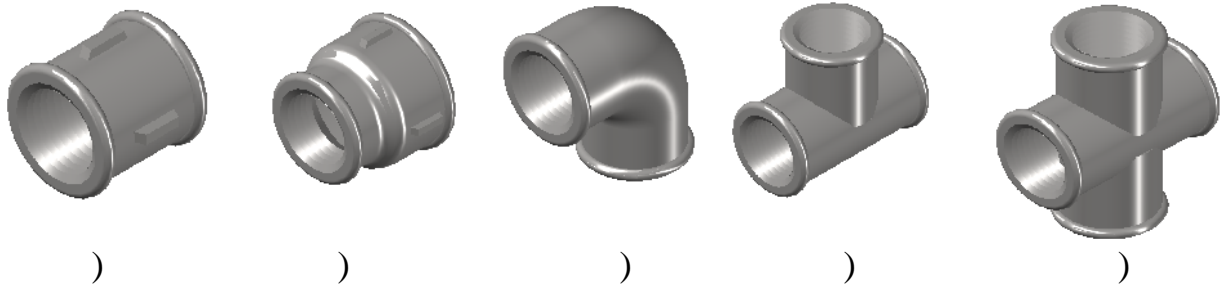
1491-80.
50

(.6.21,), (.6.21,), (.6.21,), (.6.21,).

6.21,).

– (.6.21,)

(.



)

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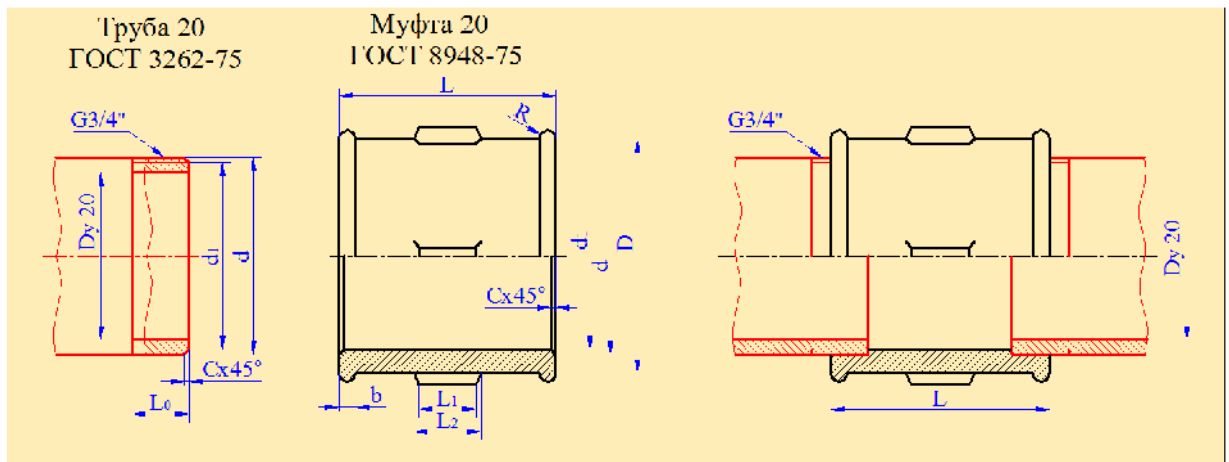
)

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.6.21

D,

2...4 ,



. 6.22

20

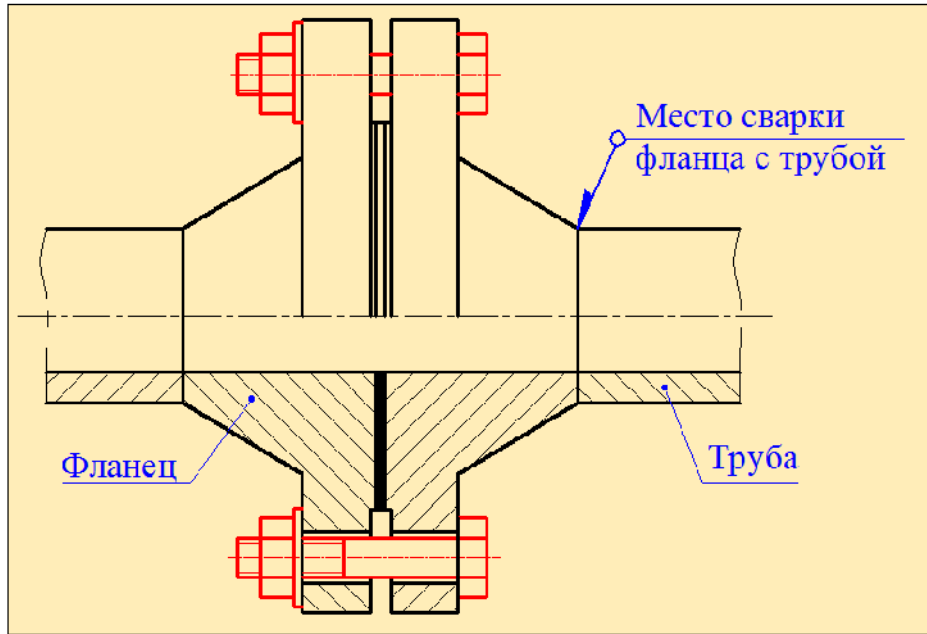
8948 – 75.

.6.22

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(.6.23).



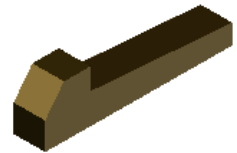
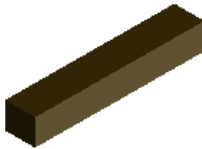
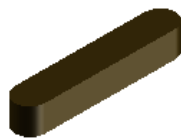
.6.23

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(.6.24,)

(.6.24,).

(.6.24,),



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.6.24

h

b)

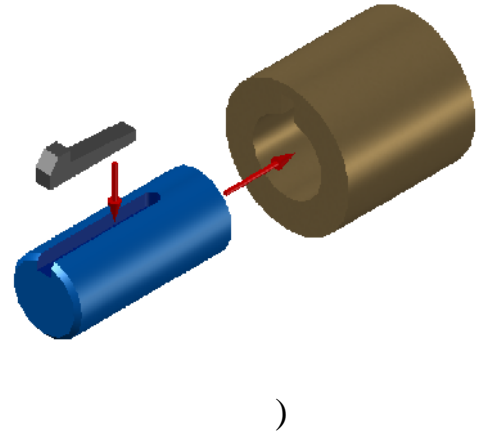
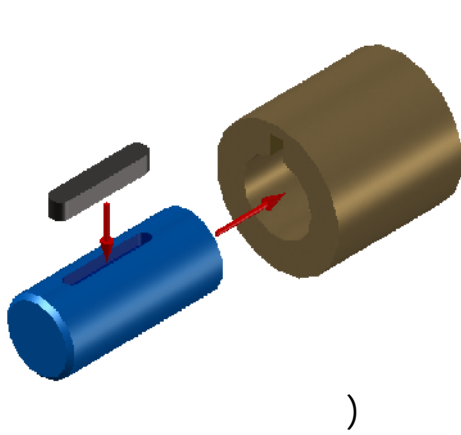
(

.6.25

6.25,)

(.6.25,)

(.



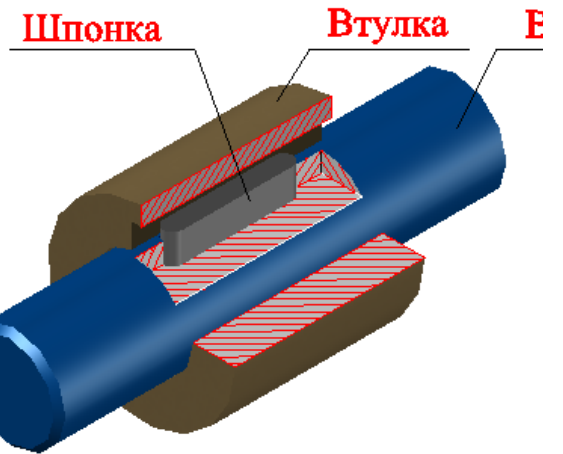
.6.26

.6.25

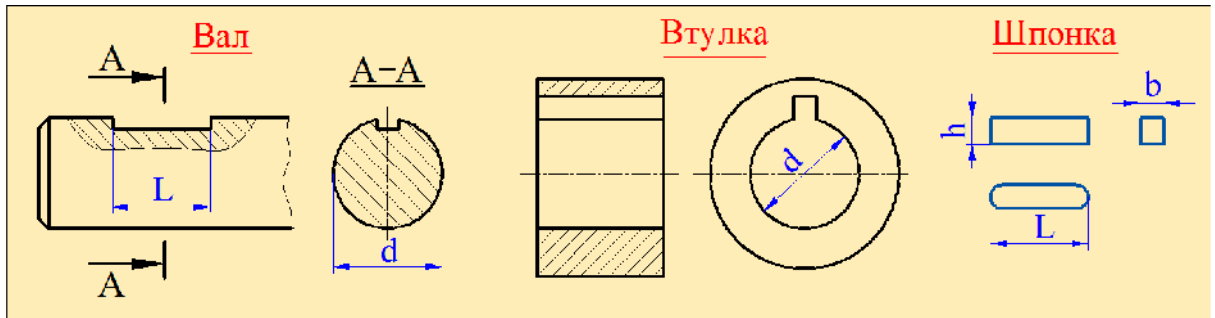
.6.27

(.6.27,)

(.6.27,)
(.6.27,)

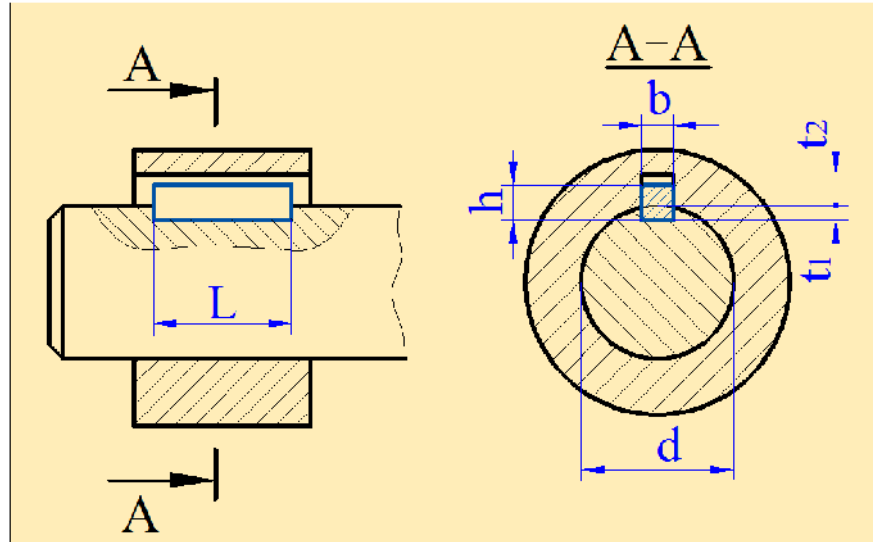


6.26



6.27

.6.28.

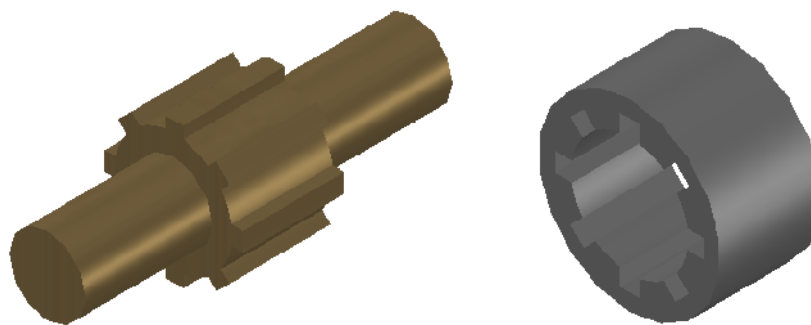


.6.28

b x h,

L

« 10 8 50 23360-78»
10 , 8 50



.6.29

.6.29

(.6.30,),

(.6.30,)

(. 6.30,).

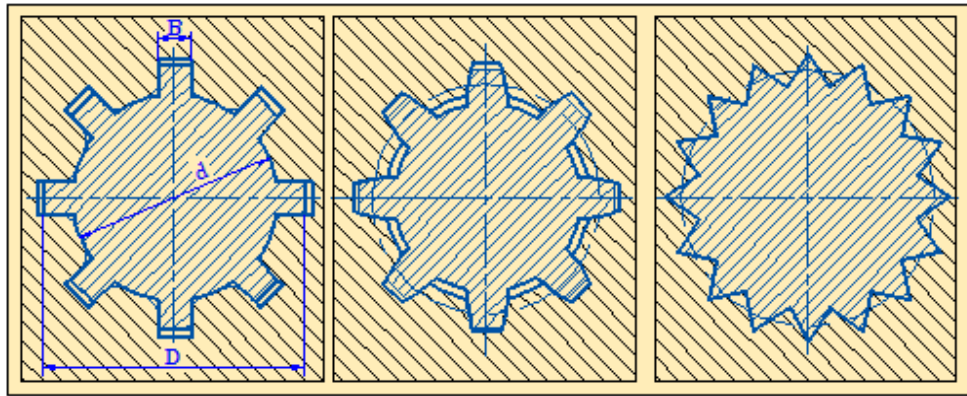
6, 8, 10, 16 20.

Z,

d,

D

b.



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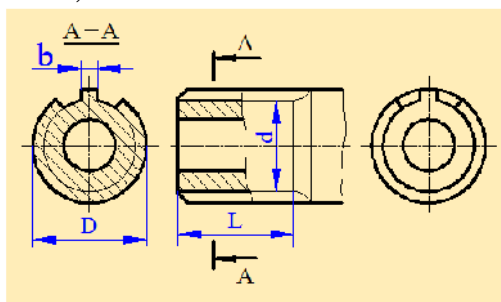
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.6.30

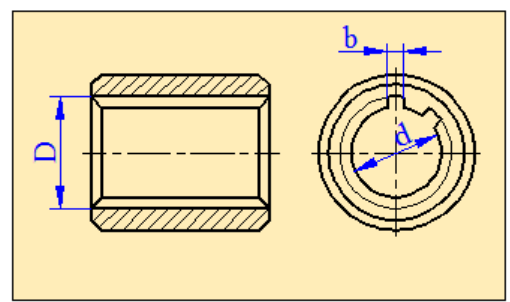
6.32

. 6.31

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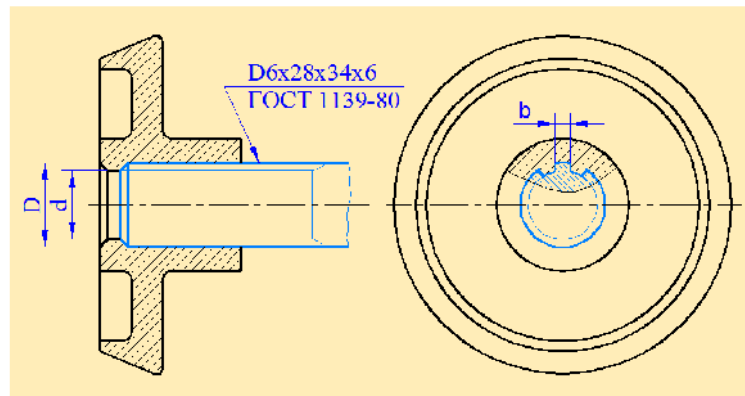


.6.31



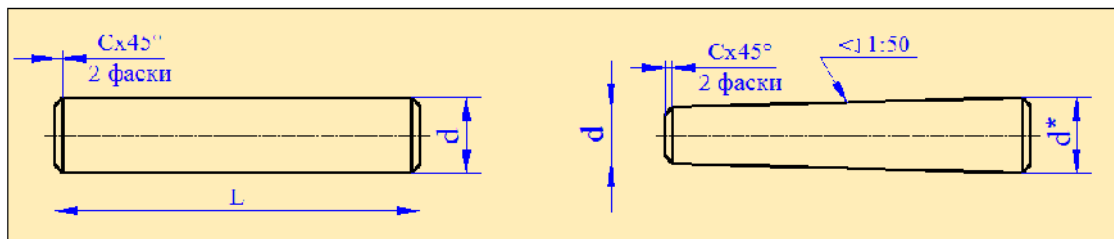
.6.32

(-),

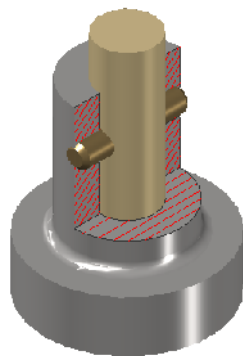


.6.33

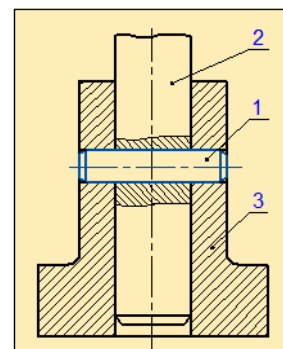
(.6.34).



.6.34

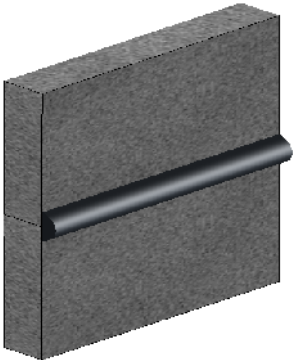
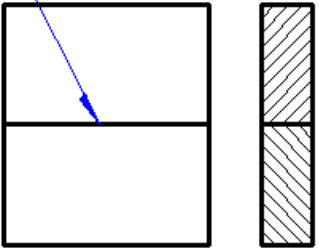
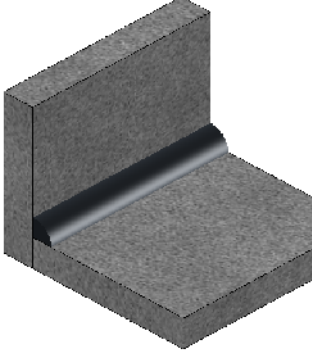
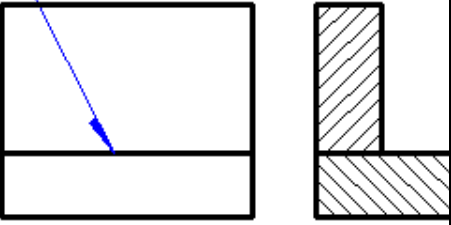
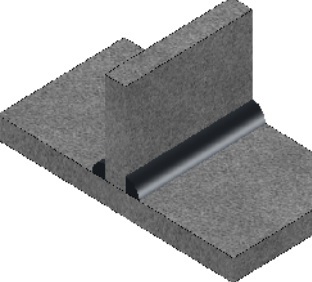
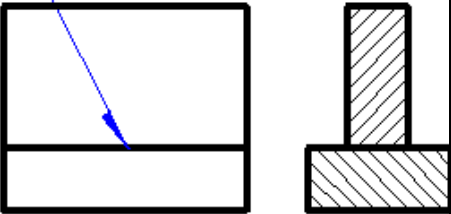
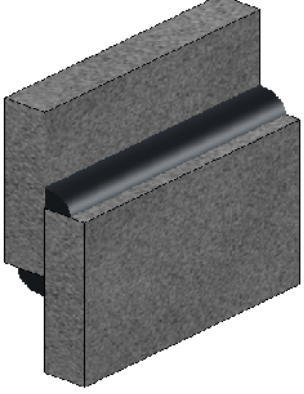
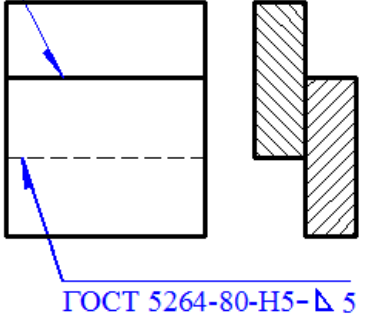


a)



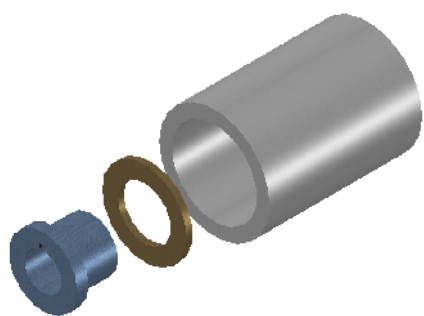
)

.6.35

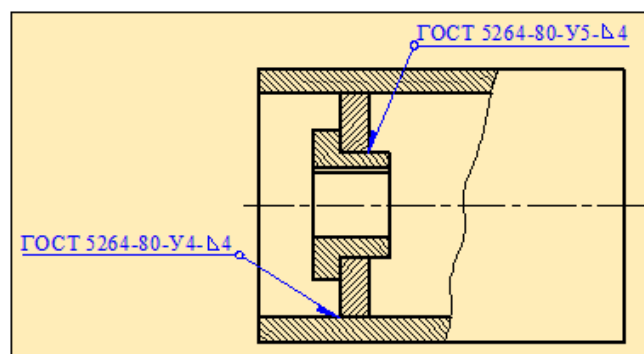
		<p>ГОСТ 5264-80-C6-Δ 5</p> 
		<p>ГОСТ 5264-80-Y5- Δ 5</p> 
		<p>ГОСТ 5264-80-T5- Δ 5</p> 
		<p>ГОСТ 5264-80-H5-Δ 5</p>  <p>ГОСТ 5264-80-H5-Δ 5</p>

.6.36,

.6.36,

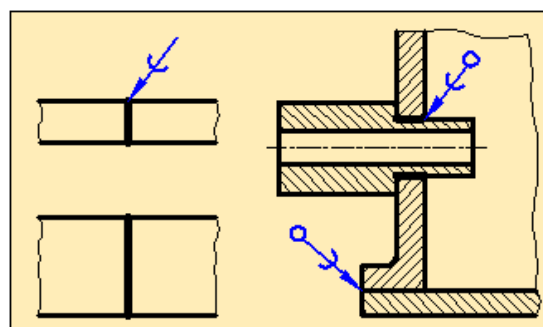


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.6.36



.6.37

"C",

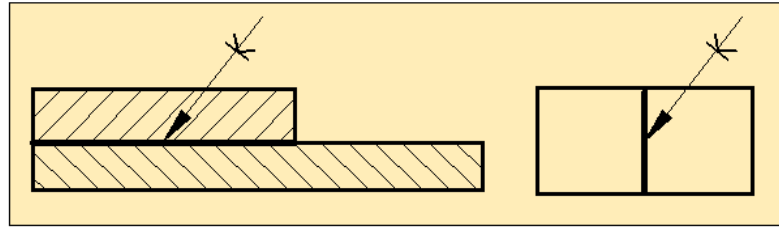
3...4 (.6.37).

"

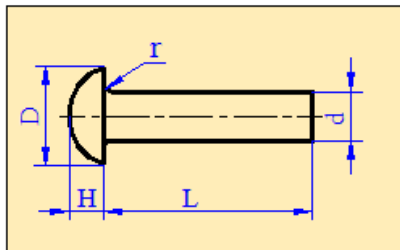
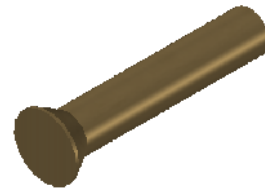
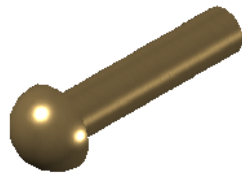
"

"K".

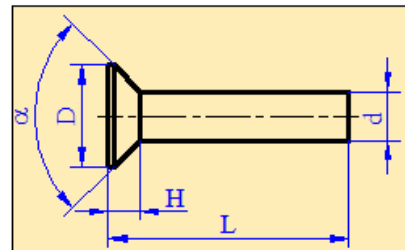
6.38).



.6.38



)



)

.6.39

(.6.39,)

(.6.39,)

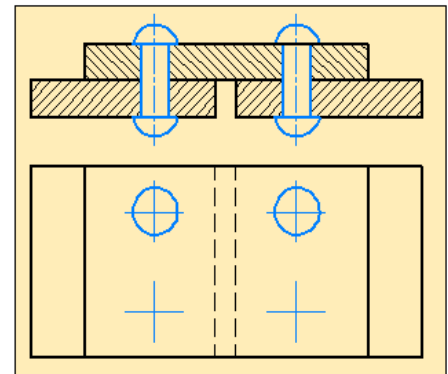
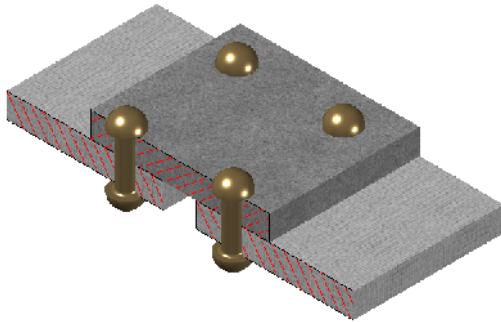
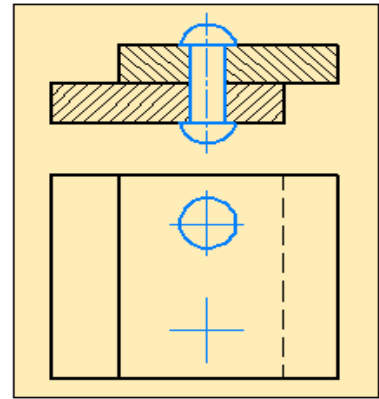
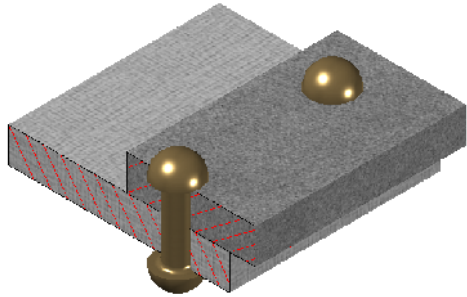
: $L = m + n + 1,5d$, m, n –

; $1,5 d$

.6.6

6.6

Диаметр заклёпки d, мм	8	10	13	16	19	22	25	28	31	34	37
Диаметр отверстия под заклёпку d ₀ , мм	9	11	14	17	20	23	26	29	32	35	38



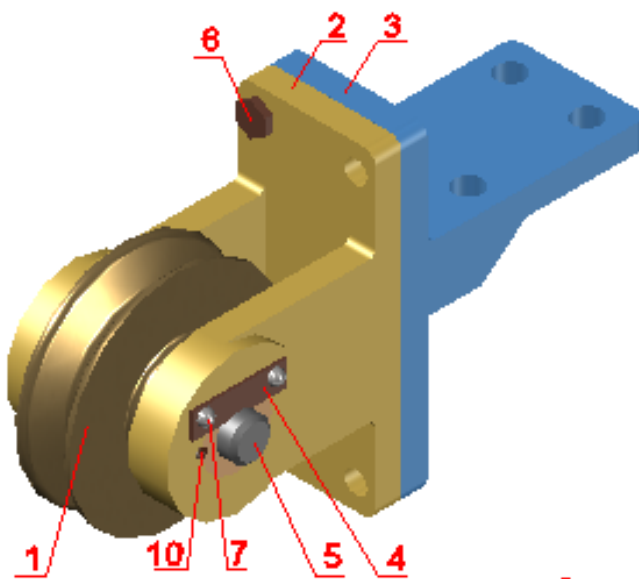
)
.6.40

6.40,)

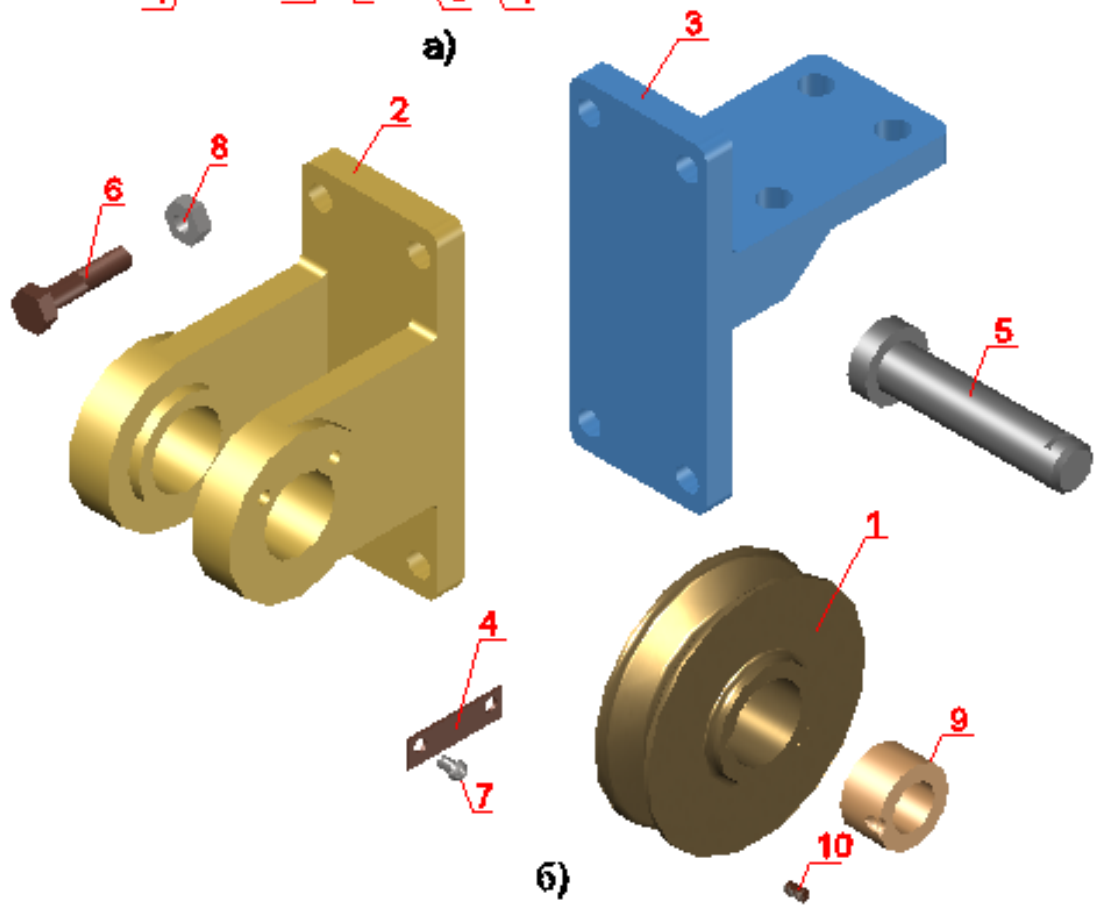
(.6.40,).

8 20
8 ,

10299-68 -
20 .



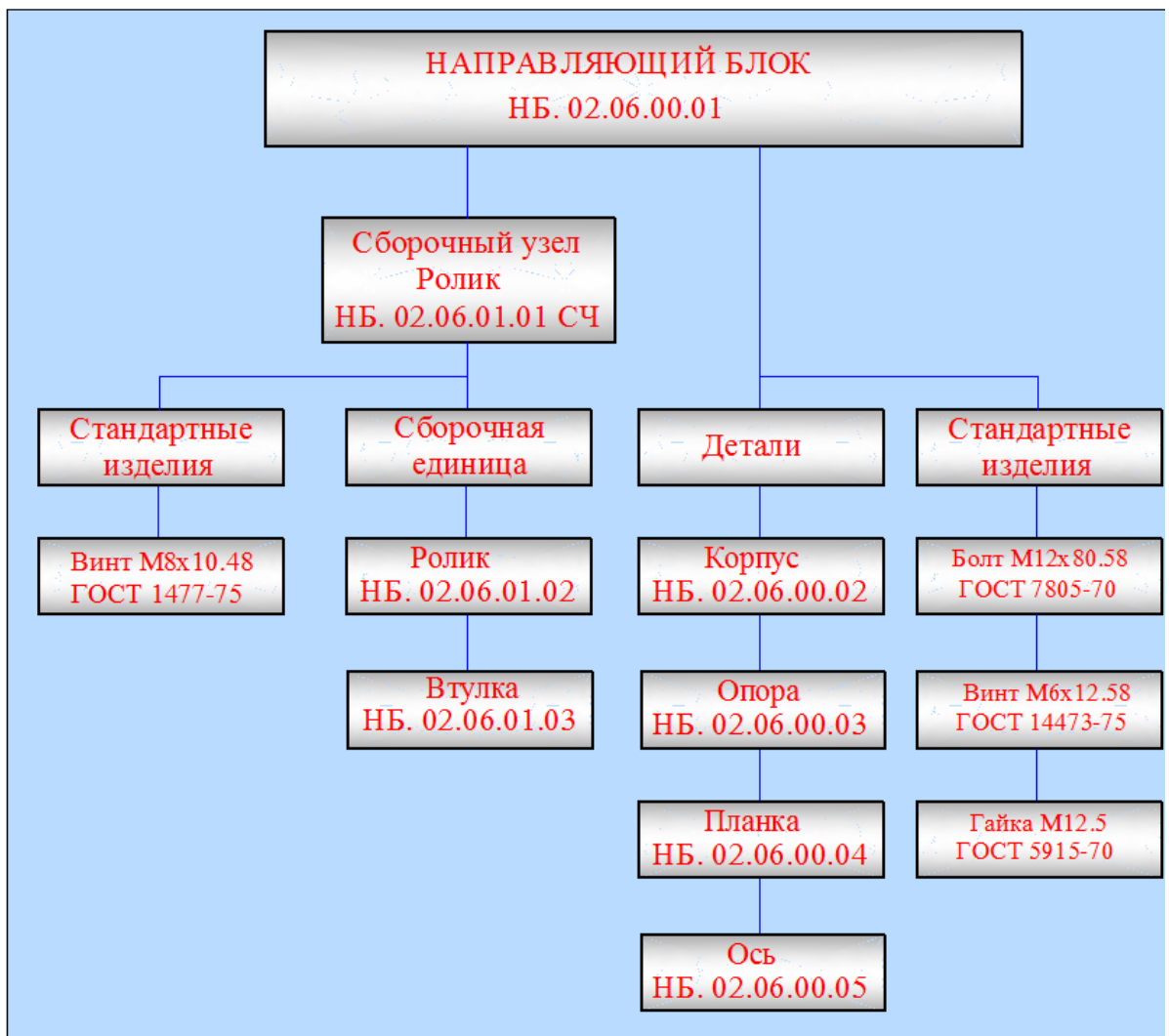
a)



b)

.7.1

.7.2



.7.2

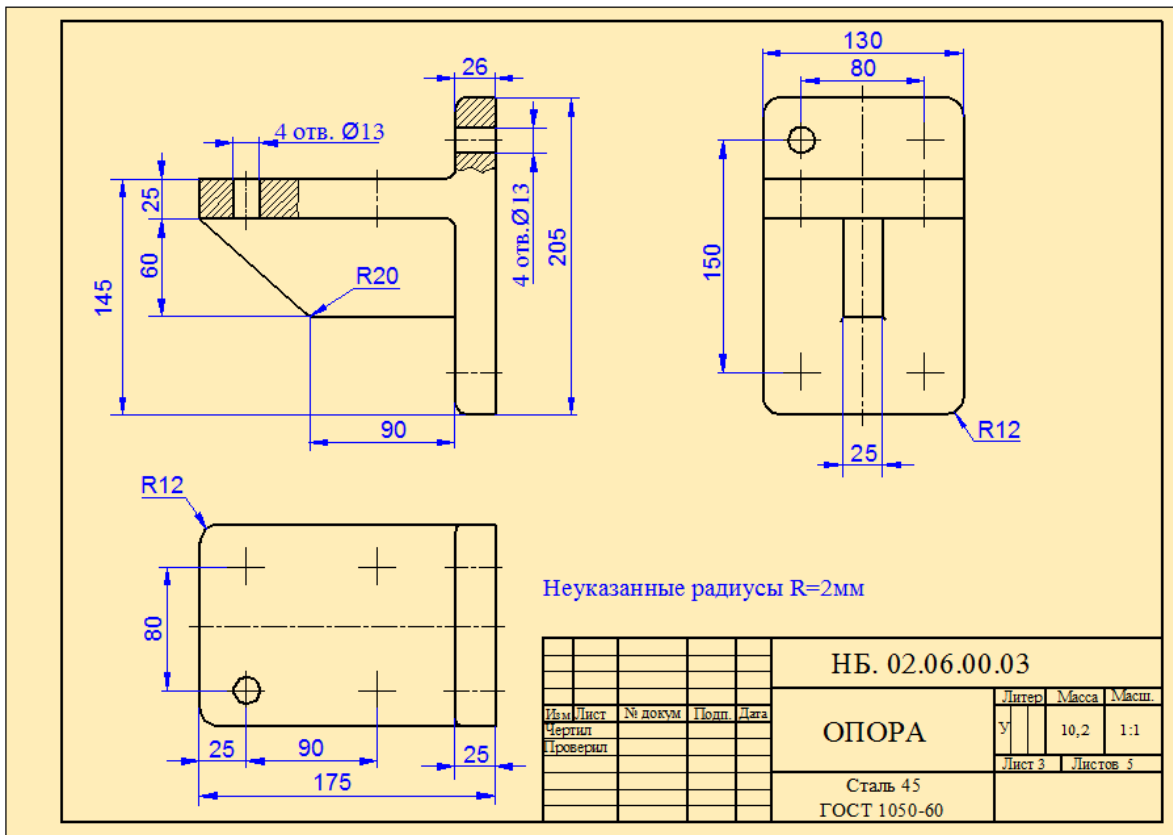
.7.3, 7.4, 7.5 7.6

.7.3

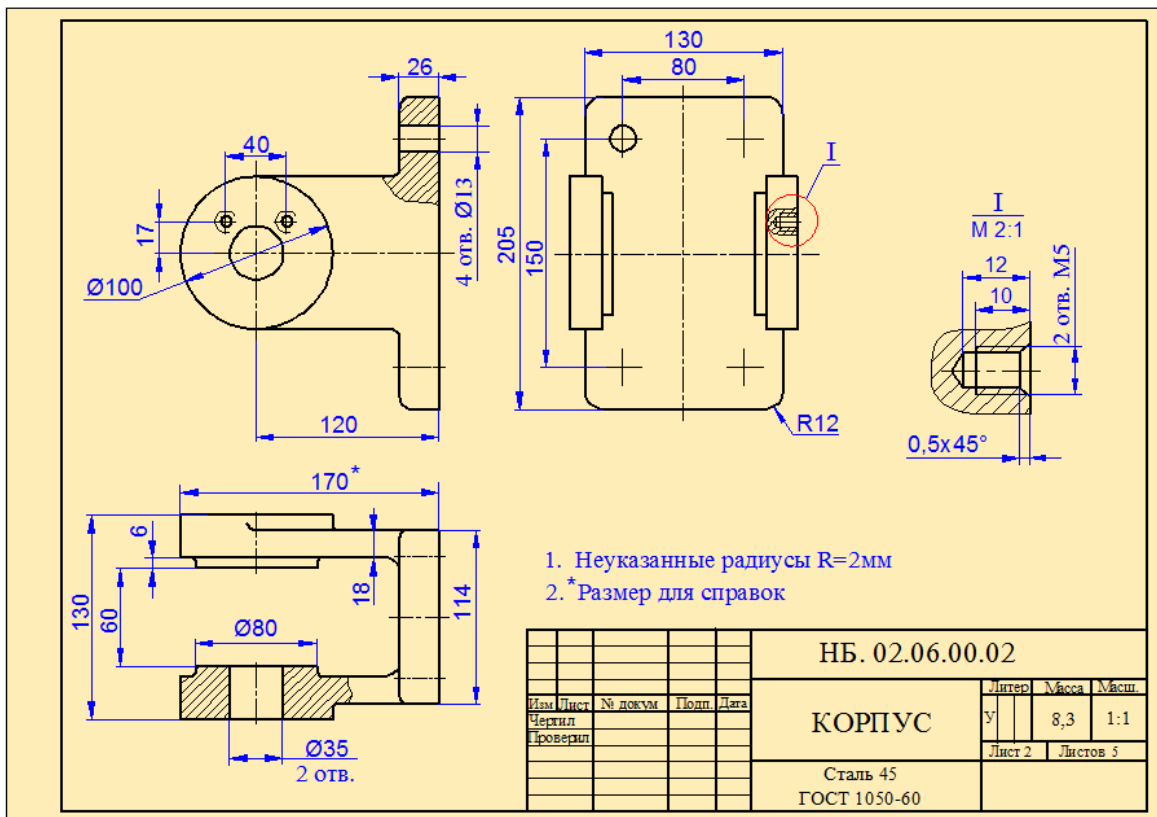
«I»

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6.



.7.3



.7.4

.7.4

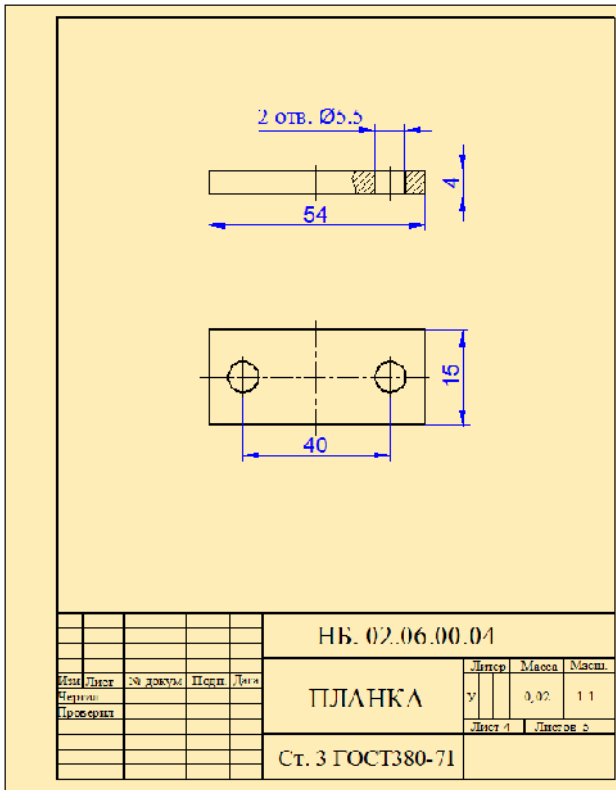
(.3).

.7.5

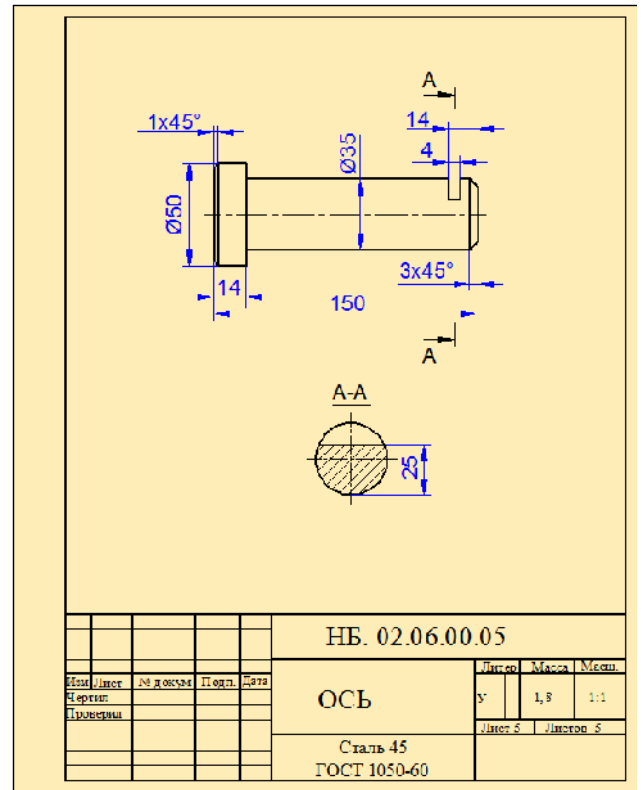
(.4)

.7.6

(.5).



.7.5



.7.6

.7.4

(.3).

.7.5

(.4)

.7.6

(.5).

.7.7

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- 55

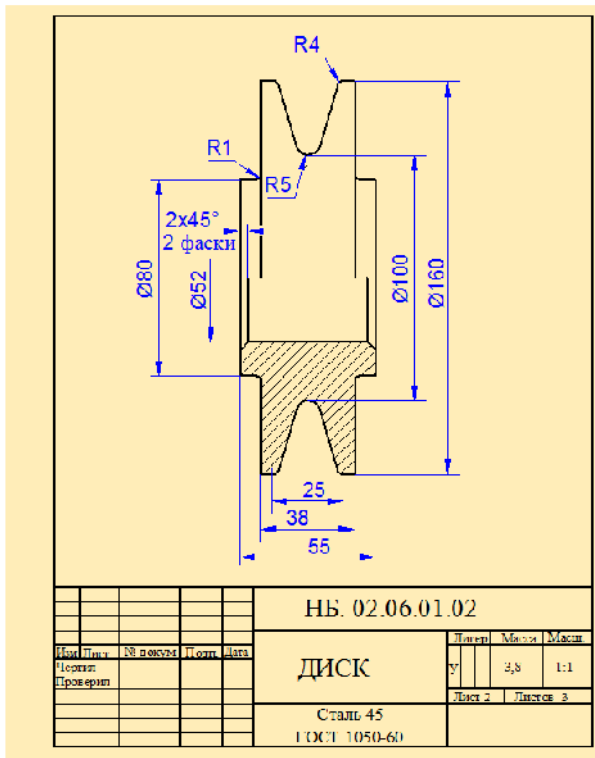
- 35

.7.8 7.9

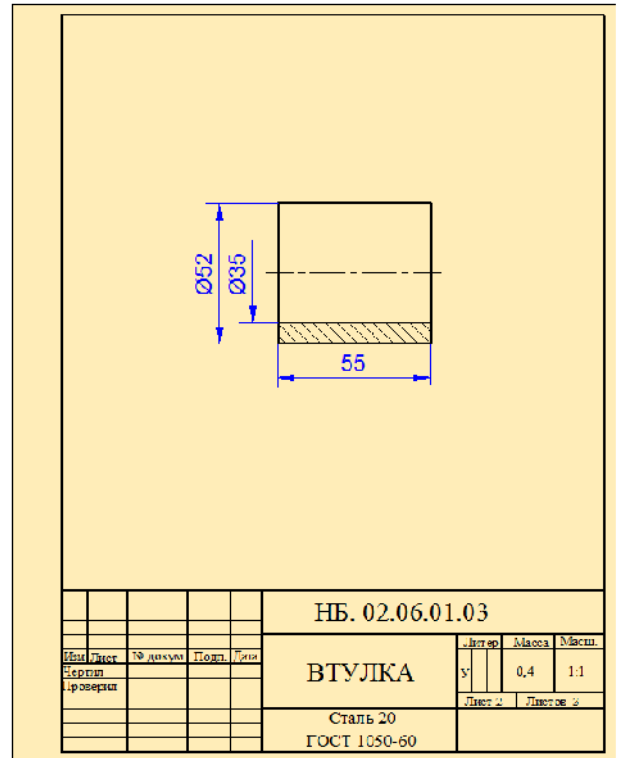
.7.10

Форм.	Зона	Поз.	Обозначение	Наименование	Кол.	Примеч.	
				<u>Детали</u>			
A4	1		НБ. 02.06.01.02	Диск	1		
A4	2		НБ. 02.06.01.03	Втулка	1		
				<u>Стандартные изделия</u>			
		3		Винт М8-10 ГОСТ 1477-84	1		
НБ. 02.06.01.01 СЧ							
				РОЛИК Сборочный чертёж	Лигер	Масса	Масш.
Изм.	Лист	№ докум.	Попп.		Дата	у	4,2
Чертил							
Проверил							
					Лист 1	Листов 3	

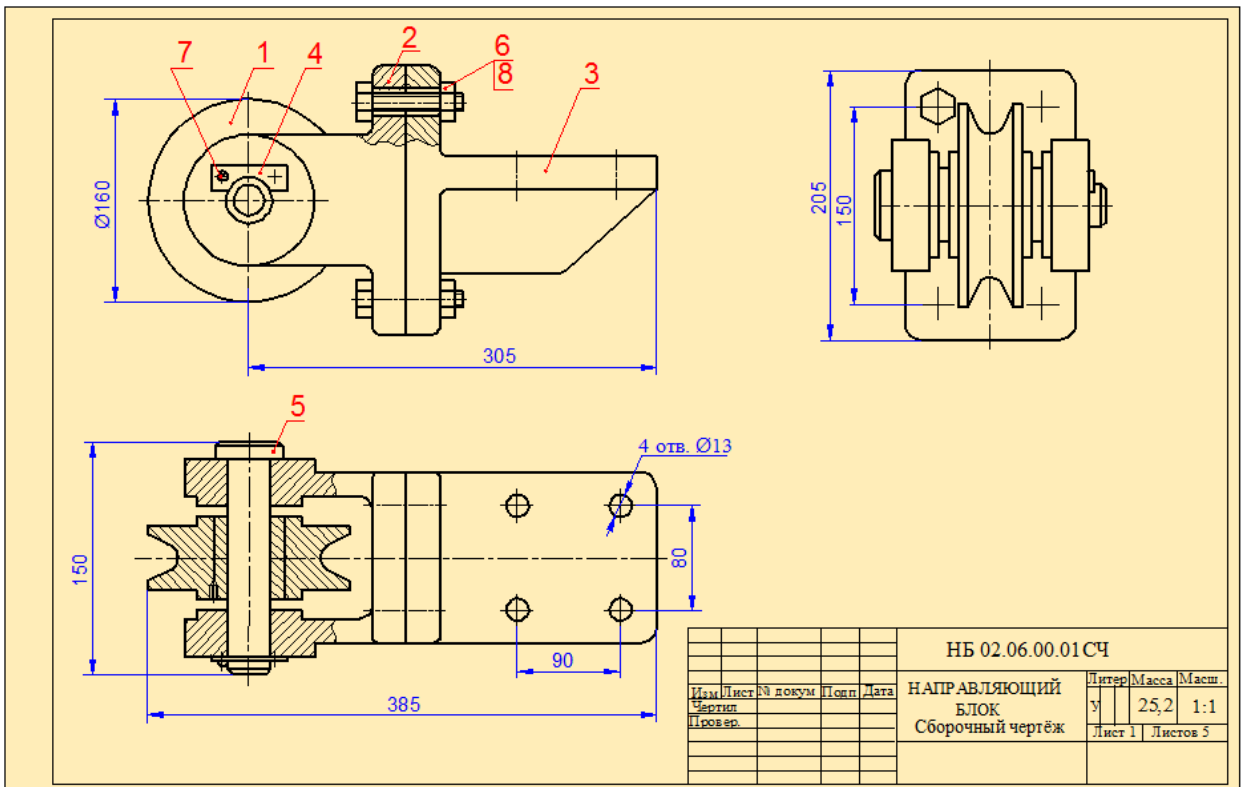
.7.7



.7.8



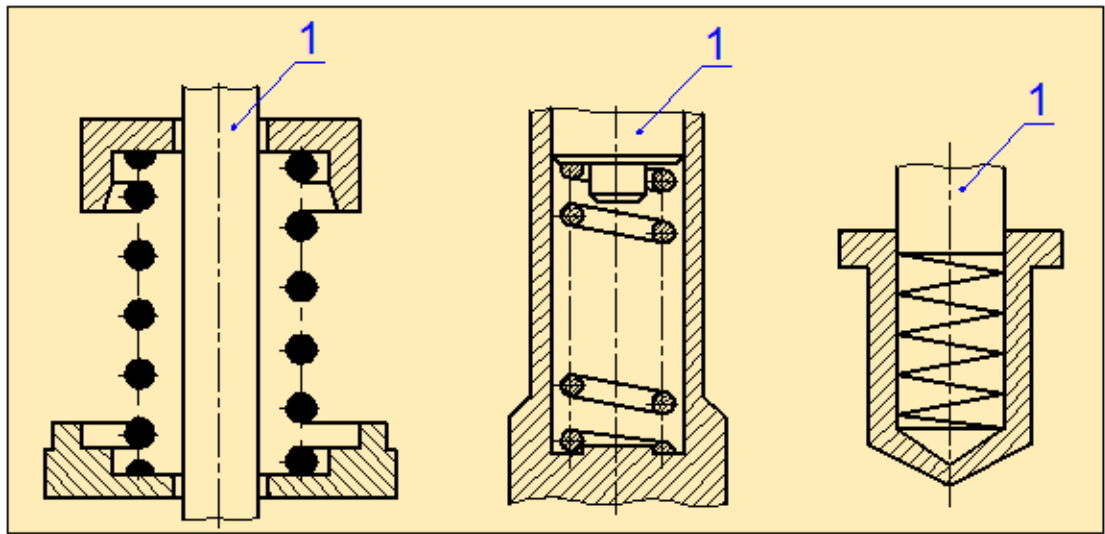
.7.9



.7.10

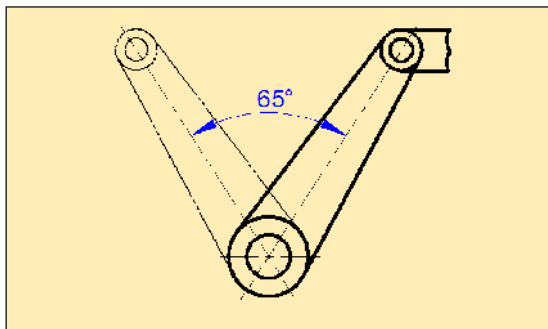
9.

2 ,

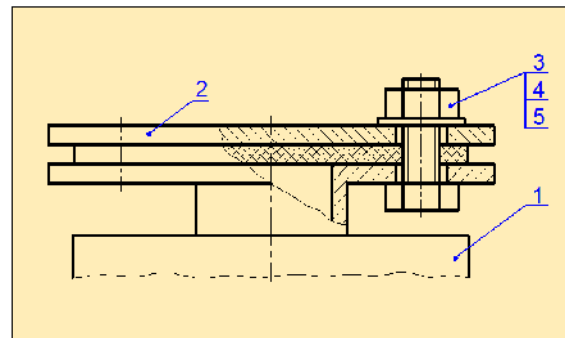


a)

.7.11



.7.12



.7.13

10.

(.7.12).

11.

.7.13

(.2)
(.3), (.4)

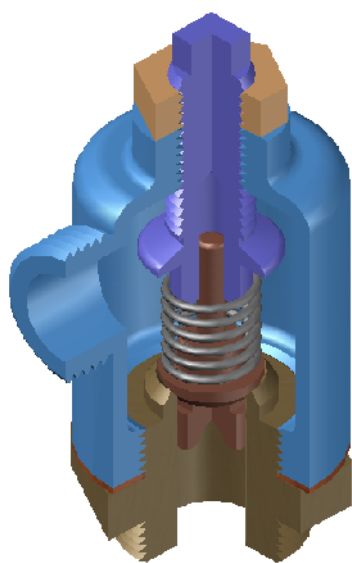
(.5).

12.

13.

(.), (.), (.)

- 1.
- 2.
- 3.
- 4.
- 5.



.7.15

- (4), (5)



.7.15.

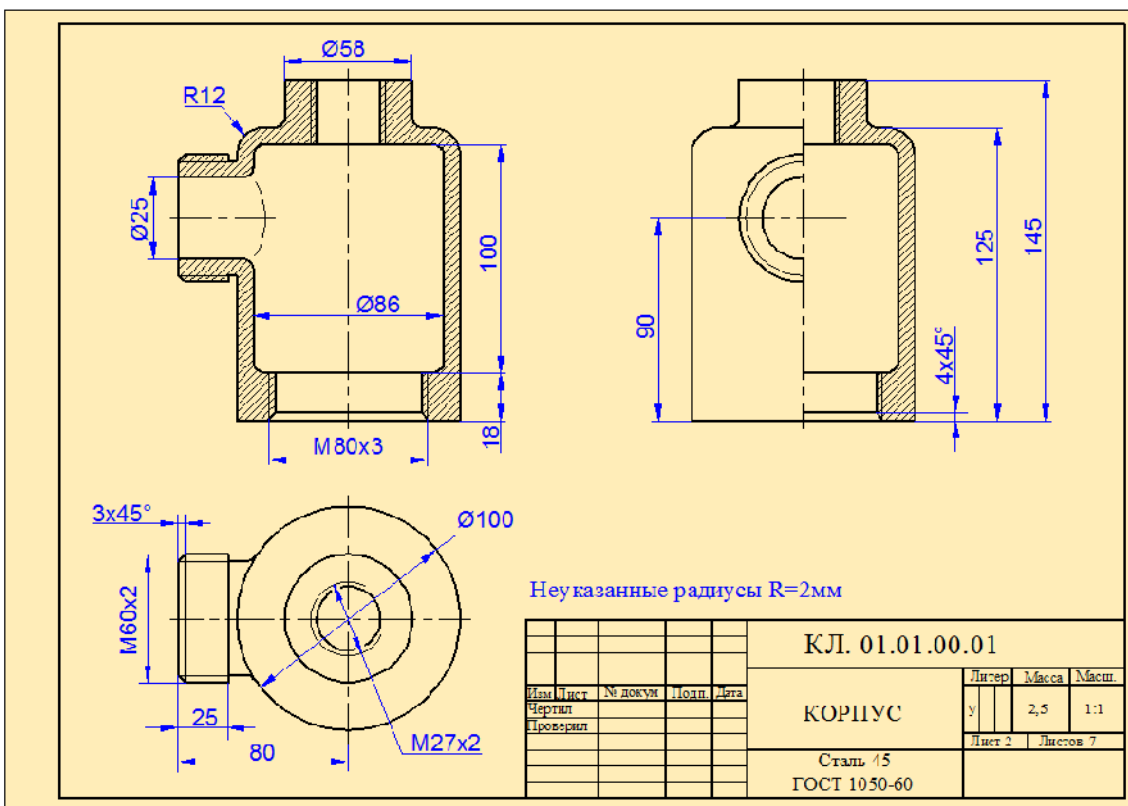
.7.16

- (1), (2), (3), (7).

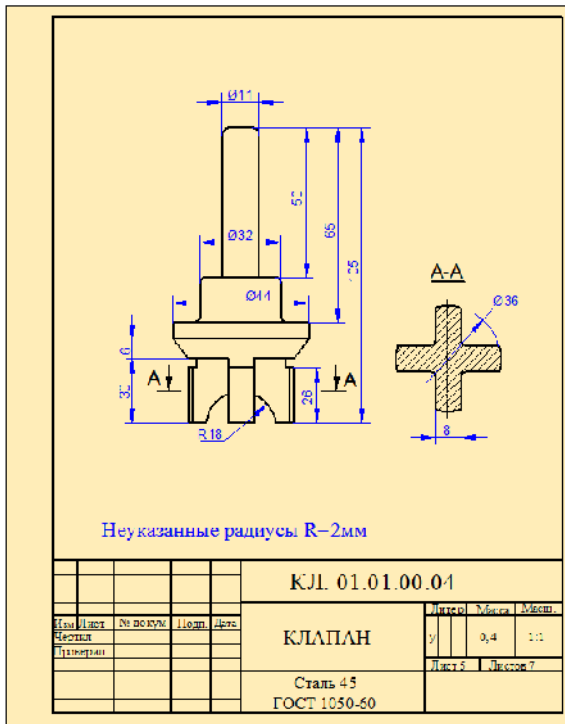
1

1

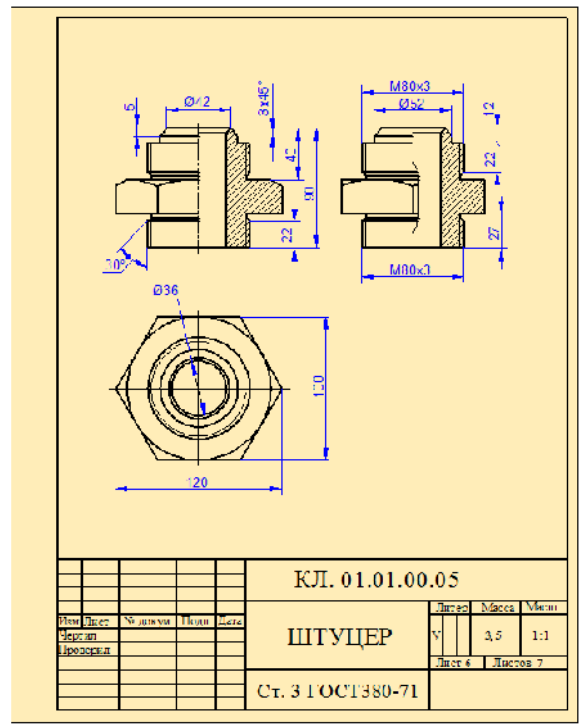
1.



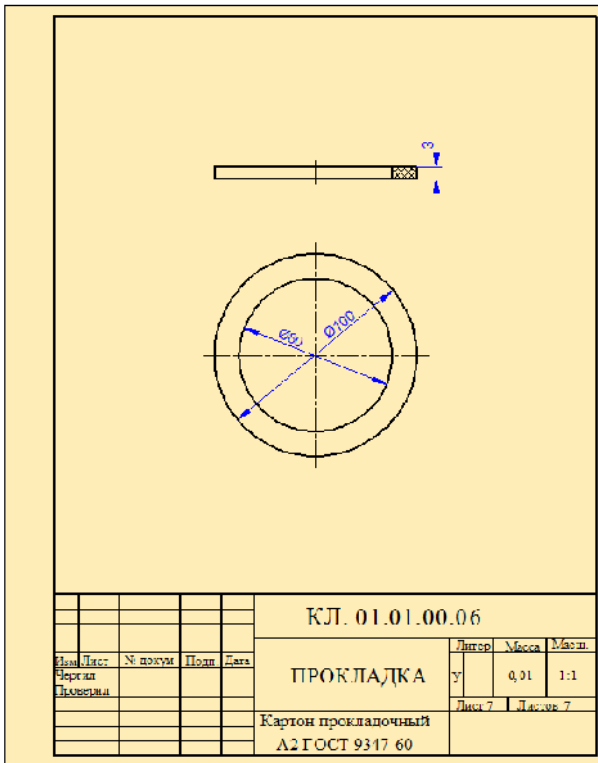
.7.19



7.22



7.23



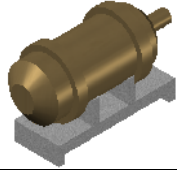
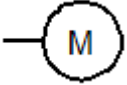
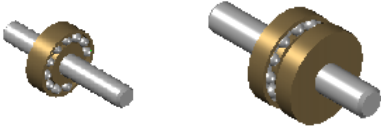
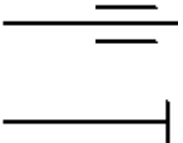
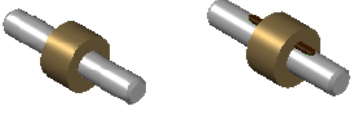
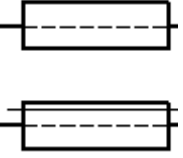
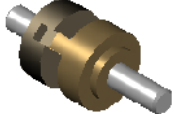

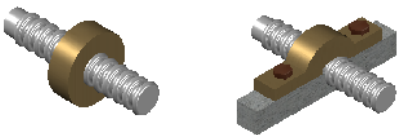
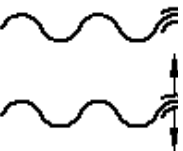
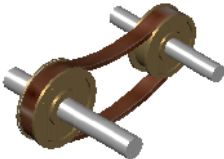
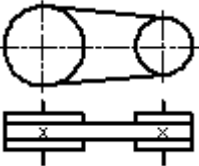
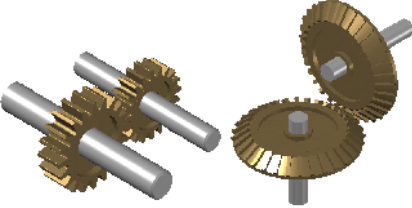
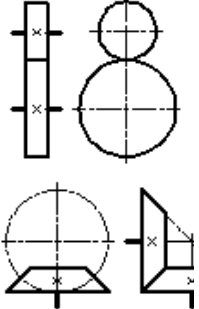
7.24

Форм. зона	Пол.	Обозначение	Наименование	Кол.	Прим.	
Документация						
а2		КЛ. 01.01.00.00 СЧ	Сборочный чертёж	1		
Детали						
а3	1	КЛ. 01.01.00.01	Корпус	1		
а4	2	КЛ. 01.01.00.02	Шпindelь	1		
а4	4	КЛ. 01.01.00.03	Пружина	1		
а4	5	КЛ. 01.01.00.04	Клапан	1		
а4	5	КЛ. 01.01.00.05	Штуцер	1		
а4	6	КЛ. 01.01.00.06	Прокладка	1		
Стандартные изделия						
	7	Гайка М27,5 ГОСТ 59 12-70		1		
КЛ. 01.01.00.00						
ОБРАТНЫЙ КЛАПАН					Листы у	Листов 1

7.25

7.19-7.24

7.25

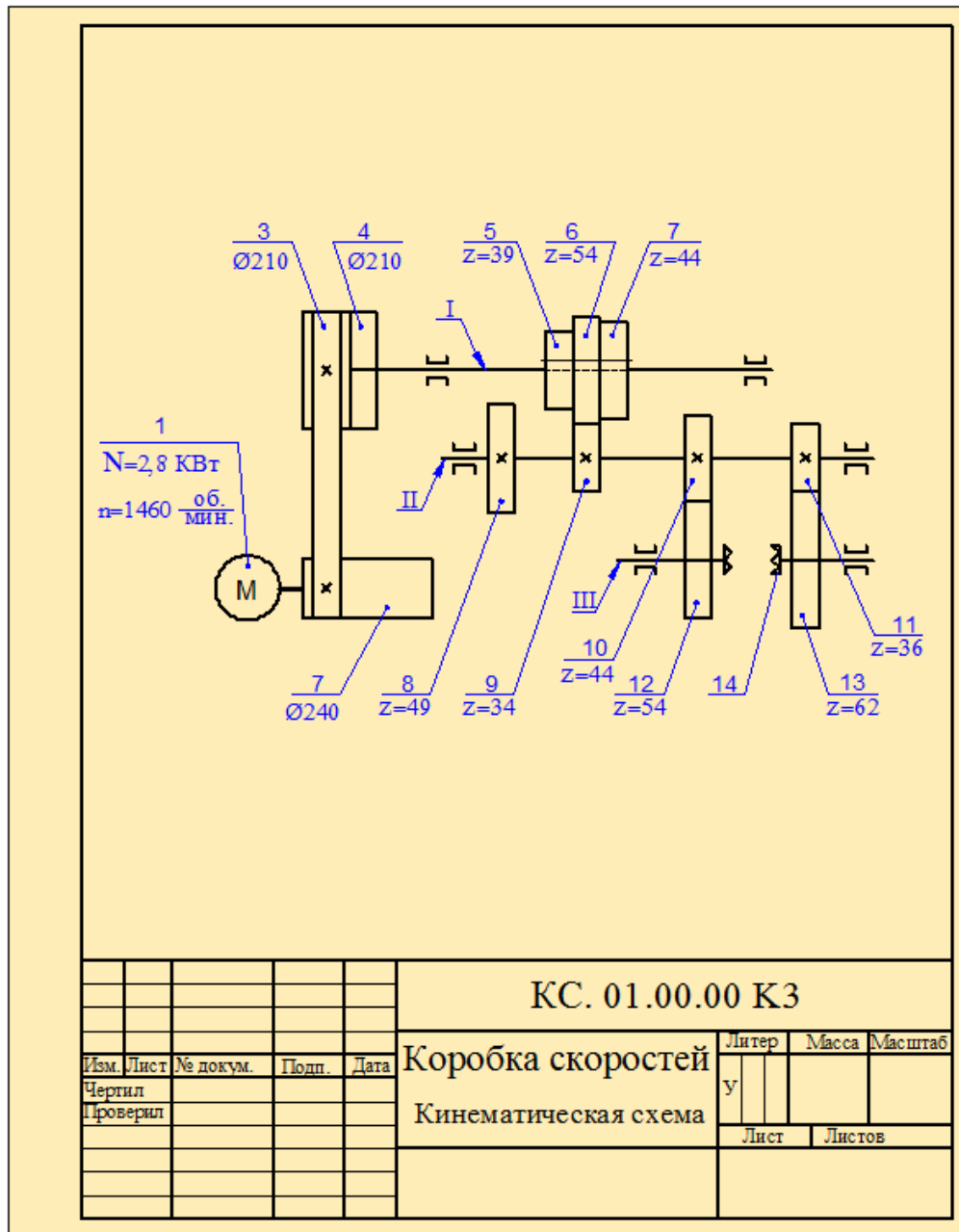
		
) ;)	)	a) )
:) ;)	)	a) )
		
) ;)	)	a) )
		
) ;)	 a))	a) )

3.

4.

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.8.1

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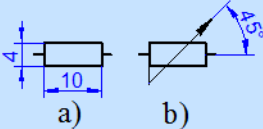
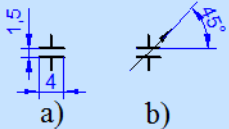
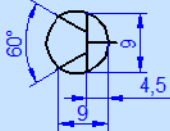
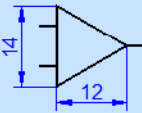
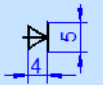
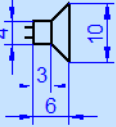
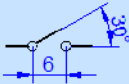
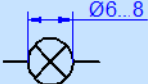
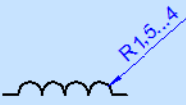

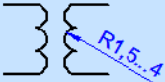

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9.

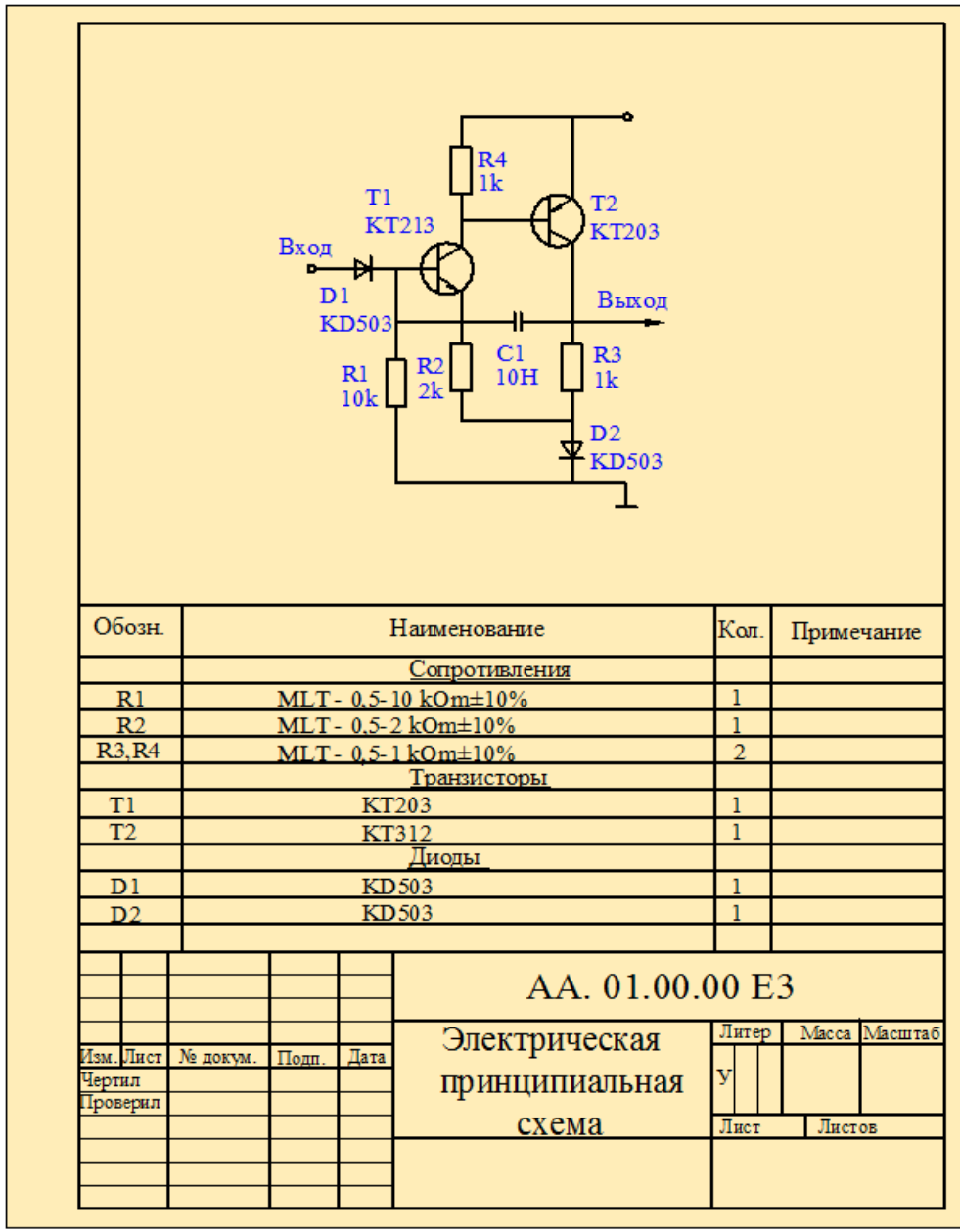
: .01.00.00 3.

8.2

8.2

Наименование	Графическое изображение	Наименование	Графическое изображение
Резистор а) постоянный б) переменный		Конденсатор а) постоянный б) переменный	
Транзистор		Усилитель	
Диод		Репродуктор	
Выключатель		Сигнальная лампа	
Катушка индуктивности		Антенна	
Трансформатор		Заземление	

0,3...0,4



.8.2

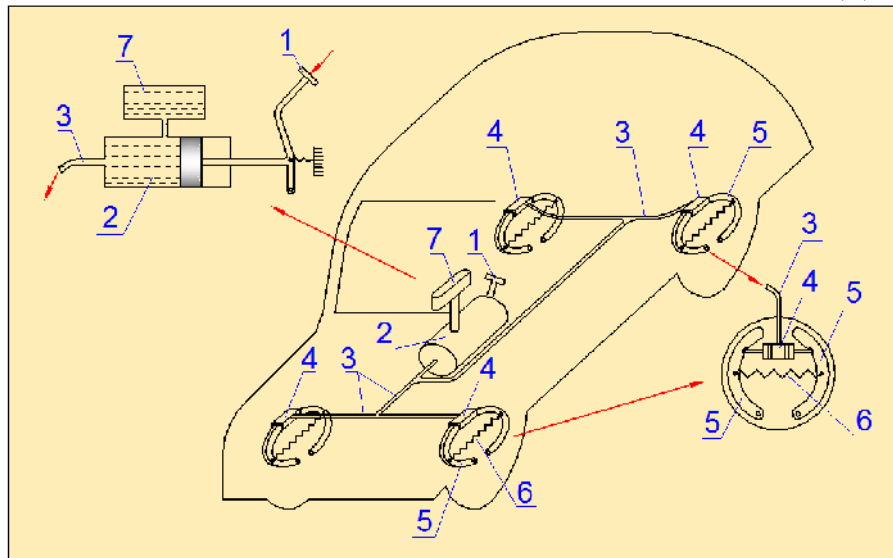
3,... 1, 2, 3.

8.2

№	Наименование	Обозначение	№	Наименование	Обозначение
1	Линии связи		15	Нормально открытый регулирующий орган	
2	Трубопроводы высокого давления		16	Клапан предохранительный	
3	Соединение линий связи		17	Регулятор давления пневматический	
4	Перекрещивание линий связи		18	Обратный клапан	
5	Подвод жидкости под давлением		19	Насос постоянной производительности	
6	Слив воздуха из системы		20	Компрессор	
7	Подвод воздуха (газа) под давлением		21	Гидромотор	
8	Выпуск воздуха (газа) в атмосферу		22	Пневмомотор	
9	Бак под атмосферным давлением		23	Ручной насос	
10	Аккумулятор пневматический (баллон, ресивер, воздухоотделитель)		24	Насос шестерённый	
11	Аккумулятор гидравлический		25	Насос ротационный	
12	Фильтр для жидкости или воздуха		26	Цилиндр гидравлический и пневматический	
13	Фильтр - влагоотделитель		27	Цилиндр гидравлический и пневматический	
14	Нормально закрытый регулирующий орган		28	Цилиндр односторонний	

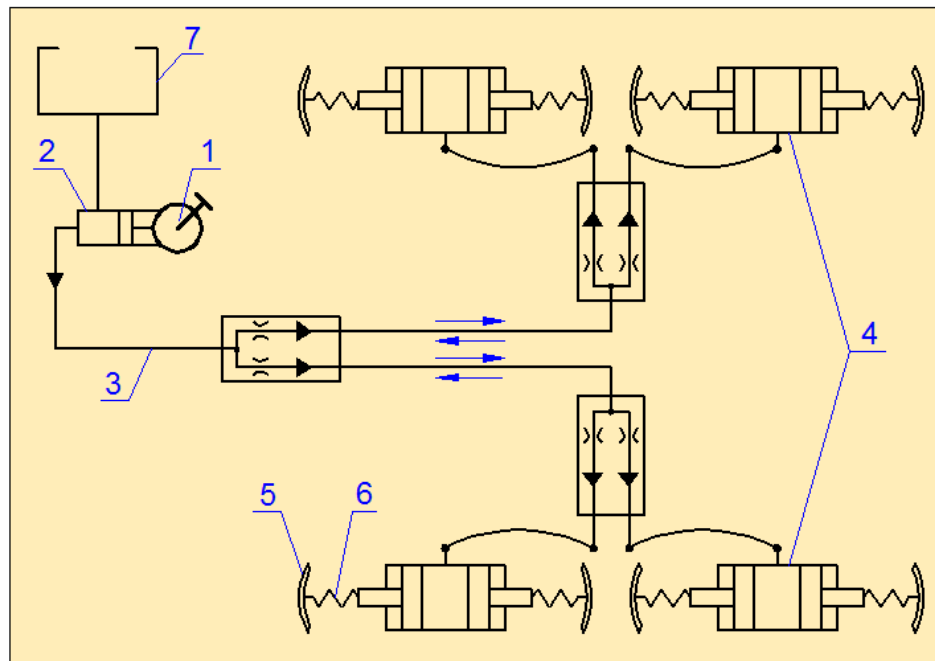
.8.3

- (1)
- (2)
- (3)
- (4)
- (5)
- (6)
- (7)



.8.3

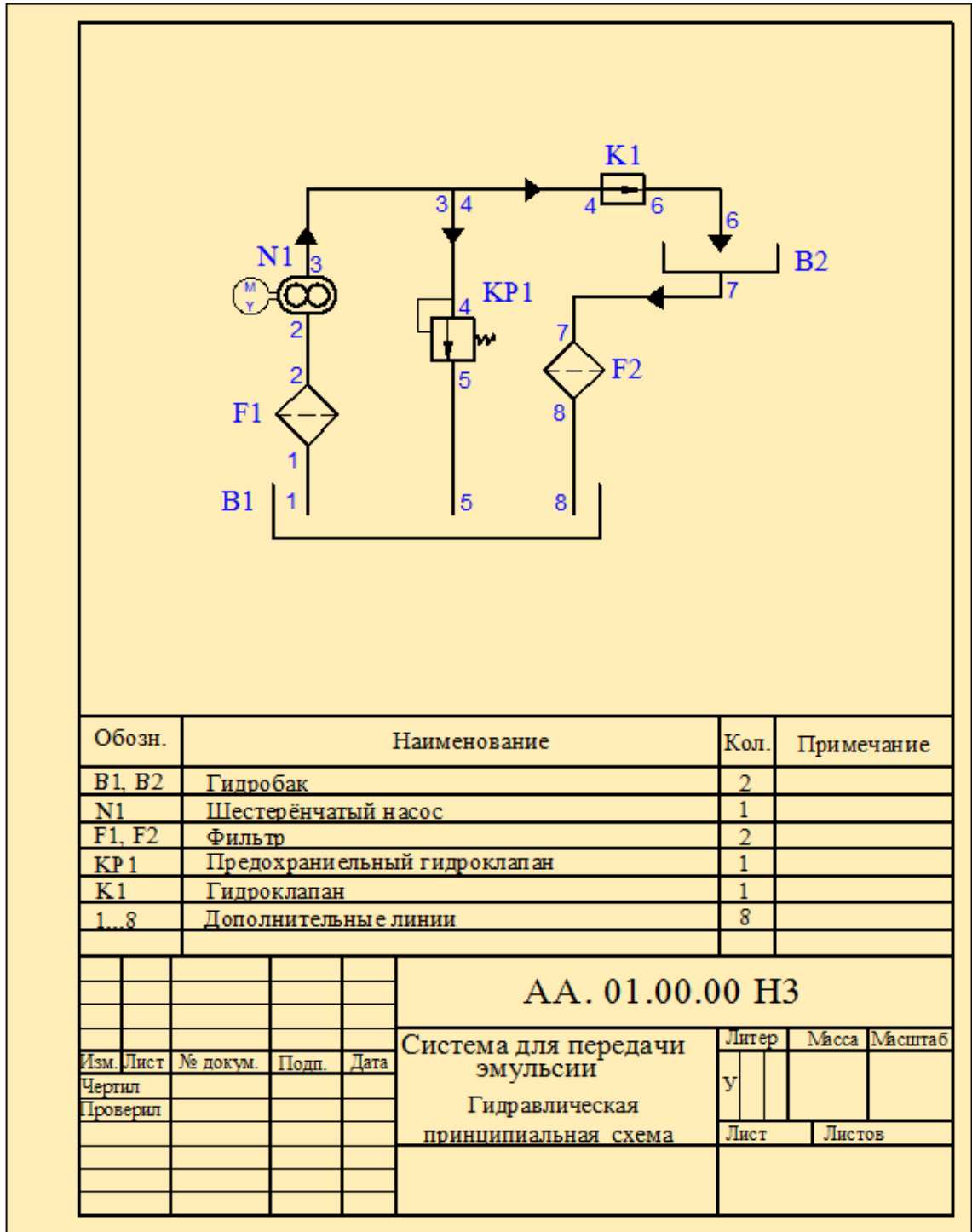
.8.4



.8.4

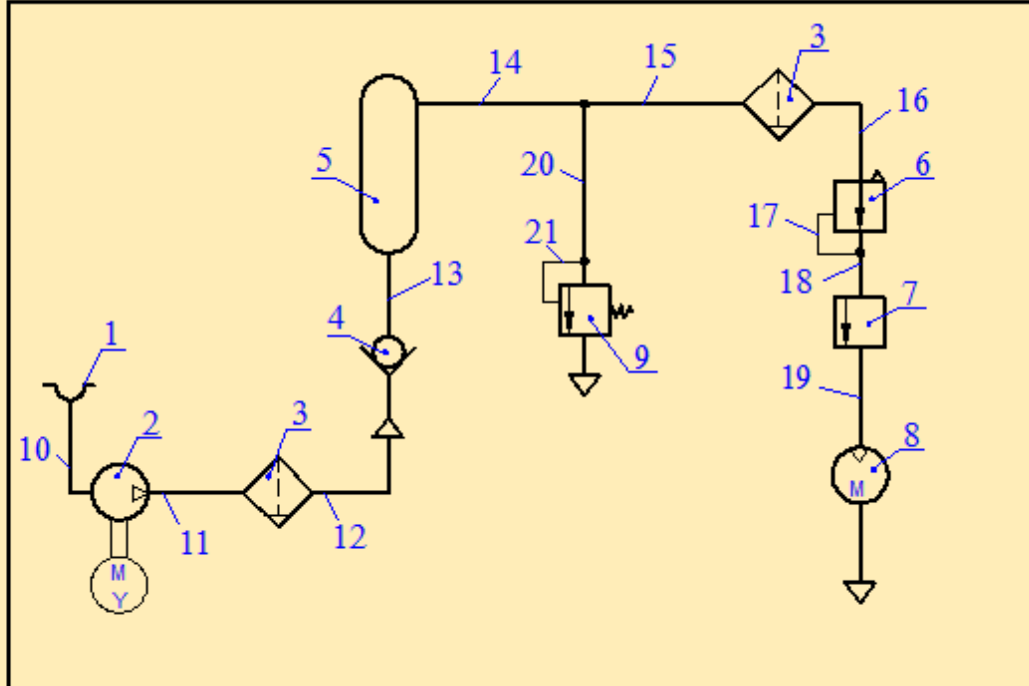
.8.5

()



.8.5

.8.6 –



№	Наименование	Кол.	Примечание
1	Заборник воздуха	1	
2	Компрессор	1	
3	Фильтры	2	
4	Пневматический обратный клапан	1	
5	Воздухосборник	1	
6	Клапан редукторный	1	
7	Клапан управления	1	
8	Пневмомотор	1	
9	Клапан предохранительный	1	
10...21	Линии связи	12	

					АА. 01.00.00 РЗ		
					Сисиема подачи воздуха		
					Пневматическая		
					принципиальная схема		
Изм.	Лист	№ докм.	Подп.	Дата	Литер	Масса	Масштаб
Чертил							
Проверил							
					Лист	Листов	

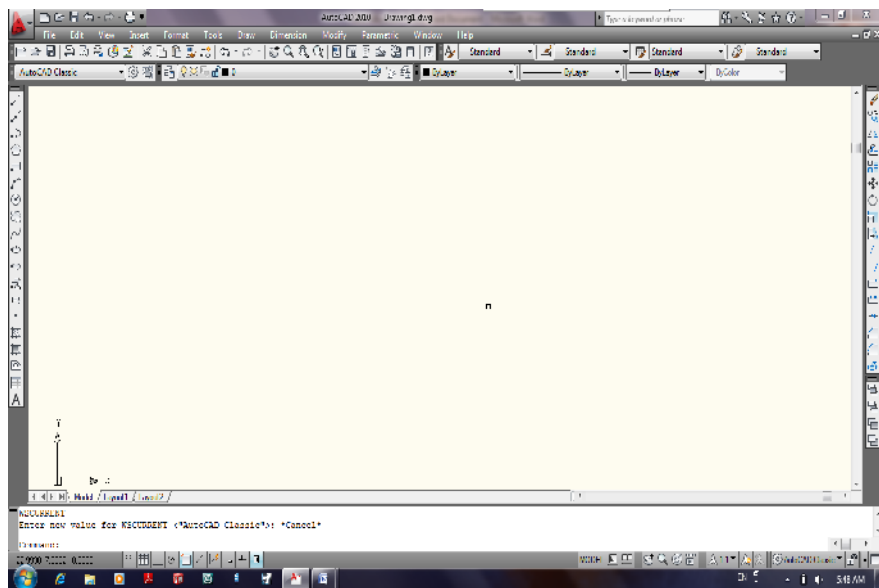
(→, →).

()

AutoCAD.

AutoCAD AutoCAD

(.9.1)



.9.1

AutoCAD

: (), ,

* File (a) -

* Edit () -

* View () -

* Insert () -

- * Format () –
- * Tools () –
- * Draw () – 2D 3D.
- * Dimension () –
- * Modify () –
- * Window () –
- * Help () –

AutoCAD

AutoCAD

AutoCAD

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AutoCAD

AutoCAD

LINE ()

(.9.2).

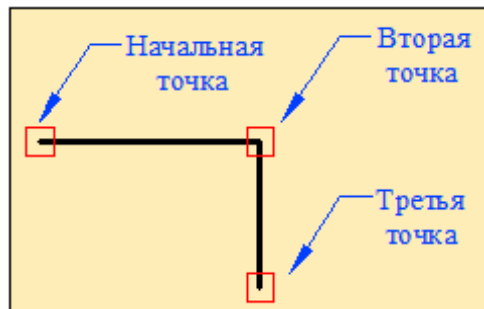
Command: LINE

Specify first point:

Specify next point or [Undo]:

Specify next point or [Undo]:

«ENTER».



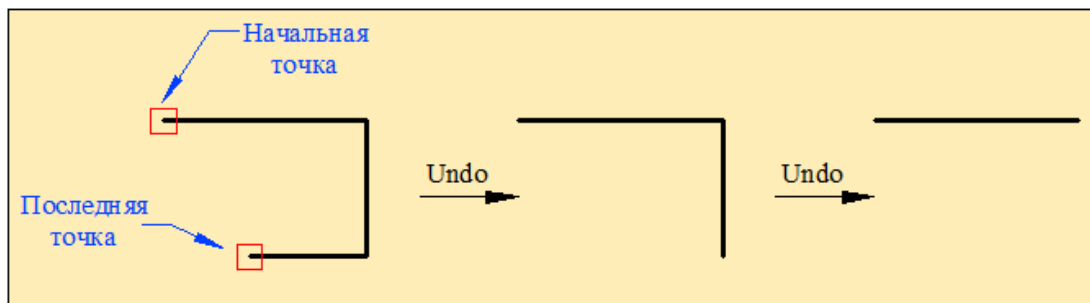
.9.2

Undo ()
«Undo»

«ENTER».

.9.3

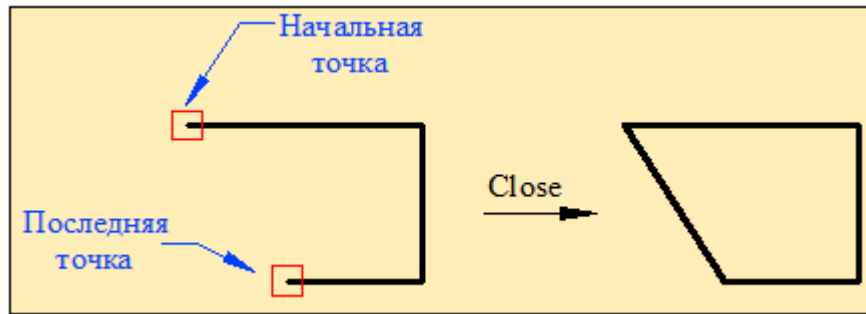
«Undo».



.9.3

Close ()

(.9.4).



.9.4

CIRCLE ().

Command: CIRCLE

Specify center point for circle or [3P/2P/Ttr(tan tan radius):

1.

CIRCLE

20 (.9.5).

Command: CIRCLE

Specify center point for circle or [3P/2P/Ttr(tan tan radius):

Specify radius of circle or [Diameter]:

: 20

«ENTER».

2.

CIRCLE

30 (.9.6).

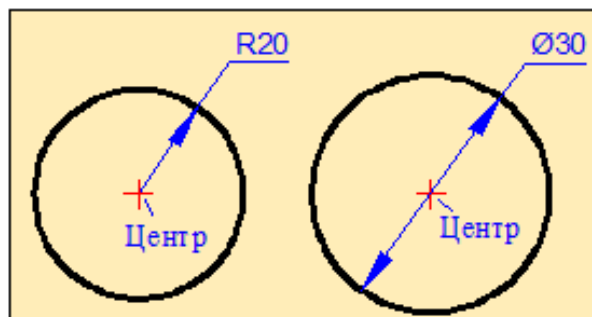
Command: CIRCLE

Specify center point for circle or [3P / 2P / Ttr(tan tan radius]:

Specify radius of circle or [Diameter]: D «ENTER»

Specify diameter of circle :

: 30 «ENTER».



.9.5

.9.6

3.

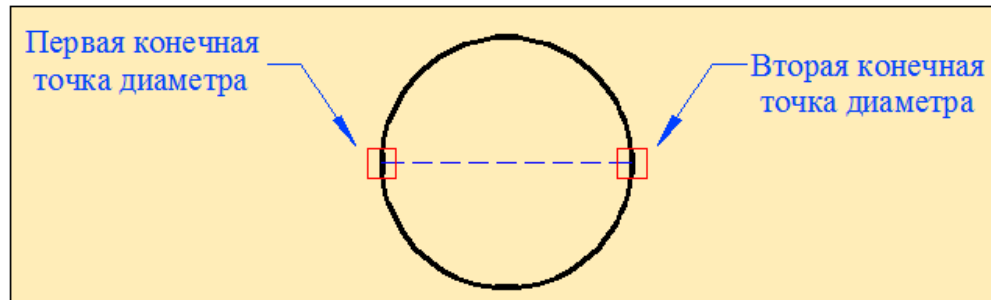
2 (2) (.9.7).

Command: CIRCLE

Specify center point for circle or [3P / 2P / Ttr(tan tan radius)]: 2P
«ENTER»

Specify first end point of circle's diameter:

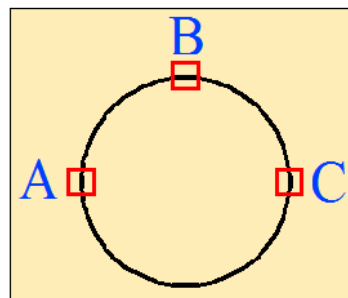
Specify second end point of circle's diameter:



.9.7

4.

3 (3) (.9.8).



.9.8

Command: CIRCLE

Specify center point for circle or [3P / 2P / Ttr(tan tan radius)]: 3P
«ENTER»

Specify first point on circle :

A.

Specify second point on circle :

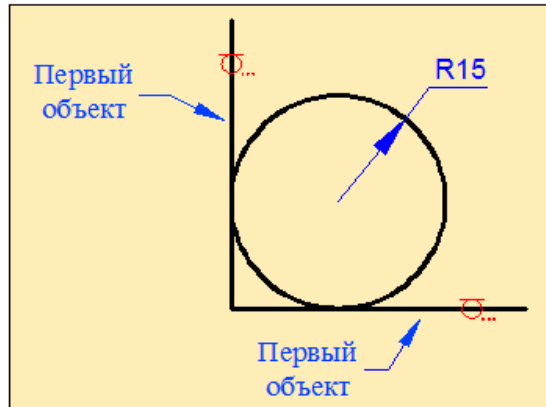
B.

Specify third point on circle :

C.

5.

15
(.9.9).



.9.9

Command: CIRCLE

Specify center point for circle or [3P/ 2P / Ttr(tan tan radius)]: «ENTER»

Specify point on object for first tangent on circle:

Specify point on object for second tangent on circle:

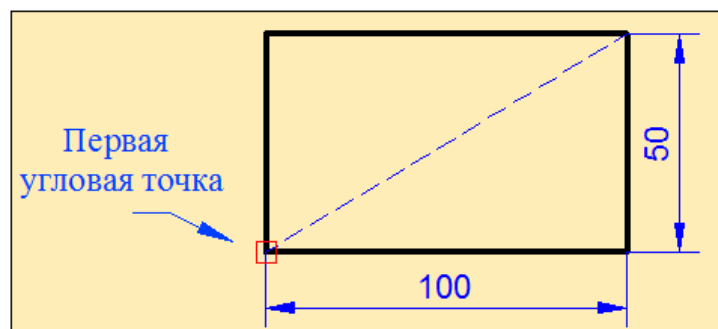
Specify radius of circle: : 15 «ENTER».

RECTANGLE ()

.9.10

100

50



.9.10

Command: RECTANGLE

Specify first corner point or [Chamfer / Elevation / Fillet / Thickness / Width]:

Specify other corner point or [Area / Dimension / Rotation]:

: @ 100,50 «ENTER».

RECTANGLE.

1. **Chamfer** ()
(.9.11).

Command: RECTANGLE

Specify first corner point or [Chamfer / Elevation / Fillet / Thickness / Widht]: «ENTER».

Specify first chamfer distance for rectangle:
: 15 «ENTER».

Specify second chamfer distance for rectangle:
: 15 «ENTER».

Specify first corner point or [Chamfer / Elevation / Fillet / Thickness / Widht]:

Specify other corner point or [Area / Dimention/ Rotation]:
: @ 100, 50 «ENTER».

2. **Fillet** ()
(.9.12).

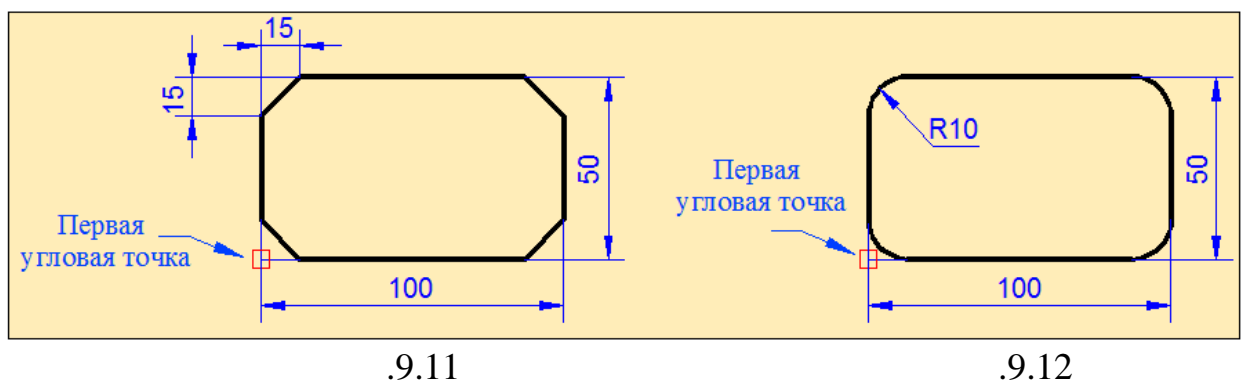
Command: RECTANGLE

Specify first corner point or [Chamfer / Elevation / Fillet / Thickness / Widht]: F «ENTER».

Specify fillet radius for rectangle: :
10 «ENTER».

Specify first corner point or [Chamfer / Elevation / Fillet / Thickness / Widht]:

Specify other corner point or [Area / Dimention/ Rotation]:
: @ 100, 50 «ENTER».



POLYGON ().
AutoCAD

(.9.13).

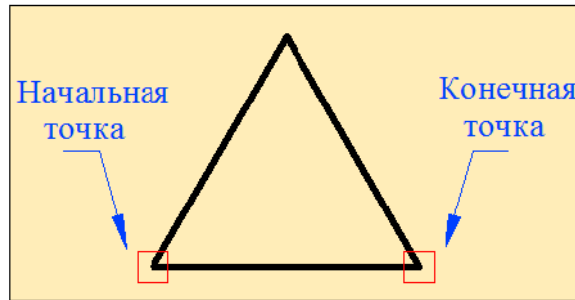
Command: POLYGON

Enter number of sides <4>: : 3 «ENTER».

Specify center of polygon or [Edge]: E «ENTER».

Specify first endpoint of edge:

Specify second endpoint of edge:



.9.13

(.9.14).

Command: POLYGON

Enter number of sides < 4>: >:

: 6 «ENTER».

Specify center of polygon or [Edge]:

Enter an option [Inscribed in circle/ Circumscribed about circle]:

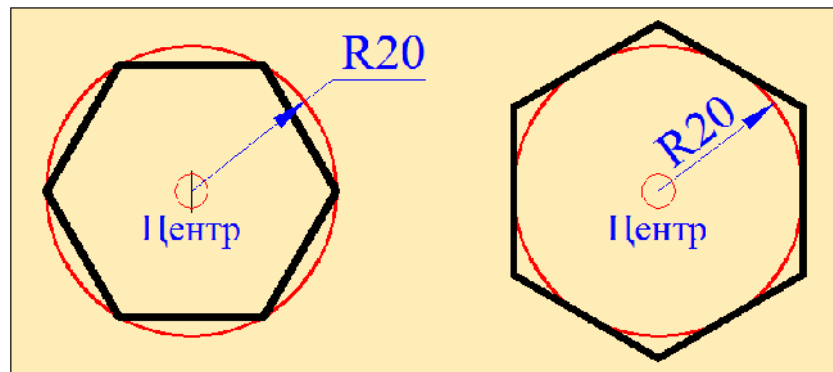
: I –

«ENTER».

Specify radius of circle :

: 20

«ENTER».



.9.14

ARC

().

11

:

1.

(.9.15,).

Command: ARC

Specify start point of arc or [Center]:

Specify second point of arc or [Center / End]:

Specify end point of arc:

2.

(.9.15,).

Command: ARC

Specify start point of arc or [Center]:

Specify second point of arc or [Center / End]: C «ENTER».

Specify center point of arc:

Specify end point of arc or [Angle / chord Length]:

1.

(.9.15,).

Command: ARC

Specify start point of arc or [Center]:

Specify second point of arc or [Center / End]: E «ENTER».

Specify end point of arc:

Specify center point of arc or [Angle / Direction / Radius]: R «ENTER».

Specify radius of arc:

«ENTER».

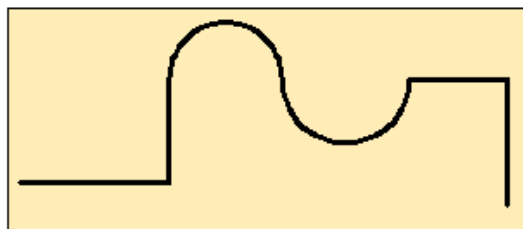


.9.15

POLYLINE ()

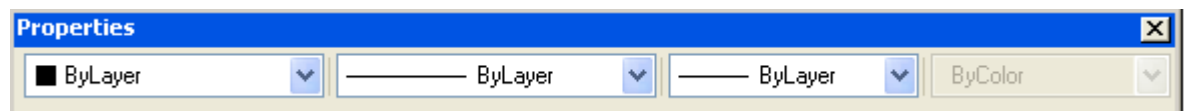
.9.16

POLYLINE.



.9.16

PROPERTIES ()



Color Control

Linetype Control

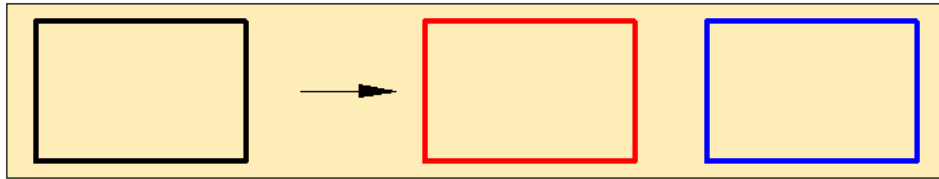
Lineweight Control

.9.17

1.

Color Control,

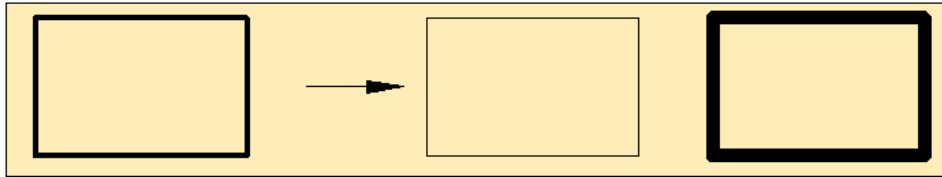
«ENTER» (.9.18).



.5.18

2.

Lineweighth Control,
«ENTER» (. 9.19).



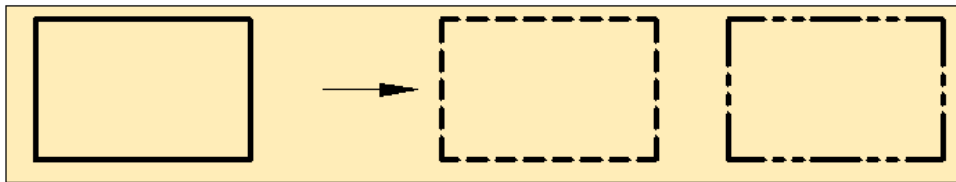
.9.19

3.

Linetype Control.
Linetype Control,

«Other» () «Load» (),
« ».

(.9.20).



.9.20

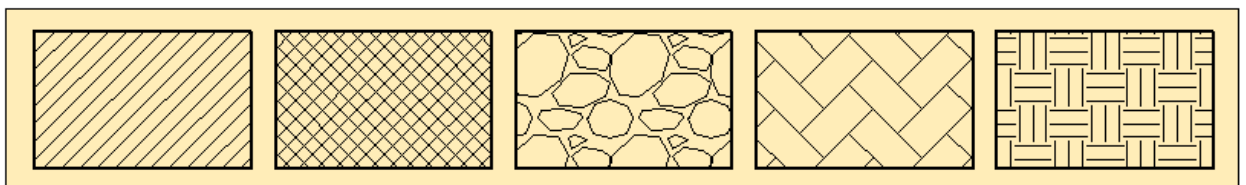
HATCH ().
HATCH

Hatch and Gradient,

Pick points (),
«ENTER» « ».

Pattern Swatch.

9.21



R

().

Command: ROTATE

Select object:

«ENTER».

Specify base point:

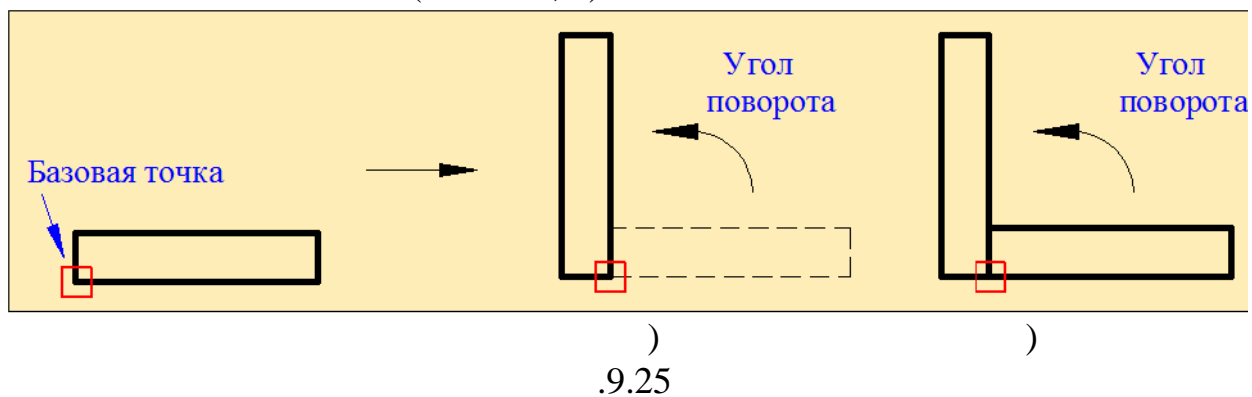
Specify rotation angle or [Copy/ Reference]:

«ENTER» (.9.25,).

,

«Copy» - «ENTER» ,

(.9.25,).



SCALE

().

Command: SCALE

Select object:

«ENTER».

Specify base point:

Specify Scale factor or [Copy / Reference]:

.

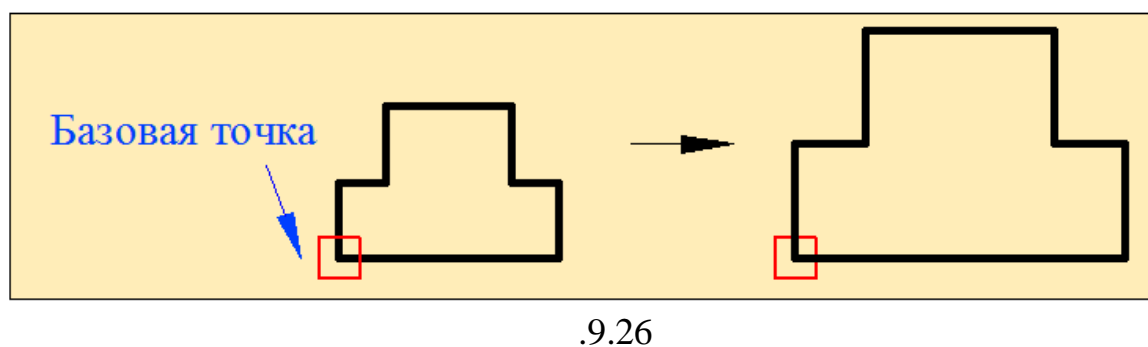
- 1,

«ENTER».

1,

«Copy» ,

(.9.26).

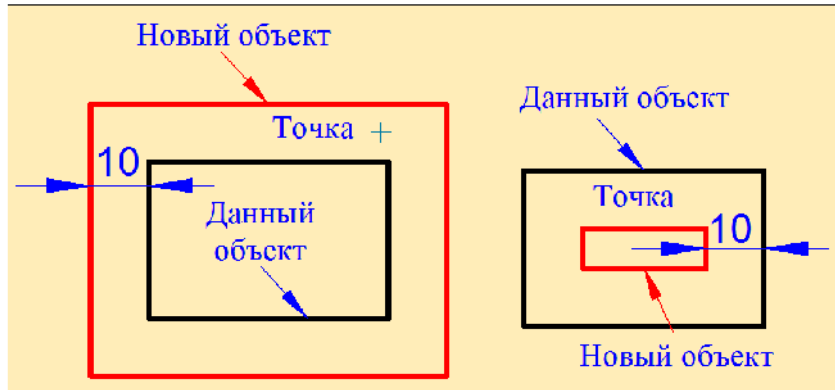


MIRROR (

).

Command: MIRROR

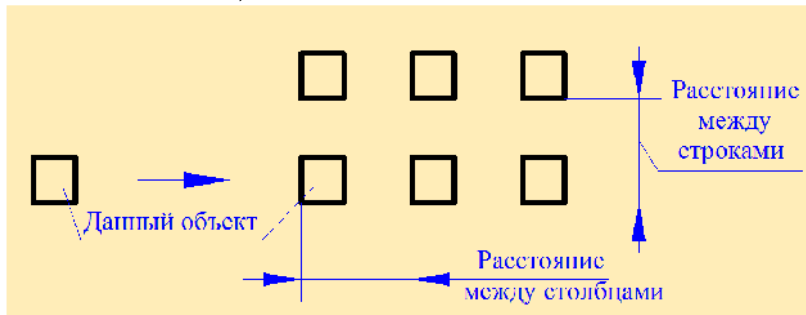
(.9.29,),



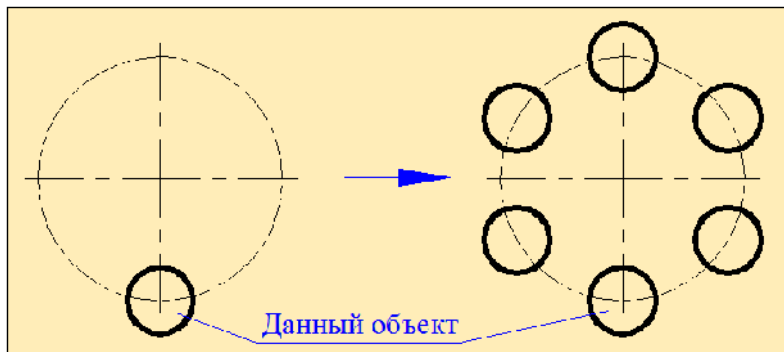
.9.29
ARRAY ()

1. Array (.9.30).
 () (Rows) (Columns)
 (Column Offset) (Row Offset) «ENTER»

2. Array (.9.31).
 (Total number of items) (Angle to Fill).
 «ENTER» « ».



. 9.30



.9.31

FILLET ()

9.32).

Command: **Fillet**

Select first object or [Undo / Polyline / Radius / Trim / Multiple]:

R «ENTER».

Specify fillet radius: : 20 «ENTER».

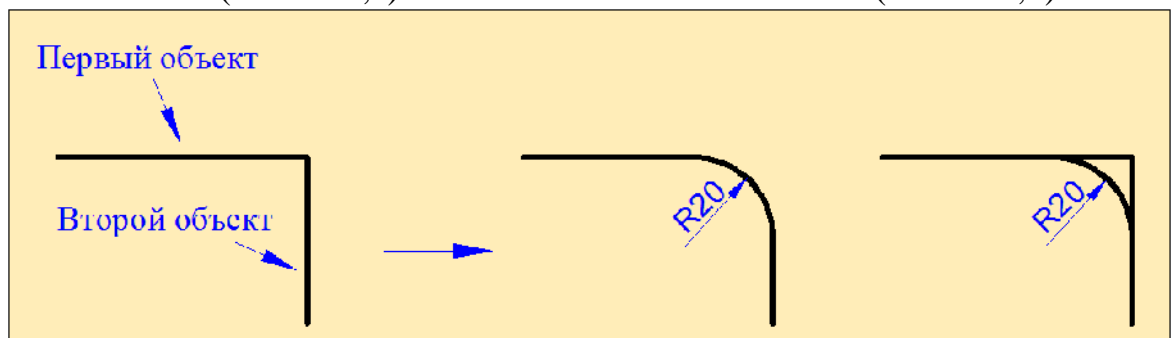
Select first object or [Undo / Polyline / Radius / Trim / Multiple]:

Select second object:

«Trim»

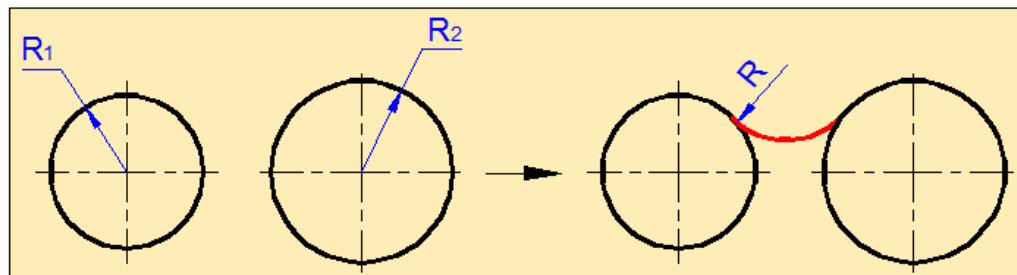
«No trim» (.9.32,)

«Trim» (.9.32,).



.9.32

R1 R2 (.9.33).



.9.33

AutoCAD
CHAMFER ().

Command: **CHAMFER**

Select first line or [Undo / Polyline / Distance / Angle / mEthod /Trim / Multiple]:

«Distance» «Angle».

1. «Distance».

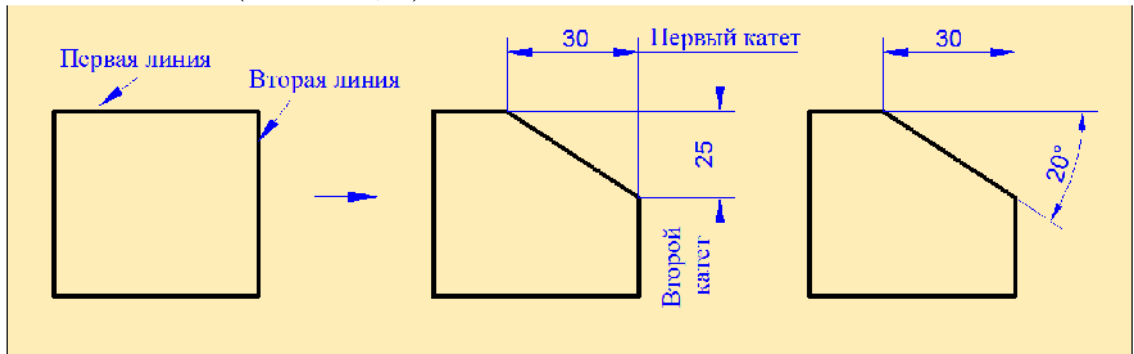
«Distance » «ENTER».
Specify first chamfer distance: : 30 «ENTER».
Specify second chamfer distance: : 25 «ENTER».
Select first line or [Undo / Polyline / Distance / Angle / mEthod /Trim / Multiple]:

Select second line: (.9.34,).

2. «Angle».

«Angle » «ENTER».
Specify chamfer length on the first line: : 30 «ENTER».
Specify chamfer angle from the first line: : 20 «ENTER».
Select first line or [Undo / Polyline / Distance / Angle / mEthod /Trim / Multiple]:

Select second line: , (.9.34,).



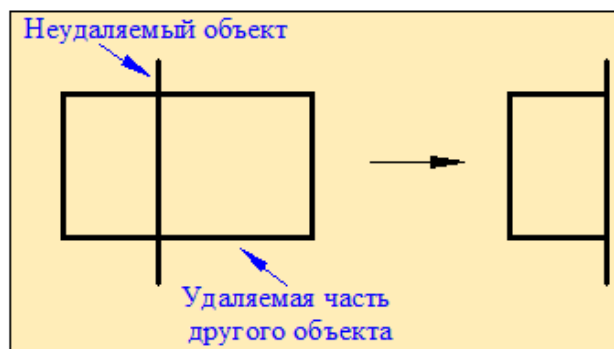
)
.9.34

TRIM ()

Command: TRIM

Select objects or <select all>: :
«ENTER».

Select objects: .9.35 Trim.



.5.35

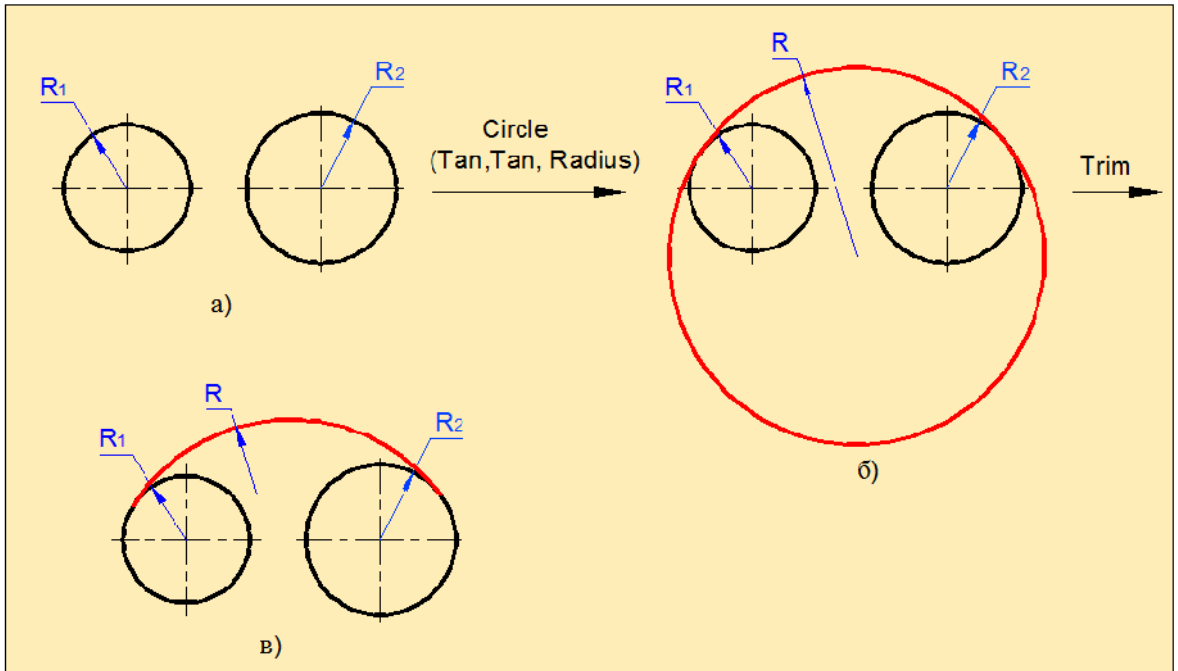
AutoCAD.

Circle (Tan, Tan, Radius) (.9.36,).

Circle (Tan, Tan, Radius) (.9.36,).

Trim

(.9.36,).



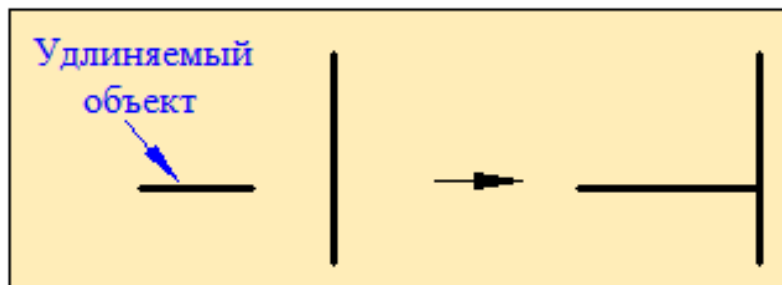
.9.36
EXTEND ()

Trim.
 ()

Command: EXTEND
 Select objects or <select all>:
 : «ENTER».

Select objects:
 .9.37

Extend.



.9.37

AutoCAD

DIMENSIONS ()

1. (Linear Dimensions).

(.9.38,).

Specify first extensions line origin or select < object >:

Specify second extensions line origin:

Specify dimension line location or [Mtext / Text/ Angle / Horizontal / Vertical / Rotated]:

2. (Aligned Dimensions).

(.9.38,).

Specify first extensions line origin or select < object >:

Specify second extensions line origin:

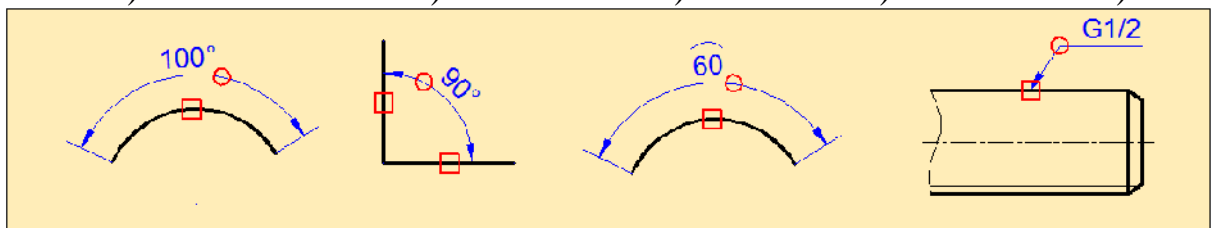
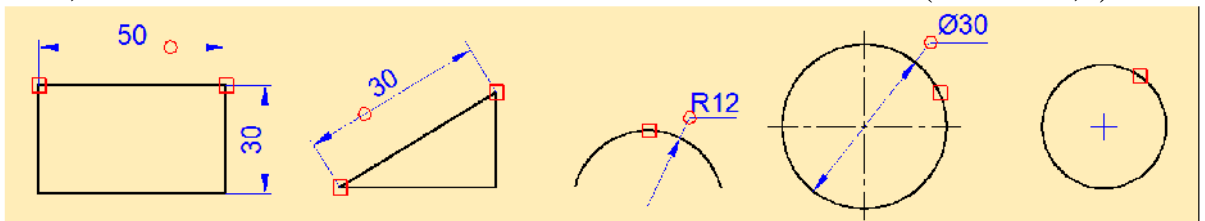
Specify dimension line location or [Mtext / Text/ Angle]:

3. (Radius).

Select arc or circle:

Specify dimension arc line location or [Mtext / Text/ Angle]:

(.9.38,).



.9.38

4. (Diameter).

Select arc or circle:

Specify dimension arc line location or [Mtext / Text/ Angle]:

(.9.38,).

5. (Center Mark).

Select arc or circle:

(.9.38,).

6. (Angular Dimensions).

Select arc , circle, line or < specify vertex >:

(.9.38,).

9.38,).

7. (Arc Length).

(.9.38,).

Select arc or polyline arc segment :

Specify dimension arc line location or[Mtext / Text/ Angle / Partial/Leader]:

8. (Multileader).

(.9.38,).

9. (Baseline).

Baseline

(.9.39,).

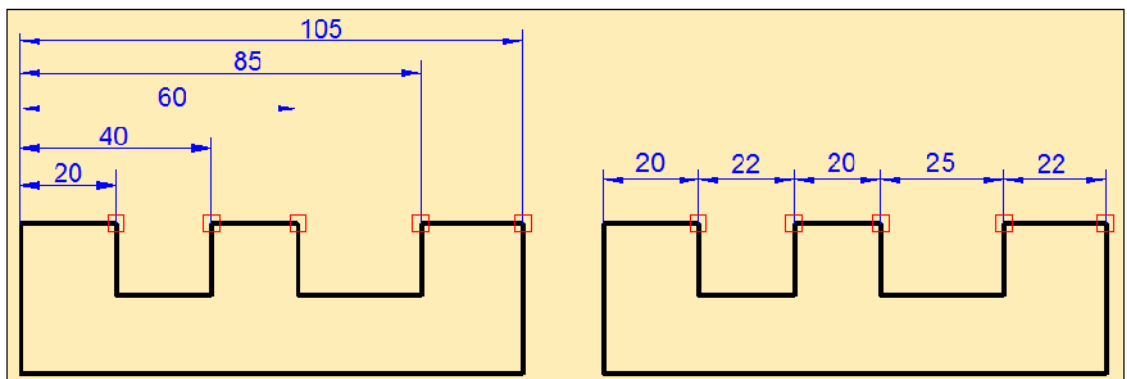
10. (Continue).

Continue

(.9.39,).

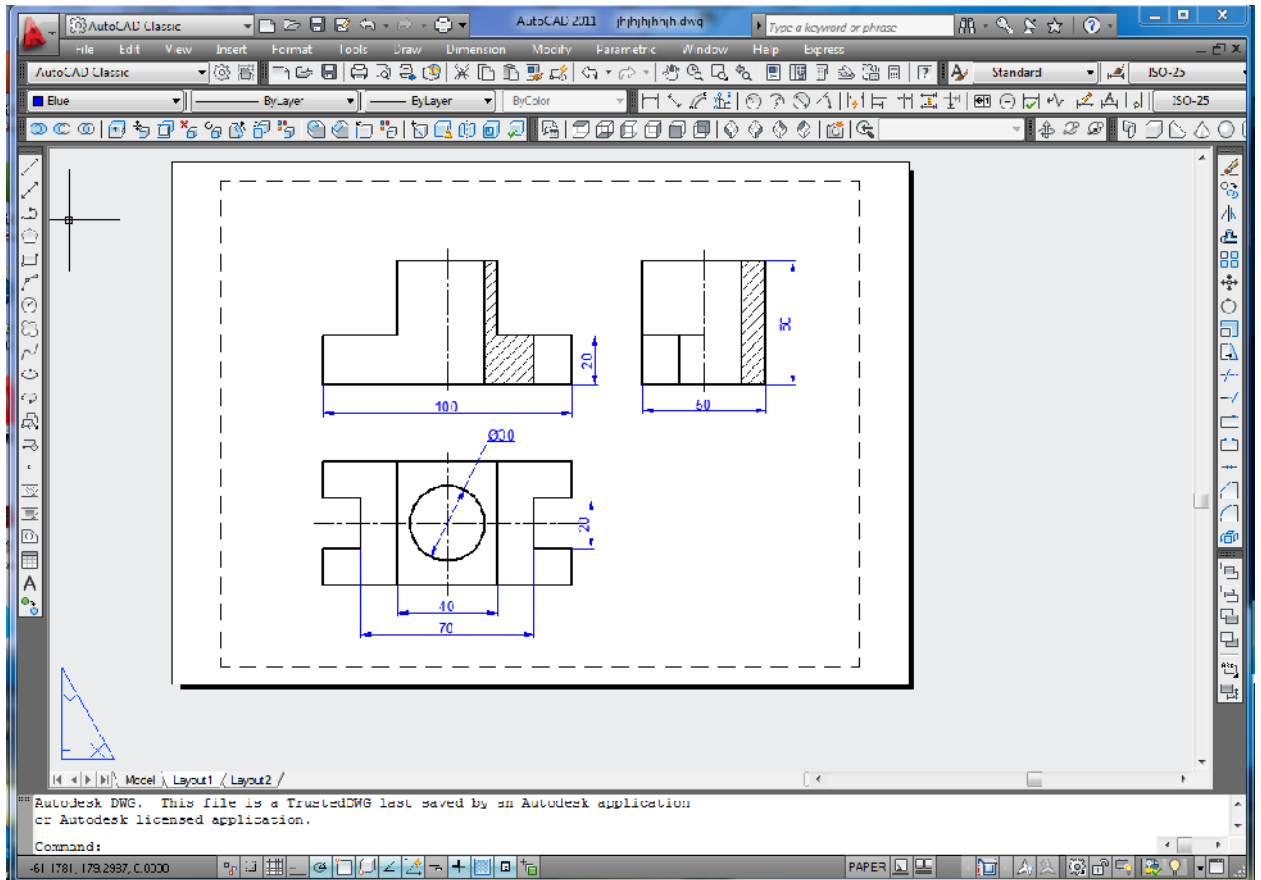
. .),

Quick Dimension



.9.39

.9.40

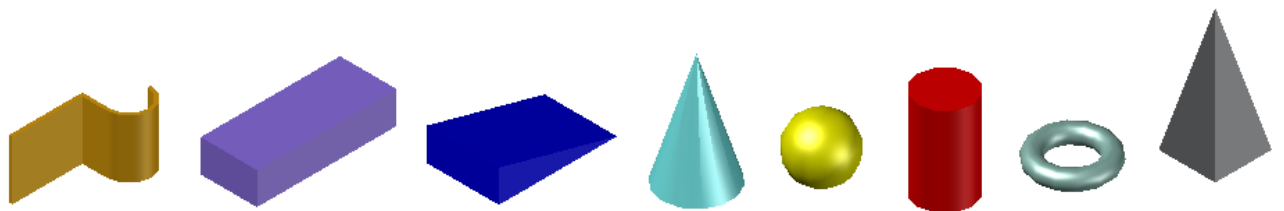


.9.40

View – 3 View – SW Isometric.

.9.42

AutoCAD.



.9.42

.9.43

(.9.43,)

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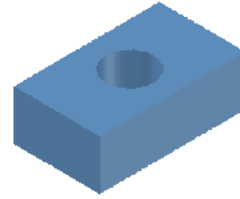
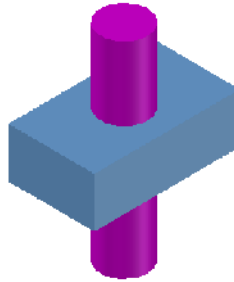
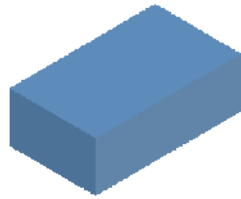
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(.9.43,),

SUBTRAKT (

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(.9.43,).



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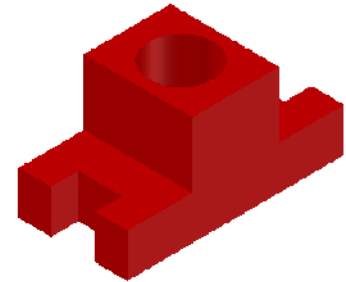
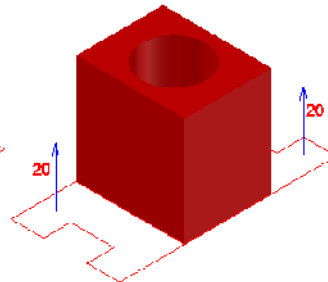
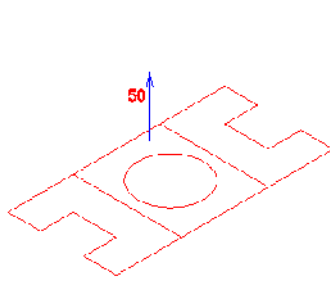
)

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.9.43

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.9.44

.9.44

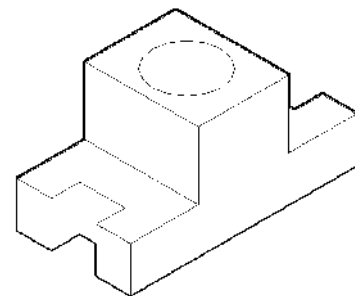
(.9.44,).

20 (.9.44,),

50 (.9.44,).

.9.45

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.9.45

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V	8
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VI

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VII C

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VIII		33
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		40
		43
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I		
	AutoCAD	49
	AutoCAD	50
	AutoCAD	51
		69
		71

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