TOSHKENT AVTOMOBIL-YO'LLAR
INSTITUTI

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CHIZMA GEOMETRIYA

AMALIY MASHG'ULOTLAR UCHUN MASALALAR TO'PLAMI

Toshkent–2010

Mazkur o‘quv qo‘llanma oily texnika o‘quv yurtlari (bakalavr) talabalari uchun mo‘ljallangan bo‘lib, 20.07.2006 yilda O‘zbekiston Respublikasi oliy va o‘rta maxsus ta’lim vazirligi tomonidan tasdiqlangan BD 5580200-3.0 sonli namunaviv dastur asosida tuzilgan ishchi dasturga muvofiq yozildi.

Ushbu qo‘llanma chizma geometriya fanidan olingan nazariy bilimlarni mustahkamlashga va pirovard natijada kerakli ko‘nikmalarga ega bo‘l ishiga xizmat qiladi.

Taqrizchilar:	prof. T.J.Azimov	TDTU “Chizma geometriya va muhandislik grafikasi” kafedrasi mudiri
	dots. S.A.Davlrtov	TTYSI “Chizma geometriya va chizmachilik” kafedrasi mudiri
	dots. R.U.Sindarov	TAYI “Chizma geometriya va grafika” kafedrasi mudiri
	dots. N.SH.Muhitdinov	TAYI “Chizma geometriya va grafika” kafedrasi dotsenti

1-mashg‘ulot

1. Chizma geometriyada figuralarni shartli ravishda belgilashlar quyidagicha qabul qilingan:

$A, B, C, D,\ldots, 1, 2, 3$	fazodagi nuqtalar
$a, b, c, d, e, h, f, m, n$	fazodagi egri va to‘g‘chiziqlar
$\theta, \Sigma, \acute{\omega}, \Omega,$	fazodagi sirtlar
P, Q, R, T	fazodagi tekisliklar
$\alpha, \beta, \gamma, \delta, \varphi$	fazodagi burchaklar
H	Gorizontal proyeksiyalar tekisligi
V	Frontal proyeksiyalar tekisligi
W	Profil proyeksiyalar tekisligi
$A', B', C', \ldots$	A,B,C,… nuqtalarning gorizontal proyeksiyalari
$A'', B'', C'', \ldots$	A,B,C,… nuqtalarning frontal proyeksiyalari
$A''', B''', C''', \ldots$	A,B,C,… nuqtalarning profil proyeksiyalari

Sirtlar, tekisliklar va burchaklarning proyeksiyalari ham yuqoridagidek belgilanadi. Tekislikning izlari esa quyidagicha belgilanadi.

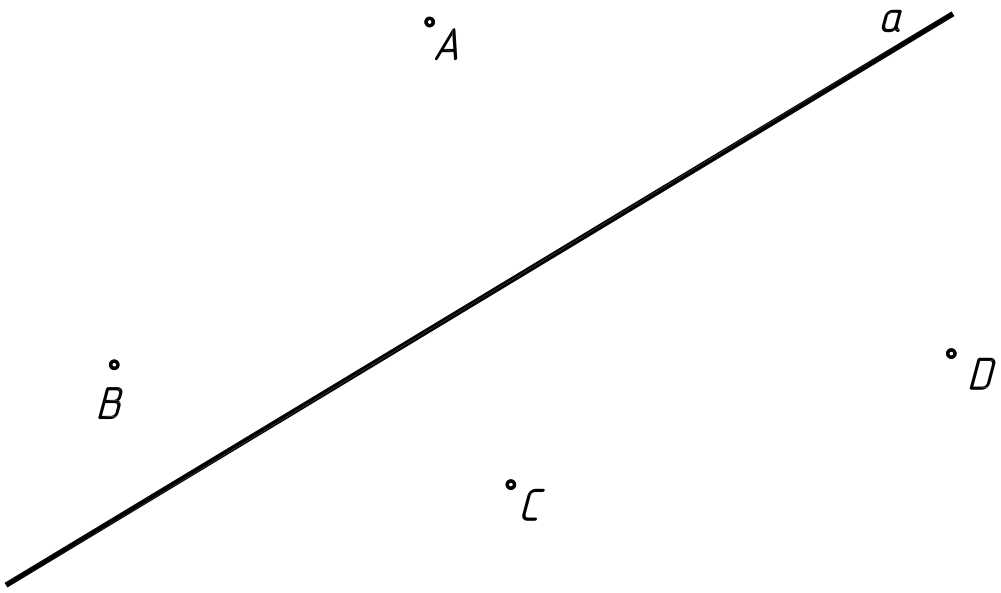
P_H	P tekislikning gorizontal izi
P_V	P tekislikning frontal izi
P_W	P tekislikning profil izi

2. Geometrik figuralarning o‘zaro munosabatlarini belgilovchi simvollar

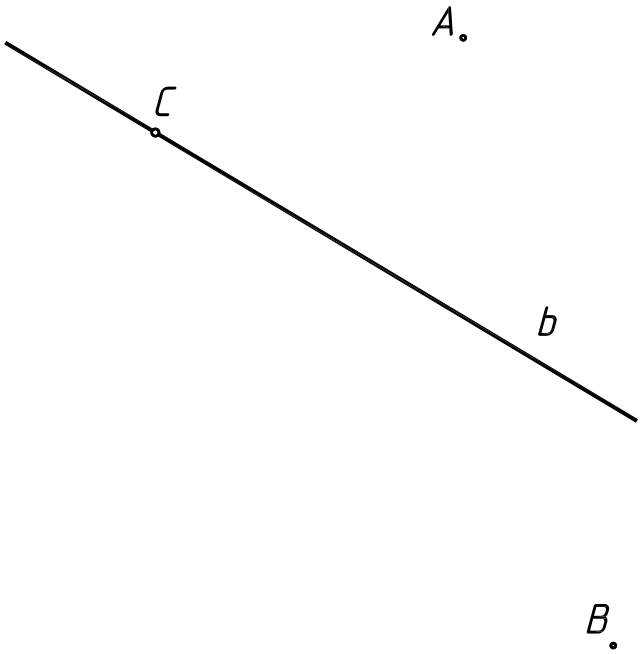
$\equiv$	Ustma-ust tushish (masalan: $A' \equiv B'$, $A'' \equiv B''$, $a'' \equiv P_H$)
$=$	Tenglik (masalan: $\lvert AB\rvert=\lvert CD\rvert$ yoki $\Delta ABC = \Delta DEF$)
$\parallel$	Parallel (masalan: $a \parallel b$, $P_H \parallel Q_H$)
$\perp$	Perpendikulyar (masalan: $a \perp b$, $a' \perp P_H$, $a'' \perp P_V$)
$\dot{-}$	Uchrashmas (ayqash) (masalan: $a \dot{-} b$, $c \dot{-} d$)
$\in$	Nuqtaning figuraga tegishliligi (masalan: $A \in P$, $B \in Q$ va h.k.)
$\subset$	Figuraning boshqa figuraga tegishliligi (masalan: $a \subset P$, $b \subset Q$ va h.k.)
$\cap$	Figuralarning o‘zaro kesishuvi(masalan: $a \cap P$, $P \cap Q$, $P_H \cap Q_H$ va h.k.)
$\llcorner$ yoki $\lrcorner$	Ikki to‘g‘ri chiziqning o‘zaro perpendikulyarligi
$\frac{V}{H} \Rightarrow \frac{V_1}{H}$	$\frac{V}{H}$ proyeksiyalar tekisliklari sistemasidan $\frac{V_1}{H}$ sistemaga o‘tish
	Gorizontal proyeksiyalovchi to‘g‘ri chiziq atrofida aylantirish
	Frontal proyeksiyalovchi to‘g‘ri chiziq atrofida aylantirish
	Gorizontal to‘g‘ri chiziq atrofida aylantirish
	Frontal to‘g‘ri chiziq atrofida aylantirish
	Gorizontal proyeksiyalar tekisligiga nisbatan parallel harakatlantirish
	Frontal proyeksiyalar tekisligiga nisbatan parallel harakatlantirish

Figuralarning fazodagi vaziyatlari va tekislikdagi proyeksiyalarini yasashda kerak bo‘lgan ba’zi geometrik yasashlar

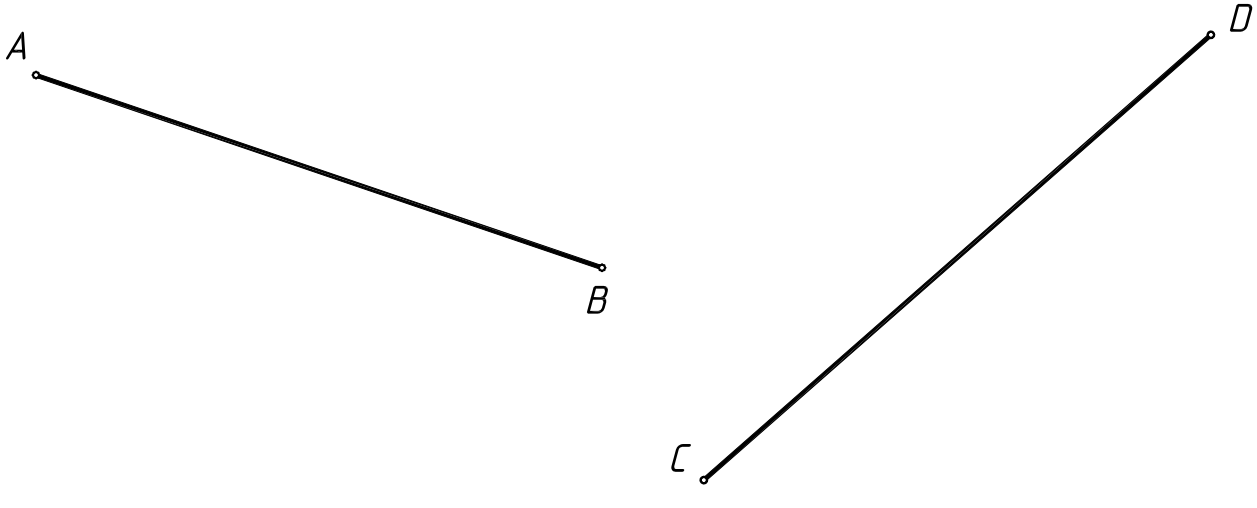
1. Berilgan ***a*** to‘g‘ri chiziqga parallel bo‘lgan to‘g‘ri chiziqlarni ***A***, ***B***, ***C*** va ***D*** nuqtalar orqali o‘tkazing.



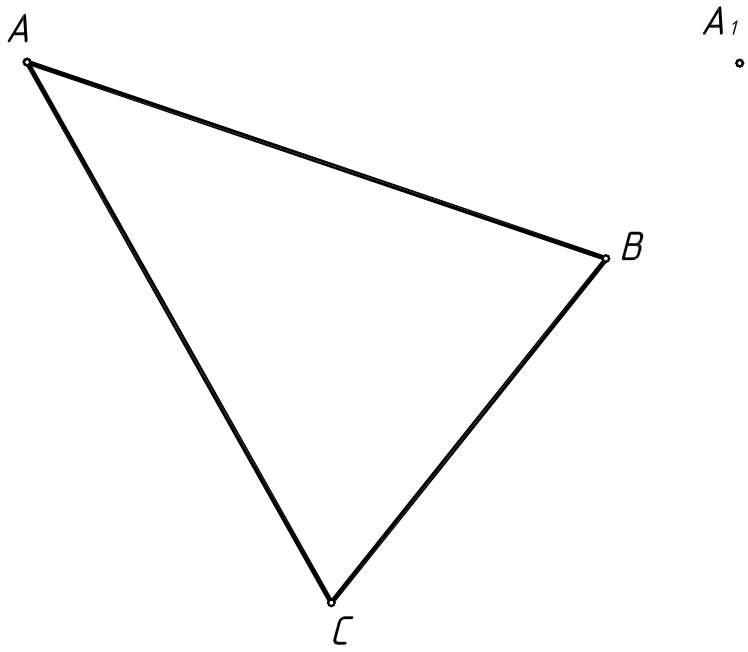
2. Berilgan ***b*** to‘g‘ri chiziqga perpendikulyar to‘g‘ri chiziqlarni ***A***, ***B*** va ***C*** nuqtalar orqali o‘tkazing.



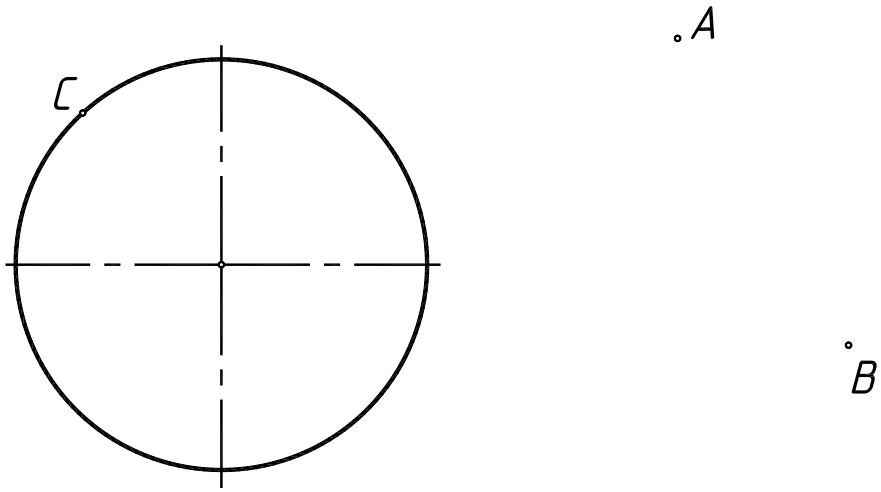
3. Berilgan ***AB*** kesmani 2:3 nisbatda, ***CD*** kesmani esa 3:4 nisbatda bo‘ling.



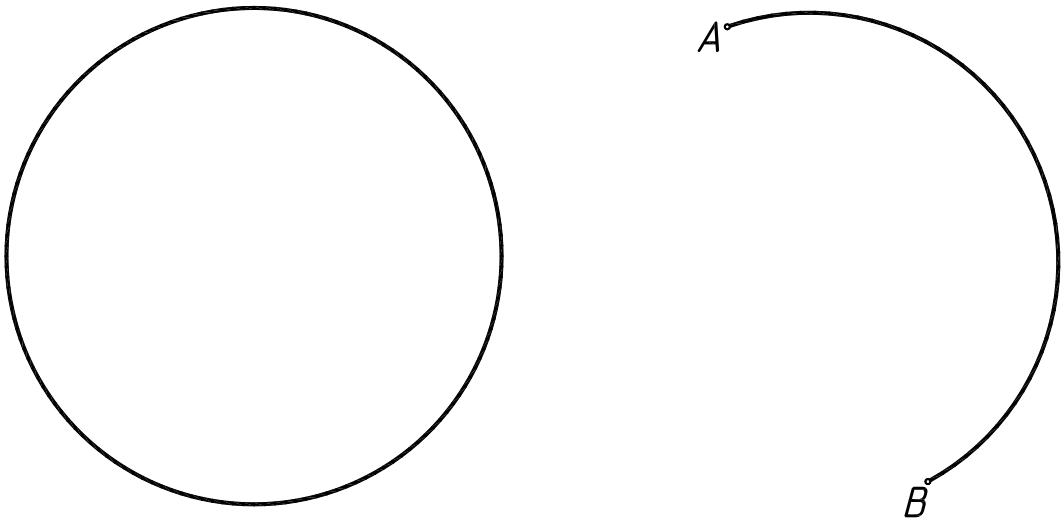
4. Berilgan ***ABC*** uchburchakka teng bo‘lgan $A_1B_1C_1$ uchburchakni yasang.



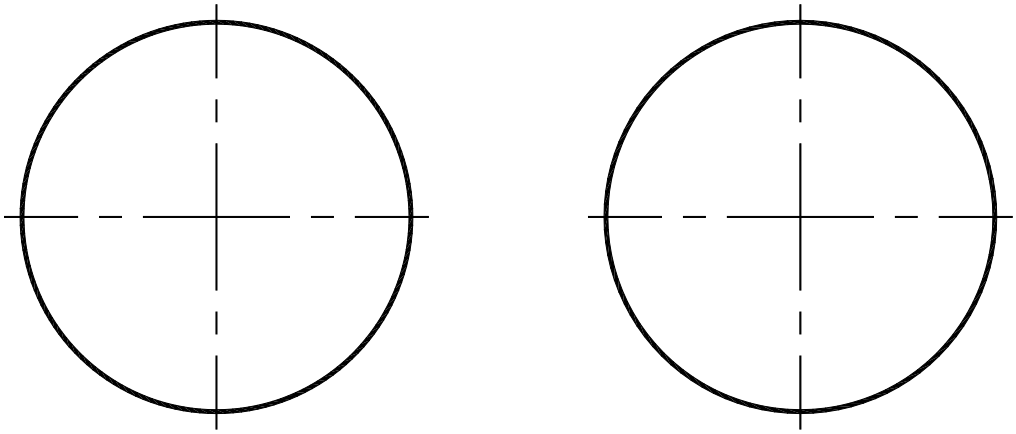
5. Berilgan aylanaga urinma to‘g‘ri chiziqlarni ***A***, ***B*** va ***C*** nuqtalar orqali o‘tkazing.



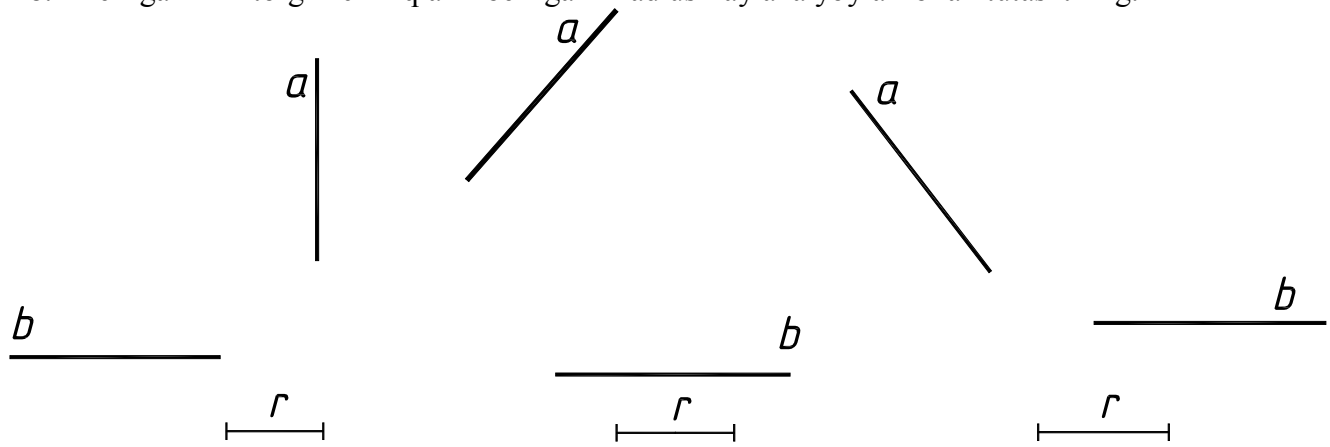
6. Berilgan aylana va ***AB*** aylana yoyi markazini toping.



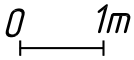
7. Berilgan aylanani 3, 5 va 6 ta teng bo‘laklarga bo‘ling.



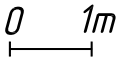
8. Berilgan ikki to‘g‘ri chiziqlarni berilgan ***r*** radiusli aylana yoylari bilan tutashtiring.



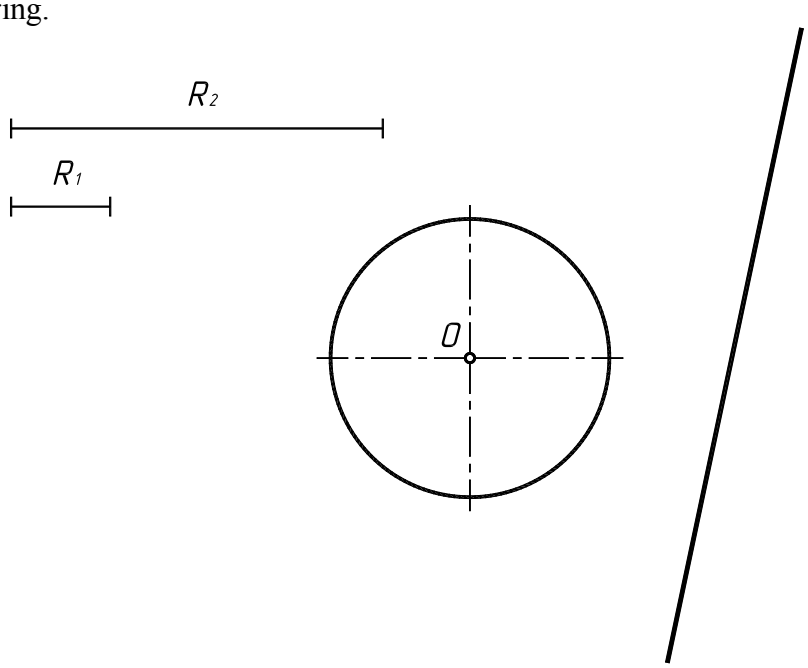
9. Qiyaligi **1:3**, **3:5** va **1:8** bo‘lgan to‘g‘ri chiziqlar chizing.



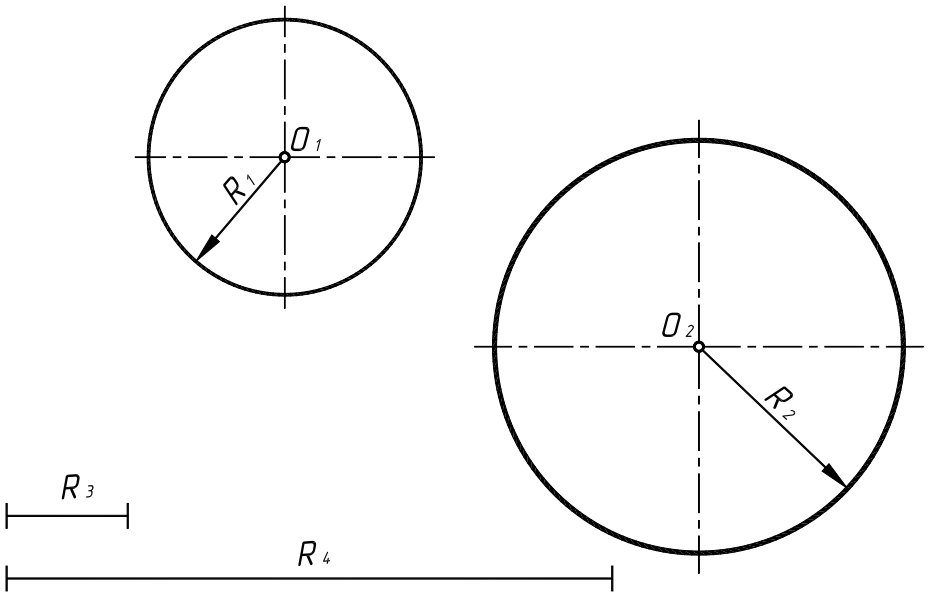
10. Konusligi **3:5** va 1:3 bo‘lgan to‘g‘ri chiziqlarni chizing.



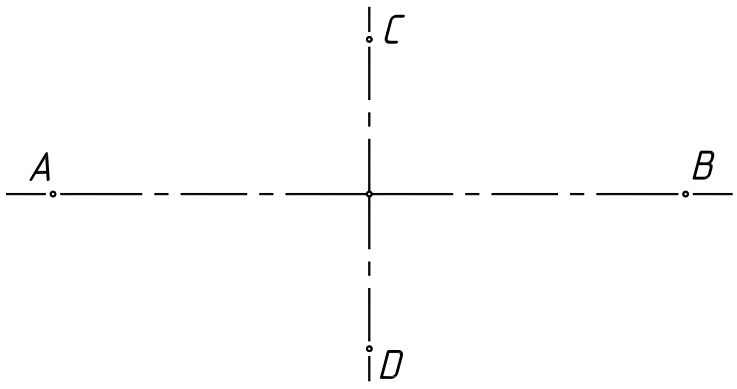
11. Berilgan aylana va to‘g‘ri chiziqni R_1 radiusli aylana bilan tashqi va R_2 radiusli aylana bilan esa ichki tutashtiring.



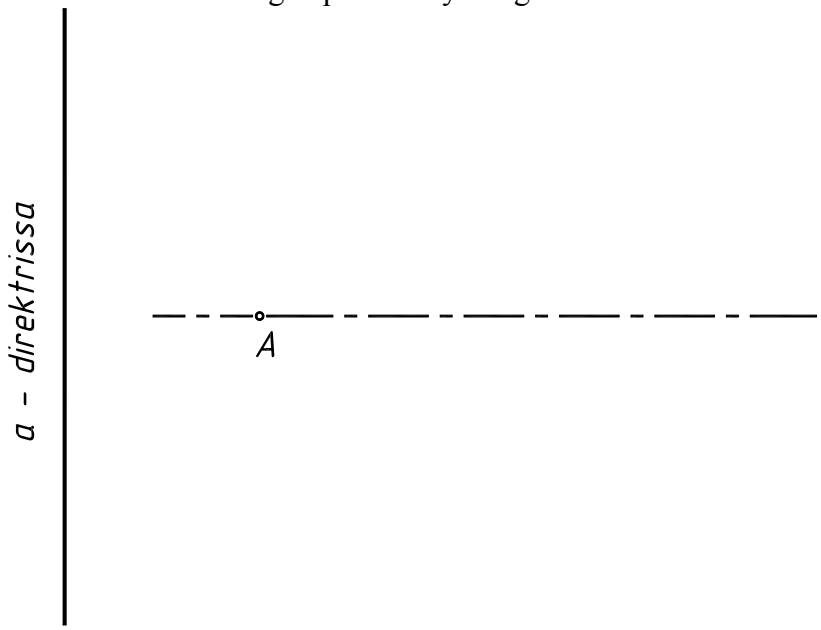
12. Berilgan ikki aylanani R_3 radiusli aylana bilan tashqi va R_4 radiusli aylana bilan esa ichki tutashtiring.



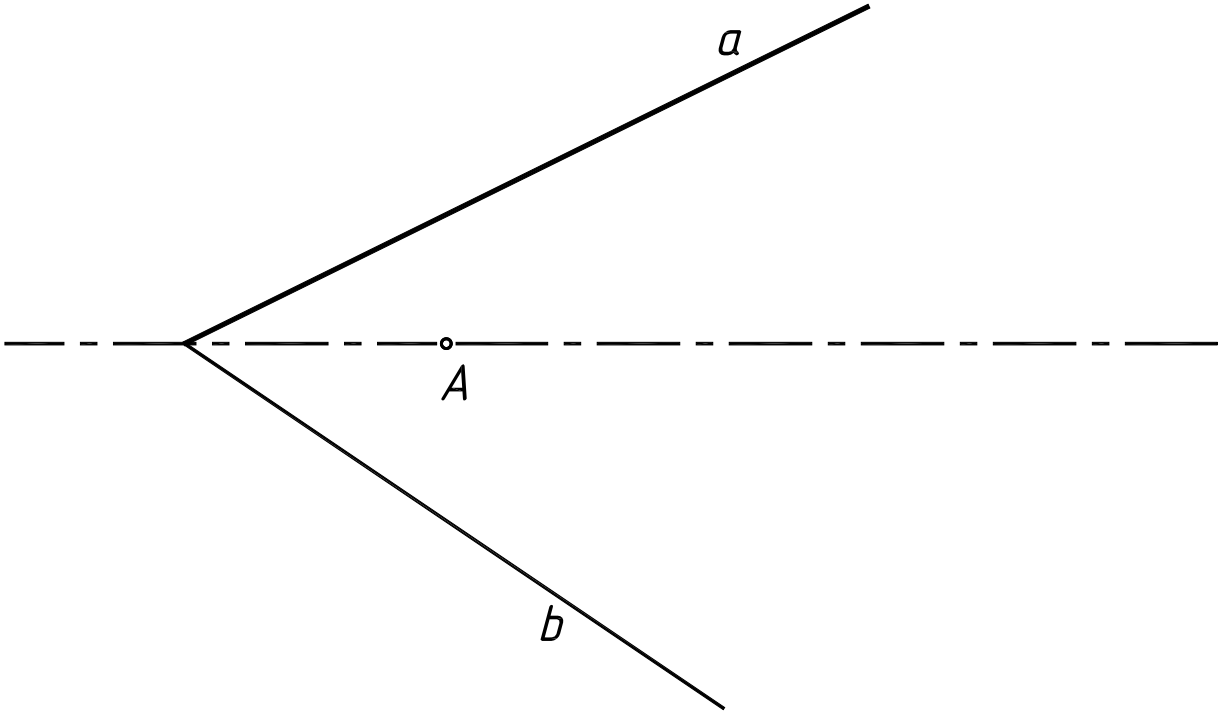
13. ***AB*** katta va ***CD*** kichik o‘qlari berilgan ellipsni yasang.



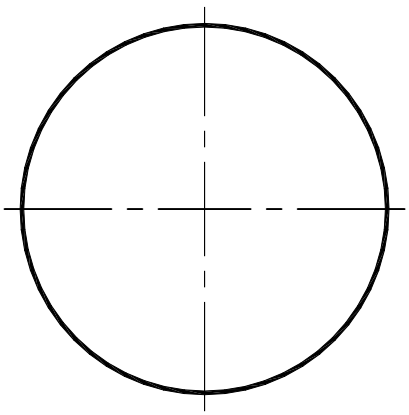
14. ***F*** - fokusi va ***a*** – direktrissasi berilgan parabola yasang.



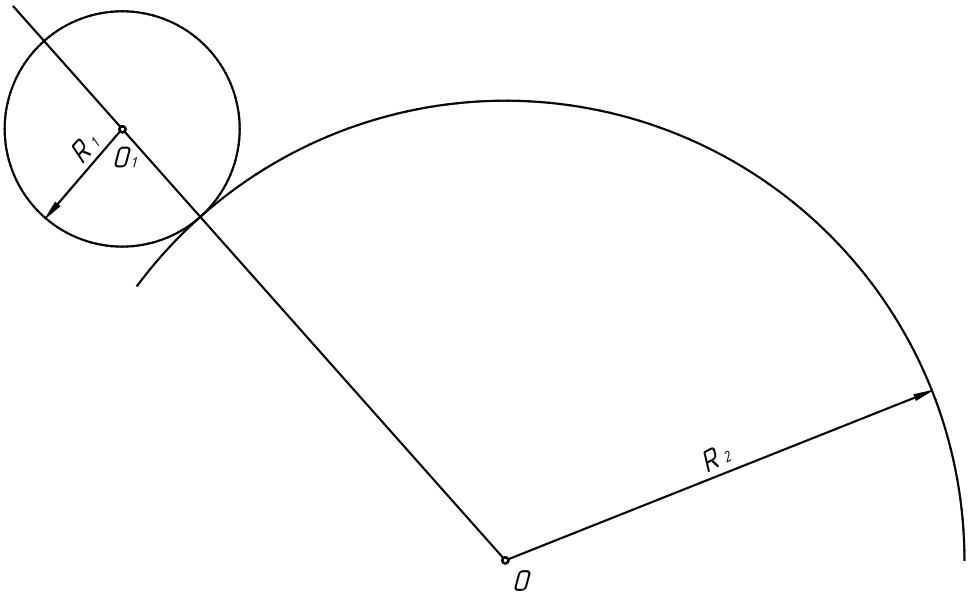
15. *A*-uchi hamda ***a*** va ***b*** asimtotalari berilgan giperbolani yasang.



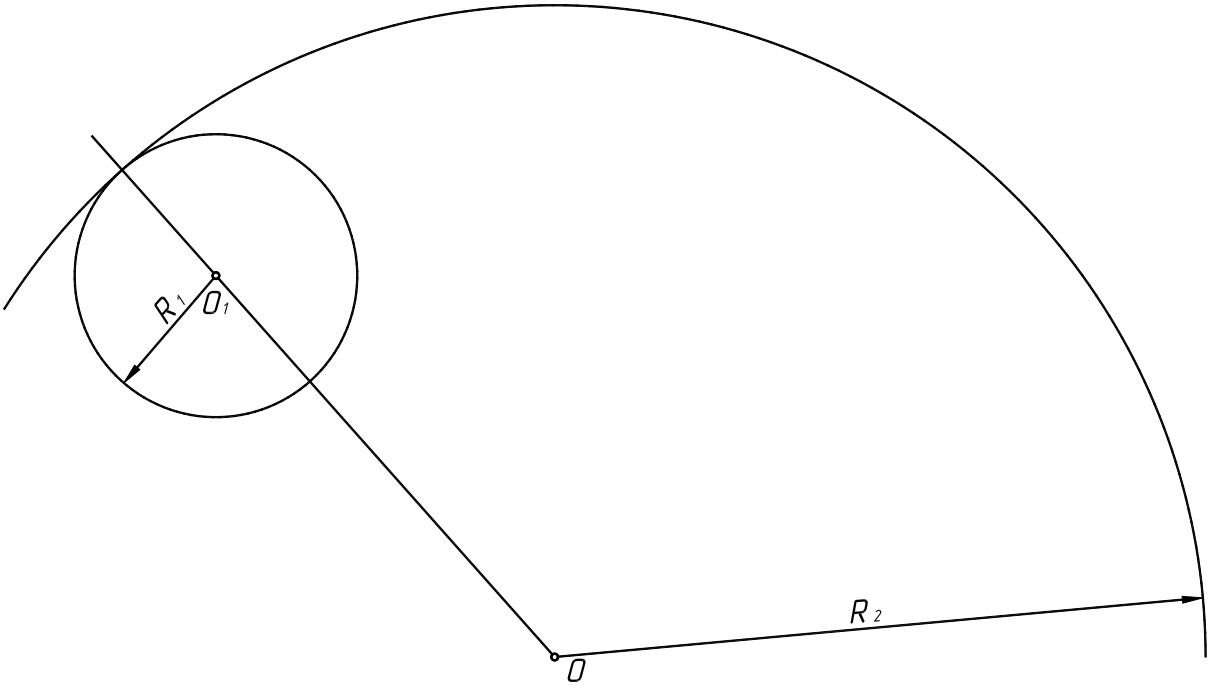
16. Berilgan aylanani 12 ta teng bo‘laklarga bo‘lib, so‘ng sikloida chizig‘ini yasang.



17. Agar R_1 – yasovchi va R_2 – yo‘naltiruvchi aylanalarning radiuslari berilgan bo‘lsa, epitsikloida chizig‘ini yasang. $R_1=R_2$ bo‘lsa qanday chiziq hosil bo‘ladi.



18. R_1 yasovchi va R_2 yo‘naltiruvchi aylanalarning radiuslari berilgan bo‘lsa, giposikloida chizig‘ini yasang.



2-mashg‘ulot

Mavzu: Nuqta

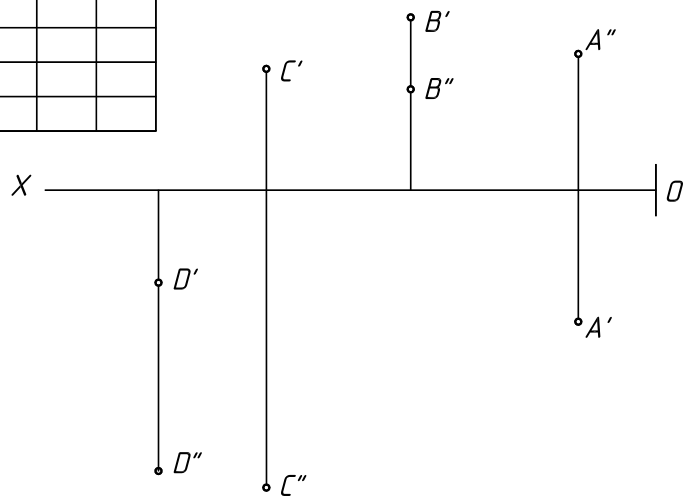
Mavzuni xotirada tiklash uchun savollar.

1. Buyumlarning tasvir (proyeksiya)lari qay tarzda hosil qilinadi?
2. Ortogonal proyeksiyalashda H va V proyeksiyalar tekisliklari o‘zaro qanday vaziyatda bo‘ladi?
3. Proyeksiyalar tekisliklari deganda nimani tushunasiz?
4. Proyeksiyalar yoki koordinatalar o‘qi nima?
5. Nuqtaning gorizontal (frontal va profil) proyeksiyalari qanday hosil qilinadi?
6. Nuqtaning ortogonal proyeksiyalari o‘zaro qanday vaziyatda joylashgan bo‘ladi?
7. Nuqtadan H,V, va W tekisliklargacha bo‘lgan masofalari qanday nomlanadi?
8. Nuqtaning fazodagi vaziyatini uning nechta koordinatasi (yoki proyeksiyasi) aniqlab bera oladi?

1 – masala

Berilgan ***A***, ***B***, ***C*** va ***D*** nuqtalarning koordinatalari son qiymatlarini hisoblab toping va ularni jadvalning keraklli katakchalariga yozing.

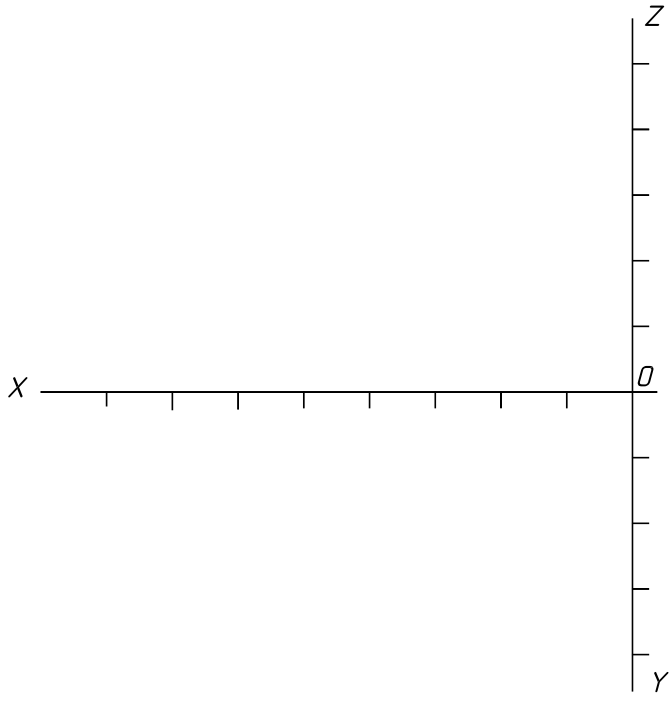
	X	Y	Z
A			
B			
C			
D			



2 – masala

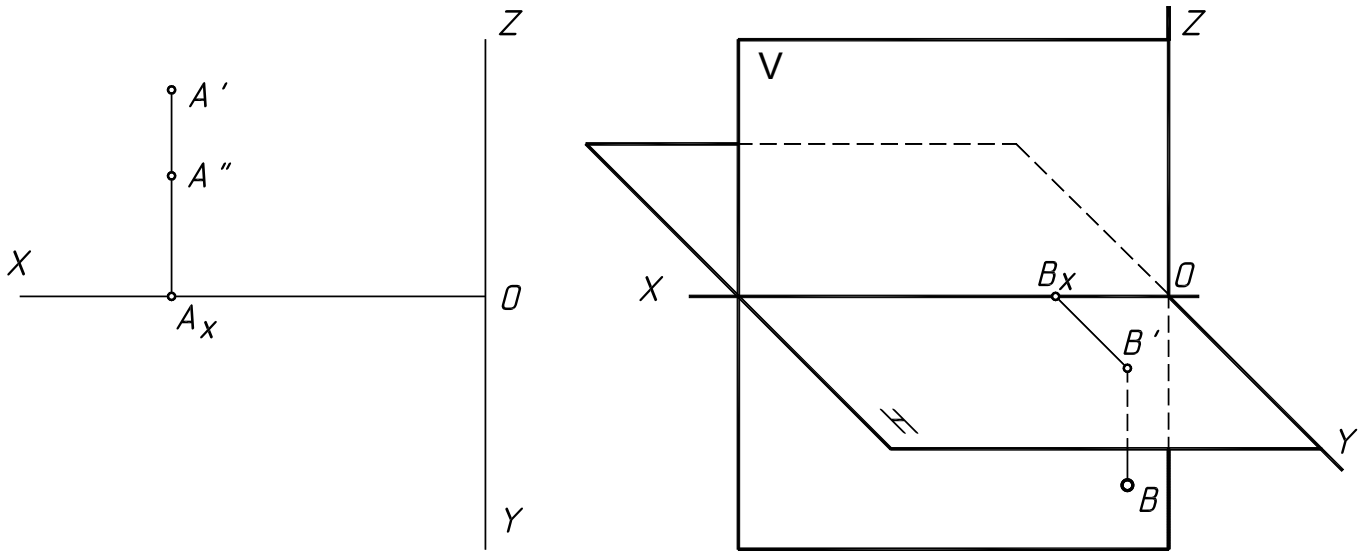
Berilgan ***A***, ***B***, ***C***, ***D***, ***E***, ***F***, ***M*** va ***N*** nuqtalarning gorizontal va frontal proyeksiyalarini yasang.

	X	Y	Z
A	0	25	40
B	35	45	-20
C	60	40	0
D	70	-45	0
E	80	-30	-30
F	45	-20	25
M	10	0	50
N	20	0	-35



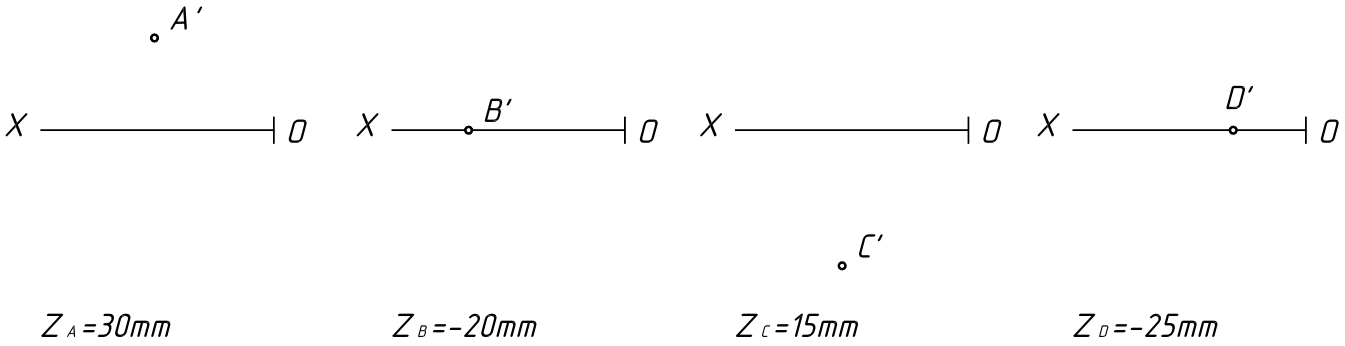
3 – masala

A nuqtaning epyuriga ko‘ra uning fazodagi o‘rni, ***B*** nuqtaning fazodagi o‘rniga ko‘ra epyuri yasalsin.



4 – masala

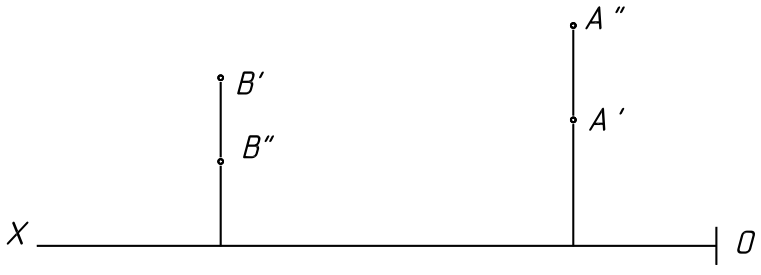
A, ***B***, ***C*** va ***D*** nuqtalarning bittadan proyeksiyalari va yetishmaydigan koordinatalarining son qiymatlari berilgan. Ushbu nuqtalarning ikkinchi proyeksiyalari topilsin va ular fazoning qaysi choragida joylashganligi aniqlansin.



$Z_A = 30mm$ $Z_B = -20mm$ $Z_C = 15mm$ $Z_D = -25mm$

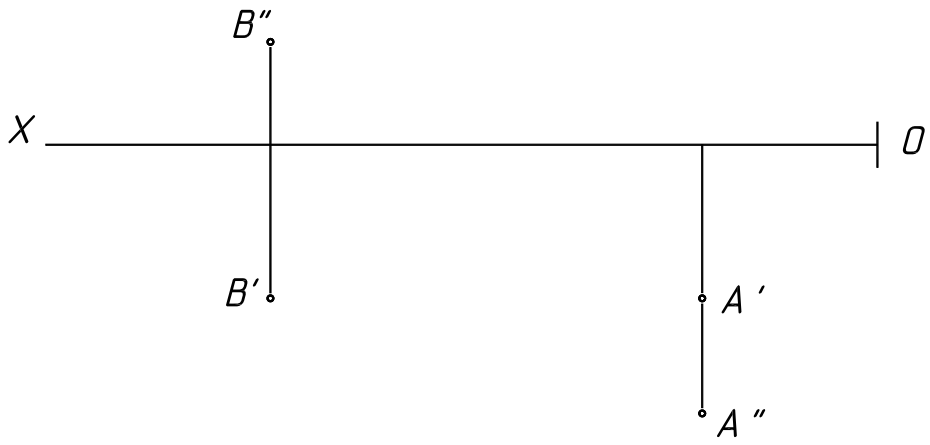
5 – masala

A nuqtaga ***V*** – frontal, ***B*** nuqtaga esa ***H*** – gorizontal proyeksiyalar tekisligiga nisbatan simmetrik bo‘lgan nuqtalarning proyeksiyalari yasalsin.



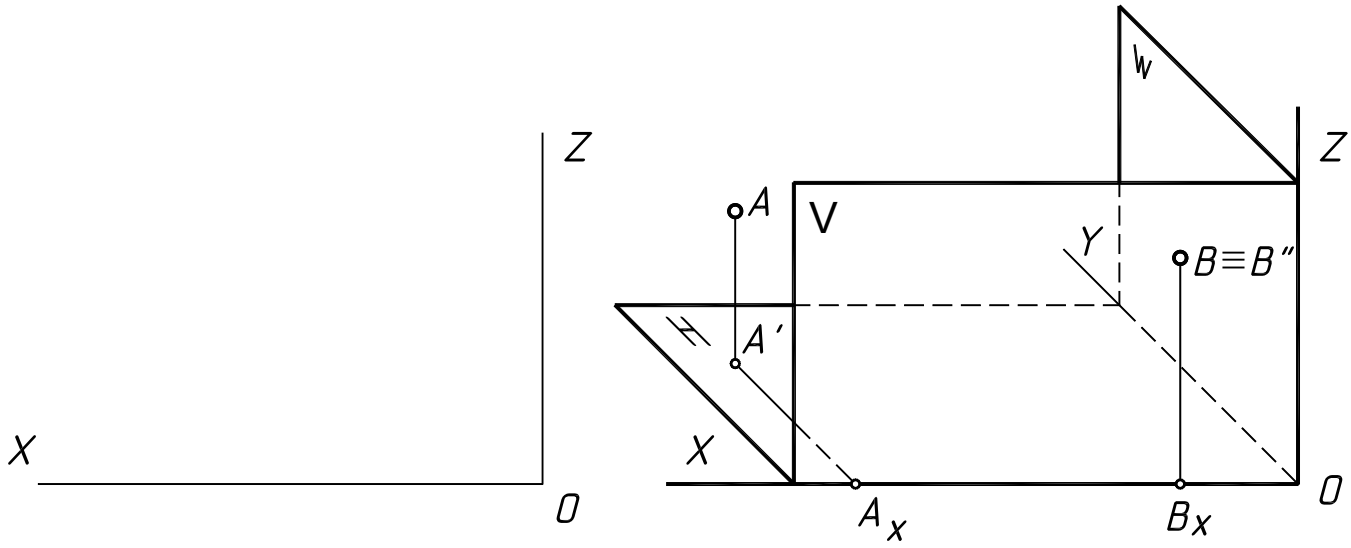
6 – masala

A va ***B*** nuqtalarga ***OX*** – o‘qiga nisbatan simmetrik bo‘lgan nuqtalarning proyeksiyalari yasalsin.



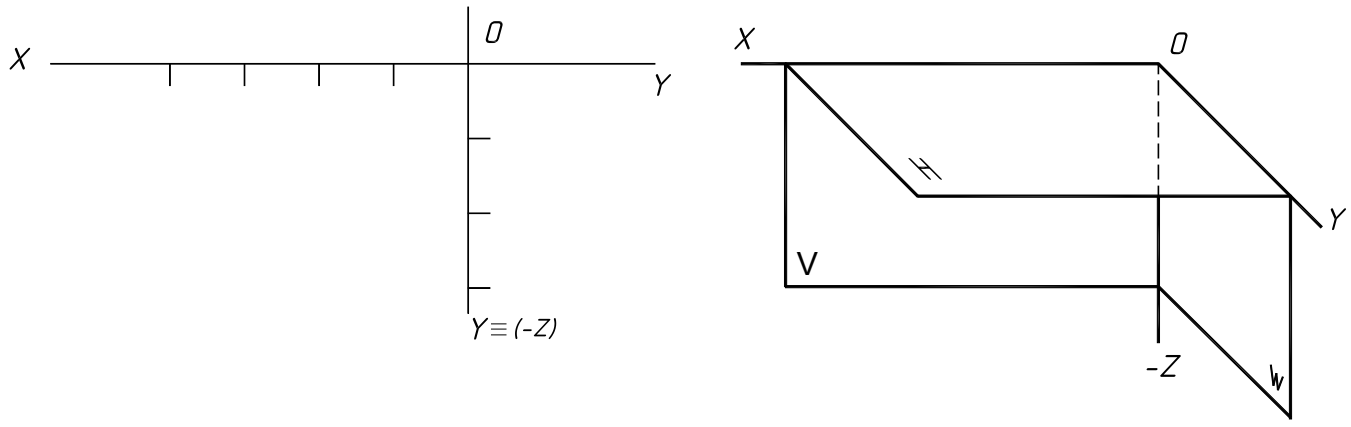
7 – masala

Ikkinchi oktanda joylashgan ***A*** va ***B*** nuqtalarning proyeksiyalari va kompleks chizmasi(epyur)dagi uchta proyeksiyasi yasalsin.



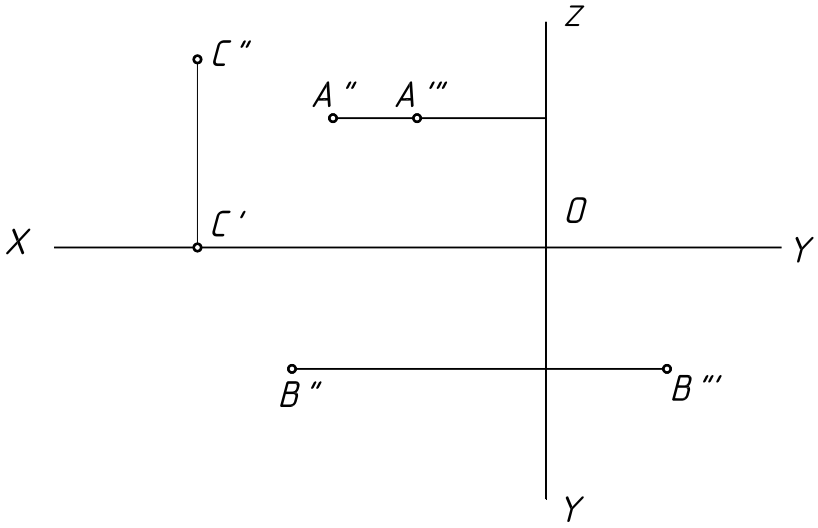
8 – masala

To‘rtinchi oktanda joylashgan hamda koordinatalari bilan berilgan ***A*** va ***B*** nuqtalarning proyeksiyalari va kompleks chizmasidagi uchta proyeksiyasi yasalsin. ***A*(20,5,-30)**, ***B*(40,10,-15)**



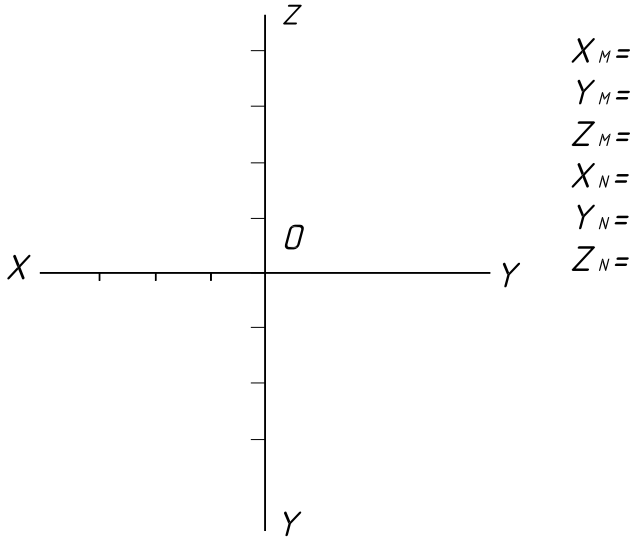
9 – masala

A, ***B***, va ***C*** nuqtalarning yetishmagan uchinchi proyeksiyalari yasalsin.



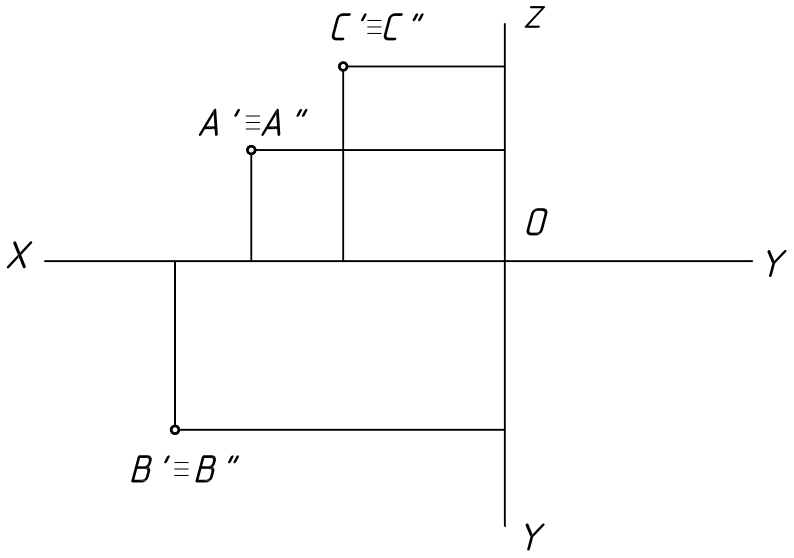
10 – masala

Agar ***M*** nuqta ***H*** proyeksiyalar tekisligidan ***40 mm***
V proyeksiyalar tekisligidan ***-30 mm***
W proyeksiyalar tekisligidan ***-15 mm*** masofada turgan bo‘lsa, uning uch proyeksiyasi yasalsin. ***M*** nuqtaga ***OX*** o‘qiga nisbatan simmetrik bo‘lgan ***N*** nuqtaning proeksiyalari yasalsin. Bu nuqtalarning koordinatalari qiymatlarini yozing.



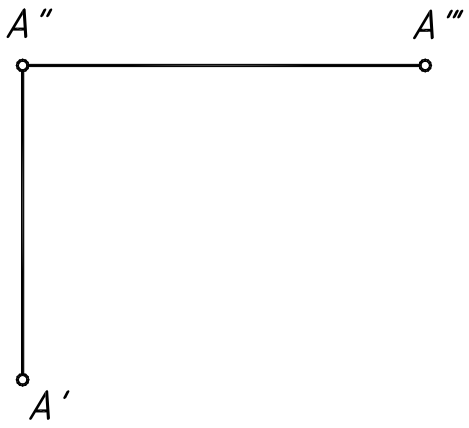
11 – masala

A, ***B***, va ***C*** nuqtalarning yetishmagan uchinchi proyeksiyalari yasalsin.



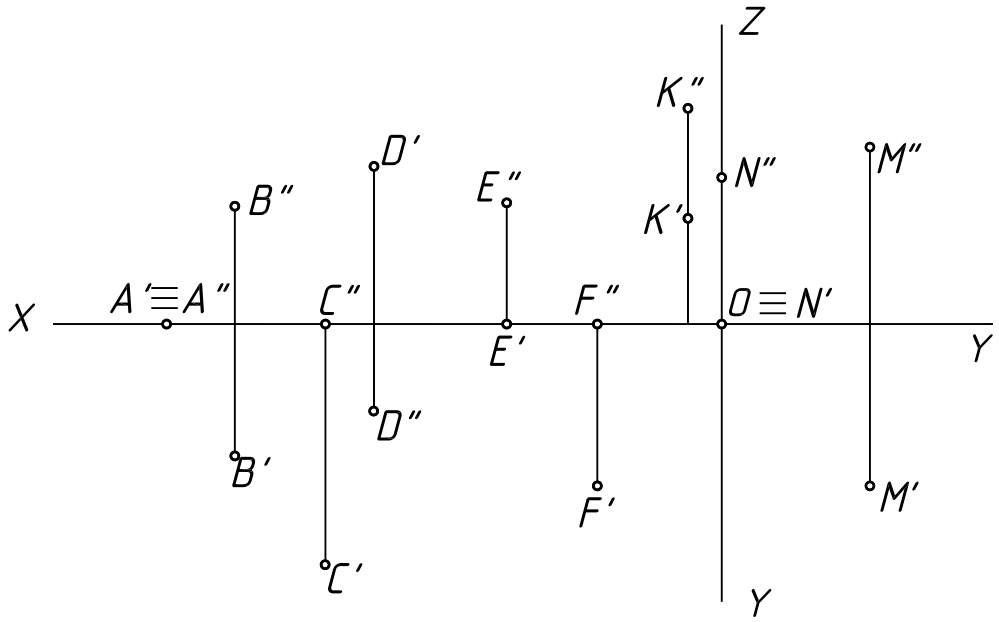
12 – masala

Ordinatasi y_A= **-25** bo'lgan ***A*** nuqtaning uchta proyeksiyasi berilgan bo'lsa proyeksiyalar o'qlarini o'tkazing.



13 – masala

Proyksiyalari bilan berilgan nuqtalarning fazoning nechanchi choragida yoki proeksiyalar tekisliklarining qaysi birida joylashganligini aniqlang va jadvalga yozing.



A	
B	
C	
D	
E	
F	
M	
N	
K	

3-mashg‘ulot

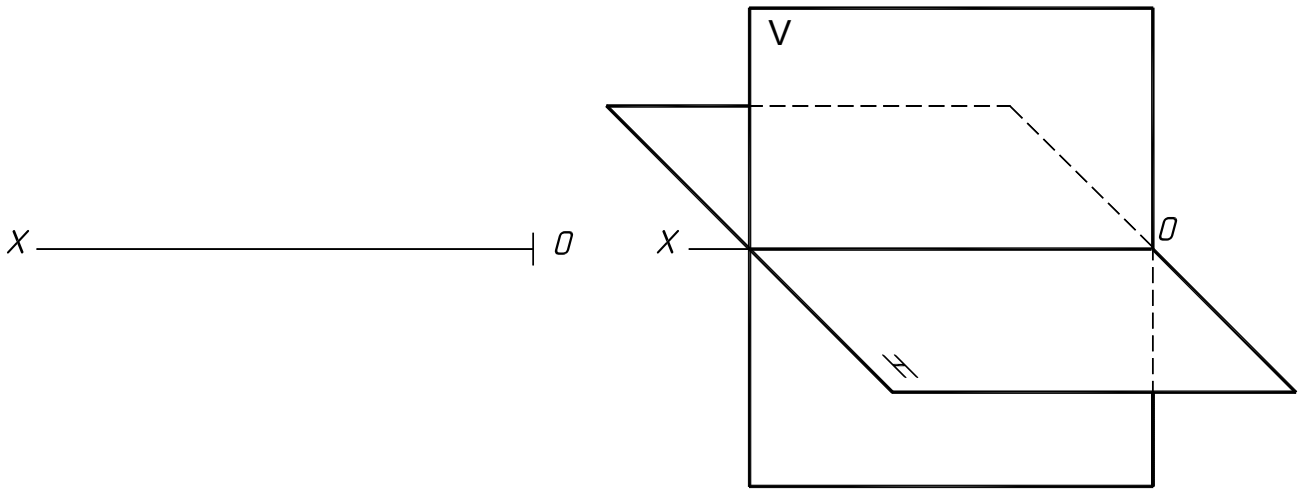
Mavzu: To‘g‘ri chiziq

Mavzuni xotirada tiklash uchun savollar.

1. To‘g‘ri chiziqning proyeksiyalari kompleks chizma(epyur)da qanday hosil qilinadi?
2. To‘g‘ri chiziqning izlari nima?
3. To‘g‘ri chiziq H,V va W proyeksiyalar tekisliklariga nisbatan qanday vaziyatlarda bo‘lishi mumkin?
4. Gorizontal proyeksiyalovchi va gorizontal to‘g‘ri chiziqlarni tushuntirib bering.
5. Frontal va frontal proyeksiyalovchi to‘g‘ri chiziqlarni qanday farqlaysiz?
6. Og‘ma vaziyatdagi kesmaning haqiqiy uzunligi kompleks chizma(epyur)da qanday yasaladi?
7. Kesmaning H, V va W proyeksiyalar tekisliklariga og‘ish burchaklari qanday aniqlanadi?
8. Ikki to‘g‘ri chiziq o‘zaro qanday vaziyatlarda joylashishi mumkin?
9. O‘zaro parallel to‘g‘ri chiziqlarning proyeksiyalari qanday bo‘ladi?
10. O‘zaro kesishuvchi to‘g‘ri chiziqlarning proyeksiyalari qanday bo‘ladi?
11. Ayqash (uchrashmas) to‘g‘ri chiziqlarga tegishli bo‘lgan konkurent nuqtalar yordamida ko‘rinishlilik qanday aniqlanadi?
12. To‘g‘ri burchakning proyeksiyasi haqidagi teoremani tushuntirib bering.

1 – masala

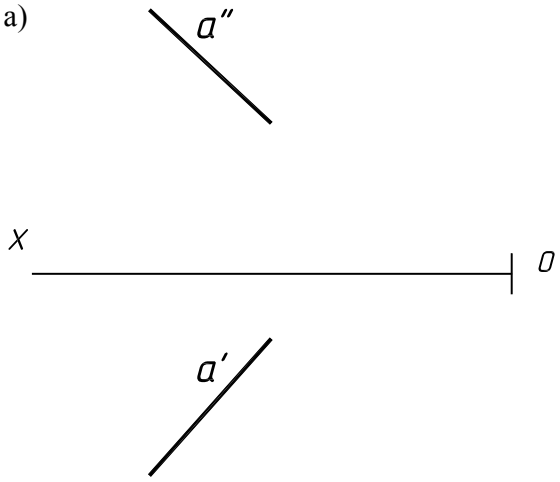
***A*(10,50,-15)** va ***B*(60,-30,25)** nuqtalardan o‘tgan to‘g‘ri chiziqning proyeksiyalari va yaqqol tasviri chizilsin.



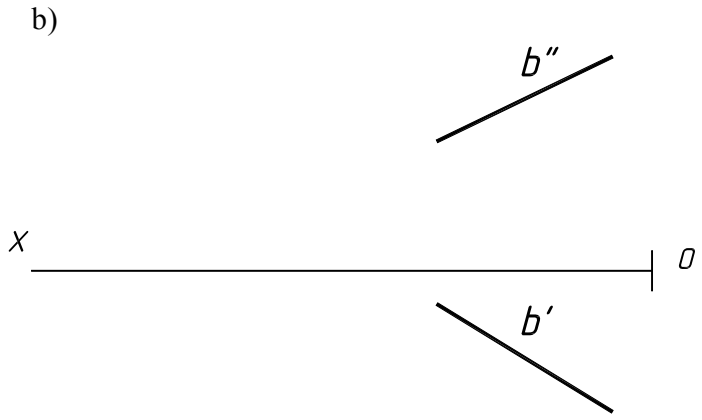
2 – masala

a, b, c, d, e to‘g‘ri chiziqlarning gorizontal va frontal izlari yasalsin.

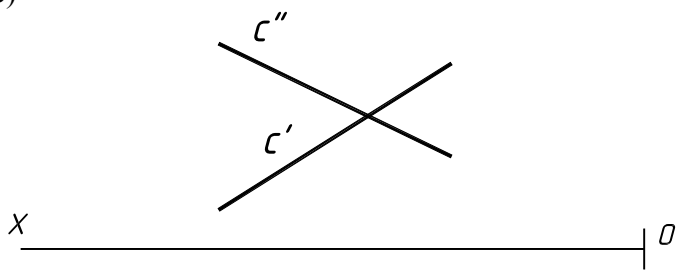
a)



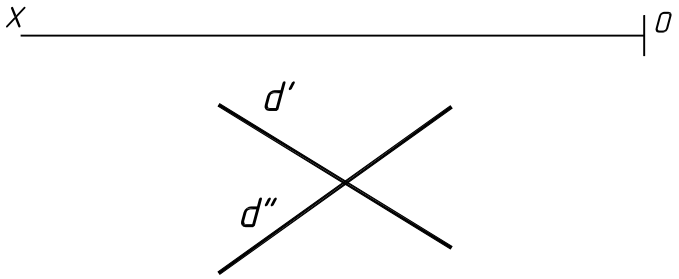
b)



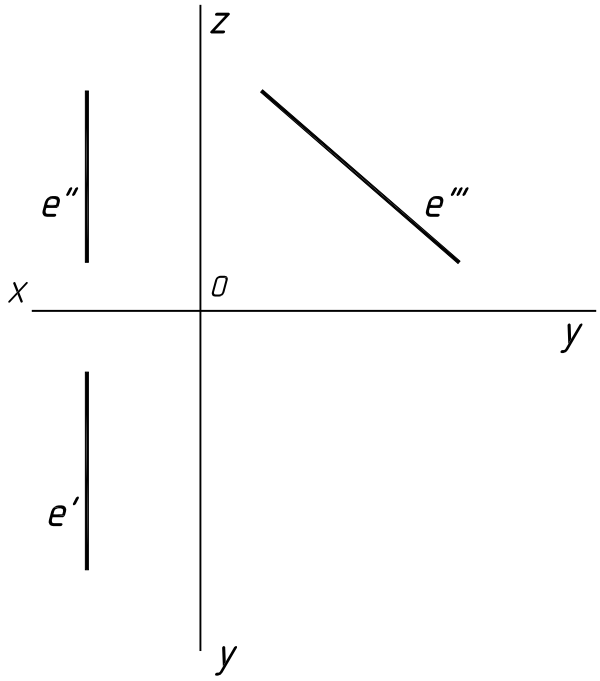
c)



d)

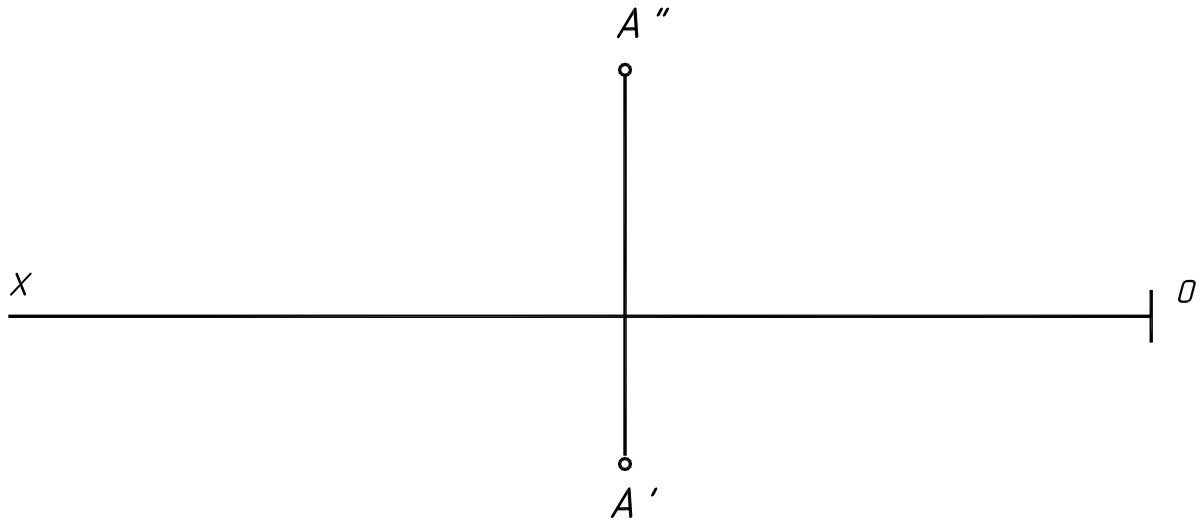


e)



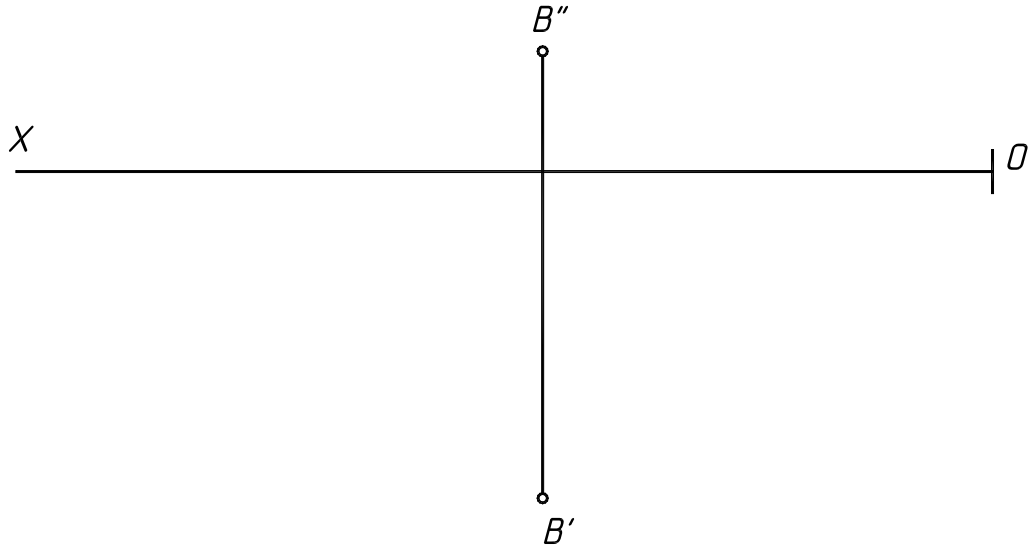
3 – masala

Berilgan ***A*** (***A′***, ***A″***) nuqta orqali frontal to‘g‘ri chiziqni ***H*** tekislikga 30° ga og‘ma vaziyatda o‘tkazing. Bunday to‘g‘ri chiziqlar nechta o‘tkazilishi mumkin.



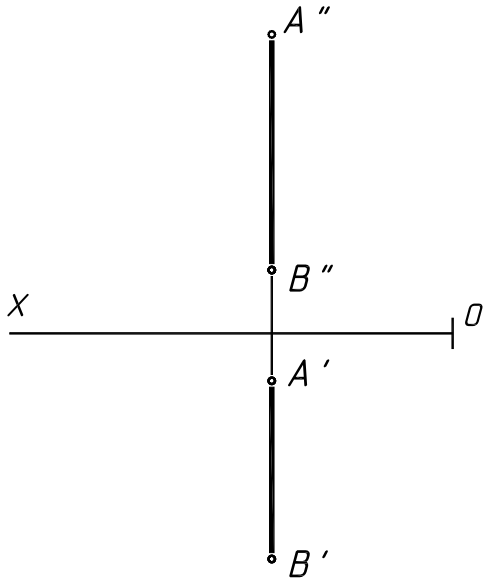
4 – masala

Berilgan ***B*** (***B′***, ***B″***) nuqta orqali gorizontal to‘g‘ri chiziqni ***V*** proyeksiyalar tekisligiga **45°** ga og‘ma vaziyatda o‘tkazing. Bunda masalaning nechta yechimi bor.



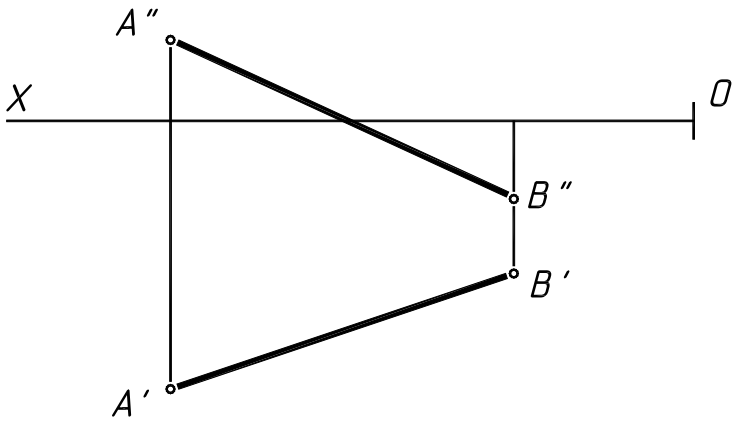
5 – masala

AB (***A′B′***, ***A″B″***) kesmaga ***A*** (***A′***, ***A″***) nuqtadan boshlab ***20 mm*** uzunlikdagi kesma qo‘yilsin.



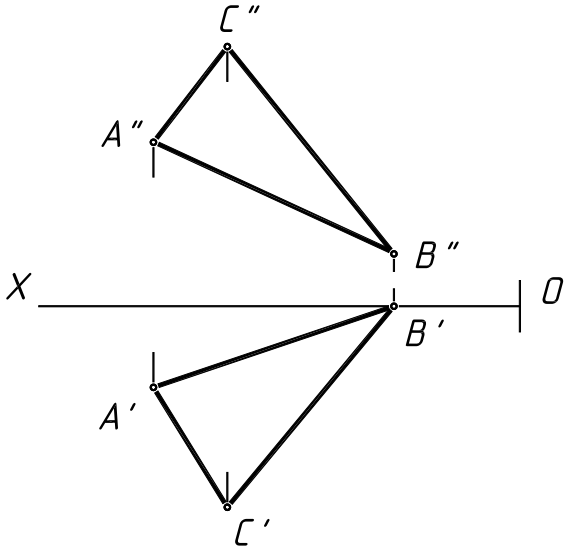
6 – masala

AB kesmaning haqiqiy uzunligi va uning ***H***, ***V*** proyeksiyalar tekisligiga og‘ish burchaklari yasalsin.



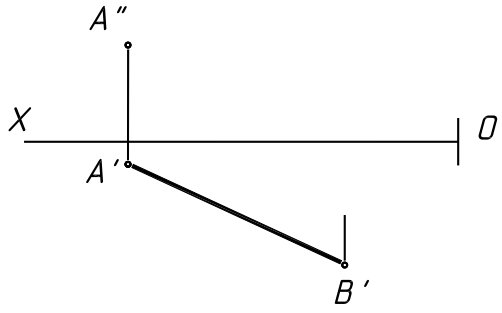
7 – masala

ABC uchburchakka tashqi chizilgan aylana markazining proyeksiyalari topilsin.



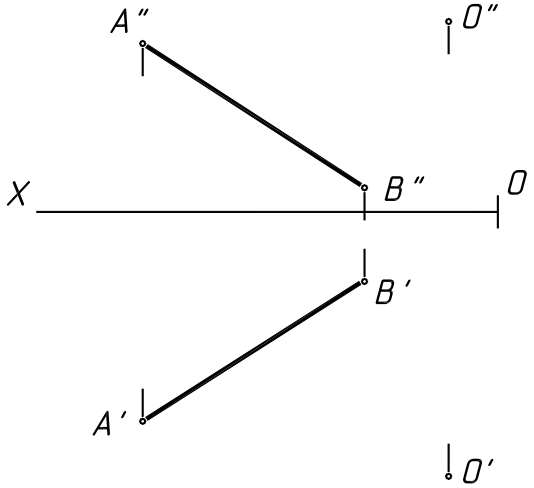
8 – masala

AB kesmaning ***A′B′*** gorizontal va ***A*** uchining ***A″*** frontal proyeksiyasi berilgan. Agar ***AB*** to‘g‘ri chiziq ***H*** proyeksiyalar tekisligi bilan ***α*=30°** burchak hosil qilsa, uning frontal proyeksiyasi yasalsin. Masalaning nechta yechimi bor?



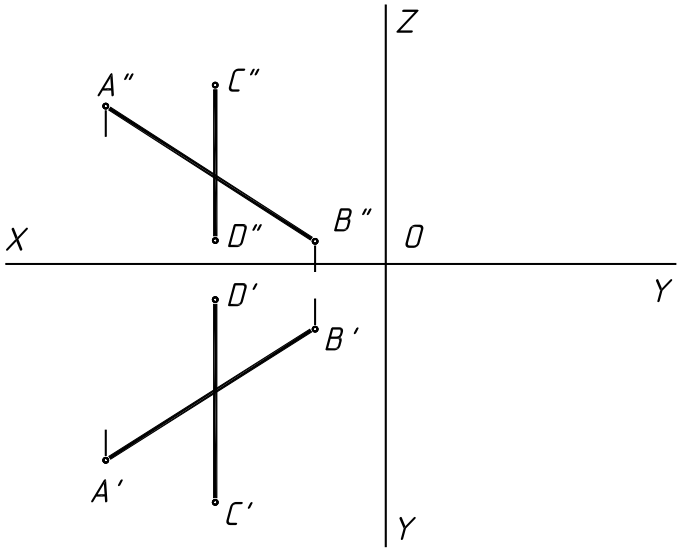
9 – masala

Markazi ***O*** (***O′***, ***O″***) nuqtada va ***AB*** (***A′B′***, ***A″B″***) to‘g‘ri chiziqqa urinma sharning proyeksiyalari chizilsin.



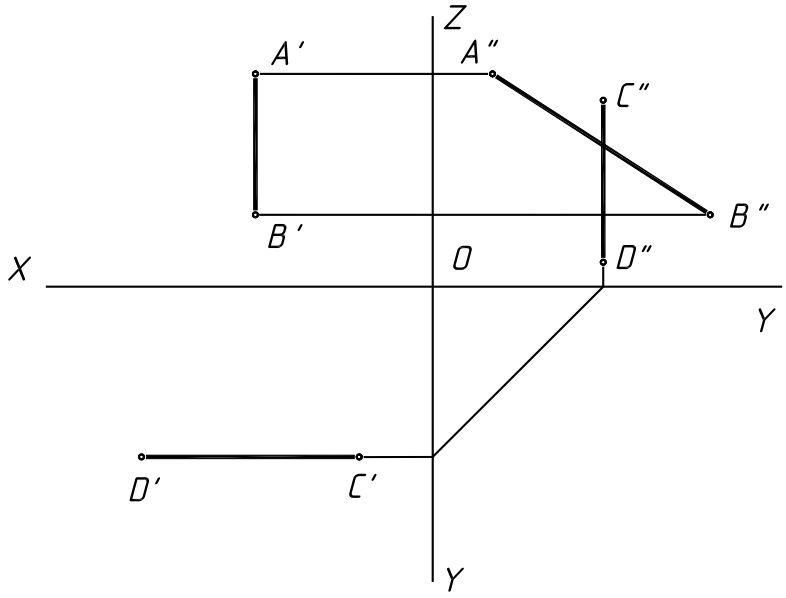
10 – masala

AB va ***CD*** kesmalarning o‘zaro vaziyati aniqlansin.



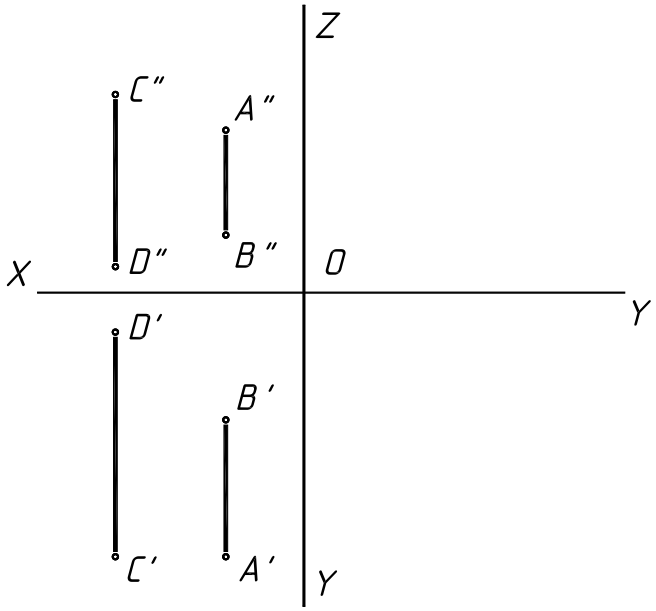
11 – masala

AB va ***CD*** kesmalarning o‘zaro vaziyati aniqlansin.



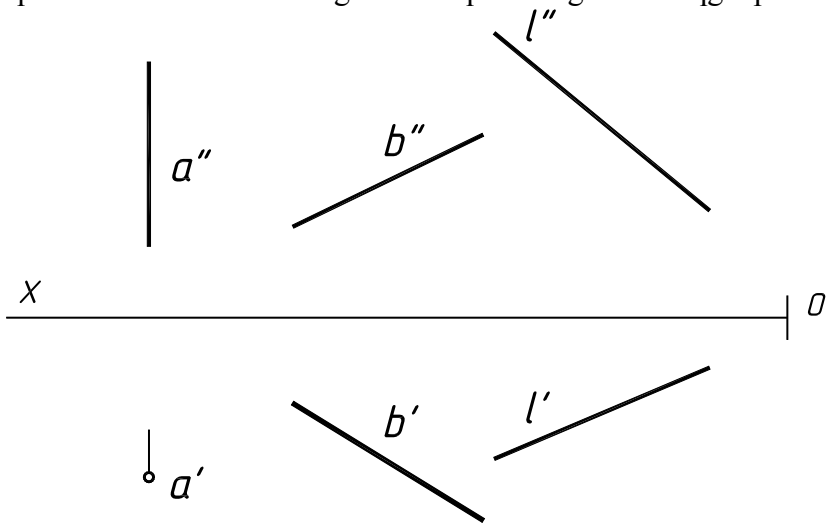
12 – masala

AB va ***CD*** kesmalar o‘zaro parallelmi? Ularning o‘zaro paralleligini tekshiring.



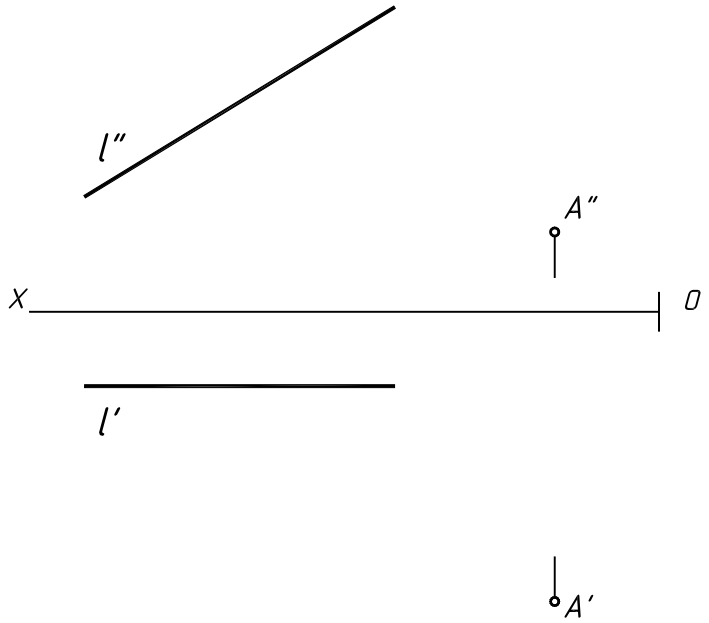
13 – masala

a va ***b*** to‘g‘ri chiziqlarni kesib o‘tuvchi to‘g‘ri chiziqni ***l*** to‘g‘ri chiziqga parallel qilib o‘tkazing.



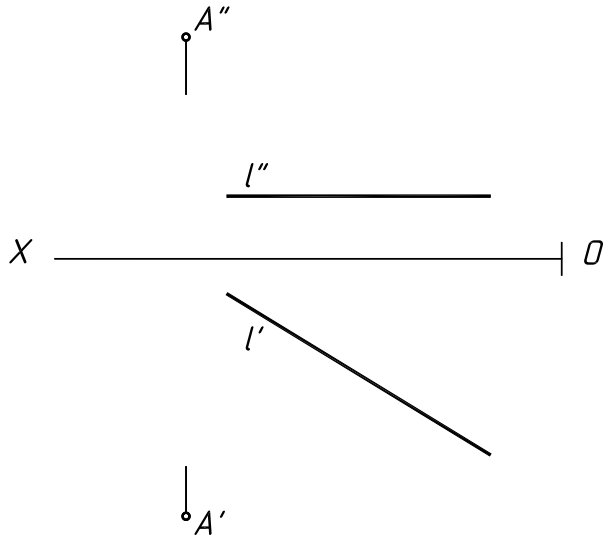
14 – masala

BC kateti ***l*** to‘g‘ri chiziqda yotgan teng katetli to‘g‘ri burchakli ***ABC*** uchburchakning proyeksiyalari yasalsin.



15 – masala

BC tomoni ***l*** to‘g‘ri chiziqda yotgan ***ABCD*** kvadratning proyeksiyalari yasalsin.



4-mashg‘ulot

Mavzu: Tekislik

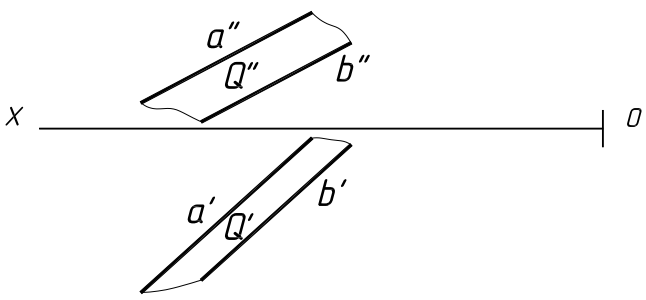
Tekislikning kompleks chizma (epyur)da berilishi. Tekislikning izlari.
Tekislikning H, V, W – proyeksiyalar tekisliklariga nisbatan vaziyatlari.
Tekislikka tegishli bo‘lgan to‘g‘ri chiziq va nuqtalar. Tekislikning bosh chiziqlari.

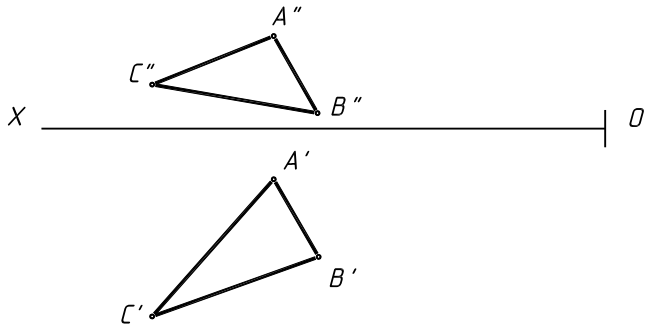
Mavzuni xotirada tiklash uchun savollar.

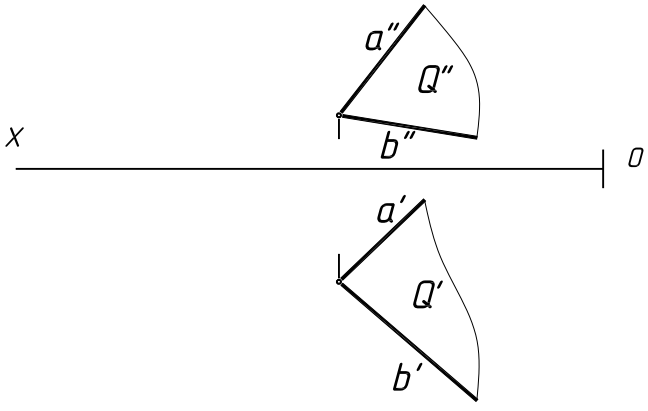
1. Kompleks chizmada tekislik qanday ko‘rinishlarda berilishi mumkin?
2. Tekislikning izlari deb nimaga aytiladi?
3. Tekislikning izlari qanday yasaladi?
4. Qanday tekisliklar gorizontal, frontal va profil tekisliklar deyiladi?
5. Gorizontal, frontal va profil proyeksiyalovchi tekisliklar deb qanday tekisliklarga aytiladi?
6. Gorizontal va frontal proyeksiyalovchi tekisliklarning o‘ziga xos hususiyatini tushuntirib bering.
7. Qanday tekisliklar umumiy (og‘ma) vaziyatdagi tekisliklar deyiladi?
8. Bissektor tekisliklari deganda qanday tekisliklar tushuniladi?
9. To‘g‘ri chiziqning tekislikka tegishlilik shartini tushuntirib bering?
10. Nuqtaning tekislikka tegishlilik sharti nimadan iborat?
11. Tekislikning gorizontali deb nimaga aytiladi?
12. Tekislikning frontali deb nimaga aytiladi?
13. Tekislikning eng katta og‘ma chiziqlari deb nimaga aytiladi va ular necha xil bo‘ladi?

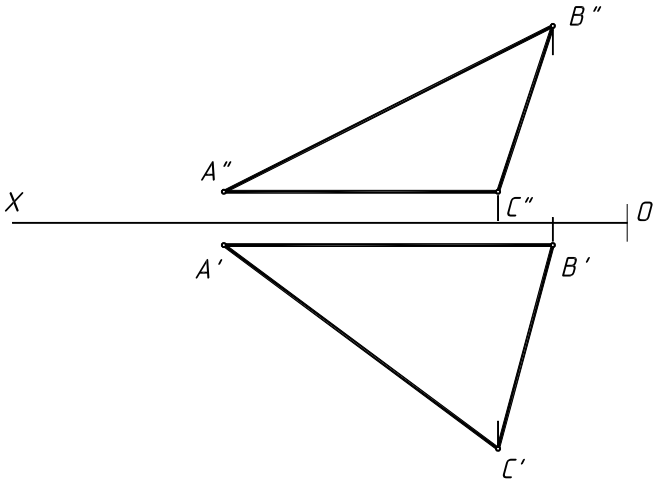
1 – masala

Berilgan tekisliklarning gorizontal va frontal izlari yasalsin.



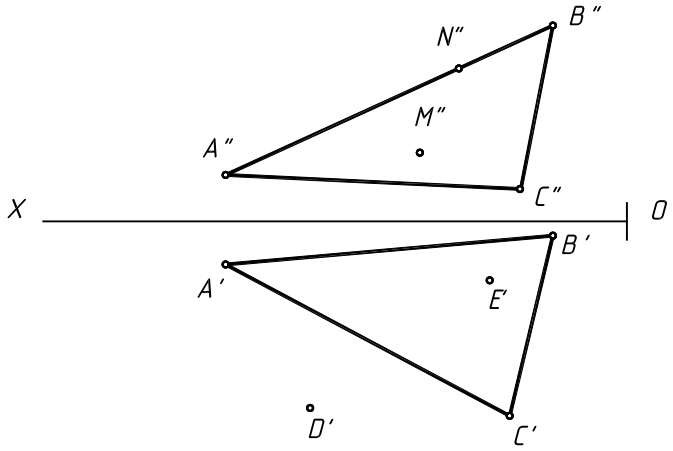


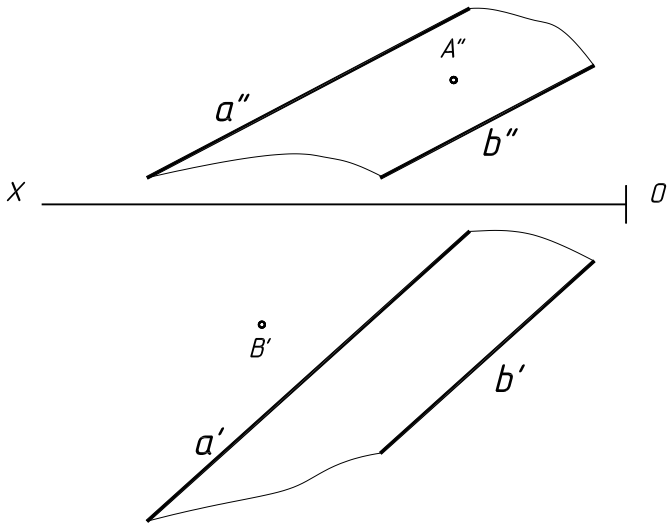




2 – masala

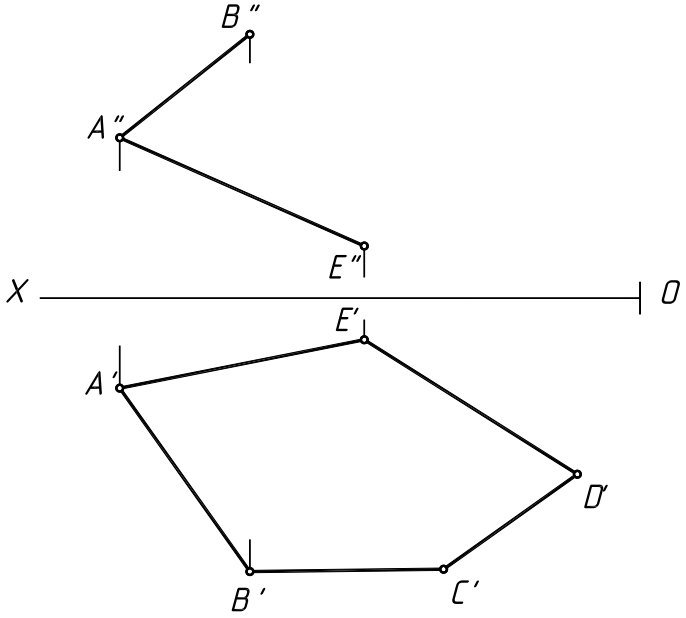
Berilgan tekislikga tegishli bo‘lgan nuqtalarning yetishmaydigan (ikkinchi) proyeksiyalari topilsin.





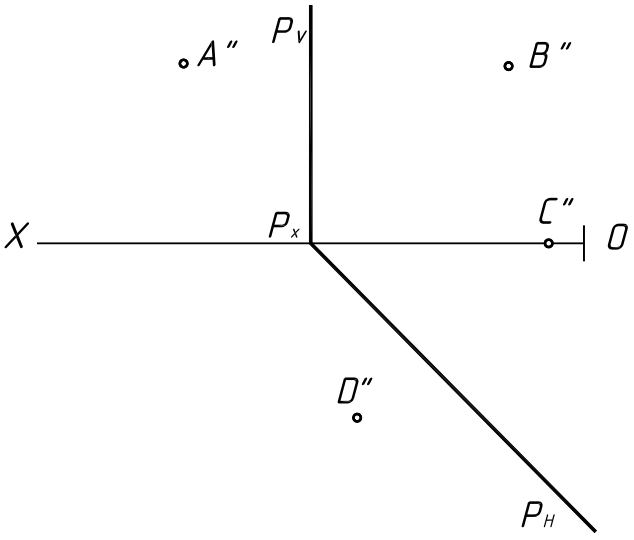
3 – masala

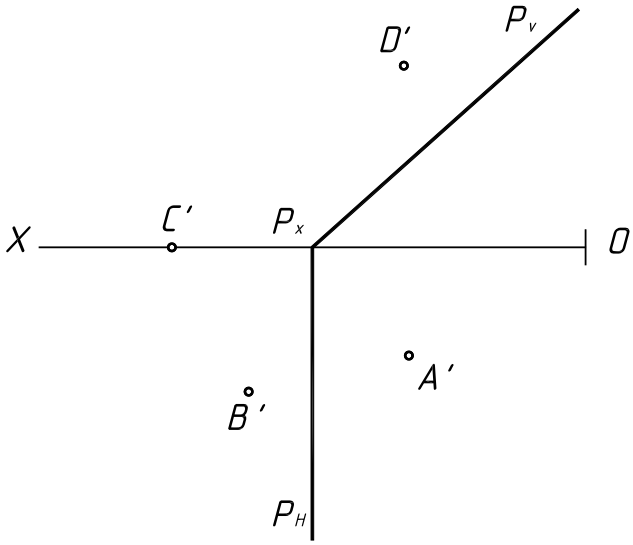
ABCDE beshburchakning frontal proyeksiyasi yasalsin.



4 – masala

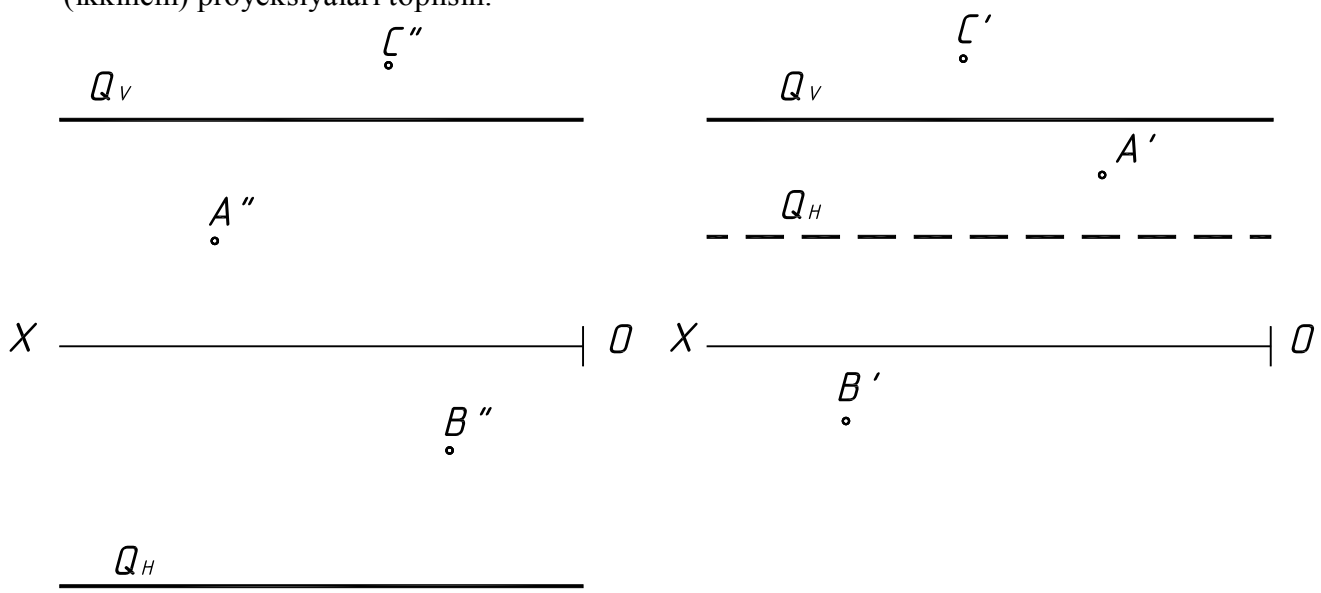
Izlari bilan berilgan ***P*** tekislikga tegishli bo‘lgan ***A***, ***B***, ***C*** va ***D*** nuqtalarning yetishmaydigan (ikkinchi) proyeksiyalari topilsin.





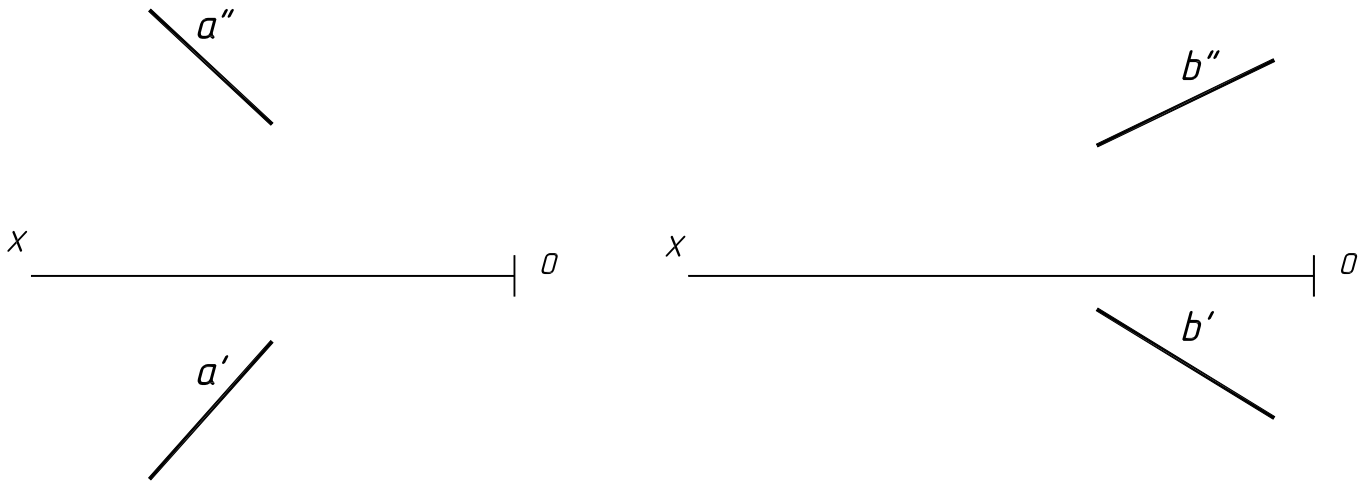
5 – masala

Profil proyeksiyalovchi ***Q*** tekislikka tegishli bo‘lgan ***A***, ***B***, ***C*** va ***D*** nuqtalarning yetishmaydigan (ikkinchi) proyeksiyalari topilsin.



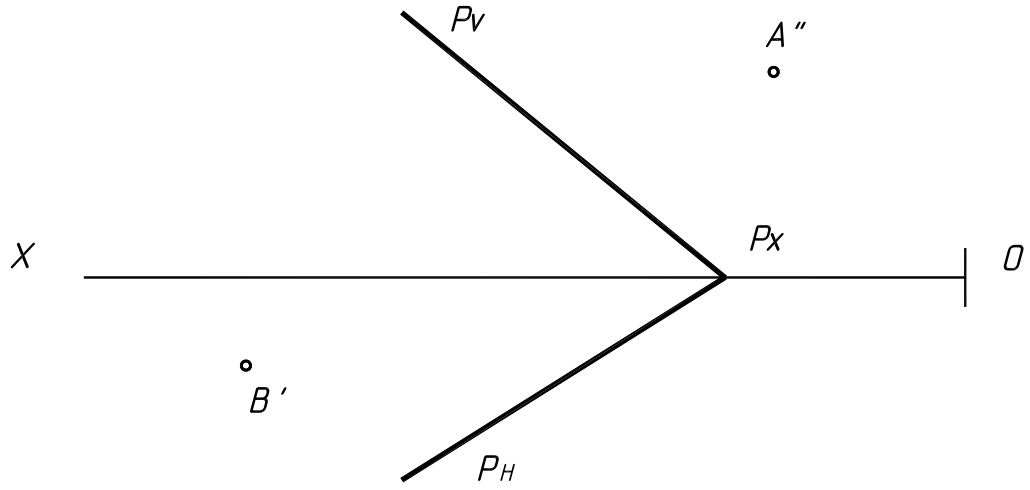
6 – masala

a va ***b*** to‘g‘ri chiziqlar orqali o‘tuvchi ***P*** gorizontal va ***Q*** frontal proyeksiyalovchi tekisliklar o‘tkazing.



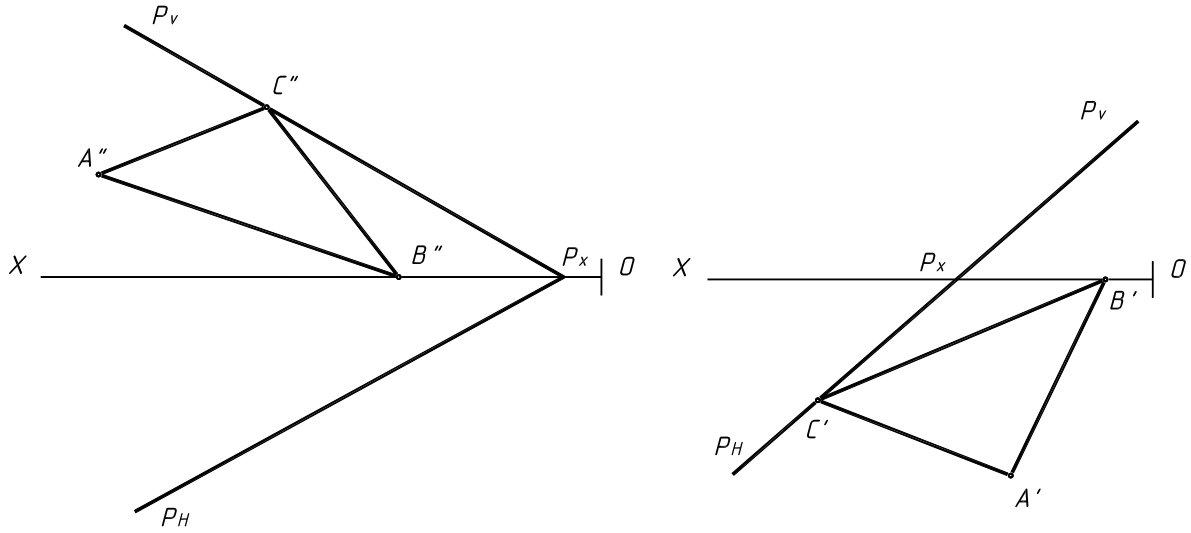
7 – masala

P tekislikka tegishli bo‘lgan ***A*** va ***B*** nuqtalarning yetishmaydigan proyeksiyalari tekislikning bosh chiziqlari yordamida topilsin.



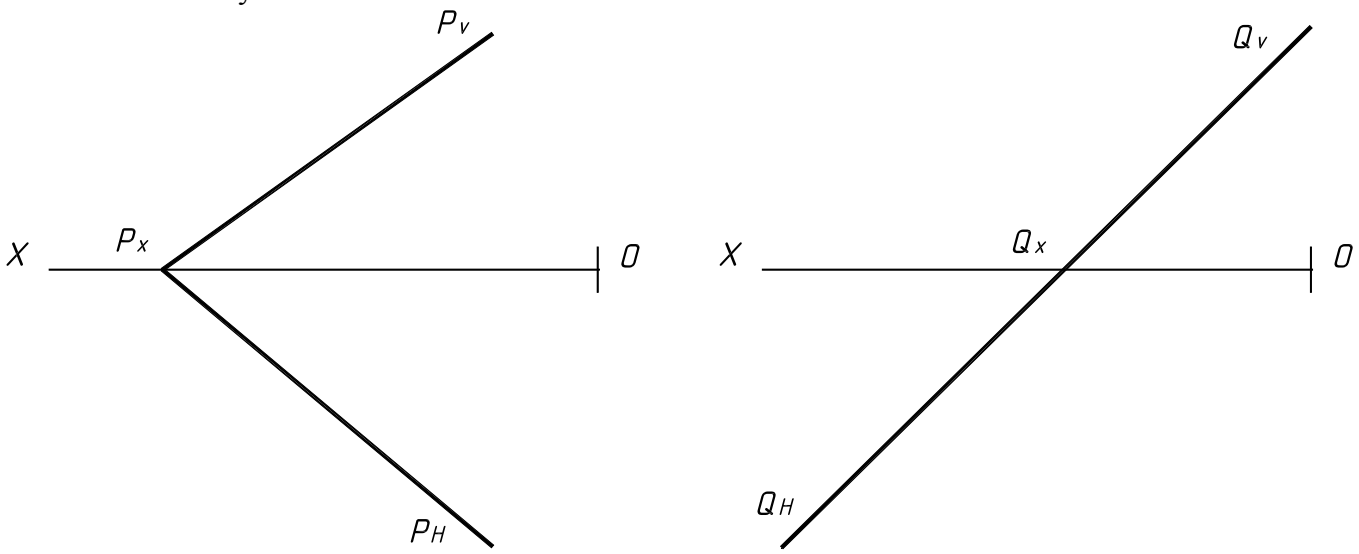
8 – masala

P tekislikka tegishli bo‘lgan ***ABC*** uchburchakning yetishmaydigan proyeksiyasi yasalsin.



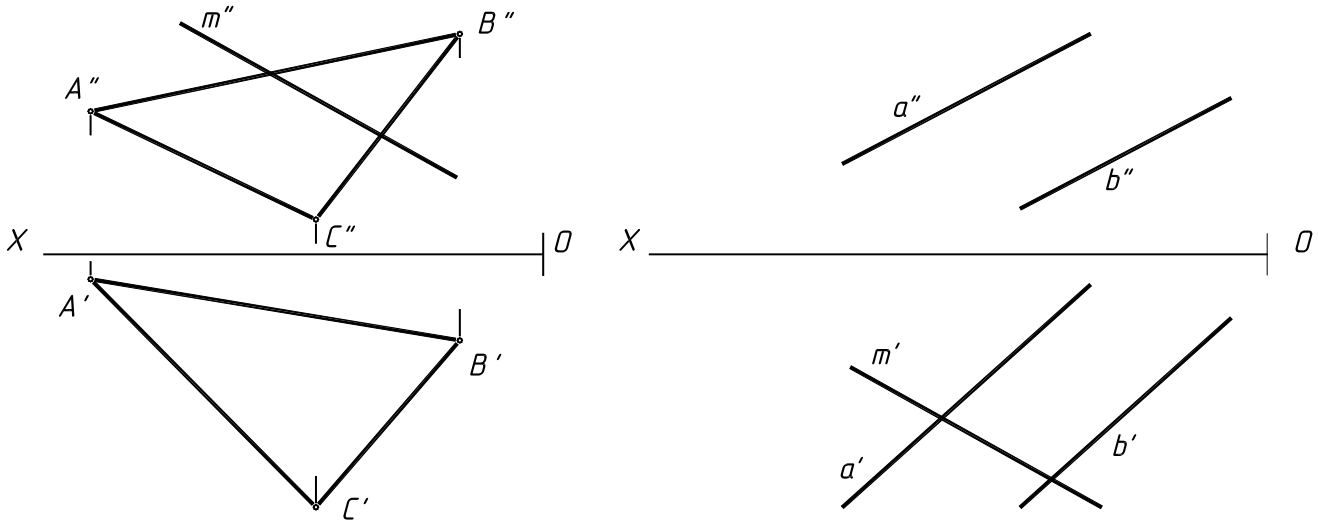
9 – masala

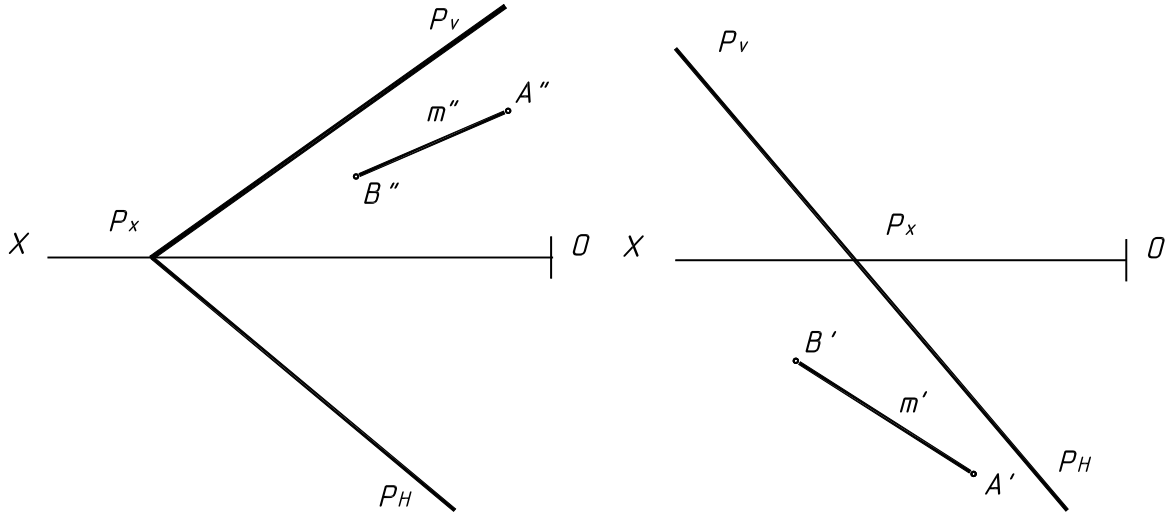
Izlari bilan berilgan ***P*** va ***Q*** tekisliklarning ***H*** va ***V*** proyeksiyalar tekisliklari bilan hosil qilgan burchaklari yasalsin.



10 – masala

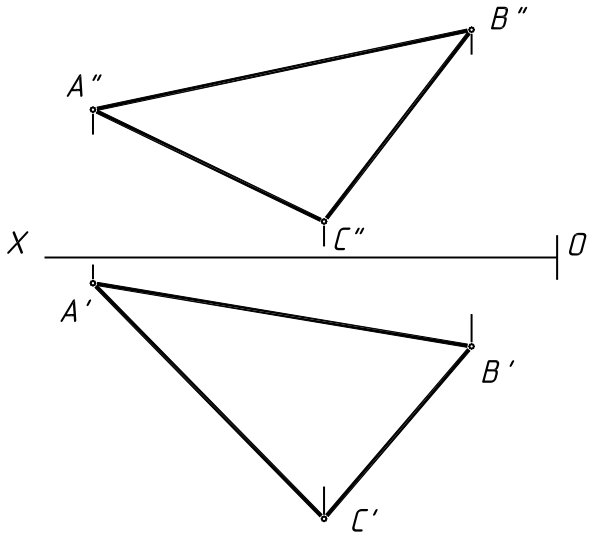
Tekislikka tegishli bo‘lgan ***m*** to‘g‘ri chiziqning bitta proyeksiyasi berilgan bo‘lsa, uning ikkinchi proyeksiyasi yasalsin.





11 – masala

ABC uchburchak tekisligining ***H*** va ***V*** proyeksiyalar tekisliklari bilan hosil qilgan burchaklari yasalsin.



5-mashg‘ulot

Mavzu: Ikki tekislikning o‘zaro kesishuvi

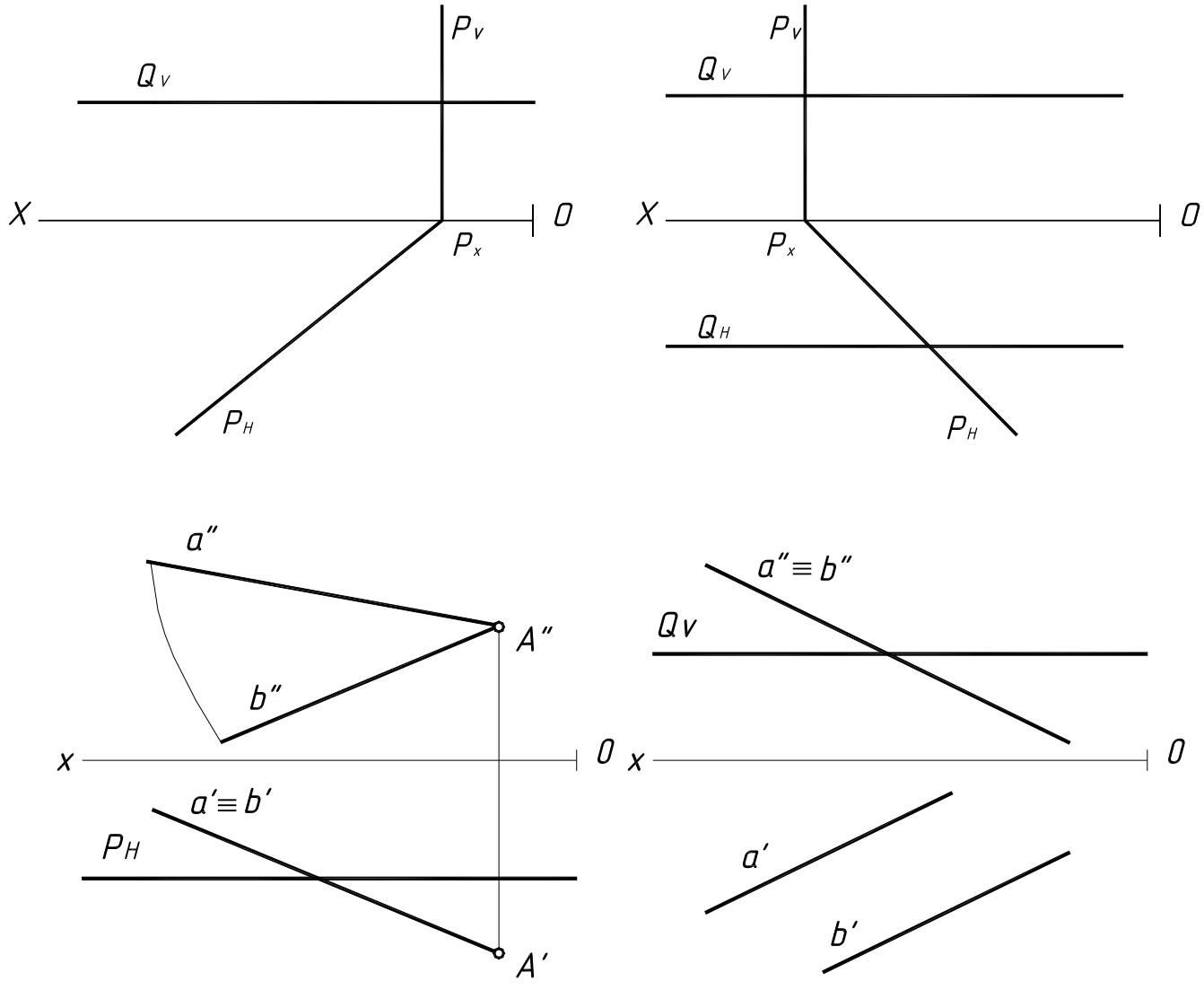
Ikki tekislikning o‘zaro kesishish chizig‘ini yasashning umumiy algoritmi.
Xususiy vaziyatdagi ikki tekislikning kesishish chizig‘ini yasash.
Xususiy vaziyatdagi tekislik bilan to‘g‘ri chiziqning kesisishi.
Xususiy va umumiy vaziyatdagi tekisliking o‘zaro kesishish chizig‘ini yasash.
Umumiy vaziyatdagi ikki tekisliking o‘zaro kesishish chizig‘ini yasash.
Ikki tekislikning o‘zaro kesishish chizig‘ini yasashda ba’zi qo‘shimcha usullar.

Mavzuni xotirada tiklash uchun savollar.

1. Ikki tekislikning o‘zaro kesishuvidan qanday chiziq hosil bo‘ladi?
2. Ikki tekislikning o‘zaro kesishish chizig‘ini yasashning umumiy algoritmini tushintirib bering.
3. Tekisliklarni o‘zaro kesishish chizig‘ini yasashda xususiy vaziyatdagi tekisliklarning qanday xossasidan foydalaniladi?
4. To‘g‘ri chiziq bilan xususiy vaziyatdagi tekislikning kesishish nuqtasining proyeksiyalari qanday aniqlanadi?

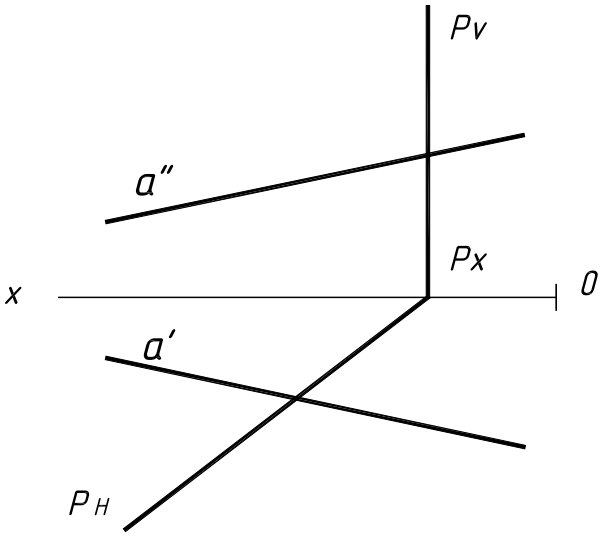
1 – masala

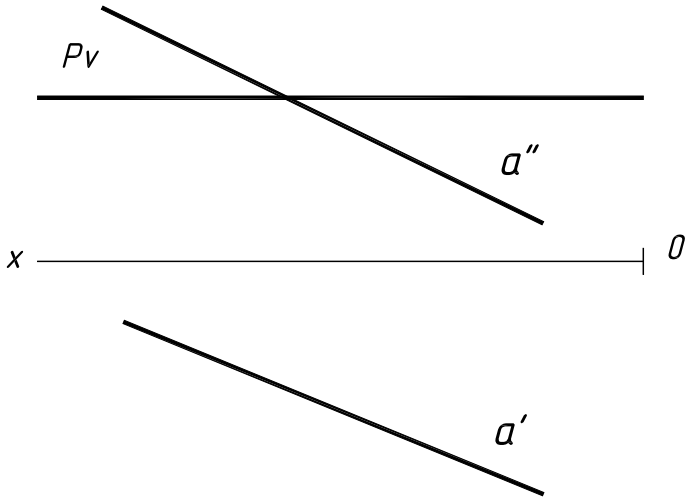
Berilgan ikki tekislikning o‘zaro kesishish chizig‘ini aniqlang.

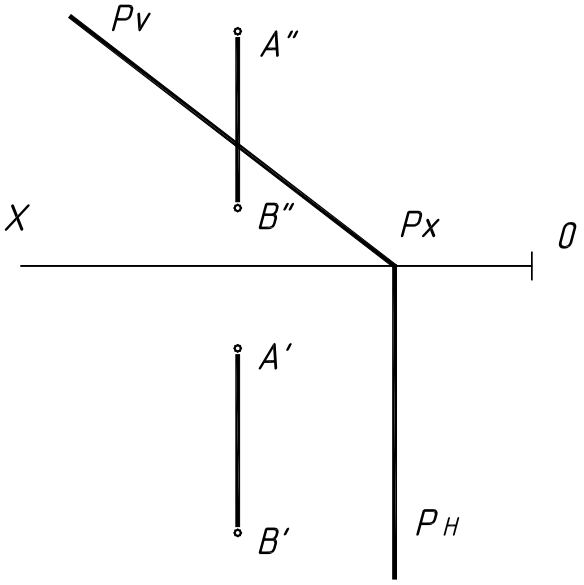


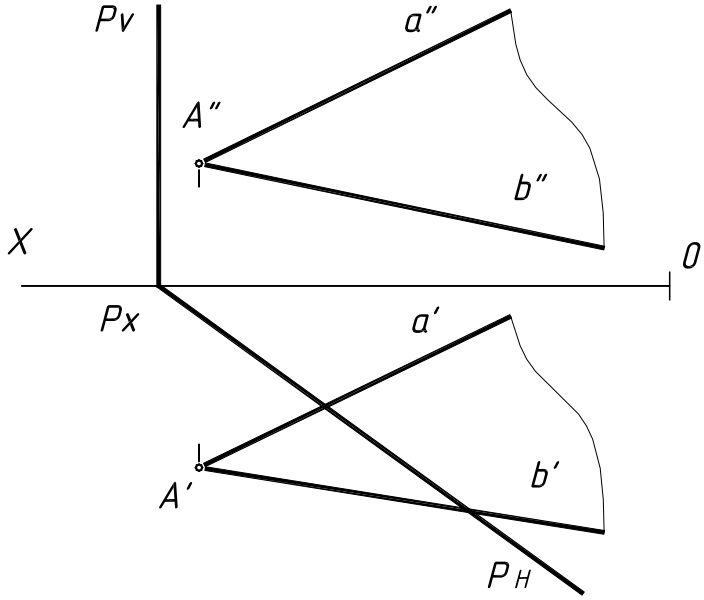
2 – masala

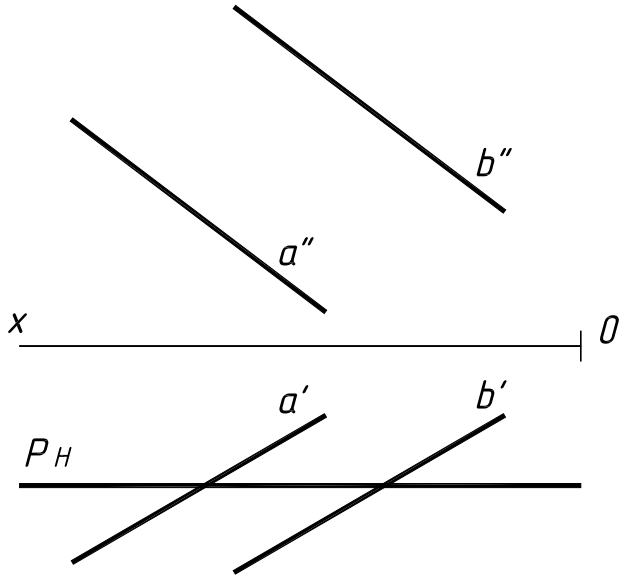
Berilgan to‘g‘ri chiziq bilan xususiy vaziyatdagi tekislikning kesishish nuqtasi yasalsin.

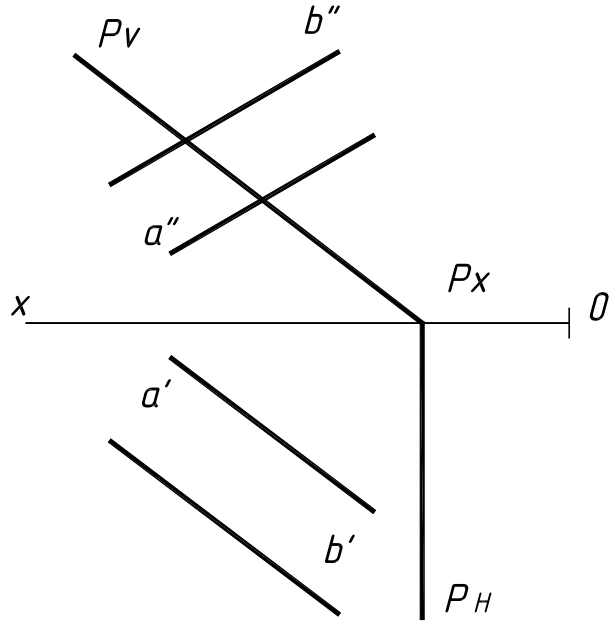






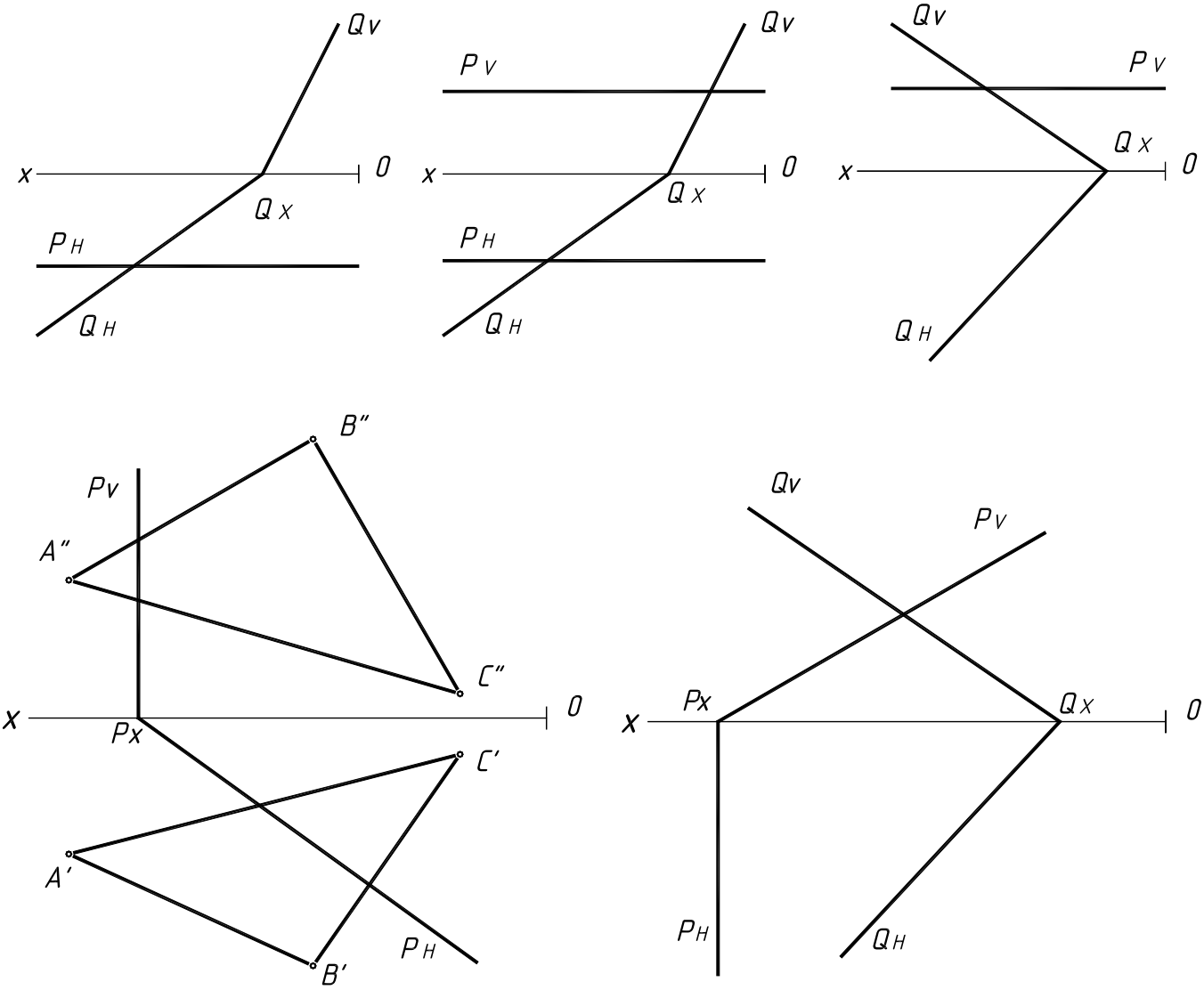






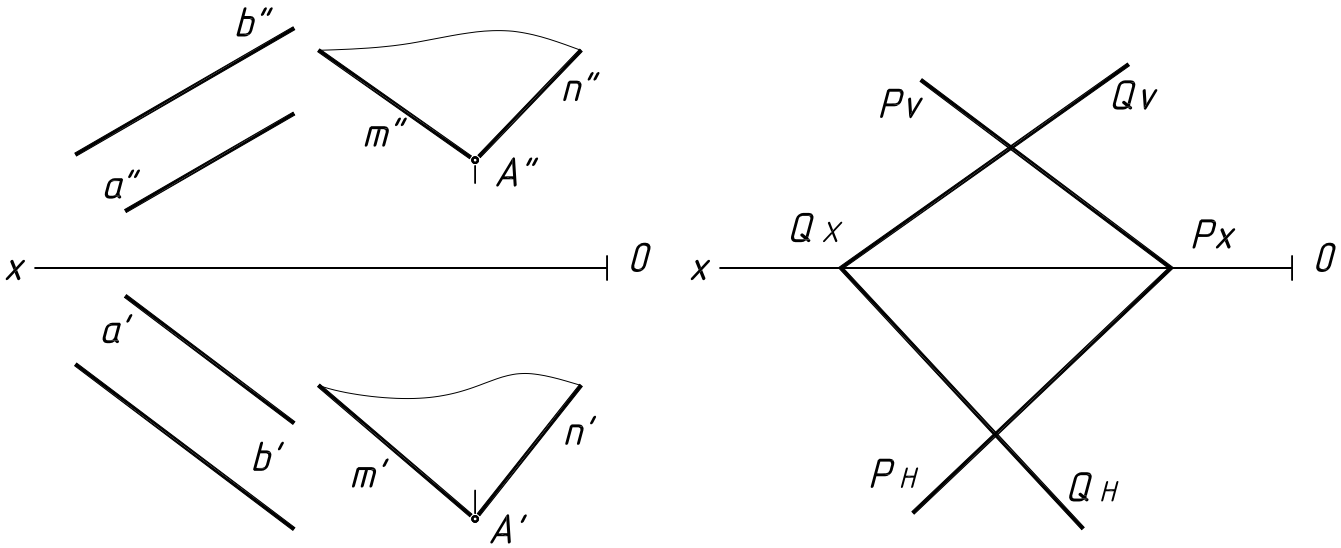
3 – masala

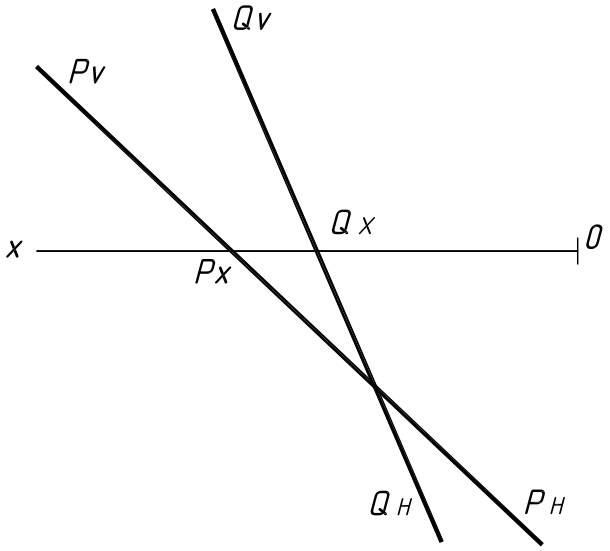
Xususiy va umumiy vaziyatdagi ikki tekislikning o‘zaro kesishish chiziqlari yasalsin.

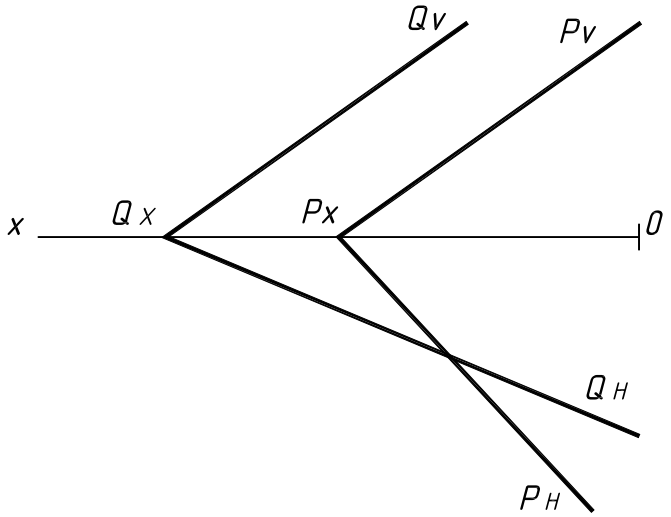


4 – masala

Umumiy (og‘ma) vaziyatdagi ikki tekislikning o‘zaro kesishish chiziqlari yasalsin.

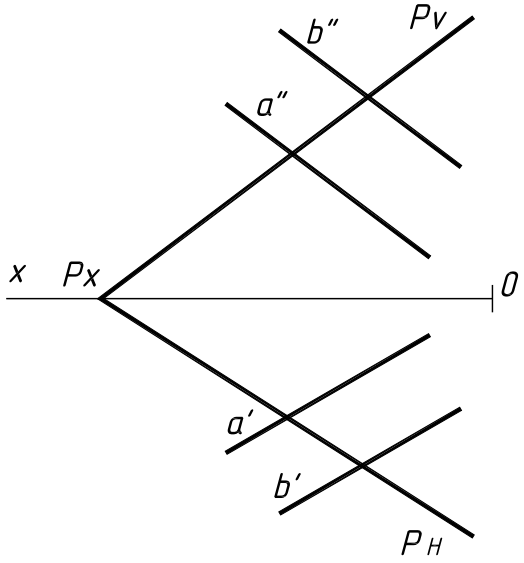


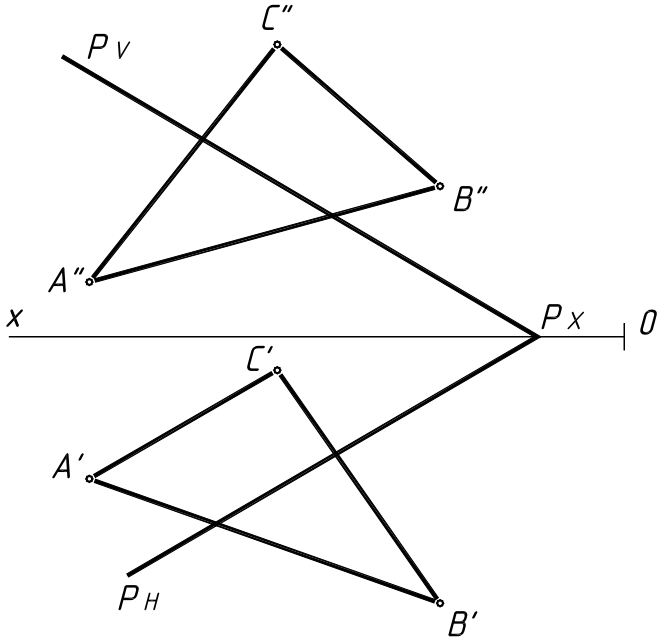




5 – masala

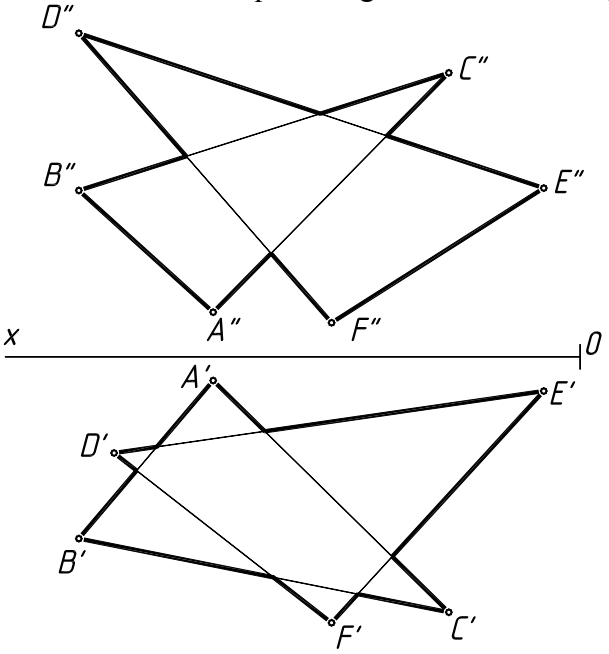
Tekis shakl va izlari orqali berilgan ikki tekislikning o‘zaro kesishish chizig‘i yasalsin.

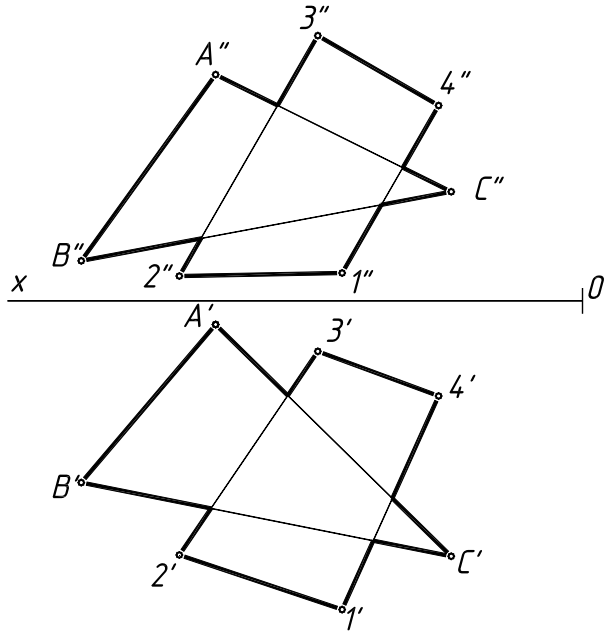




6 – masala

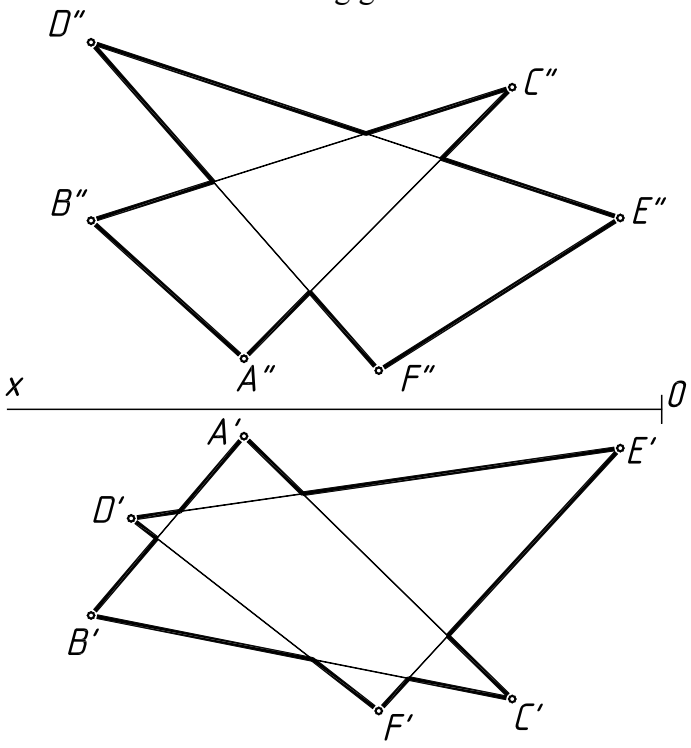
Tekis shakllar orqali berilgan ikki tekislikning o‘zaro kesishish chizig‘i yasalsin.





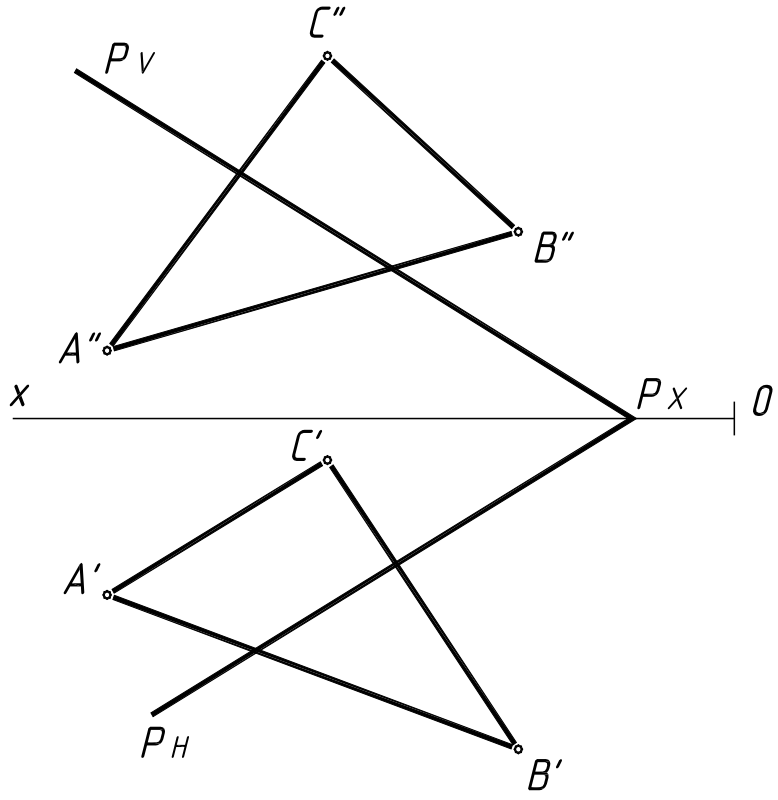
7 – masala

Ikki tekislikning o‘zaro kesishish chizig‘i yordamchi proyeksiyalash usuli bilan yasalsin. Proyeksiyalash yo‘nalishi deb uchburchak ***DEF*** ning gorizontali olinsin.



8 – masala

Berilgan ***P*** va uchburchak ***ABC*** tekisliklarning o‘zaro kesishish chizig‘i yordamchi proyeksiyalash usuli bilan yasalsin. Proyeksiyalash yo‘nalishi deb *P* tekislikning frontali olinsin.



6-mashg‘ulot

Mavzu: To‘g‘ri chiziq va tekislikning o‘zaro vaziyatlari

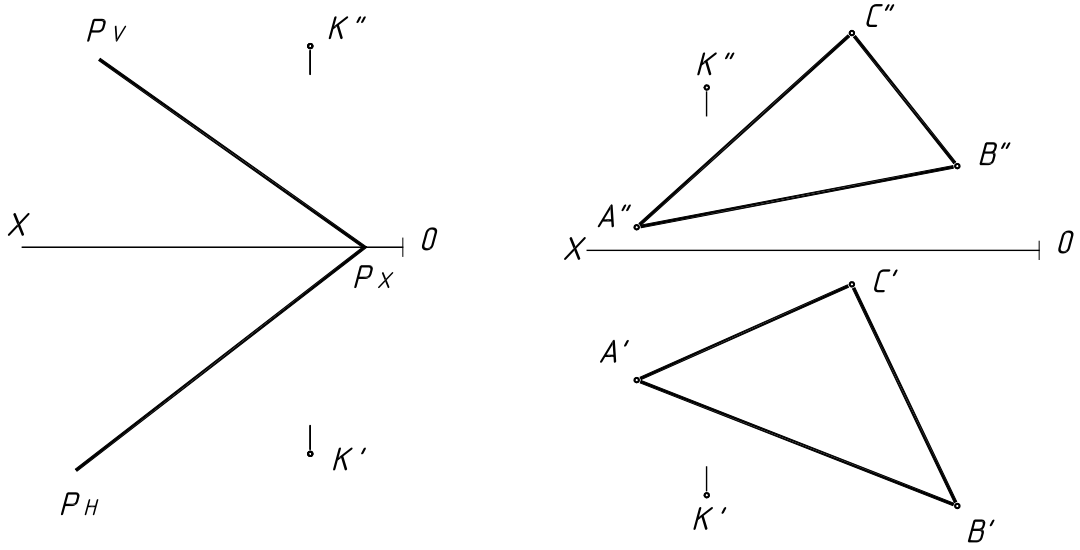
To‘g‘ri chiziqning tekislikka paralelligi.
Xususiy vaziyatdagi to‘g‘ri chiziqning tekislik bilan kesishuvi.
Umumiy vaziyatdagi to‘g‘ri chiziq va tekislikning o‘zaro kesishuvi.
To‘g‘ri chiziq va tekislikning kesishish nuqtasini yasashda ba’zi qo‘shimcha usullar.

Mavzuni xotirada tiklash uchun savollar.

1. To‘g‘ri chiziqning tekislikka paralellik shartini tushuntirib bering.
2. Gorizontal va frontal proyeksiyalovchi tekisliklarning qanday xossasi mavjud?
3. To‘g‘ri chiziq orqali gorizontal proyeksiyalovchi tekislik qanday o‘tkaziladi?
4. To’g’ri chiziq orqali frontal proeksiyalovchi tekislik qanday otkaziladi?
5. To‘g‘ri chiziqning tekislik bilan kesishish nuqtasi qanday algoritm asosida topiladi?
6. Tekislik va to‘g‘ri chiziqning o‘zaro kesishish nuqtasini qiyshiq burchakli proyeksiyalash orqali yasashda proyeksiyalash yo‘nalishi qanday olinishi maqsadga muvofiq bo‘ladi?

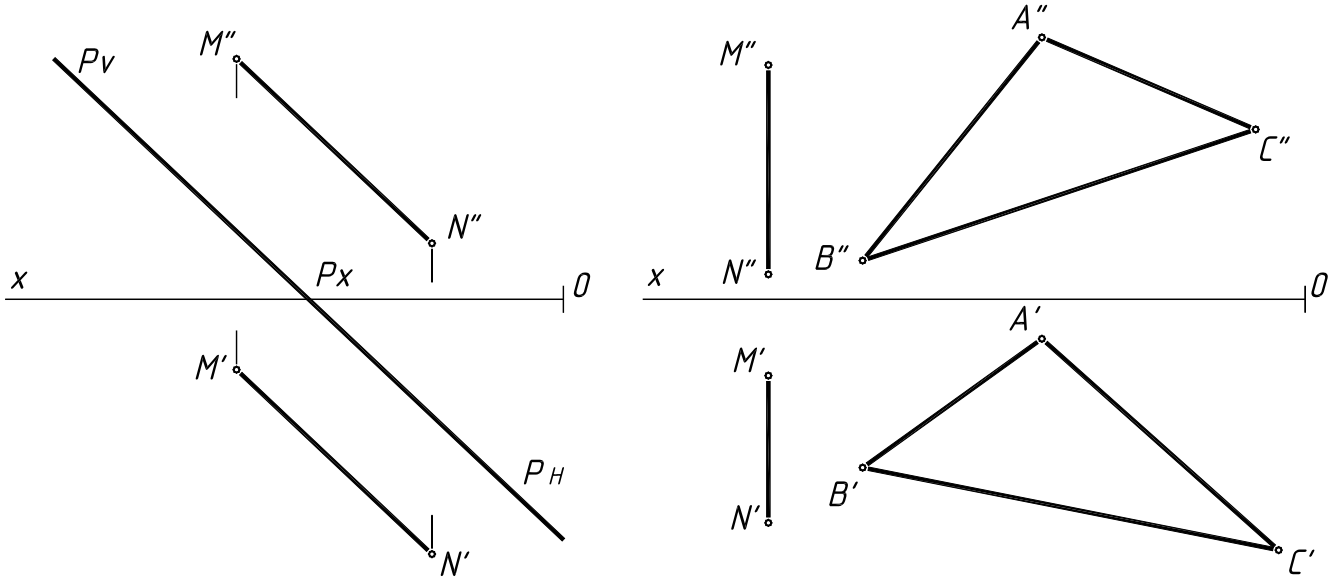
1 – masala

Berilgan ***K*** nuqtadan ***P***(∆***ABC***) tekislikka parallel bo‘lgan gorizontal va frontal to‘g‘ri chiziqlar o‘tkazing.



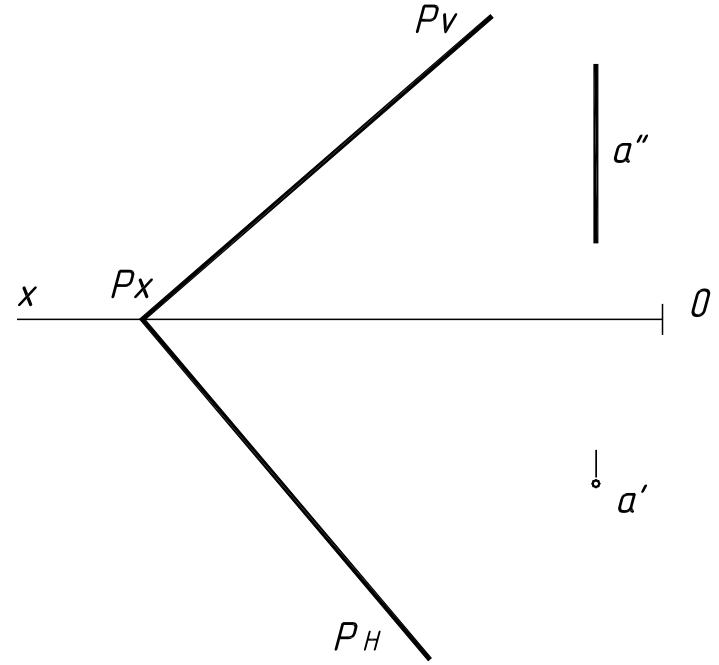
2 – masala

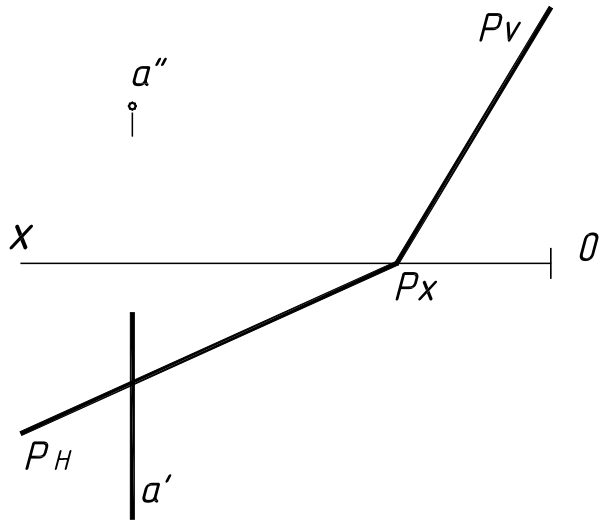
Berilgan ***MN*** to‘g‘ri chiziq ***P***(∆***ABC***) tekislikka parallelmi?

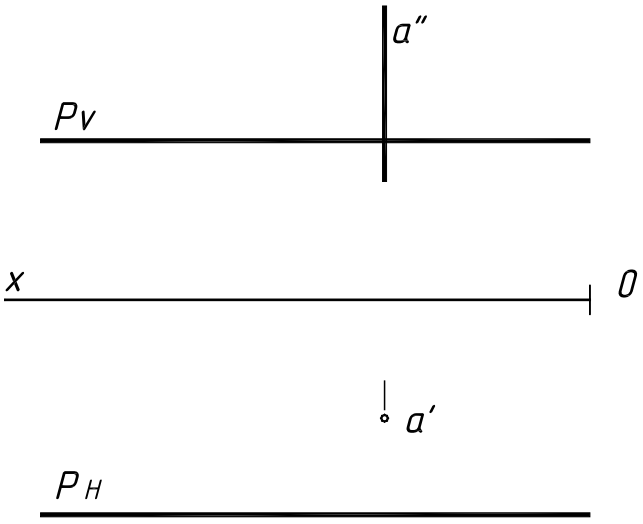


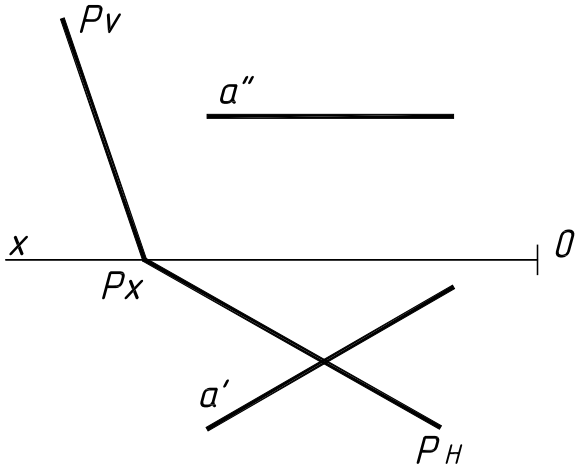
3 – masala

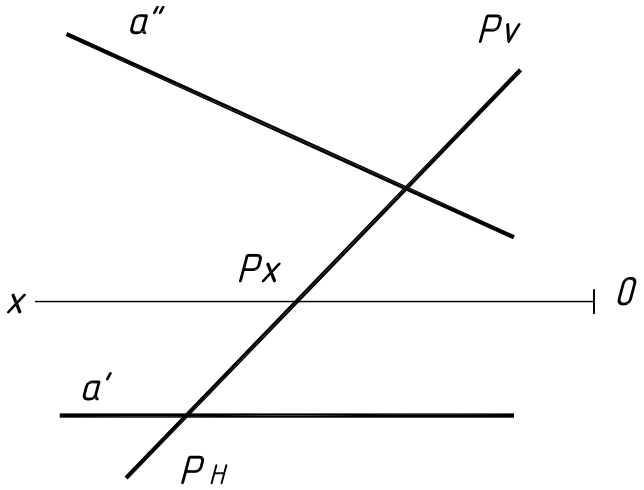
Berilgan to‘g‘ri chiziq bilan tekislikning kesishish nuqtasi yasalsin.

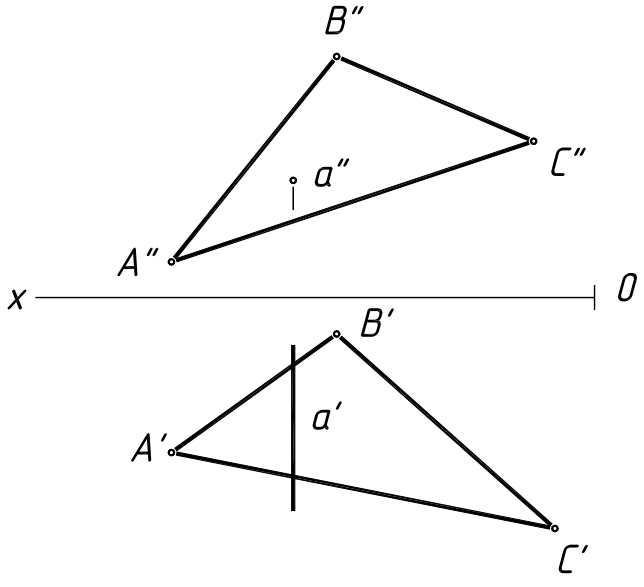


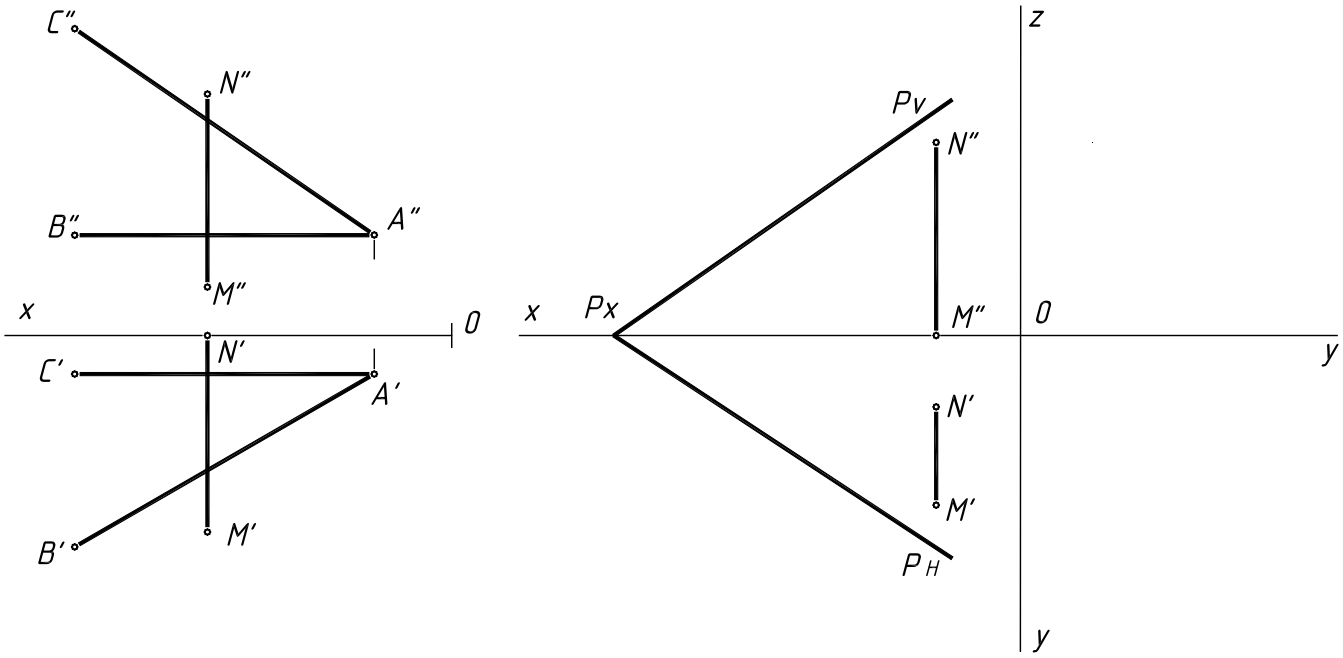






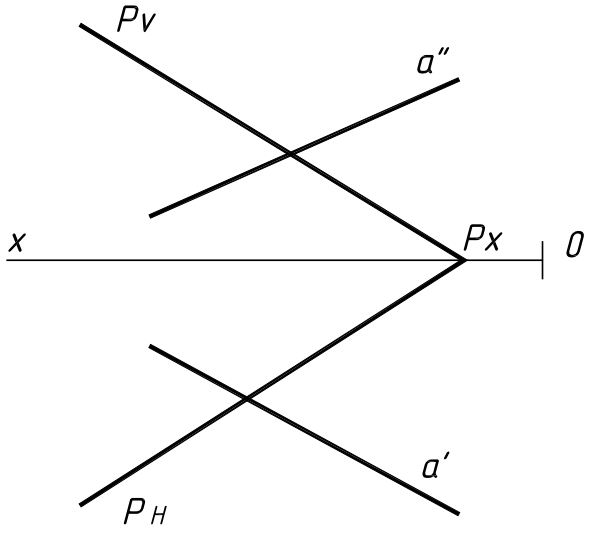


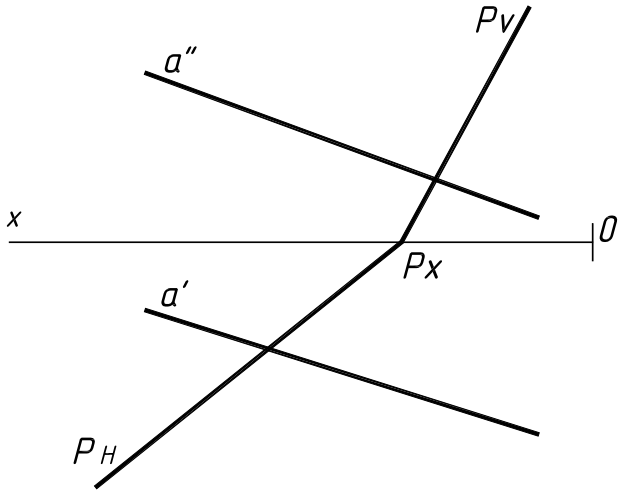


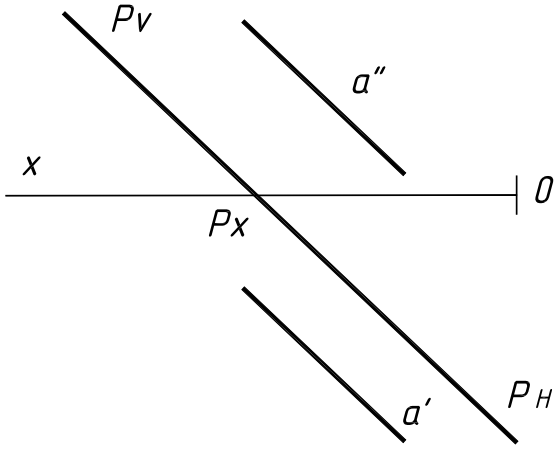


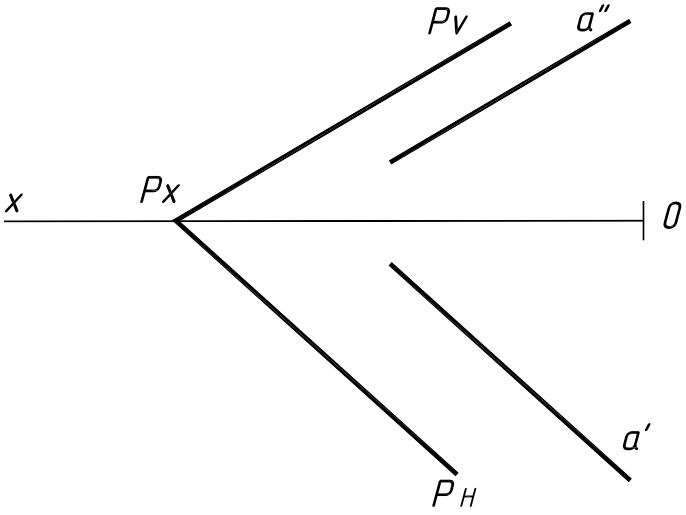
4 – masala

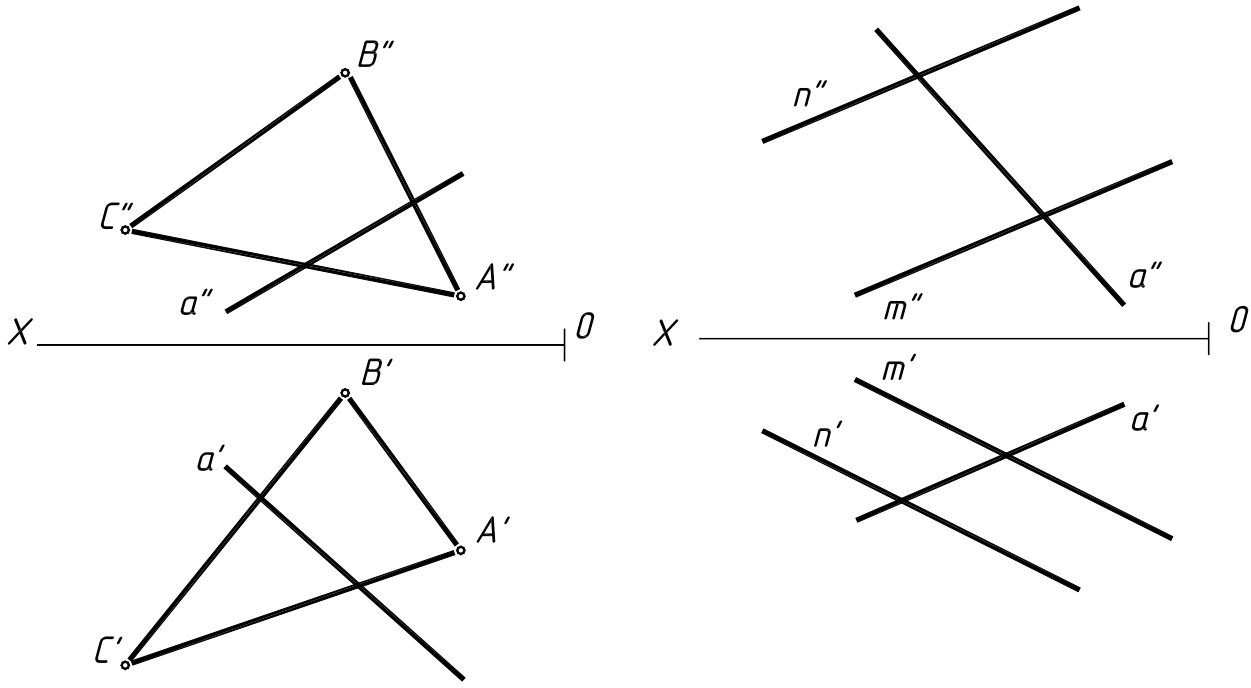
Berilgan to‘g‘ri chiziq bilan tekislikning kesishish nuqtasi yasalsin.





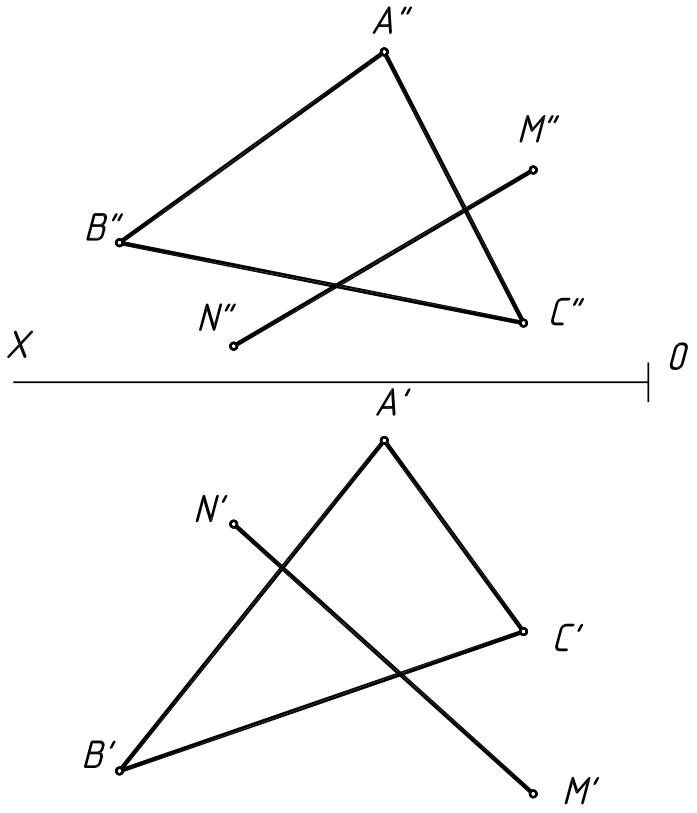






5 – masala

Berilgan to‘g‘ri chiziq bilan tekislikning kesishish nuqtasi yordamchi proyeksiyalash usuli bilan yasalsin. Proyeksiyalash yo‘nalishi deb ΔABC ning gorizontali olinsin.



7-mashg‘ulot

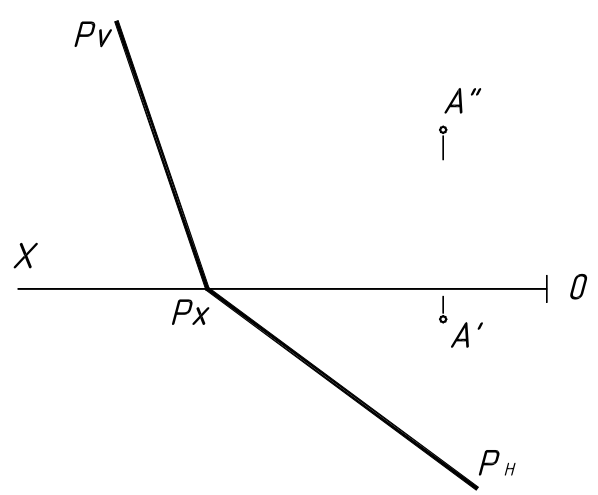
Mavzu: **To‘g‘ri chiziqning tekislikka perpendikulyarligi. Ikki tekislikning o‘zaro perpendikulyarligi.To‘g‘ri chiziq va tekislik orasidagi burchak.Ikki tekislik orasidagi burchak.**

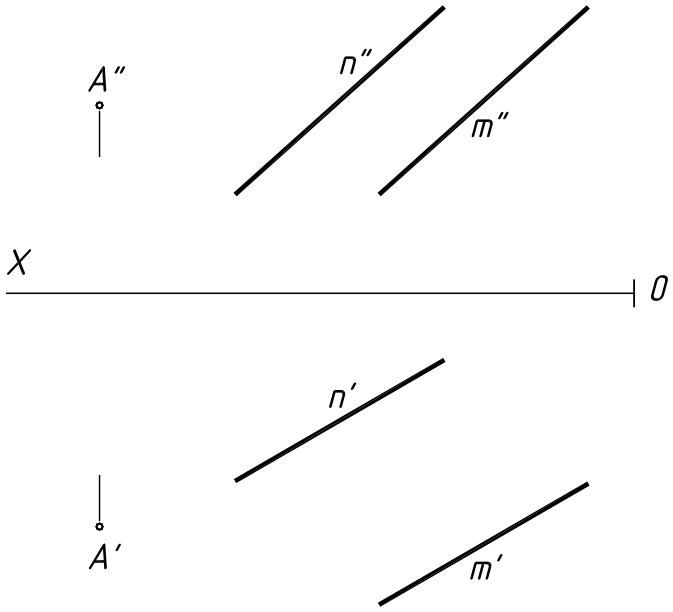
Mavzuni xotirada tiklash uchun savollar.

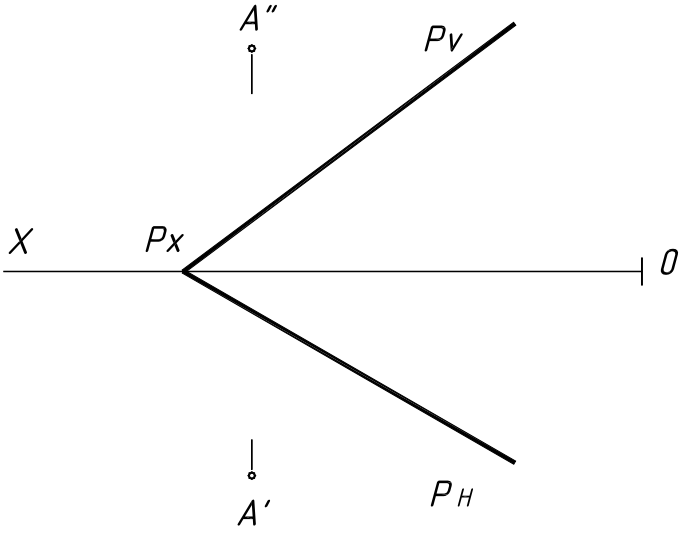
1. To‘g‘ri chiziqning tekislikga perpendikulyarlik shartini tushintirib bering.
2. To‘g‘ri burchakning proyeksiyasi haqidagi teoremani aytib bering va undan qanday xulosa chiqarish mumkin?
3. To‘g‘ri chiziq bilan tekislikning kesishish nuqtasi qanday algoritm asosida topiladi?
4. Nuqtadan to‘g‘ri chiziqgacha bo’lgan eng qisqa masofani topish algoritmi nimadan iborat?
5. Ikki tekislikning o‘zaro perpendikulyarlik shartini tushintirib bering.
6. To‘g‘ri chiziq bilan tekislik orasidagi burchak deb nimaga aytiladi?
7. To‘g‘ri chiziq bilan tekislik orasidagi burchakning to‘ldiruvchi burchagi deb nimaga aytiladi?
8. Ikki tekislik orasidagi burchak deb nimaga aytiladi?
9. Ikki tekislik orasidagi burchak ning to‘ldiruvchi burchagi deb nimaga aytiladi?

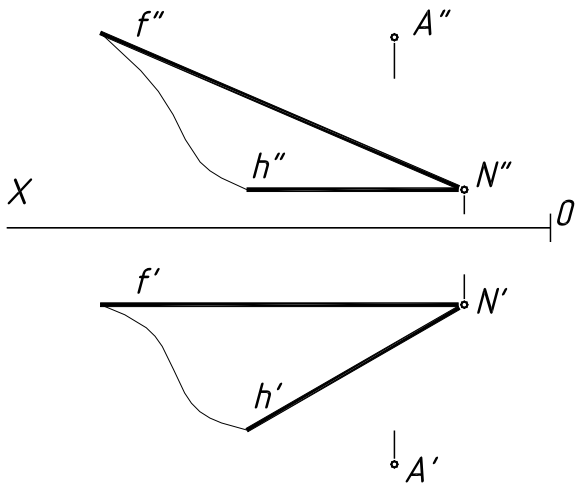
1 – masala

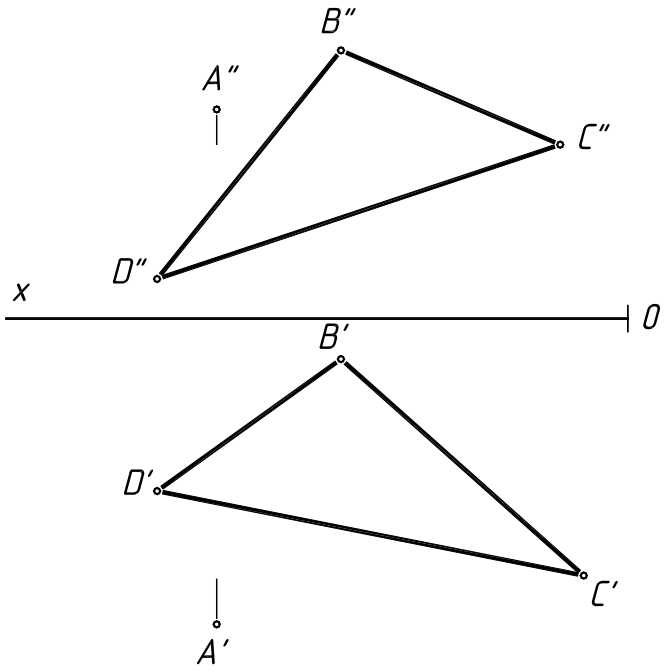
Berilgan nuqtadan tekislikkacha bo‘lgan masofa aniqlansin.

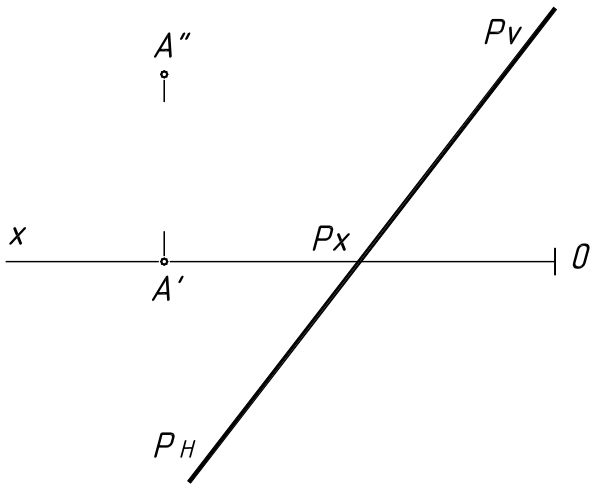






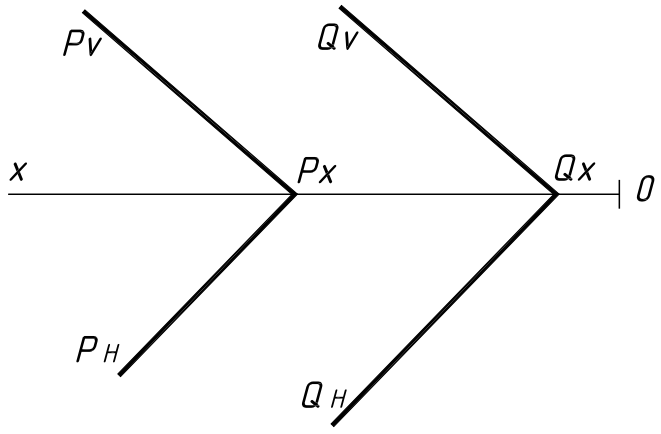


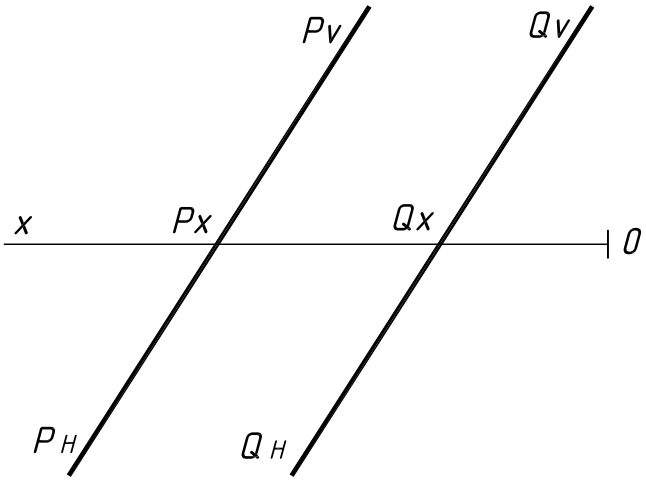




2 – masala

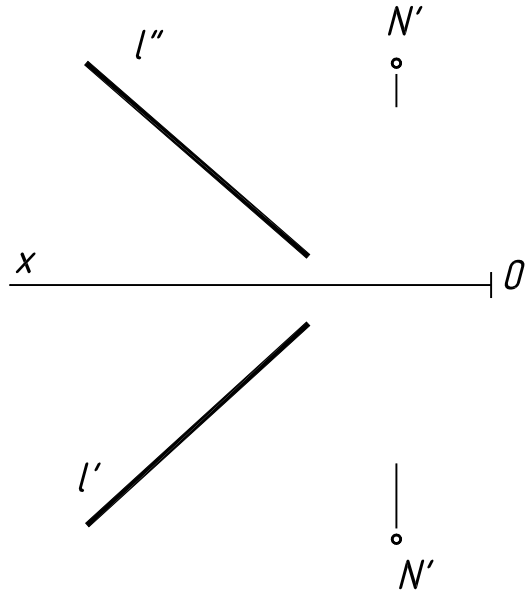
Ikki o‘zaro parallel tekisliklar orasidagi masofa aniqlansin.

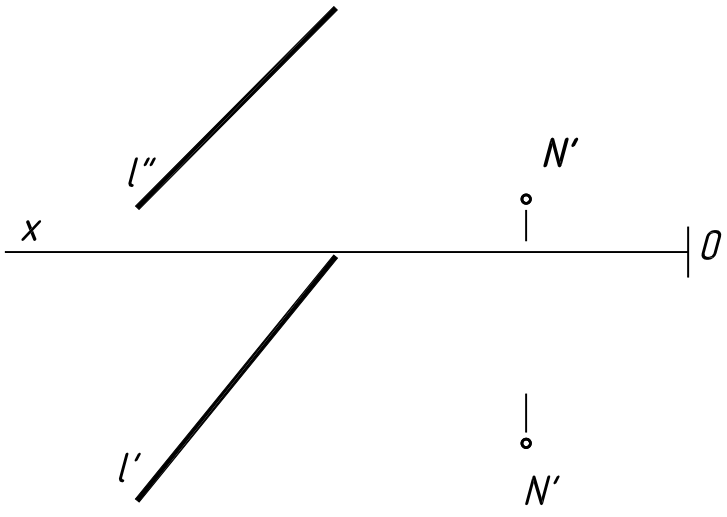




3 – masala

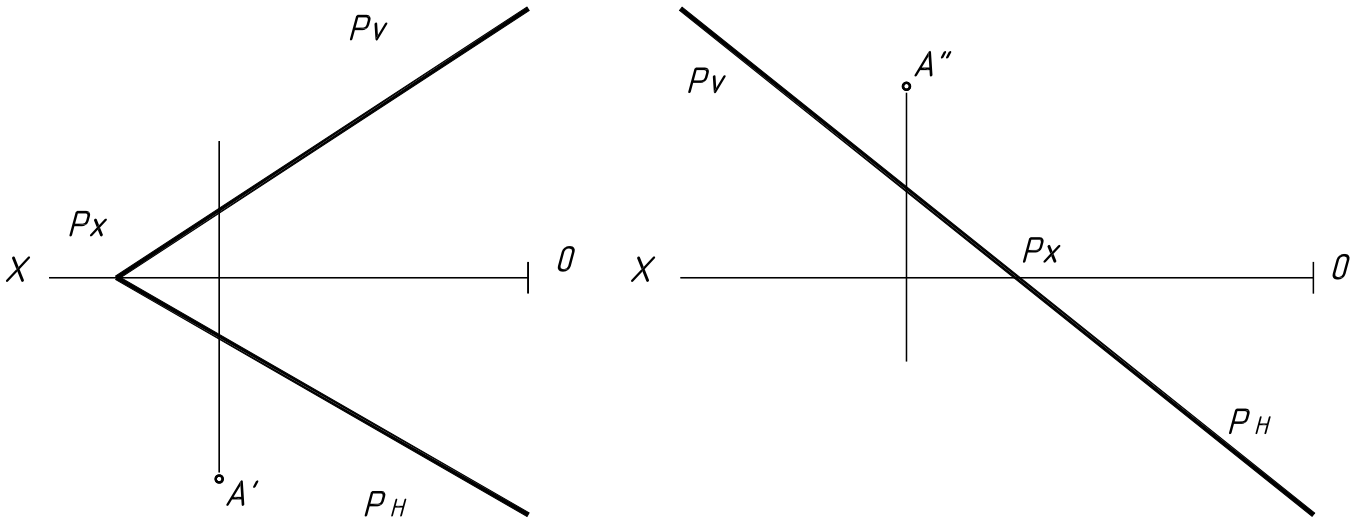
Berilgan nuqtadan to‘g‘ri chiziqgacha bo‘lgan eng qisqa masofa aniqlansin.





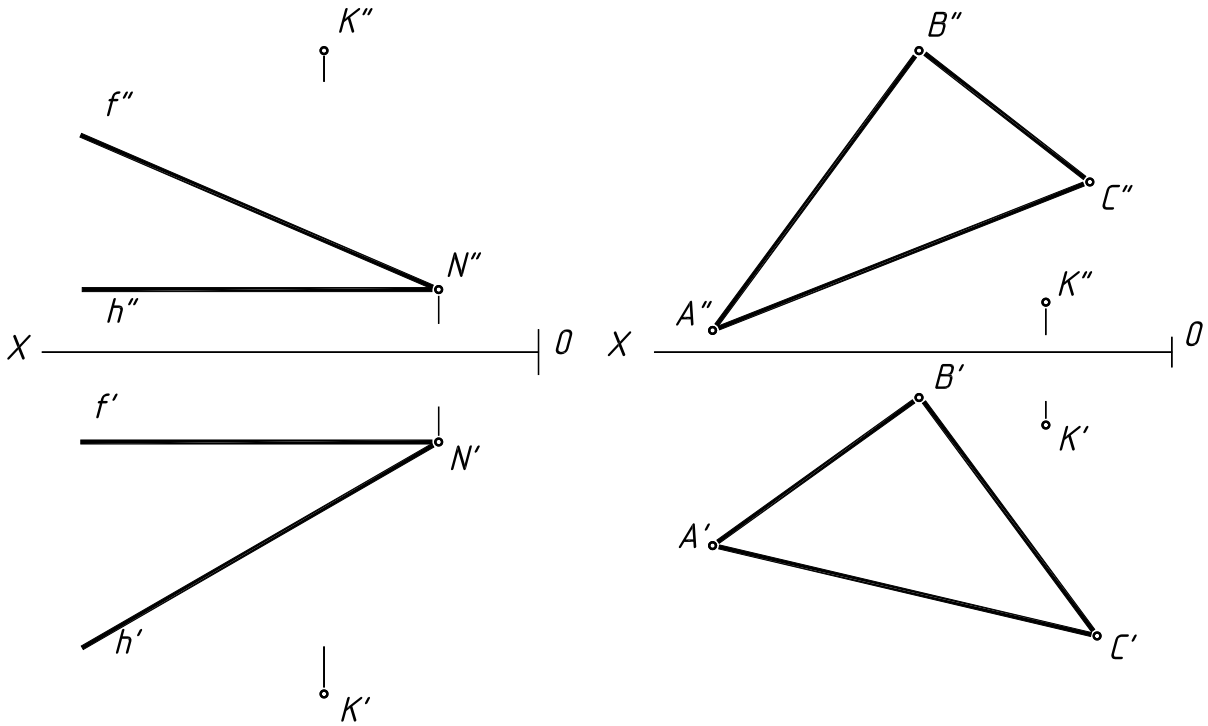
4 – masala

Agar ***A*** nuqta ***P*** tekislikdan ***30 mm*** masofada joylashgan bo‘lsa, uning yetishmaydigan ikkinchi proyeksiyasi topilsin. Masala nechta yechimga ega.



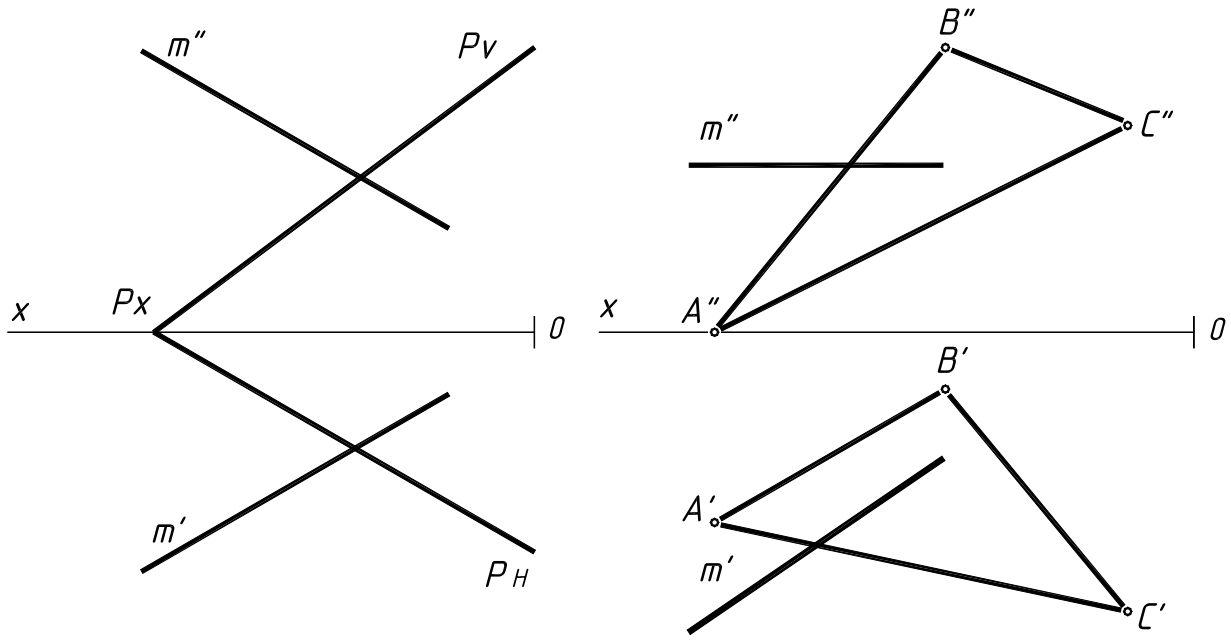
5 – masala

Berilgan tekislikga nisbatan ***K*** nuqtaga simmetrik bo‘lgan K_1 nuqtaning proyeksiyalarini aniqlansin.



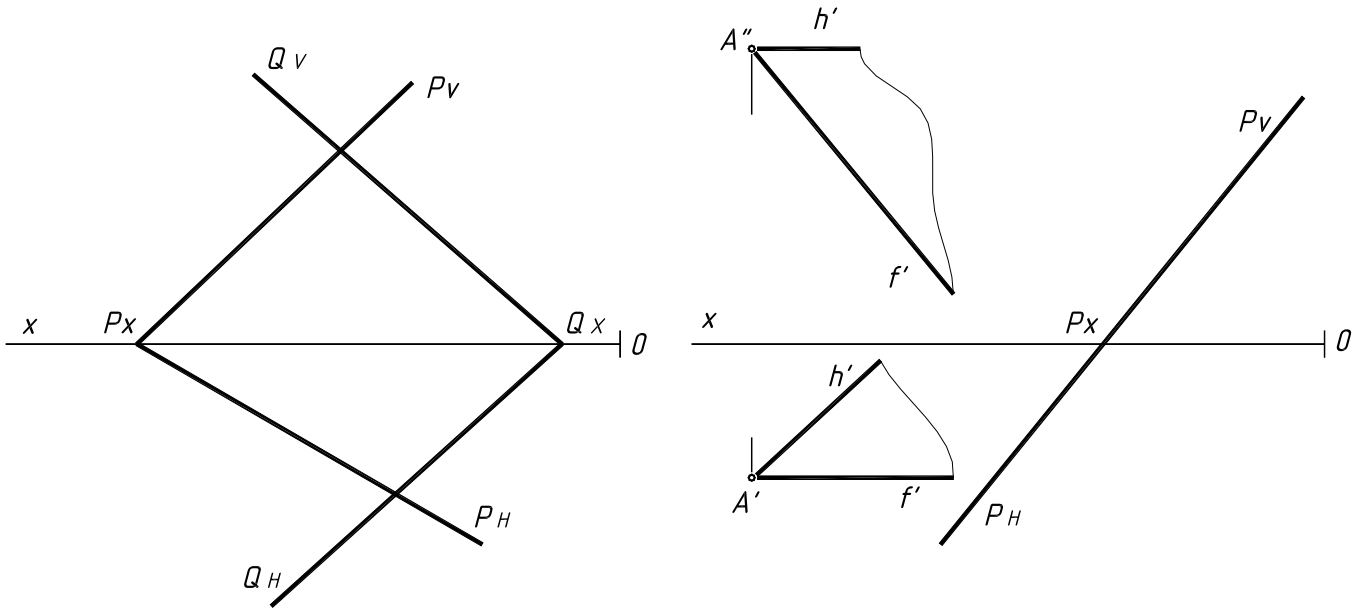
6 – masala

Berilgan to‘g‘ri chiziq bilan tekislik orasidagi burchakning proyeksiyalari topilsin.



7 – masala

Berilgan ikki tekislik orasidagi chiziqli burchakning proyeksiyalari topilsin.



8-mashg‘ulot

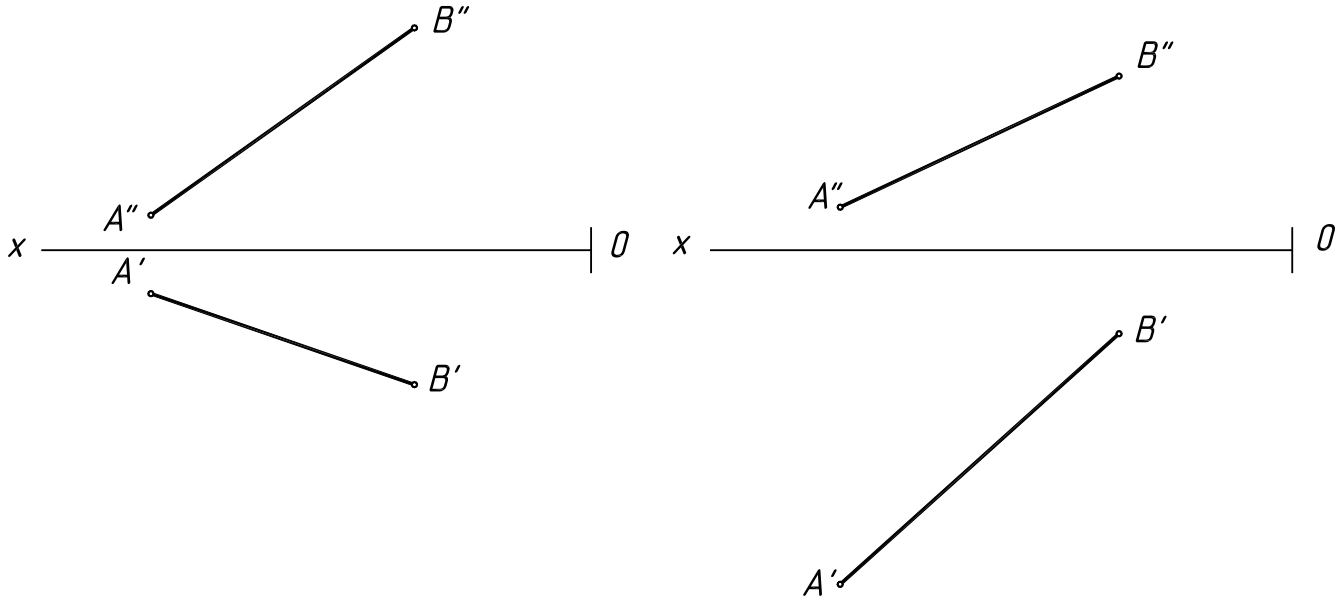
Mavzu: Proyeksiyalar tekisliklarini almashtirish usuli

Mavzuni xotirada tiklash uchun savollar.

1. Proyeksiyalar tekisliklarini almashtirish usulining mohiyati va maqsadi nimalardan iborat?
2. Proyeksiyalar tekisligidan birini almashtirishning mohiyatini tushuntirib bering.
3. Proyeksiyalar tekisligini ketma-ket ikki marta almashtirish qanday amalga oshiriladi?
4. Tekis shakl (masalan uchburchak)ning haqiqiy ko‘rinishini yasash uchun tekisliklarni qanday ketma-ketlikda almashtiriladi?

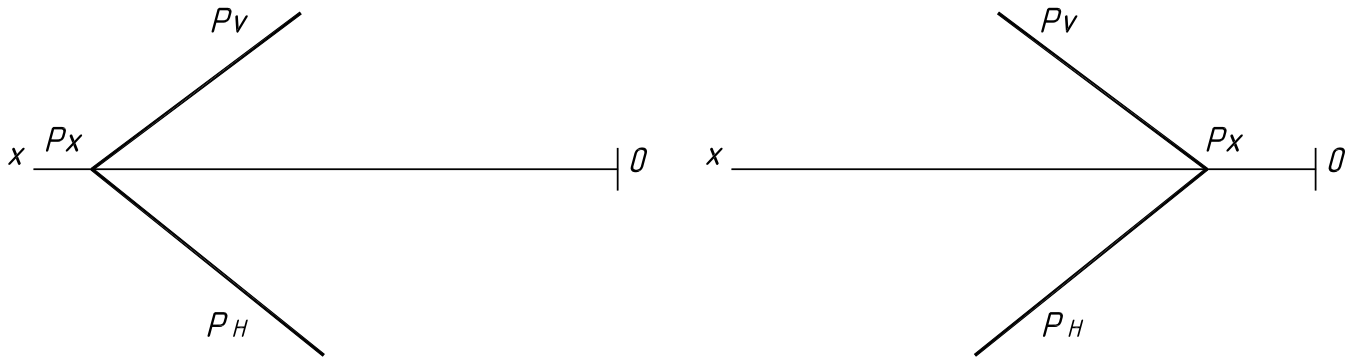
1-masala

AB kesmaning haqiqiy uzunligi dastlab ***V*** tekislikni V_1 ga, so‘ngra ***H*** tekisligini H_1 ga almashtirib yasalsin. Kesmaning ***H*** va *V* tekisliklarga og‘ish burchagi aniqlansin.



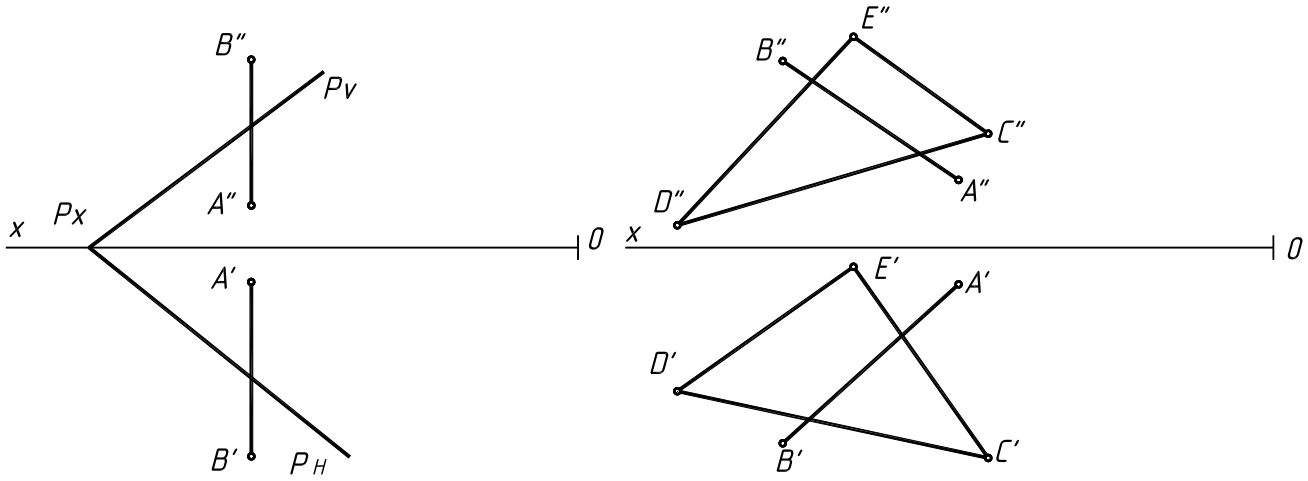
2-masala

Umumiy vaziyatdagi ***P*** tekislikni proyeksiyalovchi vaziyatga keltirib, uning ***H*** va ***V*** tekisliklarga og‘ish burchagi aniqlansin.



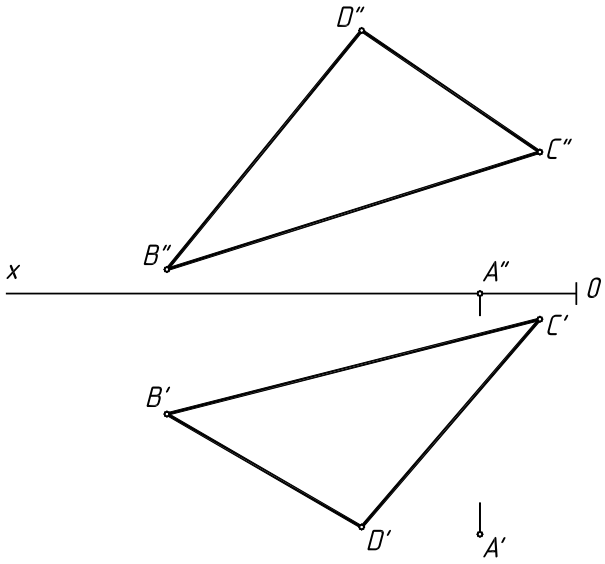
3-masala

AB to‘g‘ri chiziqning tekislik bilan kesishish nuqtasi yasalsin.



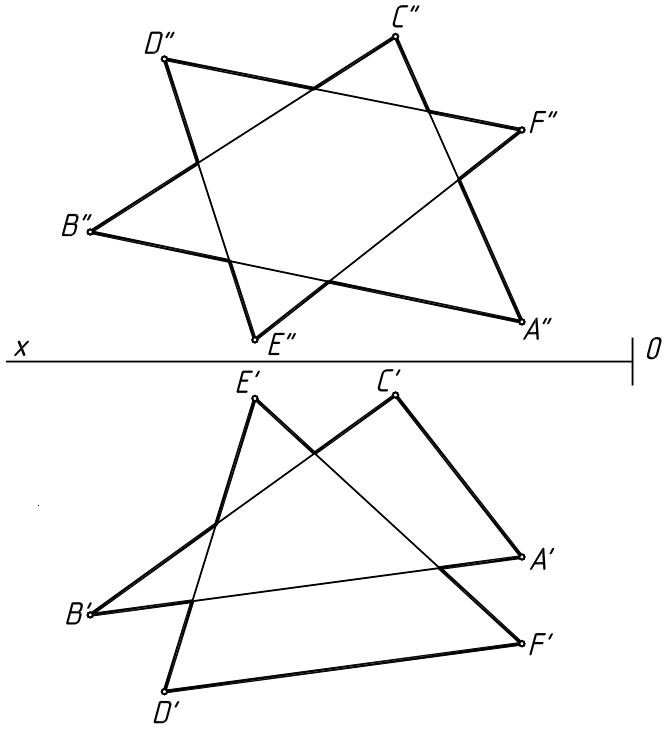
4-masala

A nuqtadan tekislikkacha bo‘lgan eng qisqa masofa topilsin.



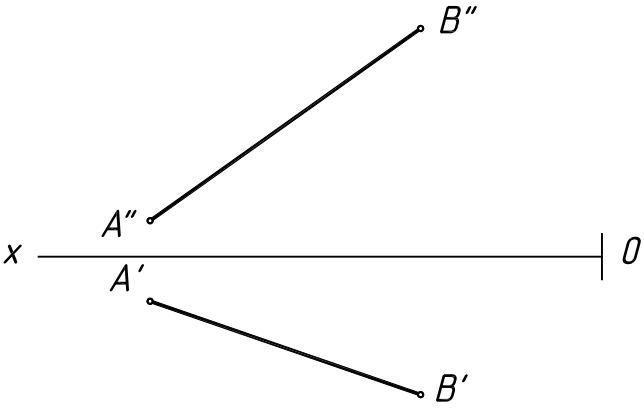
5-masala

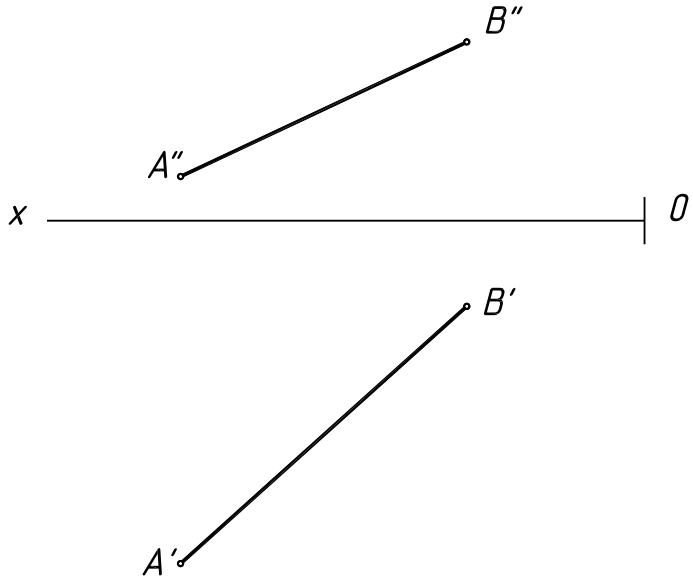
Ikki ΔABC va ΔDEF larning o‘zaro kesishish chizig‘i yasalsin va ularning ko‘rinishligi aniqlansin.



6-masala

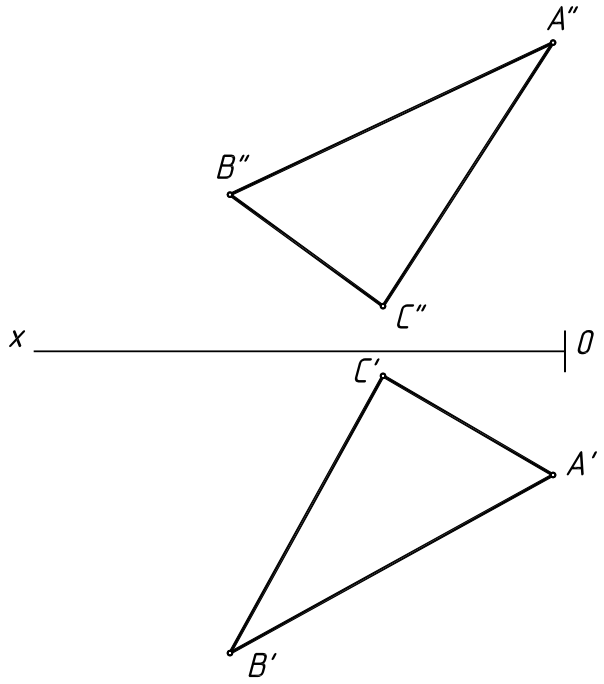
AB kesma proyeksiyalovchi vaziyatga keltirilsin.





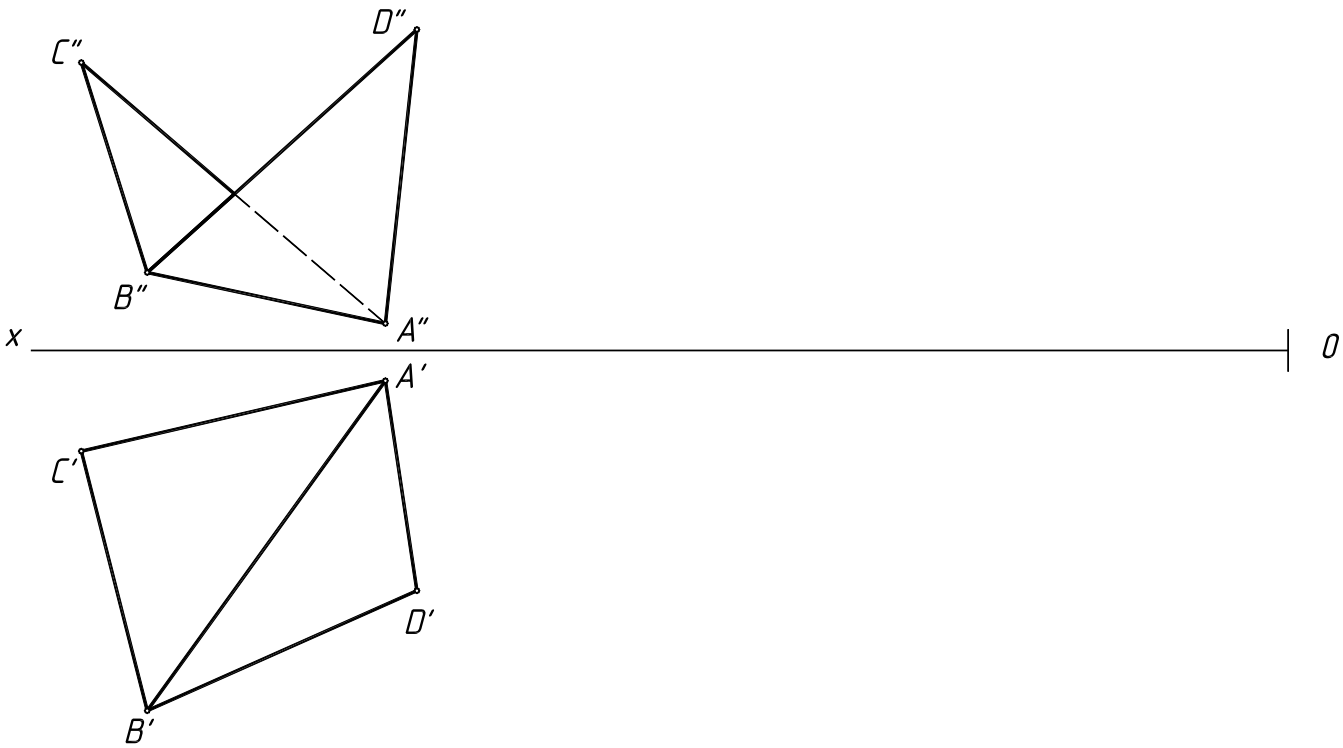
7-masala

ΔABC ning haqiqiy kattaligi yasalsin.



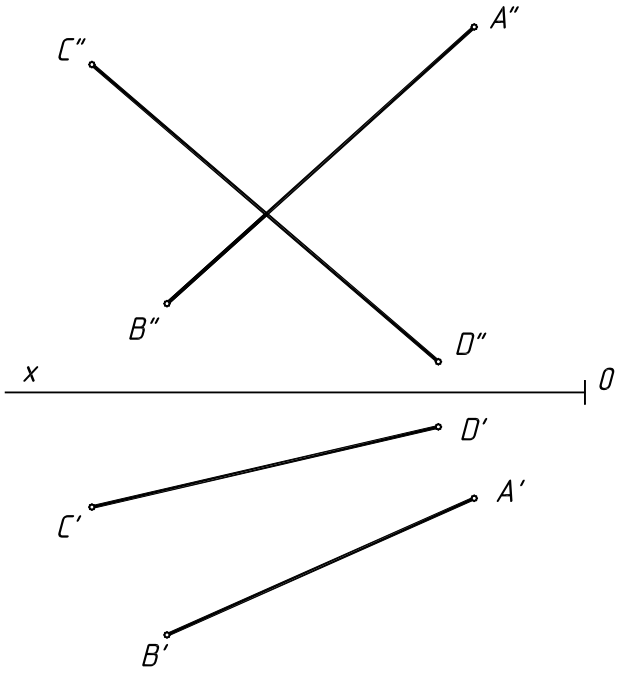
8-masala

AB qirradagi ikki yoqli burchak chiziqli burchagining proyeksiyalari yasalsin.



9-masala

Ikki ayqash (uchrashmas) to‘g‘ri chiziqlar orasidagi eng qisqa masofa topilsin.



9-mashg‘ulot

Mavzu: Tekis parallel harakat va aylantirish usullari

H tekislikka parallel bolgan tekislikda harakatlantirish.
V tekislikka parallel bolgan tekislikda harakatlantirish.
H ga perpendikulyar o’q atrofida aylantirish.
V ga perpendikulyar o’q atrofida aylantirish.
H ga parallel (shu jumladan tekislikning gorizontal izi) o’q atrofida aylantirish.
V ga parallel (shu jumladan tekislikning frontal izi) o’q atrofida aylantirish.

Mavzuni xotirada tiklash uchun savollar.

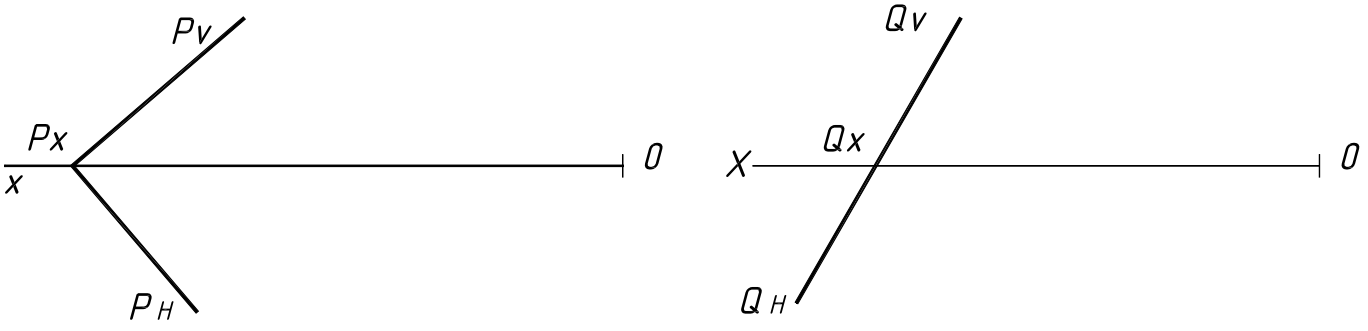
1. Nuqta H yoki V tekislikka parallel bo‘lgan tekislikda harakatlantirilsa, uning proyeksiyalari qanday harakatlanadi?
2. H (yoki V) tekislikka perpendikulyar o‘q atrofida aylanayotgan nuqtaning proyeksiyalari qanday harakatlanadi?
3. Kesmaning haqiqiy uzunligini yasash uchun uni qanday vaziyatga kelguncha aylantirish kerak?
4. Gorizontal (yoki frontal) to‘g‘ri chiziq (o‘q) atrofida aylanayotgan nuqtaning aylanish tekisligi qanday vaziyatdagi tekislik deyiladi?

1-masala

AB kesmani dastlab gorizontal, so‘ngra frontal proeksiyalovchi vaziyatga keltiring.

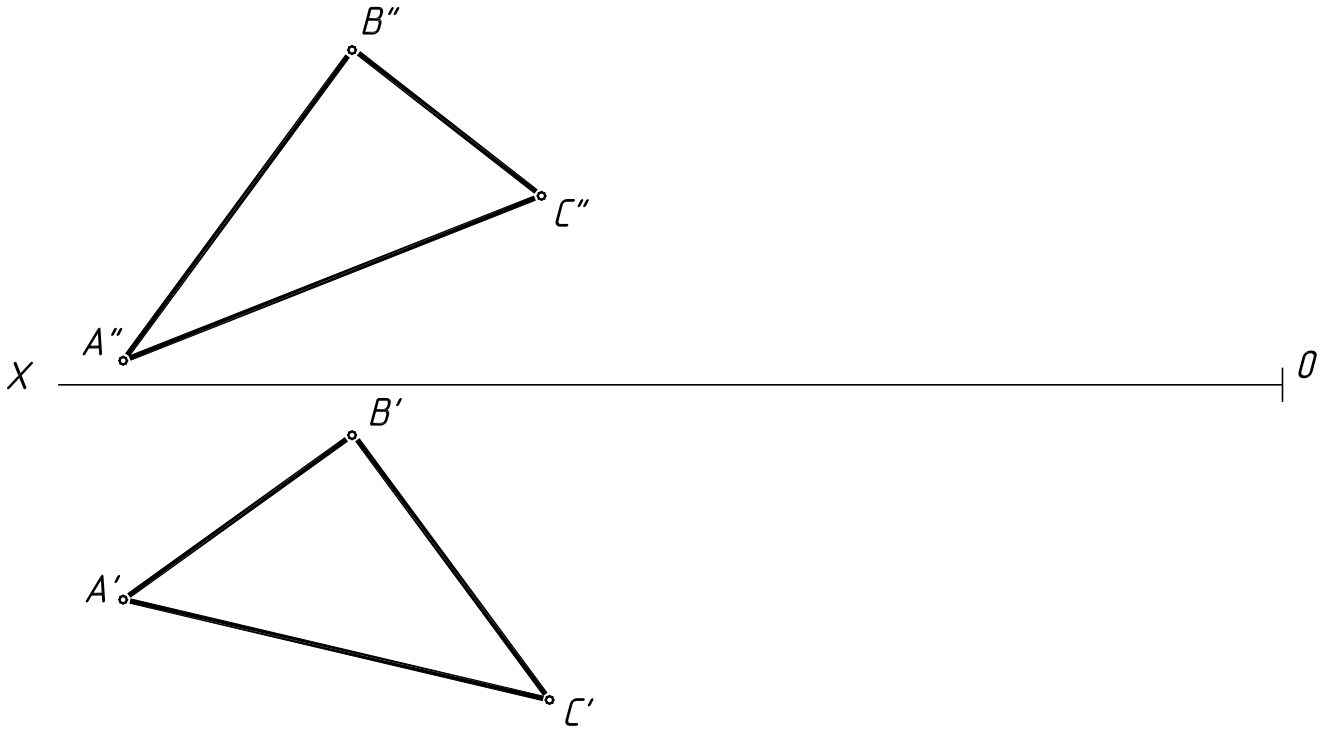
2-masala

Berilgan ***P*** tekisligini gorizontal, ***Q*** tekislikni esa frontal proyeksiyalovchi vaziyatga keltiring.



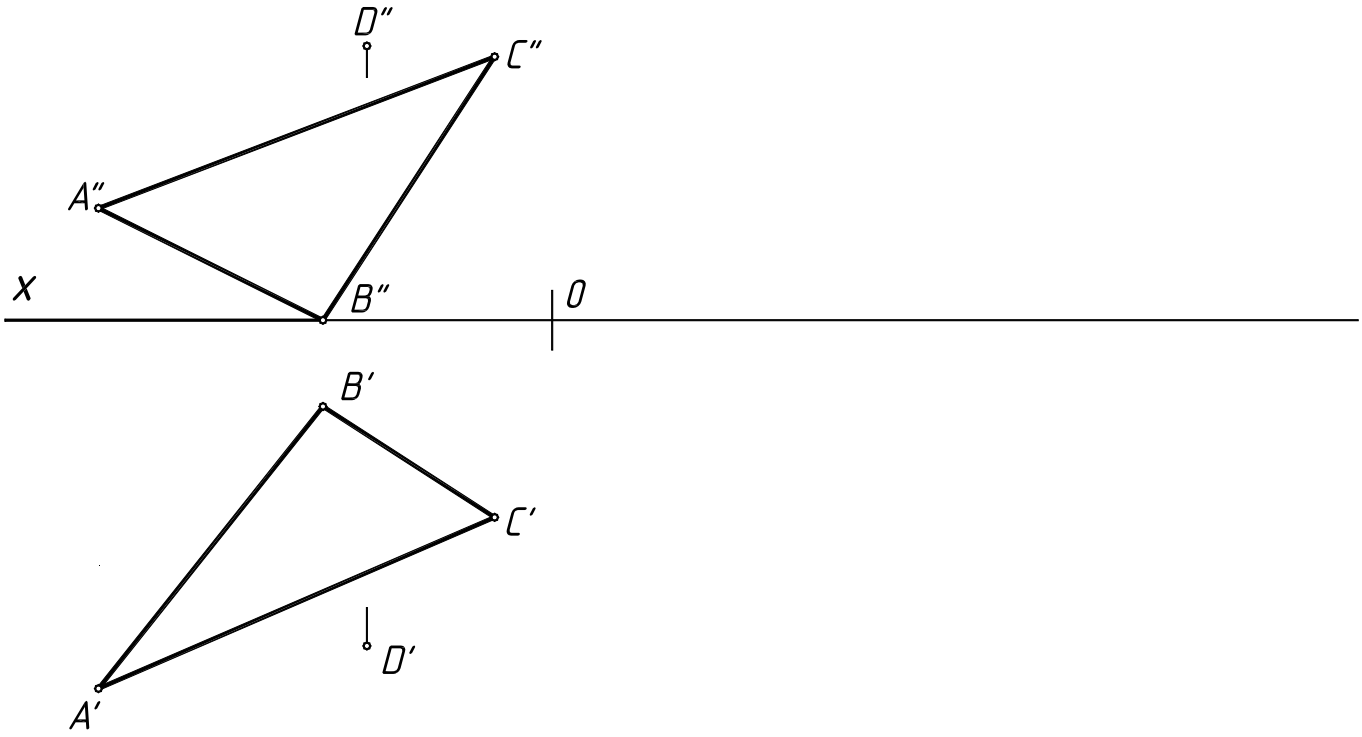
3-masala

ΔABC ning haqiqiy kattaligi yasalsin.



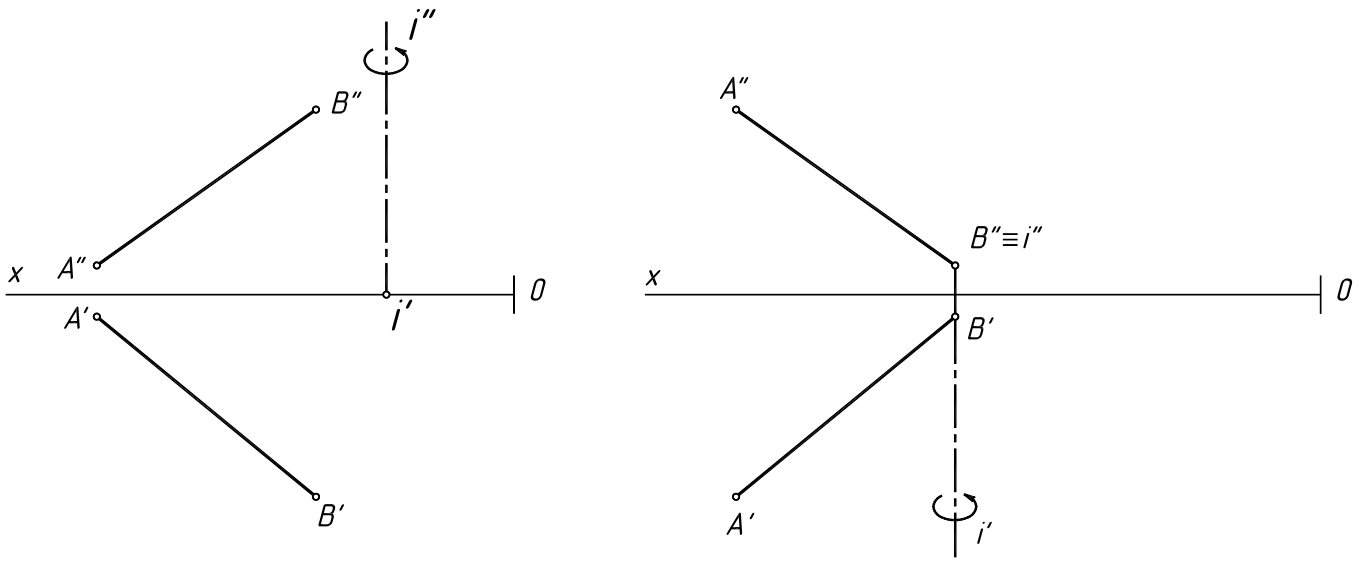
4-masala

Berilgan ***D*** nuqtadan ΔABC tekisligigacha bo‘lgan eng qisqa masofa topilsin.



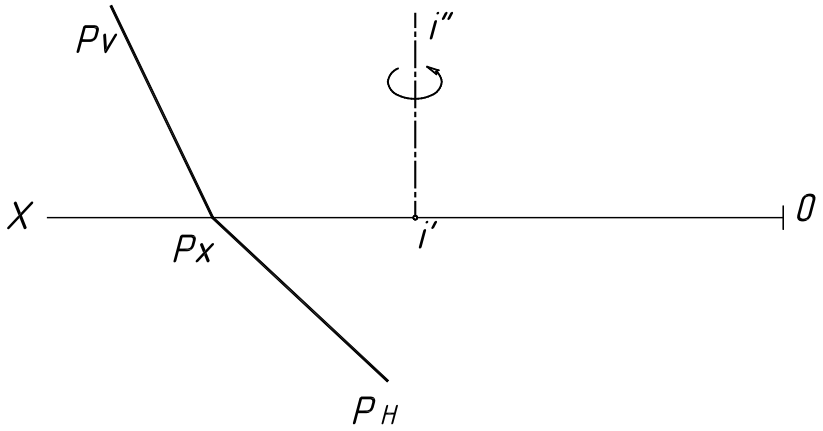
5-masala

Berilgan ***AB*** kesmaning haqiqiy uzunligi dastlab ***i*** ⊥ ***H***, so‘ngra ***i*** ⊥ ***V***, o‘q atrofida aylantirib yasalsin.



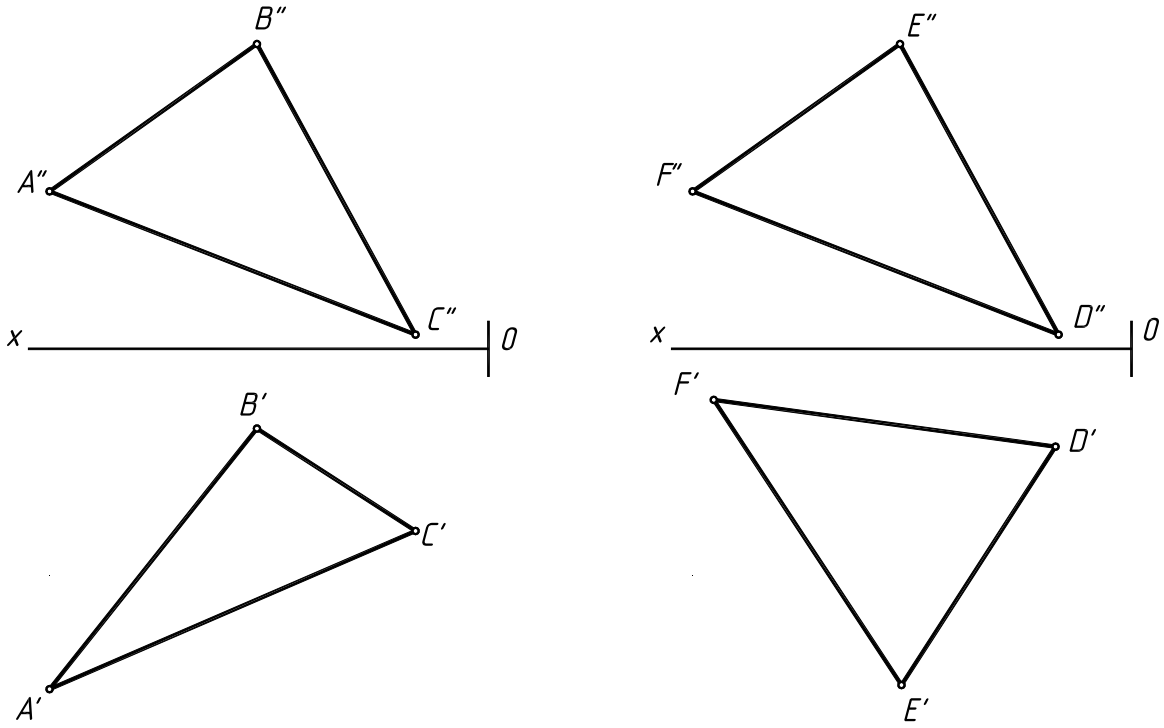
6-masala

Berilgan ***P*** tekisligini gorizontal proyeksiyalovchi vaziyatga keltiring.



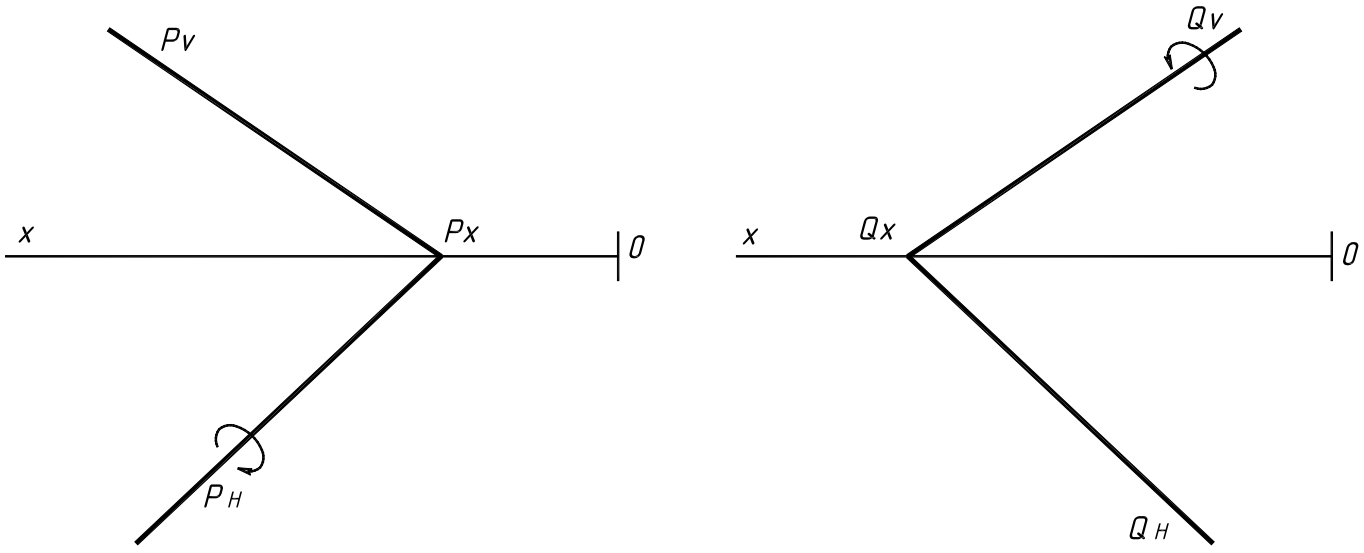
7-masala

ΔABC ning haqiqiy kattaligi gorizontali, ΔDEF ning haqiqiy kattaligi esa frontali atrofida aylantirib yasalsin.



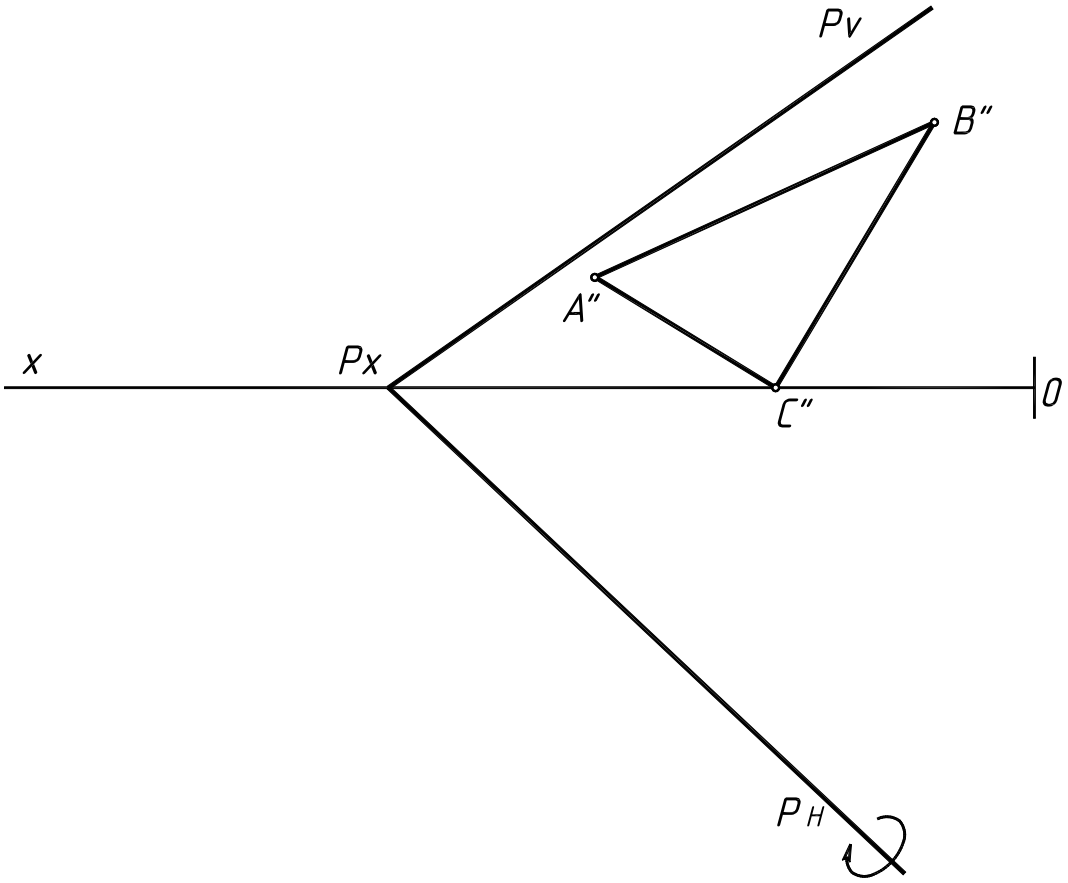
8-masala

Berilgan P tekislikni P_H izi, Q tekislikni Q_V izi atrofida aylantirib mos ravishda H va V proyeksiyalar tekisliklari bilan jipslashtirilsin.



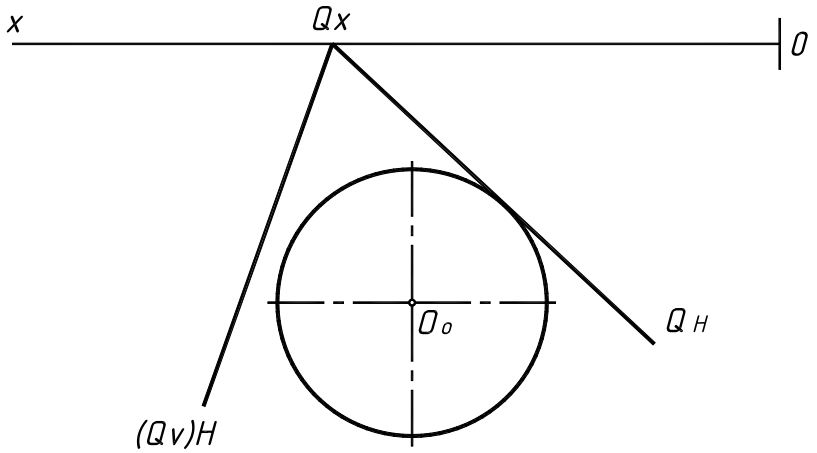
9-masala

P tekislikda yotgan (tegishli bo‘lgan) ΔABC ning haqiqiy kattaligi yasalsin.



10-masala

Asosi ***Q*** tekislikda yotgan va balandligi ***40 mm*** bo‘lgan konusning proyeksiyalari yasalsin. ***Q*** tekislik va unda yotgan konusning asosi ***H*** tekislik bilan jipslashgan vaziyatda berilgan.



10-mashg‘ulot

Mavzu: Ko‘pyoqliklar

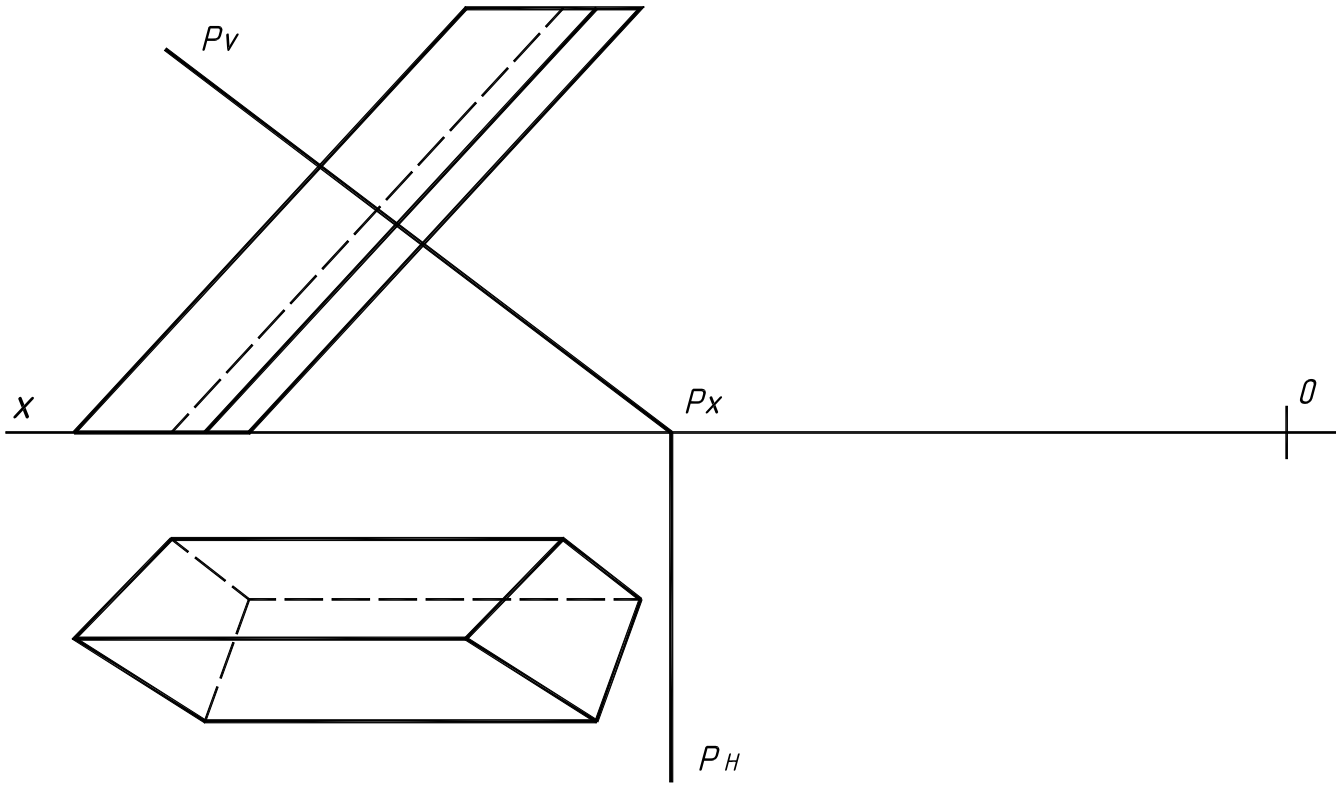
Ko‘pyoqliklarning proyeksiyalovchi tekisliklar bilan kesishuvi.
Ko‘pyoqliklarning umumiy vaziyatdagi tekisliklar bilan kesishuvi.
Ko‘pyoqliklarning yoyilmalari.
Ko‘pyoqliklarning to‘g‘ri chiziq bilan kesishuvi.
Ikki ko‘pyoqliklarning o‘zaro kesishuvi.

Mavzuni xotirada tiklash uchun savollar.

1. Ko‘pyoqlik deb nimaga aytiladi?
2. Ko‘pyoqliklarning aniqlovchilari nima?
3. Ko‘pyoqlikning tekislik bilan kesishuvidan qanday shakl hosil bo‘ladi?
4. Ko‘pyoqlikning tekislik bilan kesishish chizig‘i qanday aniqlanadi?
5. To‘g‘ri chiziqning ko‘pyoqlik bilan kesishish nuqtalari qanday algoritm asosida yasaladi?

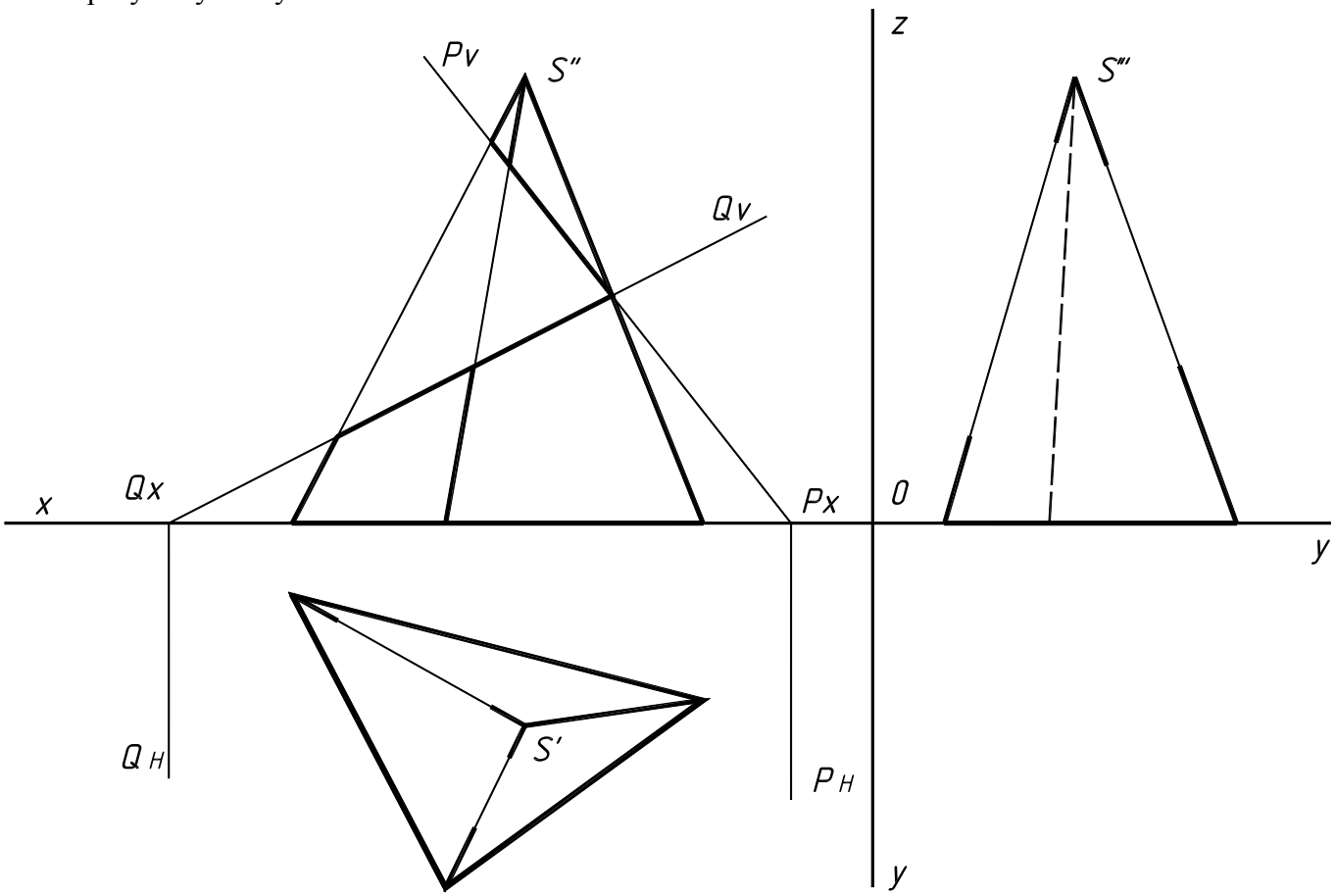
1-masala

Berilgan og‘ma prizmaning proyeksiyalovchi tekislik bilan kesishish chizig‘i va kesim yuzasining haqiqiy kattaligi yasalsin.



2-masala

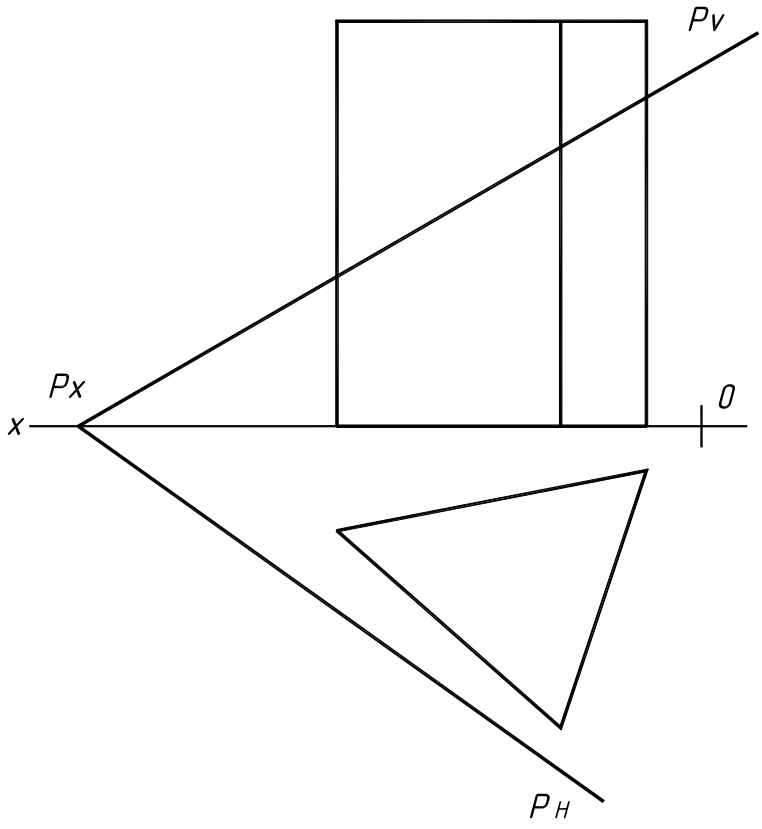
Piramidaning proyeksiyalovchi tekisliklar bilan kesishish chiziqlarining gorizontal va profil proyeksiyalari yasalsin.



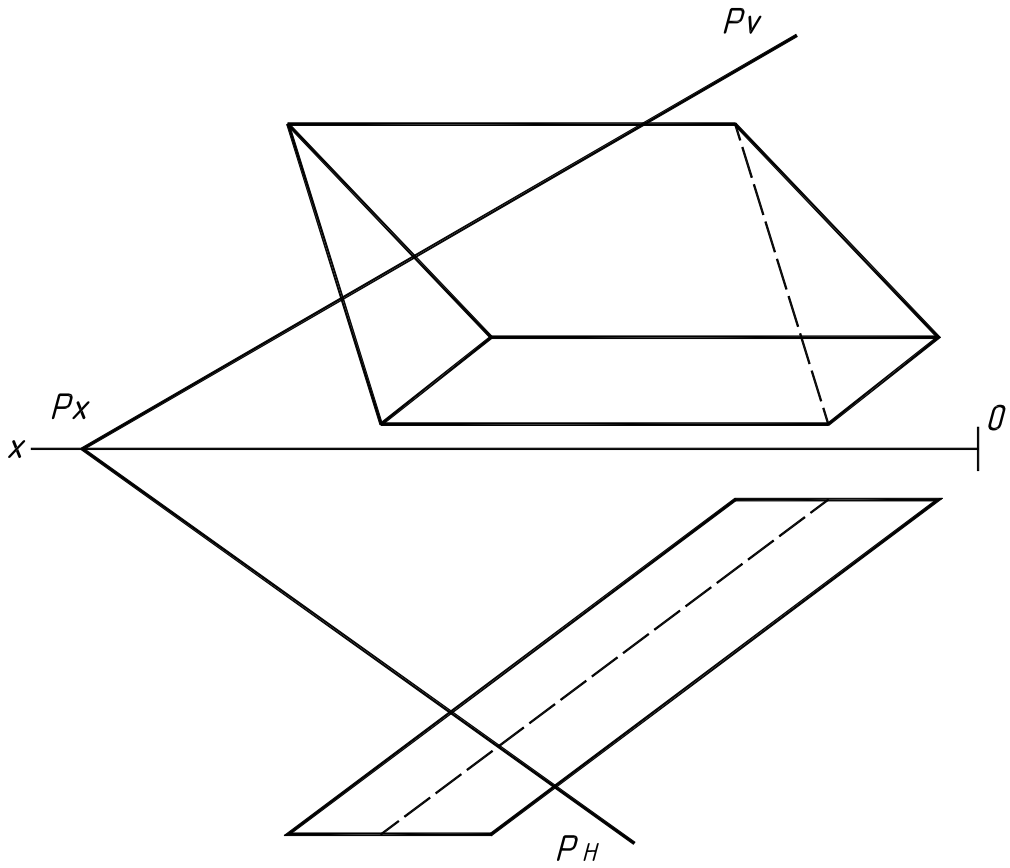
3-masala

Prizmaning umumiy vaziyatdagi tekislik bilan kesishish chizig‘i va kesim yuzasining haqiqiy kattaligi yasalsin.

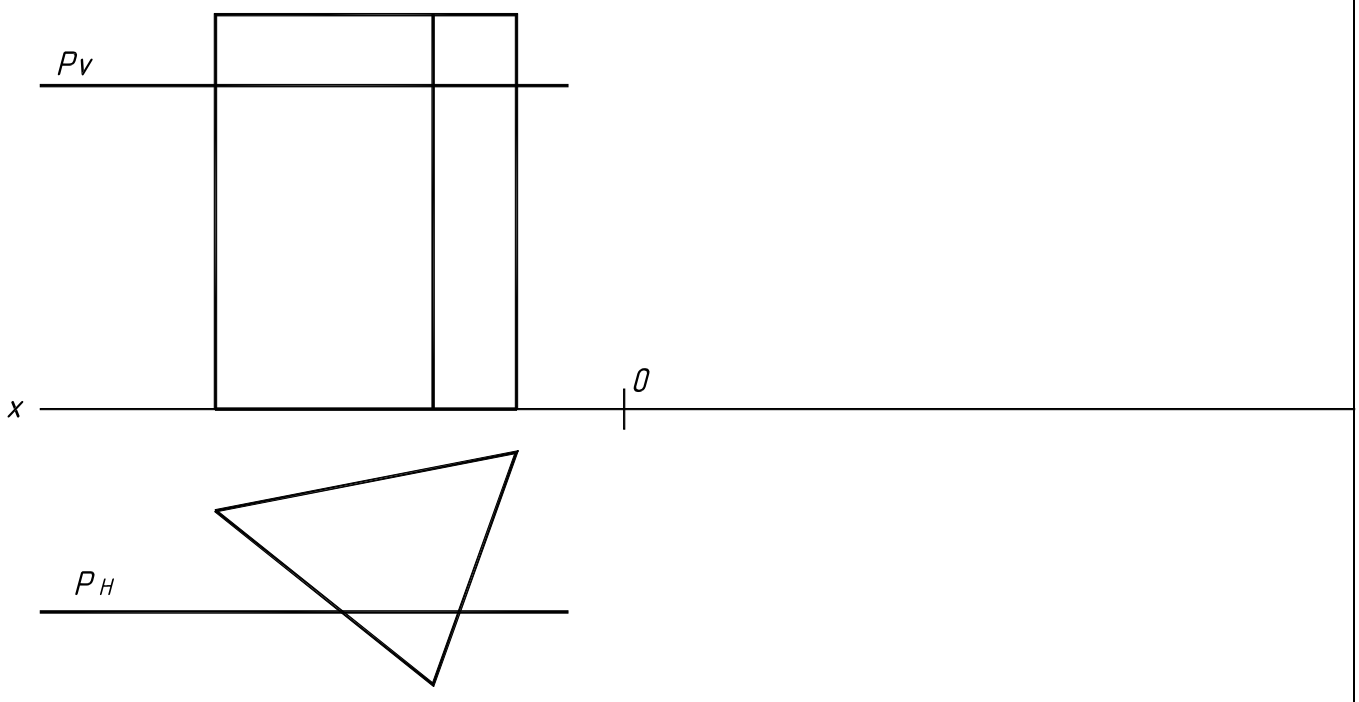
a)



b)

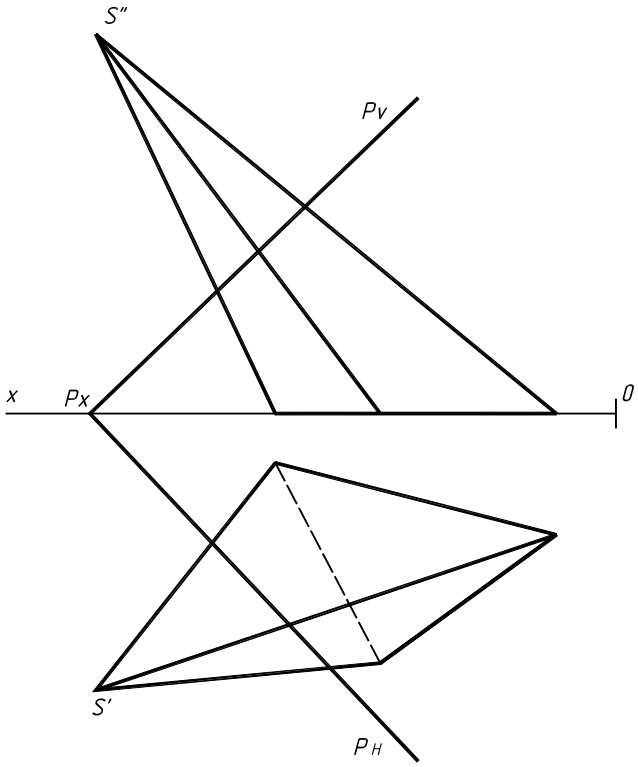


c)



4-masala

Piramidaning umumiy vaziyatdagi tekislik bilan kesishish chizig‘i va kesim yuzasining haqiqiy kattaligi yasalsin.

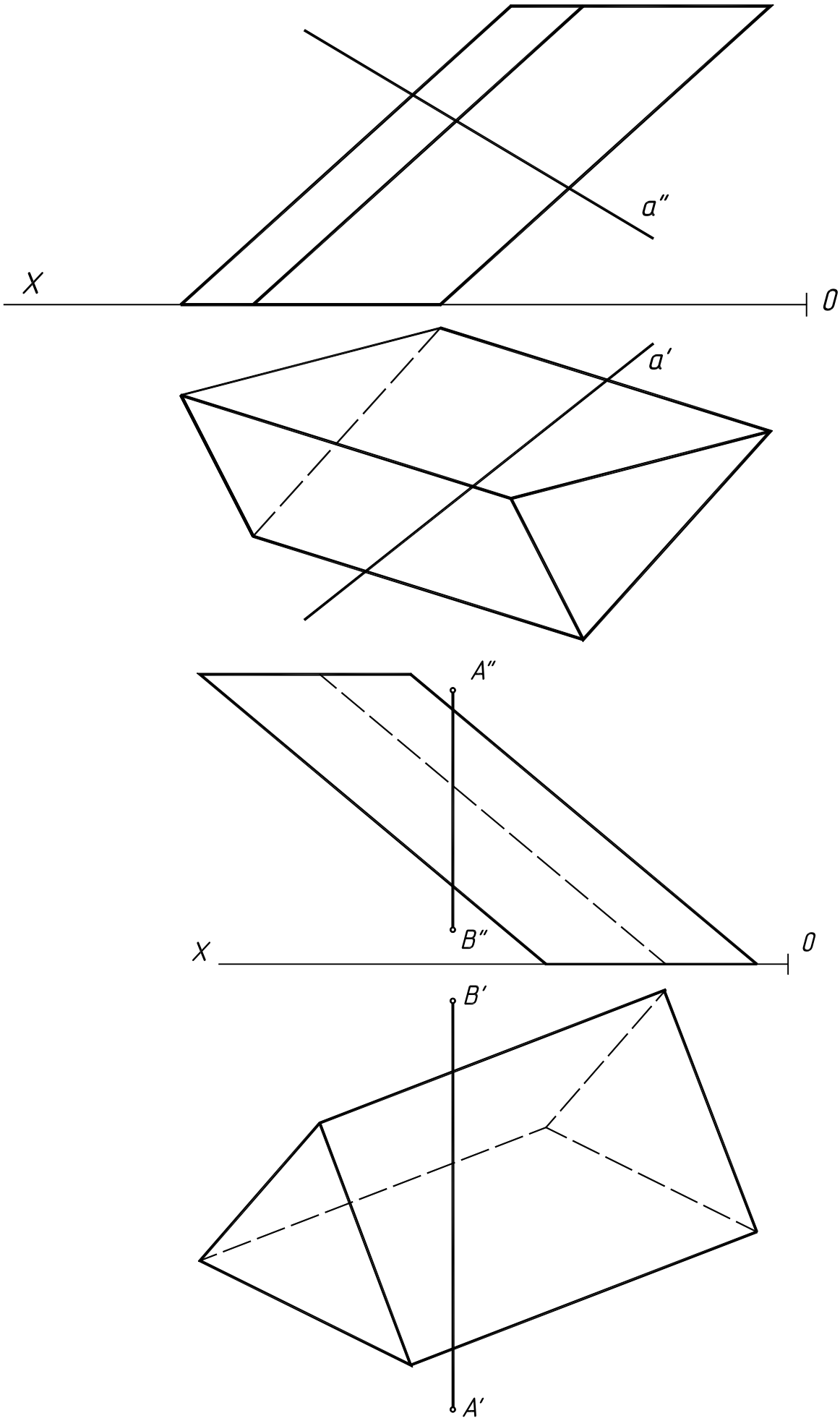


5-masala

4-masaladagi berilgan piramidaning to‘la sirtining yoyilmasi va kesishish chizig‘ining yoyilmadagi o‘rni yasalsin.

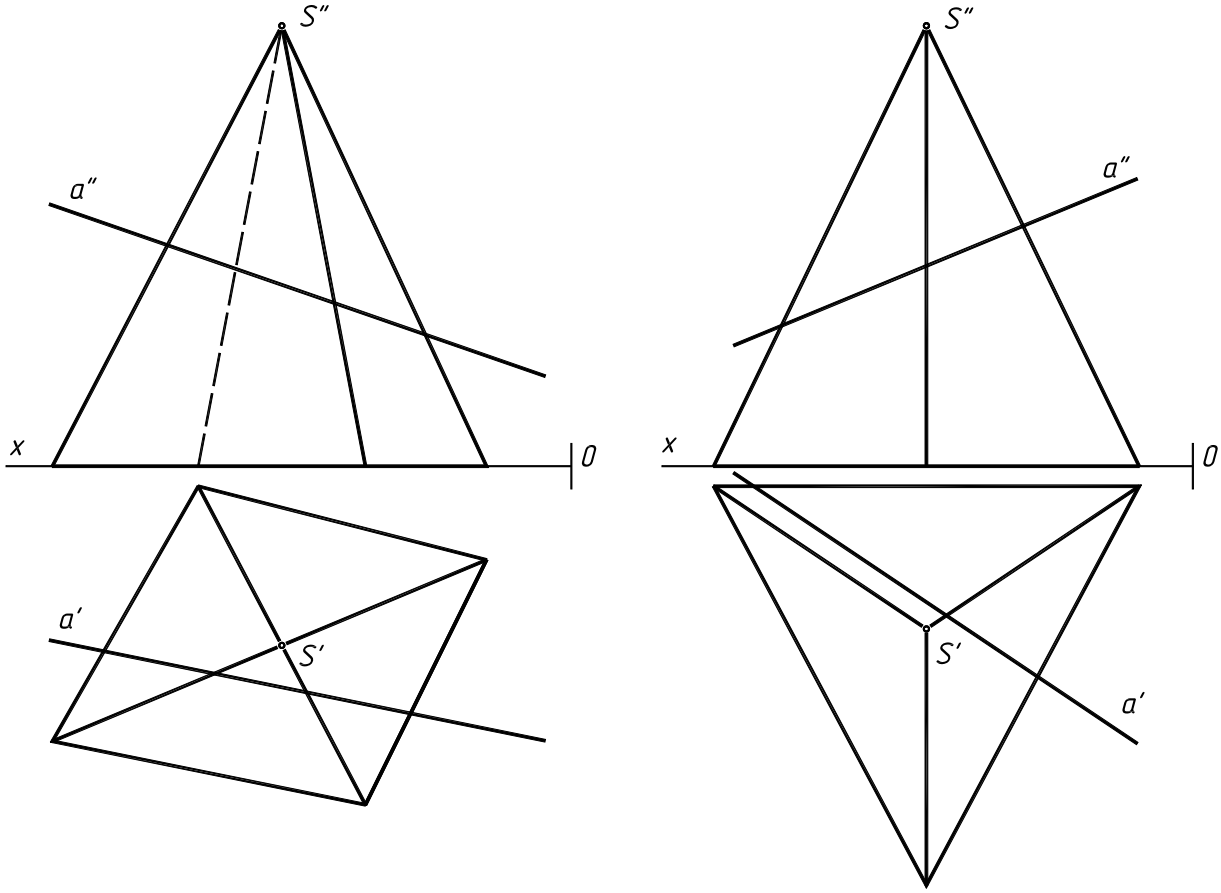
6-masala

To‘g‘ri chiziqning prizma bilan kesishish nuqtalari yasalsin.



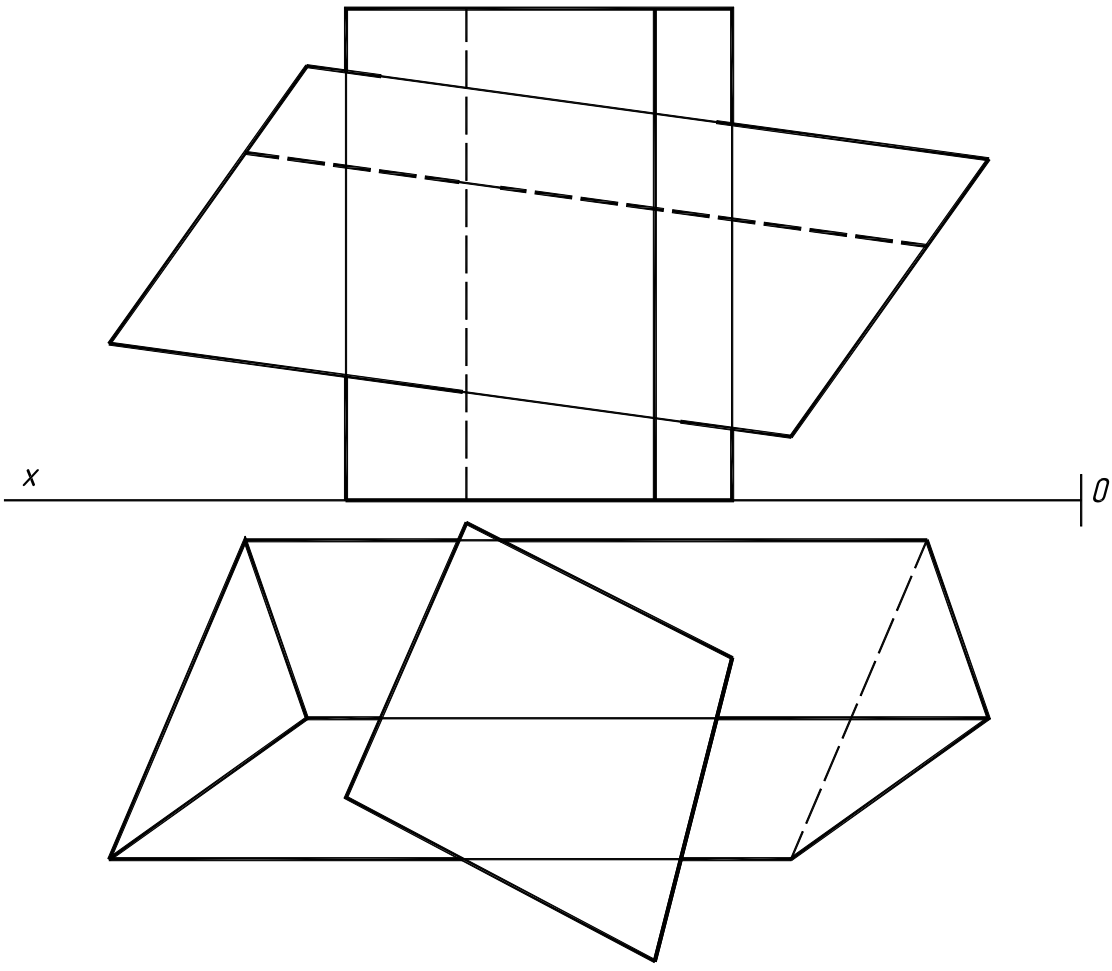
7-masala

To‘g‘ri chiziqning piramida bilan kesishish nuqtalari yasalsin.



8-masala

Ikki ko‘pyoqlikning o‘zaro kesishish chizig‘i yasalsin.



11-mashg‘ulot

Mavzu: Egri chiziqlar

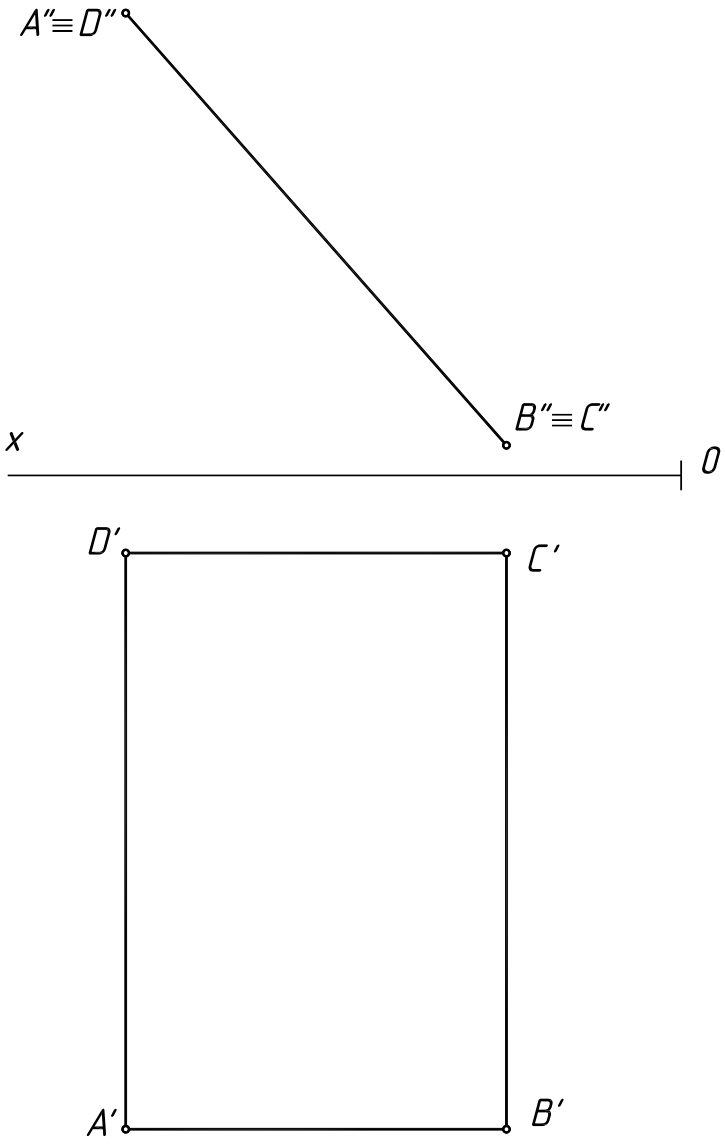
Tekis egri chiziqlar.
Fazoviy egri chiziqlar.

Mavzuni xotirada tiklash uchun savollar.

1. Egri chiziq deb nimaga aytiladi?
2. Tekis va fazoviy egri chiziqlar deb nimaga aytiladi?
3. Monoton va ulama egri chiziqlarni tushuntirib bering?
4. Ulama egri chiziqlarning qanday maxsus nuqtalari mavjud?
5. Ikkinchi tartibli egri chiziqlarni ta’riflab bering.
6. Fazoviy egri chiziqlarning uzunligi qanday aniqlanadi?
7. Vint chizig‘i deb nimaga aytiladi?

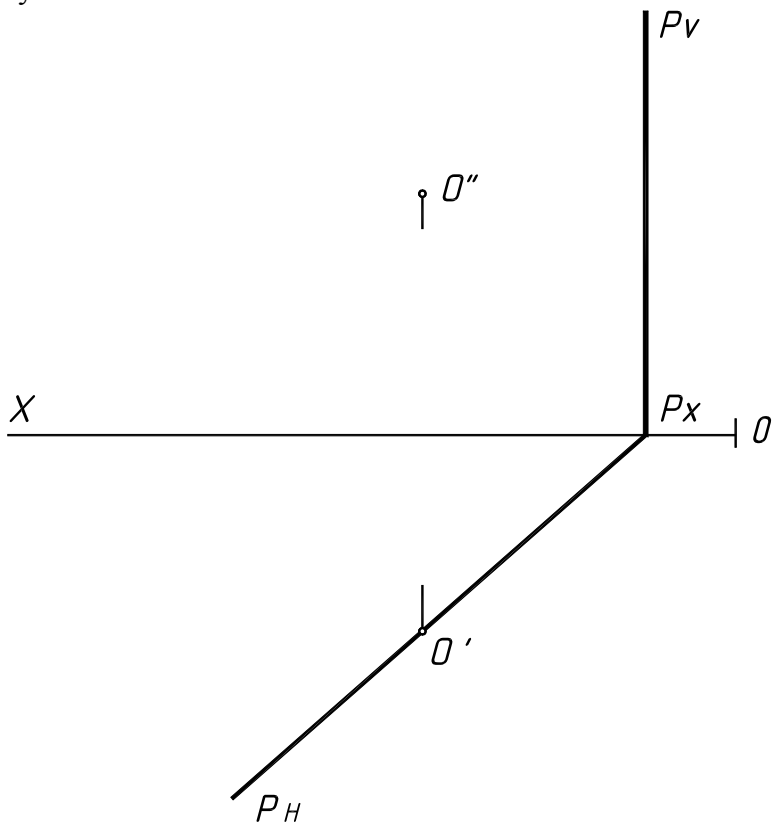
1-masala

Frontal proyeksiyalovchi vaziyatda joylashgan kvadratga ichki chizilgan aylananing proyeksiyalari yasalsin.



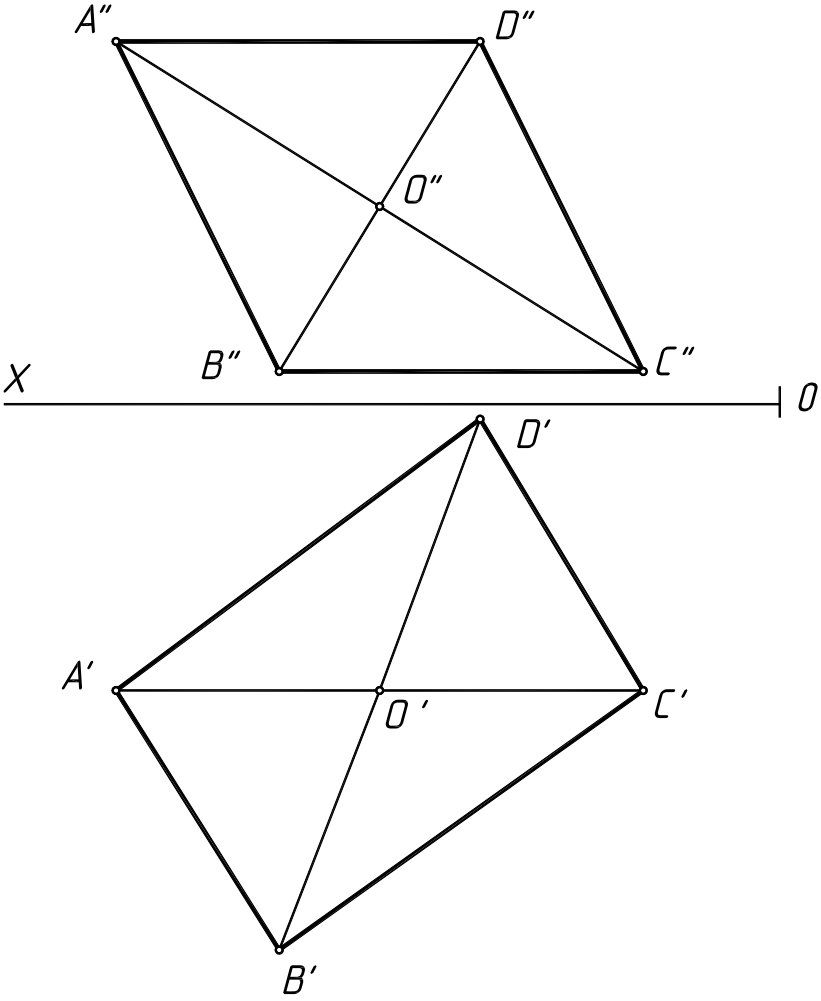
2-masala

P tekislikda yotgan va markazi ***O*** nuqtada joylashgan, radiusi ***25 mm*** teng bo‘lgan aylananing proyeksiyalari yasalsin.



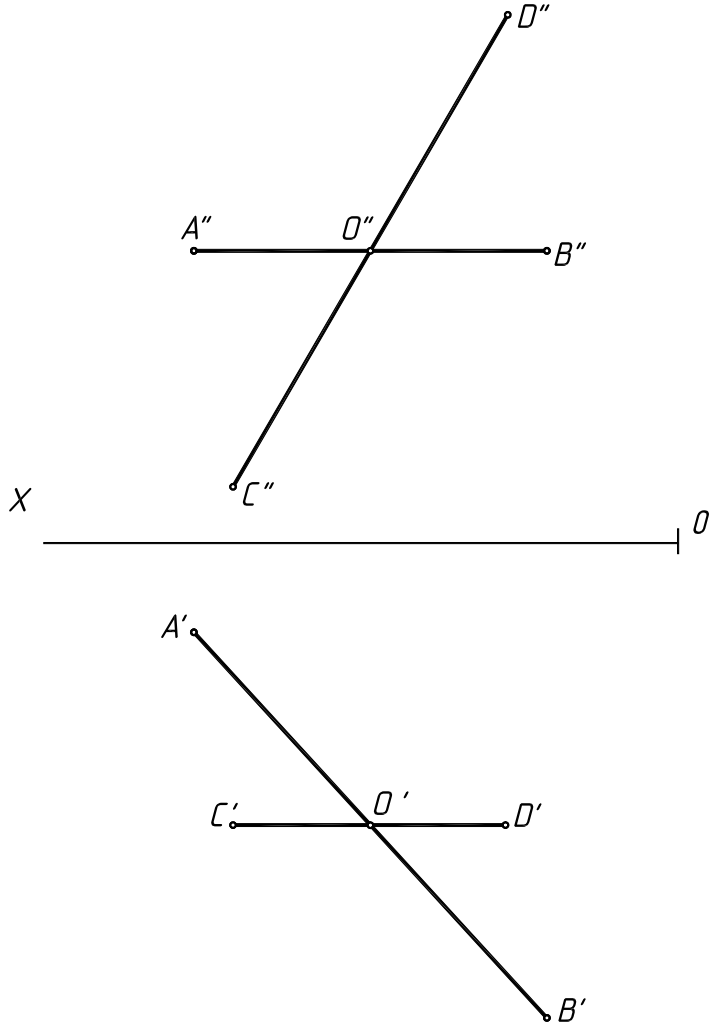
3-masala

ABCD kvadratning proyeksiyalari berilgan bo‘lsa, markazi kvadratning markazida joylashgan ichki urinma aylananing proyeksiyalari yasalsin.



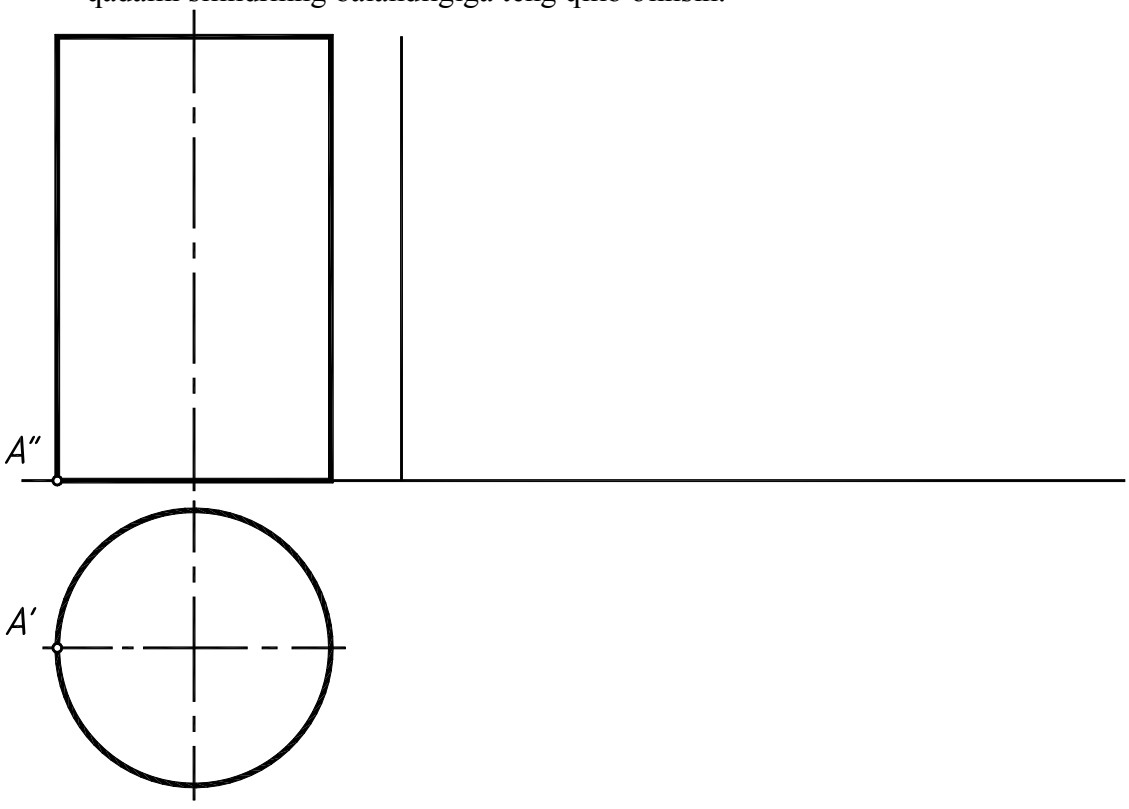
4-masala

AB-gorizontal, ***CD***-frontal chiziqlar bilan berilgan ellepsning proyeksiyalari yasalsin.



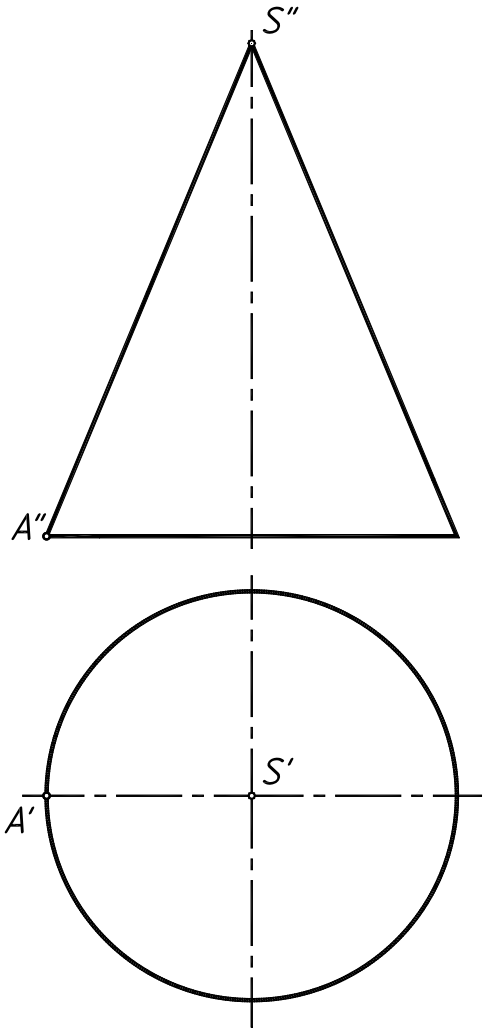
5-masala

Silindr sirtida yotgan ***A*** nuqtadan o‘tuvchi o‘ng silindrning vint chizig‘i yasalsin. Vint chizig‘ining qadami silindrning balandligiga teng qilib olinsin.



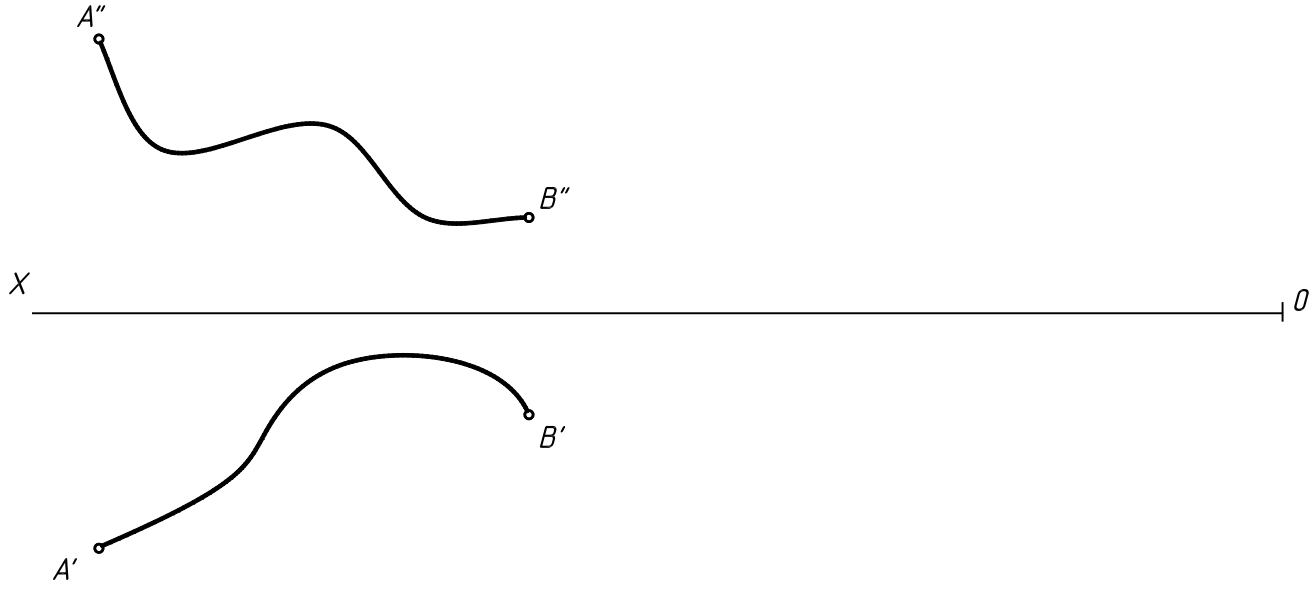
6-masala

Konus sirtida yotgan A nuqtadan o‘tuvchi chap vint sirtining proeksiyalari yasalsin. Vint chizig‘ining qadami konusning balandligiga teng qilib olinsin.



7-masala

Berilgan fazoviy egri chiziqning uzunligini aniqlang.



12-mashg‘ulot

Mavzu: Egri chiziqli sirtlar. Ularning hosil bo‘lishi va chizmada berilishi.

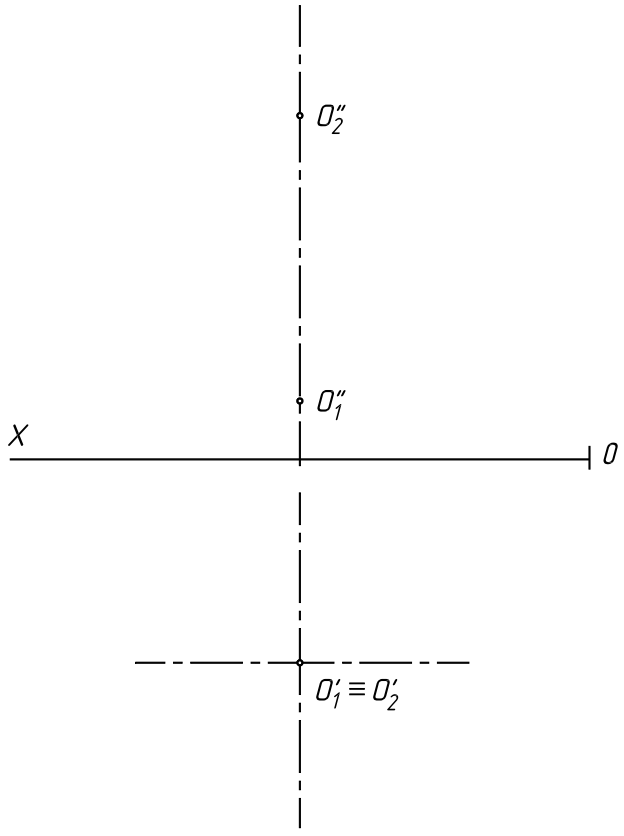
Egri chiziqli sirtlarning hosil bo‘lishi
Egri chiziqli sirtlarning chizmada berilishi.
Egri chiziqli sirt ustida nuqta tanlab olish.

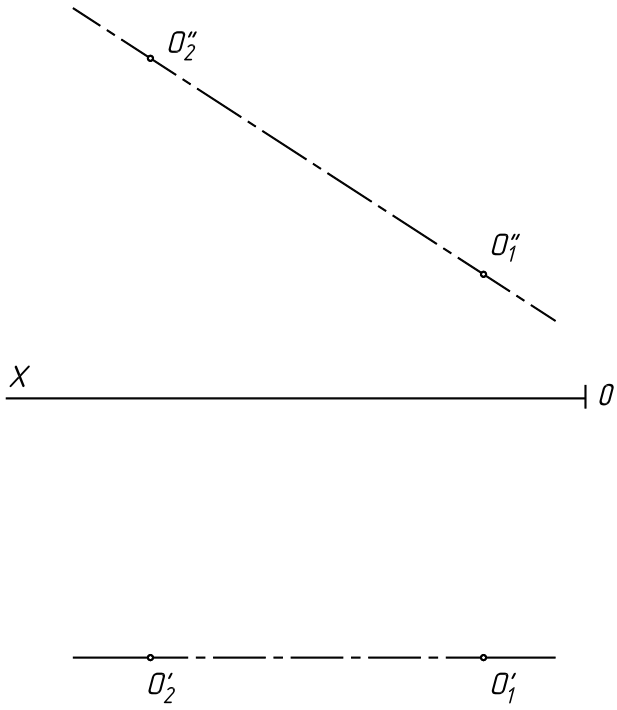
Mavzuni xotirada tiklash uchun savollar.

1. Egri chiziqli sirtning yasovchisi va yo‘naltiruvchilari deb nimaga aytiladi?
2. Chiziqli va chiziqli bo‘lmagan sirtlarning farqi nima?
3. Aylanma sirtlar qanday hosil bo‘ladi?
4. Vintsimon sirtlar qanday hosil bo‘ladi?

1-masala

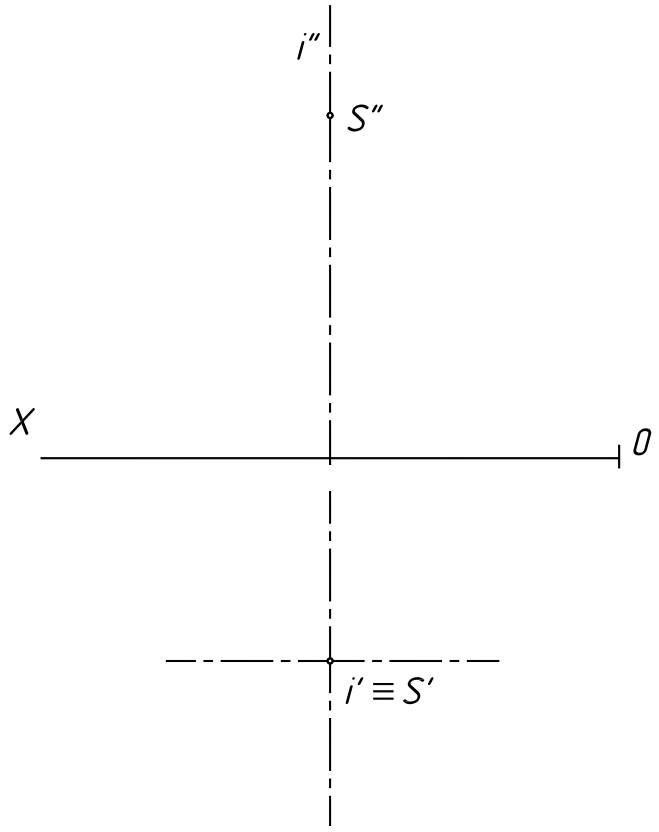
Ostki asosi O_1, ustki asosining markazi esa O_2 nuqtalarda joylashgan radiusi ***15 mm*** ga teng bo‘lgan to‘g‘ri doiraviy silindrning proyeksiyalari yasalsin.





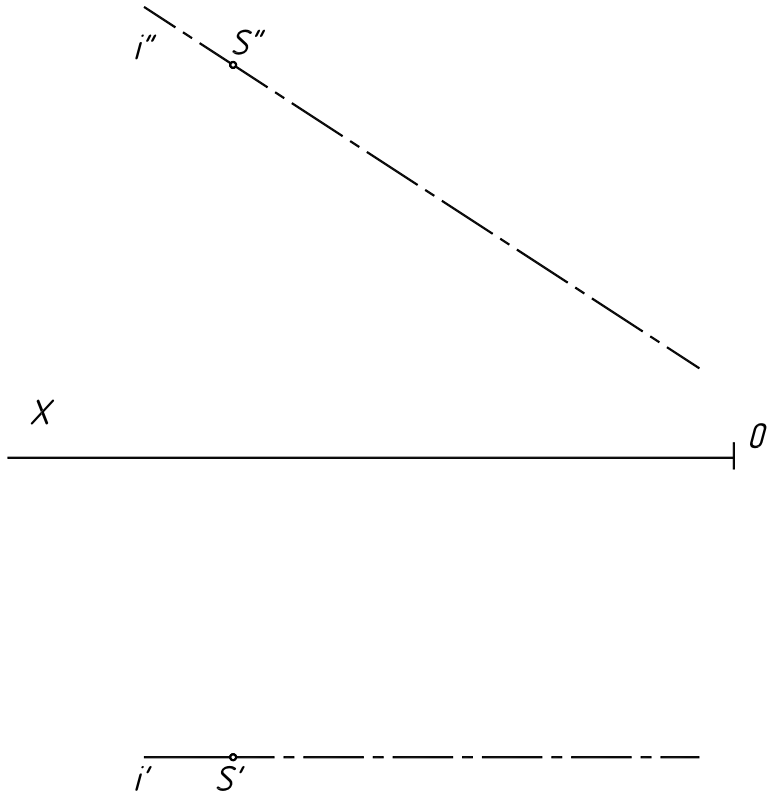
2-masala

S uchi ***i*** o‘qda joylashgan, asosi ***H*** tekislikda joylashgan to‘g‘ri doiraviy konusning proyeksiyalari yasalsin. Asosining radiusini ***25 mm*** ga teng deb olinsin.



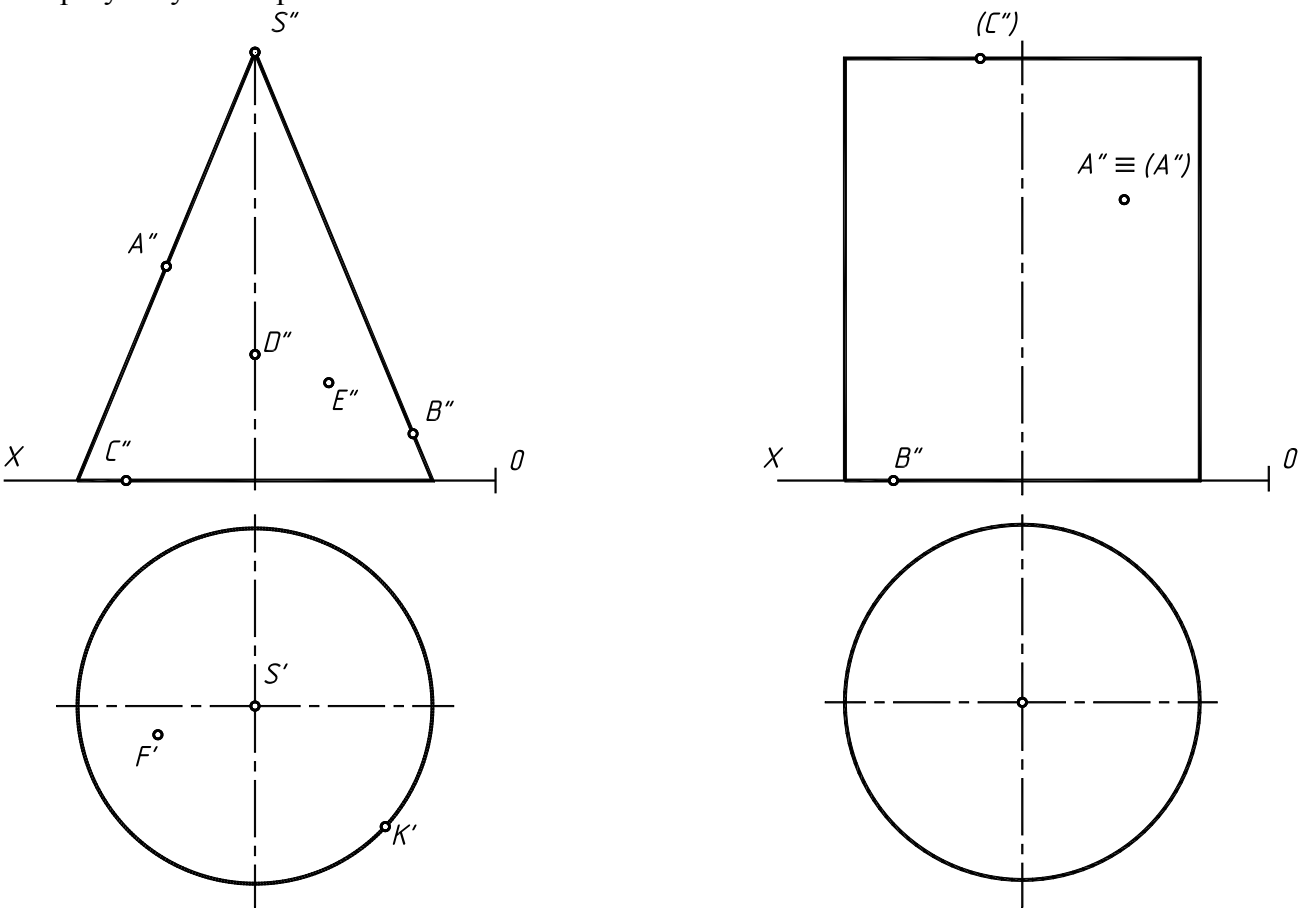
3-masala

S uchi ***i*** o‘qda joylashgan balandligi ***h = 50 mm*** bo‘lgan, hamda asosi ***H*** tekislikka urunuvchi joylashgan to‘g‘ri doiraviy konusning proyeksiyalari yasalsin.



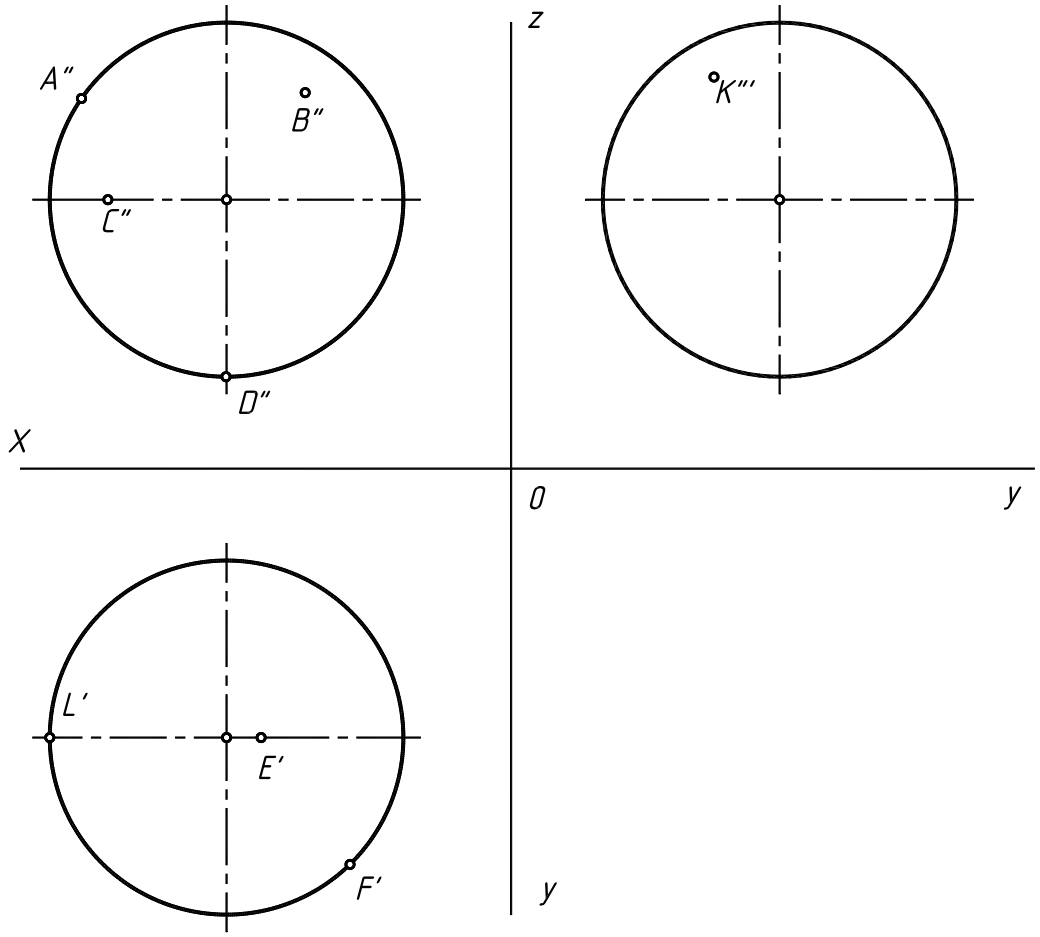
4-masala

To‘g‘ri doiraviy silindr va konuslarning sirtida yotgan nuqtalarning yetishmaydigan ikkinchi proyeksiyalari topilsin.



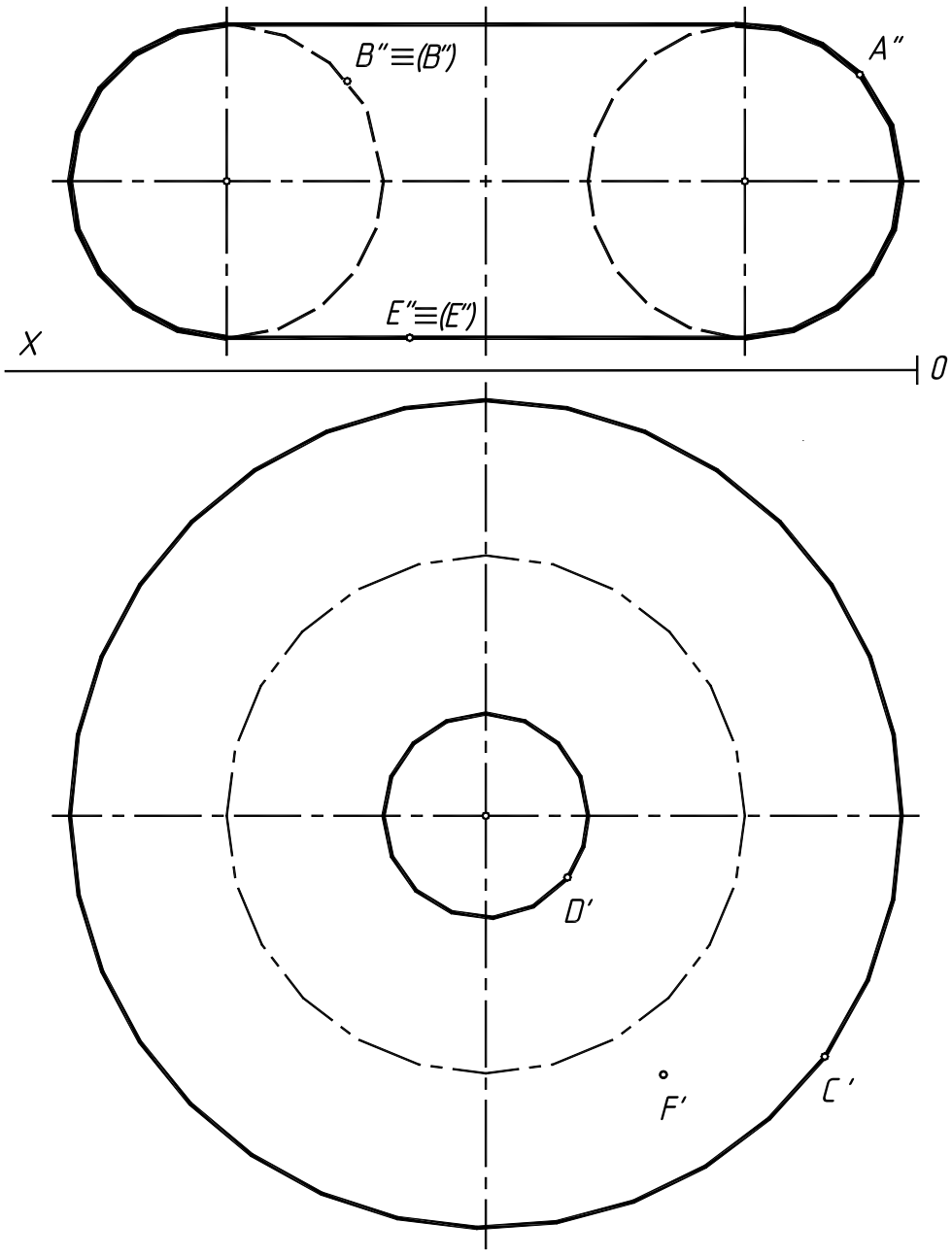
5-masala

Shar sirtida yotgan nuqtalarning yetishmaydigan proyeksiyalari topilsin.



6-masala

Tor (halqa) sirtida yotgan nuqtalarning yetishmaydigan ikkinchi proyeksiyalari topilsin.



13-mashg‘ulot

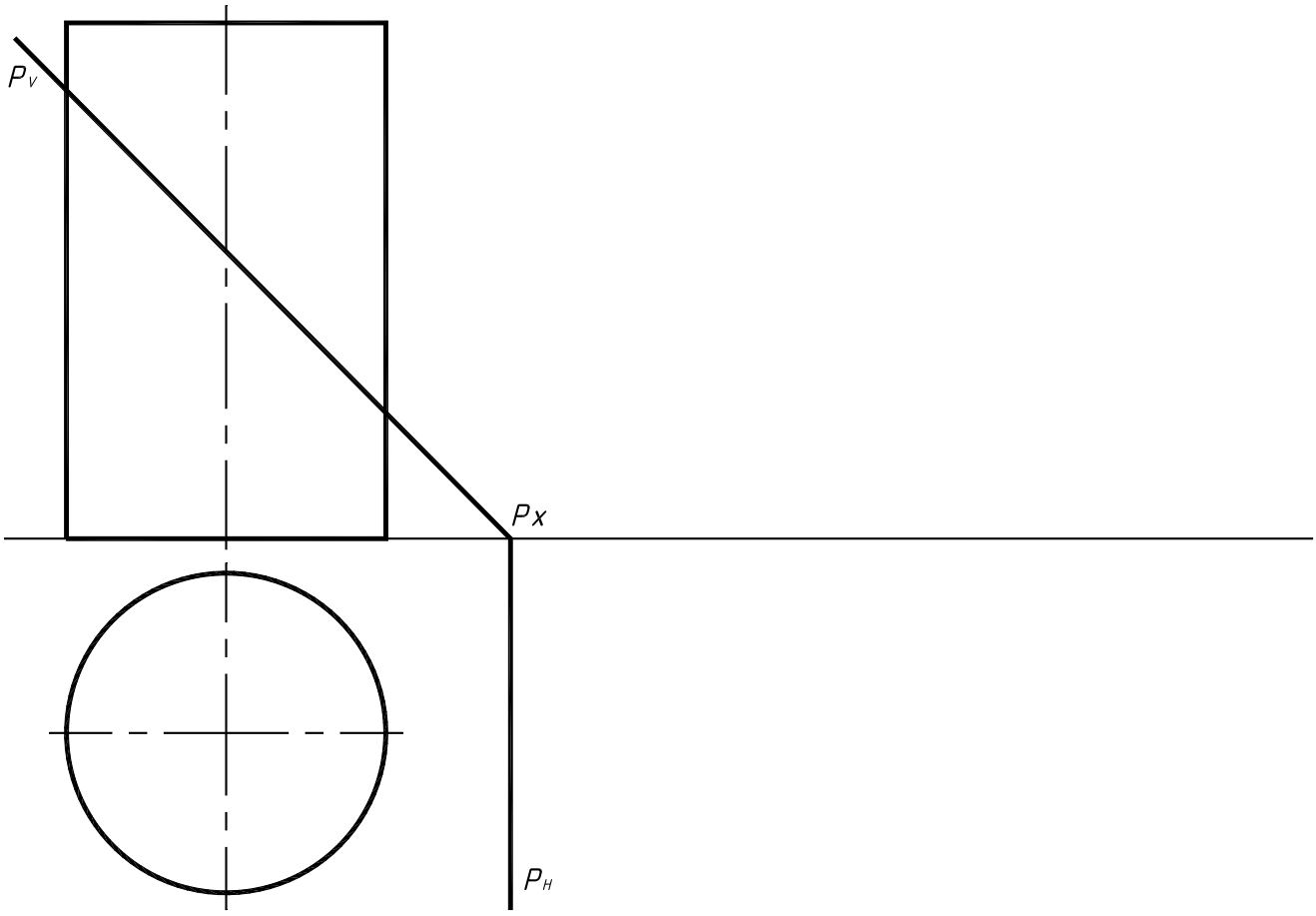
Mavzu: Sirtlarning proyeksiyalovchi tekisliklar bilan kesishuvi

Mavzuni xotirada tiklash uchun savollar.

1. Sirtlarning tekislik bilan kesishish chiziqlarini yasashning umumiy algoritmi nimalardan iborat?
2. Kesishish chizig‘ining xarakterli nuqtalari qanday aniqlanadi?
3. Proyeksiyalovchi tekisliklarning o‘ziga xos qanday xususiyati mavjud?

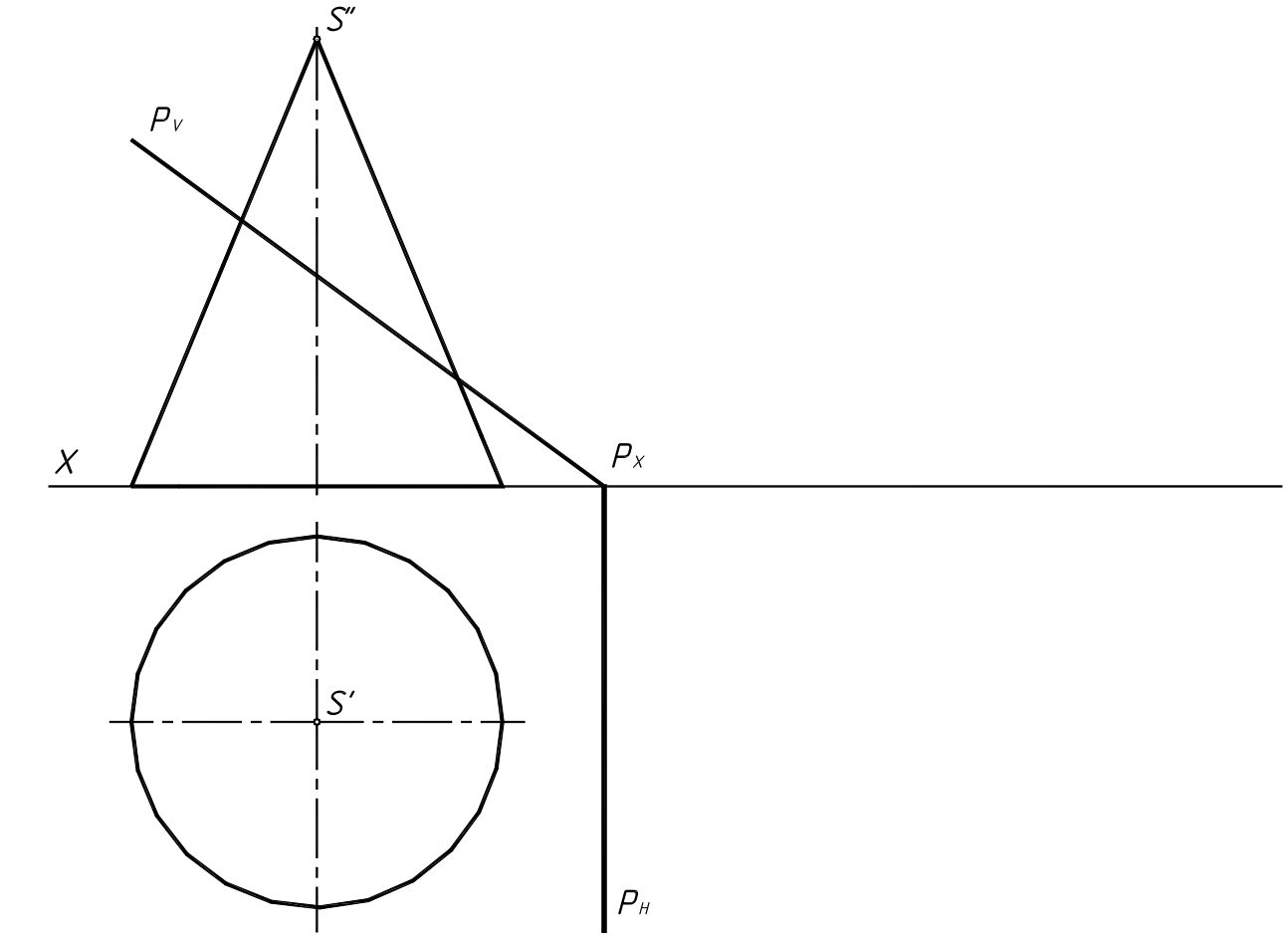
1-masala

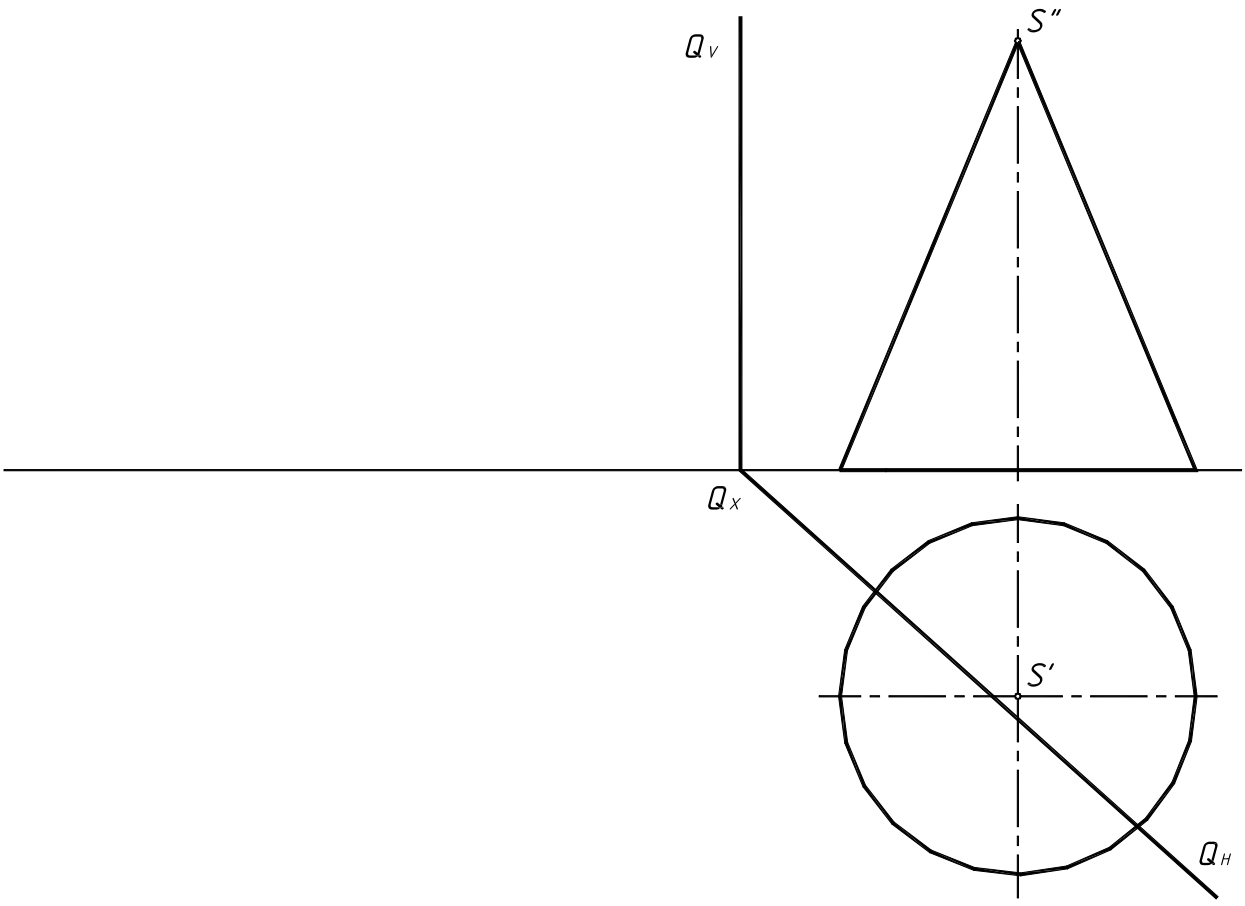
To‘g‘ri doiraviy silindrning frontal proyeksiyalovchi tekislik bilan kesishish chizig‘i va kesim yuzasining haqiqiy kattaligi yasalsin.



2-masala

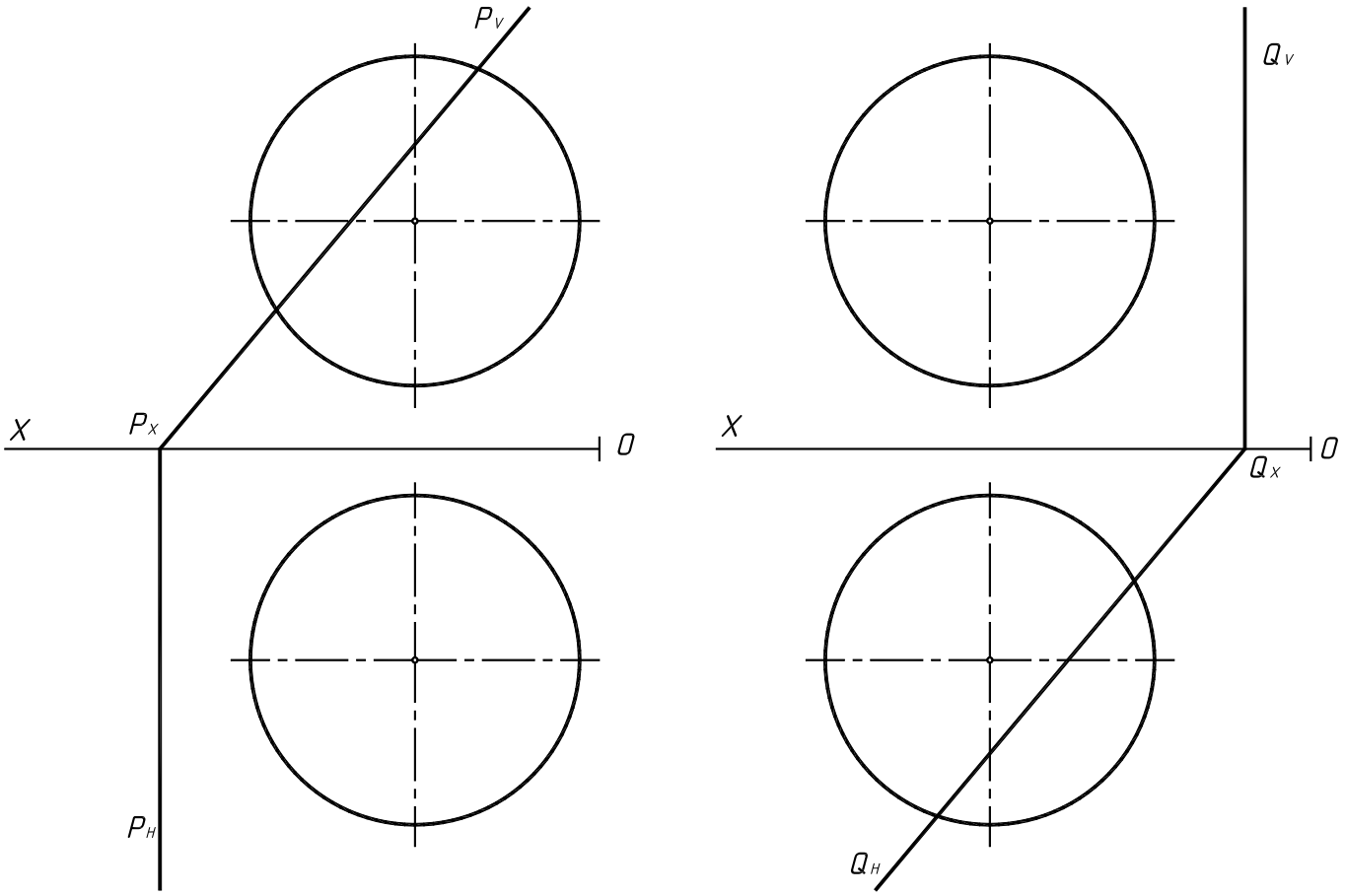
To‘g‘ri doiraviy konusning proyeksiyalovchi ***P*** va ***Q*** tekisliklar bilan kesishish chiziqlari va kesim yuzalarining haqiqiy kattaligi yasalsin.





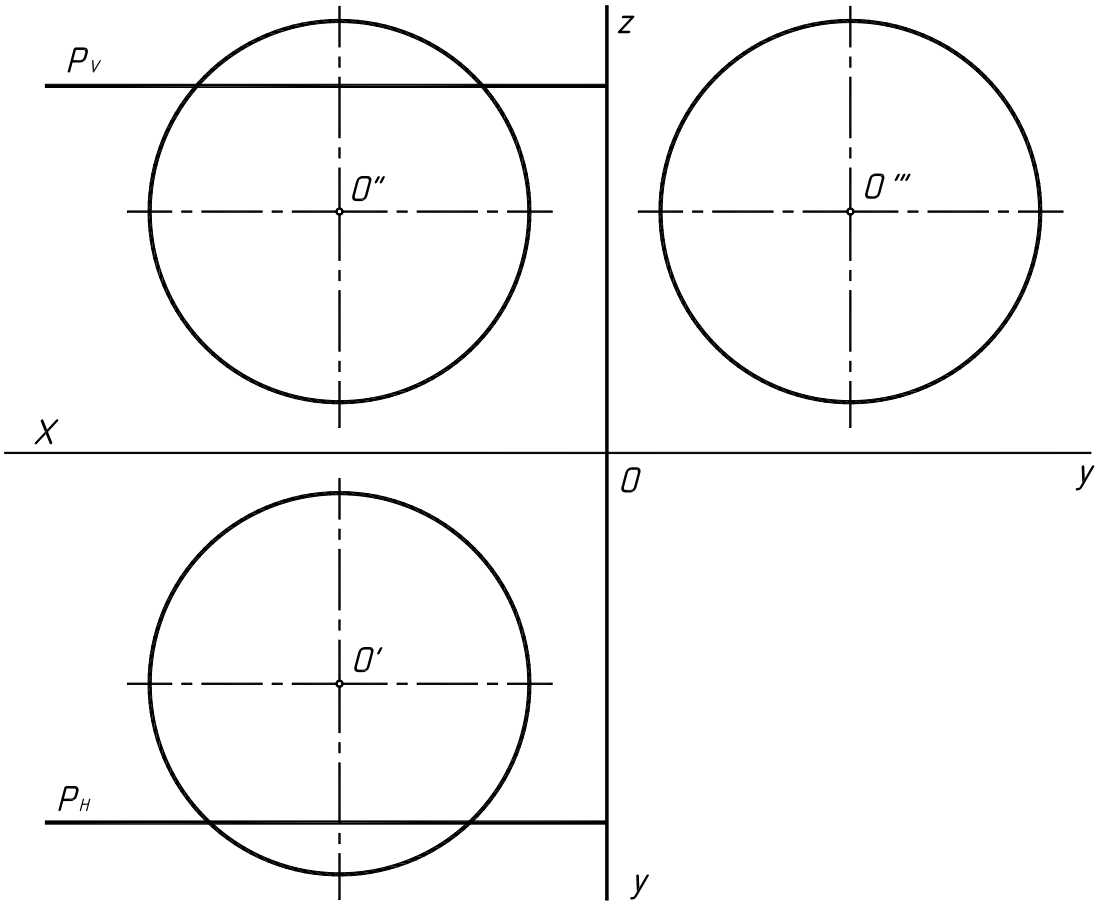
3-masala

Sferaning gorizontal va frontal proyeksiyalovchi tekisliklar bilan kesishish chiziqlari yasalsin.



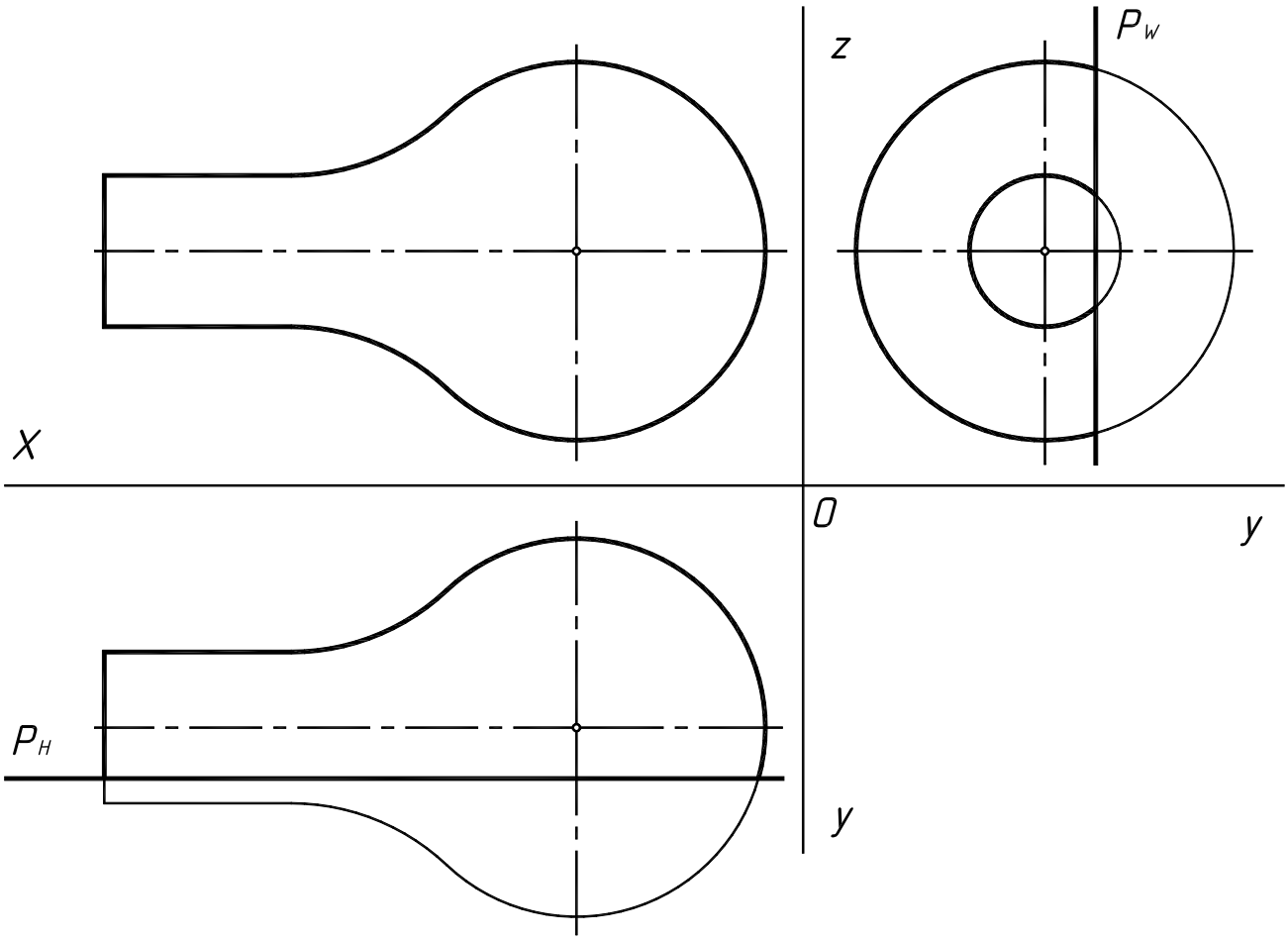
4-masala

Sferaning profil proyeksiyalovchi tekislik bilan kesishish chizig‘ining gorizontal, frontal va profil proyeksiyalari yasalsin.



5-masala

Berilgan aylanma sirtning ***P*** tekislik bilan kesishish chizig‘i yasalsin.



14-mashg‘ulot

Mavzu: Sirtlarning to‘g‘ri chiziq bilan kesishuvi

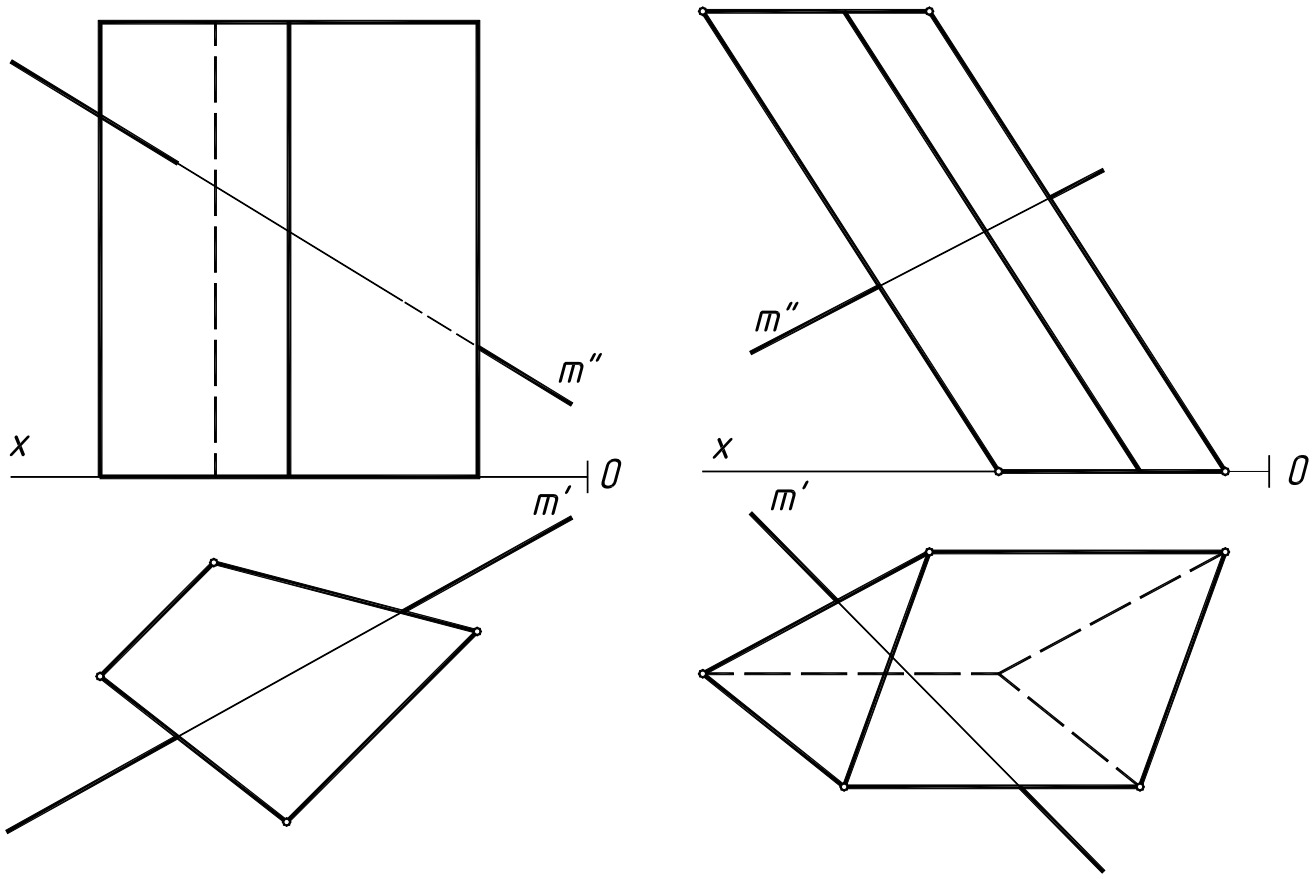
Ko‘pyoqliklarning to‘g‘ri chiziq bilan kesishishi.
Egri chiziqli sirtlarning to‘g‘ri chiziq bilan kesishishi.

Mavzuni xotirada tiklash uchun savollar.

1. Sirtning to‘g‘ri chiziq bilan kesishish nuqtalarini topish uchun yordamchi tekislikni qanday vaziyatda o‘tkazish kerak?
2. Ko‘pyoqlikning to‘g‘ri chiziq bilan kesishish nuqtalarini topish uchun yordamchi tekislikni qanday vaziyatda o‘tkazish kerak?
3. Silindrik sirtning to‘g‘ri chiziq bilan kesishish nuqtalarini topish uchun yordamchi tekislikni qanday vaziyatda o‘tkazish kerak?
4. Konus sirtning to‘g‘ri chiziq bilan kesishish nuqtalarini topish uchun yordamchi tekislikni qanday vaziyatda o‘tkazish kerak?
5. Sferik sirtning to‘g‘ri chiziq bilan kesishish nuqtalarini topish uchun yordamchi tekislikni qanday vaziyatda o‘tkazish maqsadga muvofiq bo‘ladi?

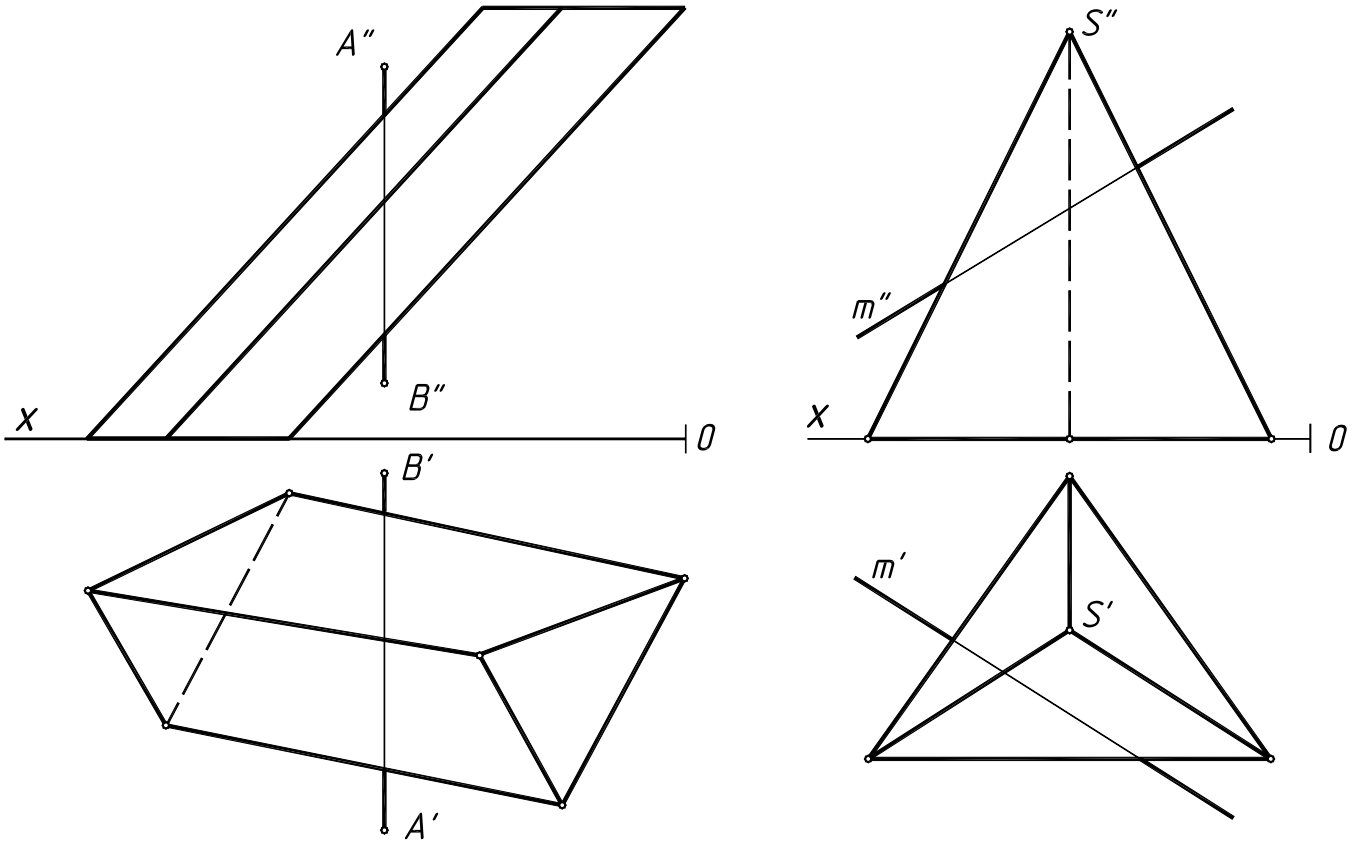
1-masala

Berilgan ko‘pyoqlikning to‘g‘ri chiziq bilan kesishish nuqtalari topilsin va ularning ko‘rinishligi aniqlansin.



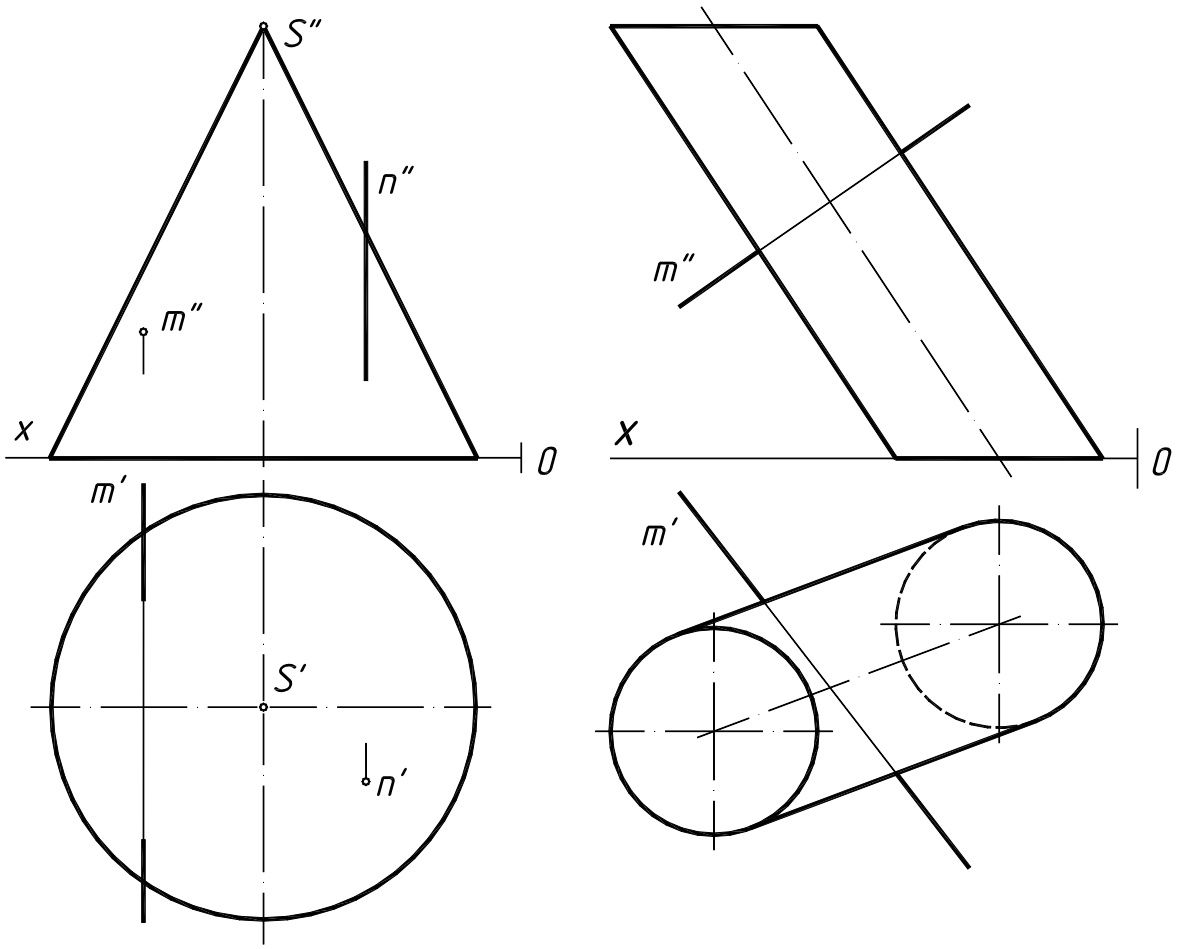
2-masala

Ko‘pyoqlikning to‘g‘ri chiziq bilan kesishish nuqtalari topilsin hamda ularning ko‘rinishligi aniqlansin.



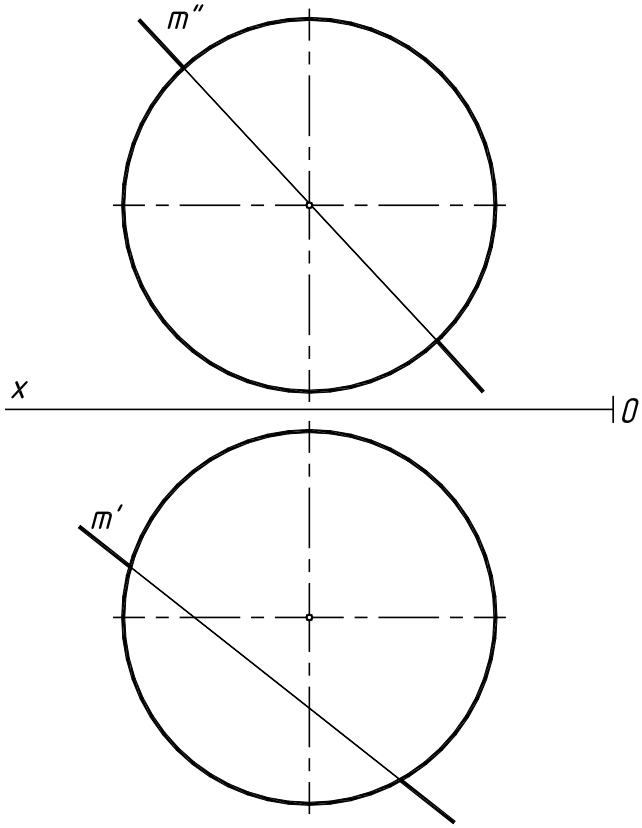
3-masala

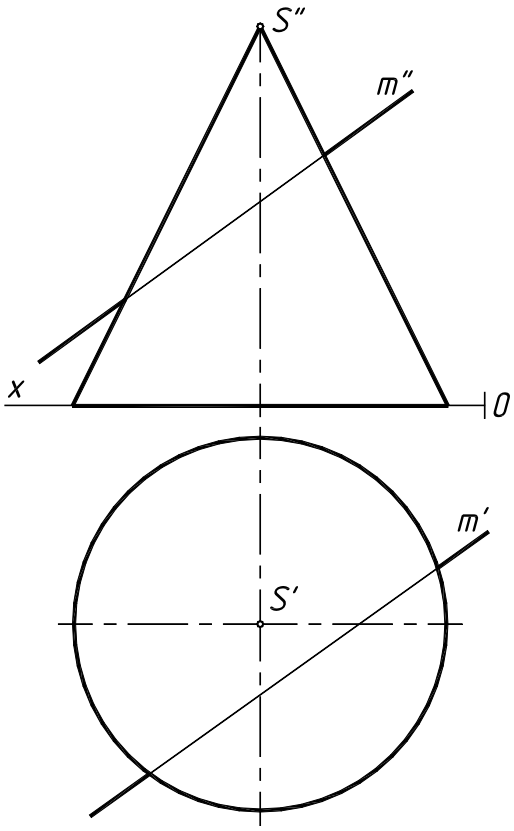
Berilgan sirtning to‘g‘ri chiziq bilan kesishish nuqtalari topilsin va ularning ko‘rinishligi aniqlansin.



4-masala

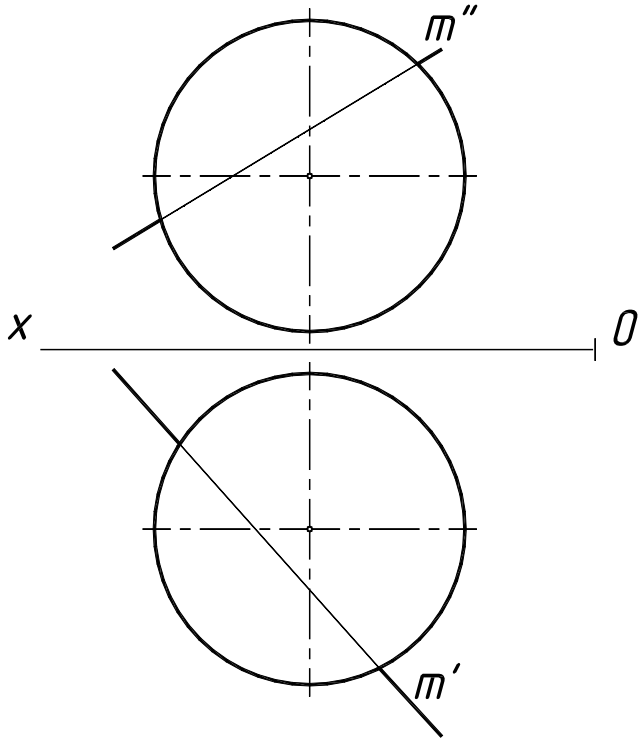
Berilgan sirtning to‘g‘ri chiziqlar bilan kesishish nuqtalari topilsin va ularning ko‘rinishligi aniqlansin.





5-masala

Sferaning to‘g‘ri chiziq bilan kesishish nuqtalari topilsin va ularning ko‘rinishligi aniqlansin.



15-mashg‘ulot

Mavzu: Sirtlarning umumiy vaziyatdagi tekisliklar bilan kesishuvi. Sirtlarning yoyilmalarini yasash.

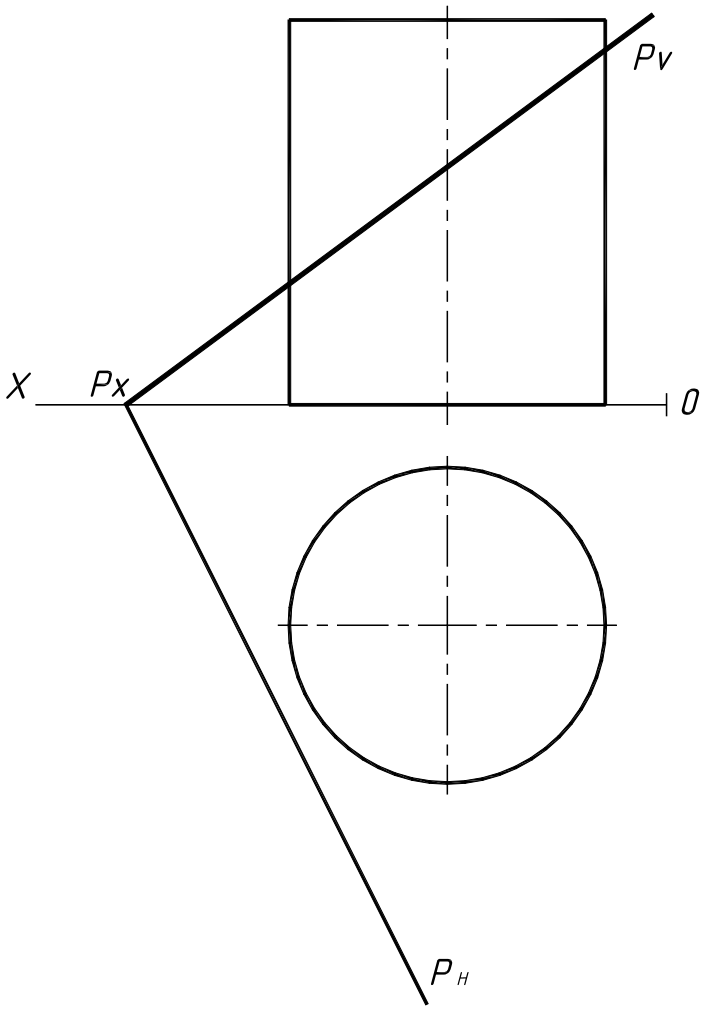
Egri chiziqli sirtlarning umumiy vaziyatdagi tekisliklar bilan kesishishi.
Egri chiziqli sirtlarning yoyilmalarini yasash.

Mavzuni xotirada tiklash uchun savollar.

1. Sirtni tekislik bilan kesishish chizig‘ini yasashning umumiy algoritmi nimalardan iborat?
2. Sferaning tekislik bilan kesishuvidan qanday shakl hosil bo‘ladi?
3. Doiraviy silindrning tekislik bilan kesishuvidan qanday shakl hosil bo‘ladi?
4. Doiraviy konusning kesimlari nimalardan iborat va ular qanday hosil bo‘ladi?
5. Sirtning yoyilmasi deb nimaga aytiladi?
6. To‘g‘ri doiraviy konusning yoyilmasi qanday shakldan iborat?

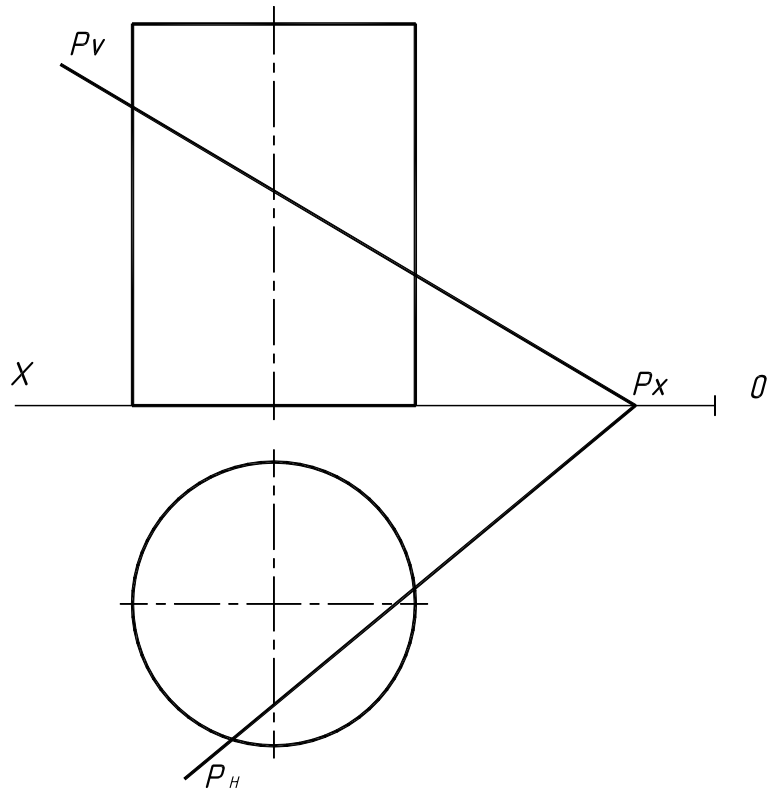
1-masala

Doiraviy silindrning tekislik bilan kesishish chizig‘i yasalsin va kesim yuzasining haqiqiy kattaligi yasalsin.



2-masala

Doiraviy silindrning tekislik bilan kesishish chizig‘i yasalsin va kesim yuzasining haqiqiy kattaligi yasalsin.

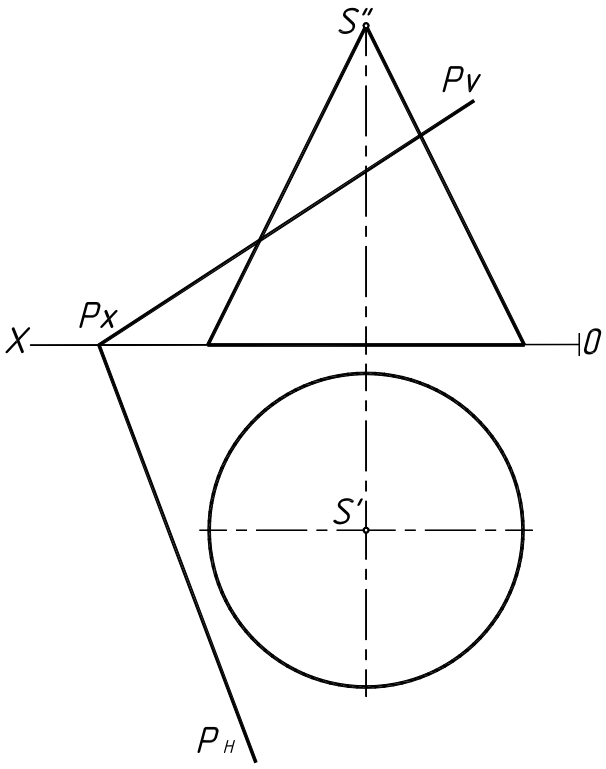


3-masala

2-masalada berilgan doiraviy silindrning to‘la yoyilmasi va yoyilmada kesishish chizig‘i yasalsin.

4-masala

To‘g‘ri doiraviy konusning tekislik bilan kesishish chizig‘i va kesim yuzaning haqiqiy kattaligi yasalsin.

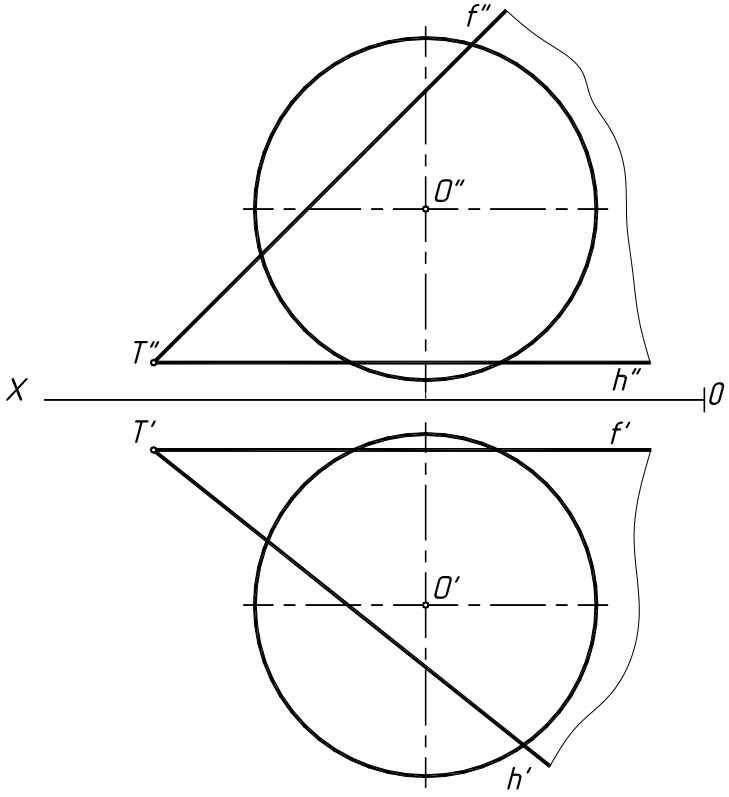


5-masala

4-masalada berilgan konusning to‘la yoyilmasi va yoyilmada kesishish chizig‘i yasalsin.

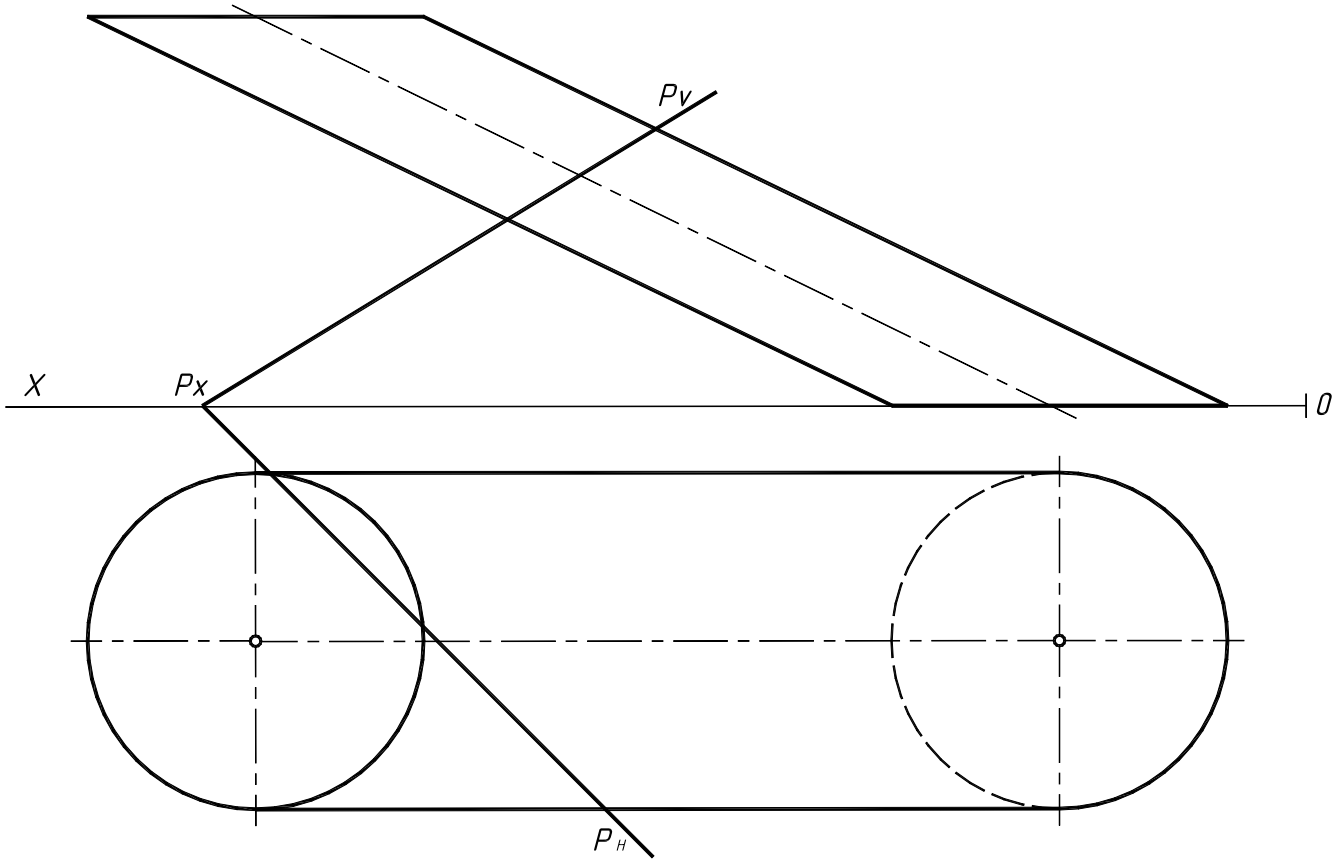
6-masala

Sferaning tekislik bilan kesishish chizig‘i yasalsin.



7-masala

Og‘ma silindrning tekislik bilan kesishish chizig‘i yasalsin.



16-mashg‘ulot

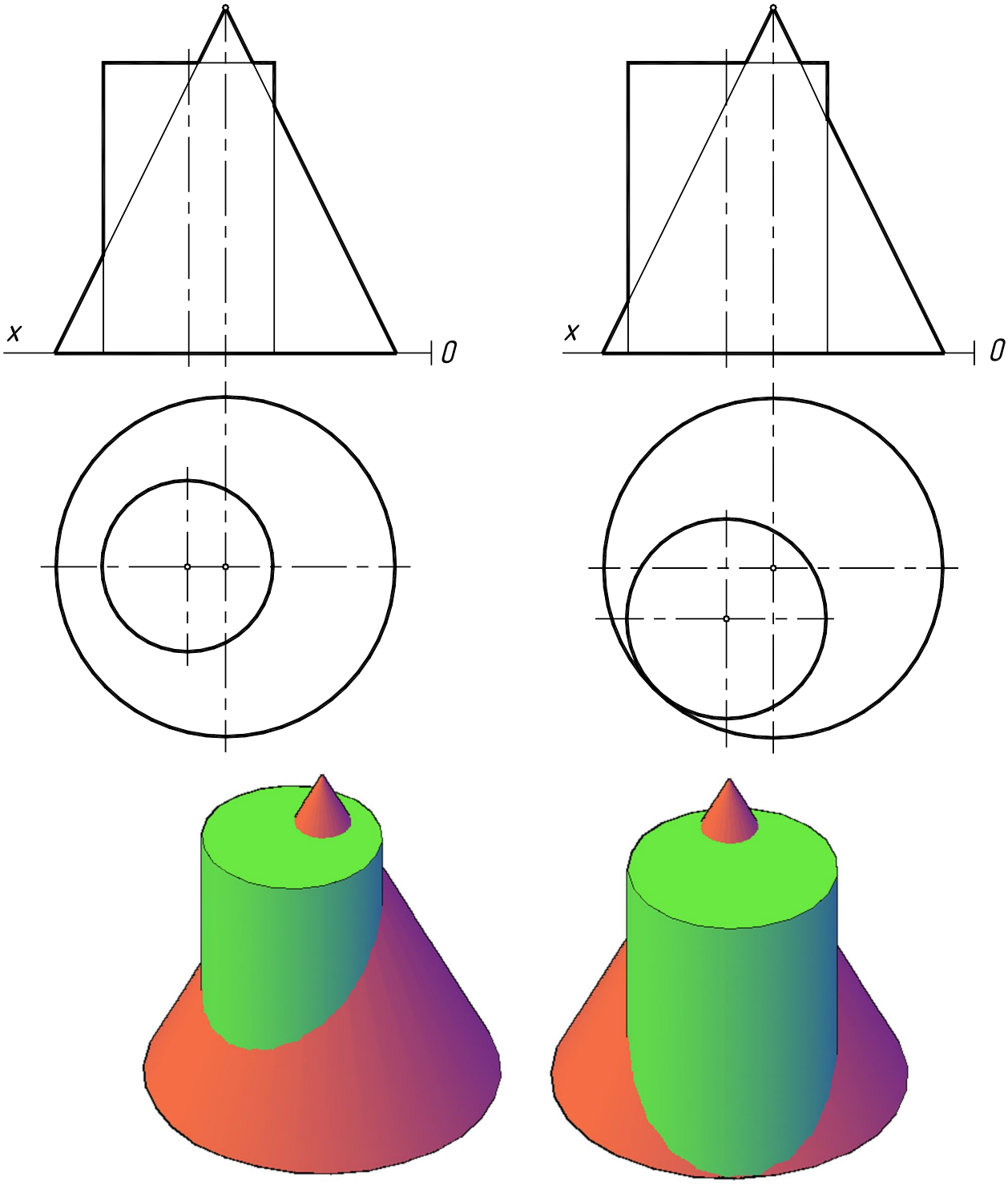
Mavzu: Sirtlarning o‘zaro kesishuvi. Yordamchi tekisliklar usuli.

Mavzuni xotirada tiklash uchun savollar.

1. Ikki sirtning o‘zaro kesishish chizig‘i deb nimaga aytiladi?
2. Kesishish chizig‘ining xarakterli nuqtalari qanday aniqlanadi?
3. Kesishish chizig‘ining oraliq nuqtalarini topish algoritmini tushuntirib bering.
4. Yordamchi kesuvchi tekislikning vaziyati qanday shartlarga ko‘ra tanlab olinadi?

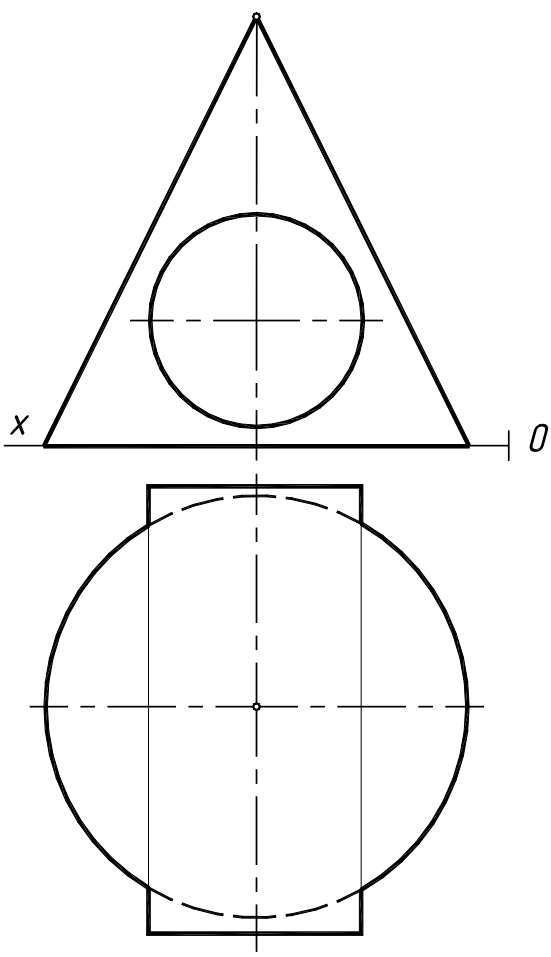
1-masala

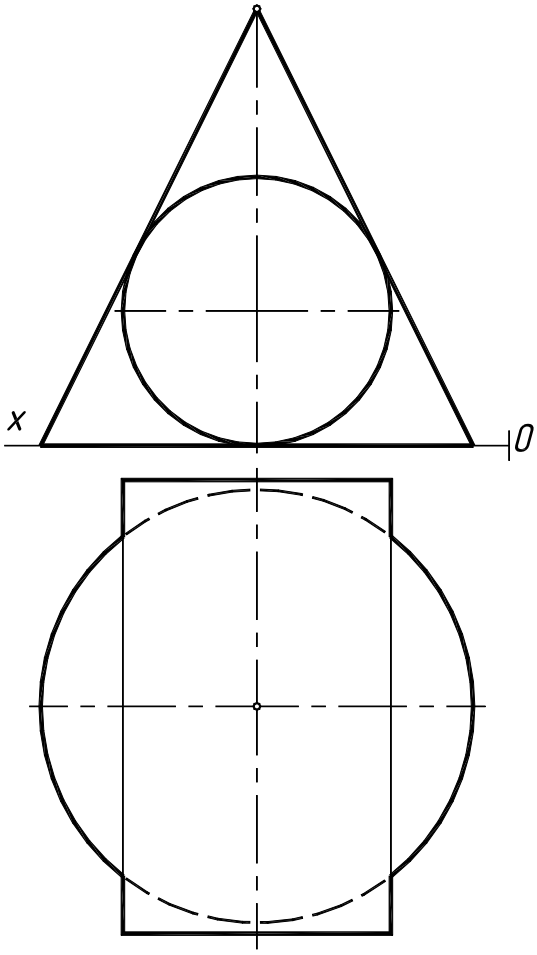
Berilgan ikki sirtning o‘zaro kesishish chizig‘i yasalsin va ko‘rinishligi aniqlansin.



2-masala

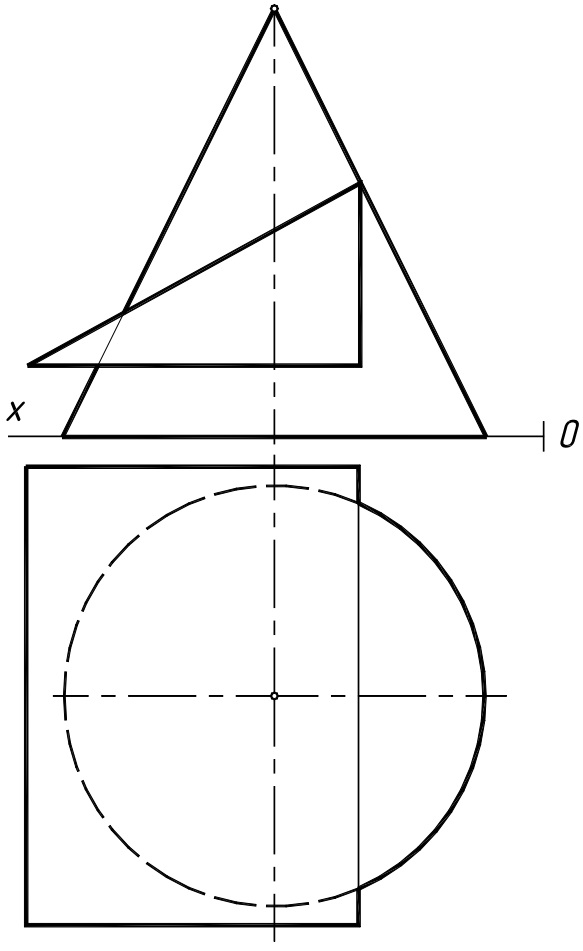
Berilgan ikki sirtning o‘zaro kesishish chizig‘i yasalsin va ko‘rinishligi aniqlansin.

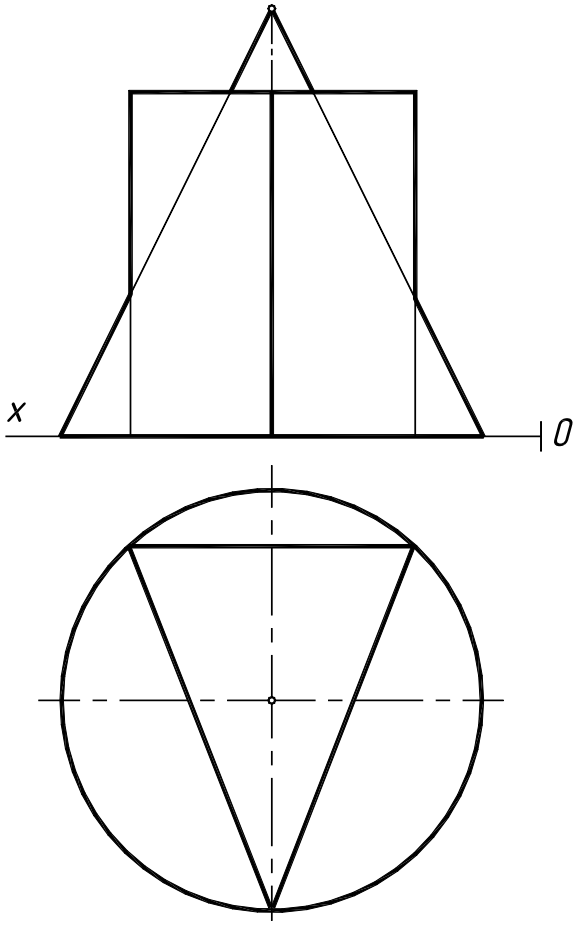




3-masala

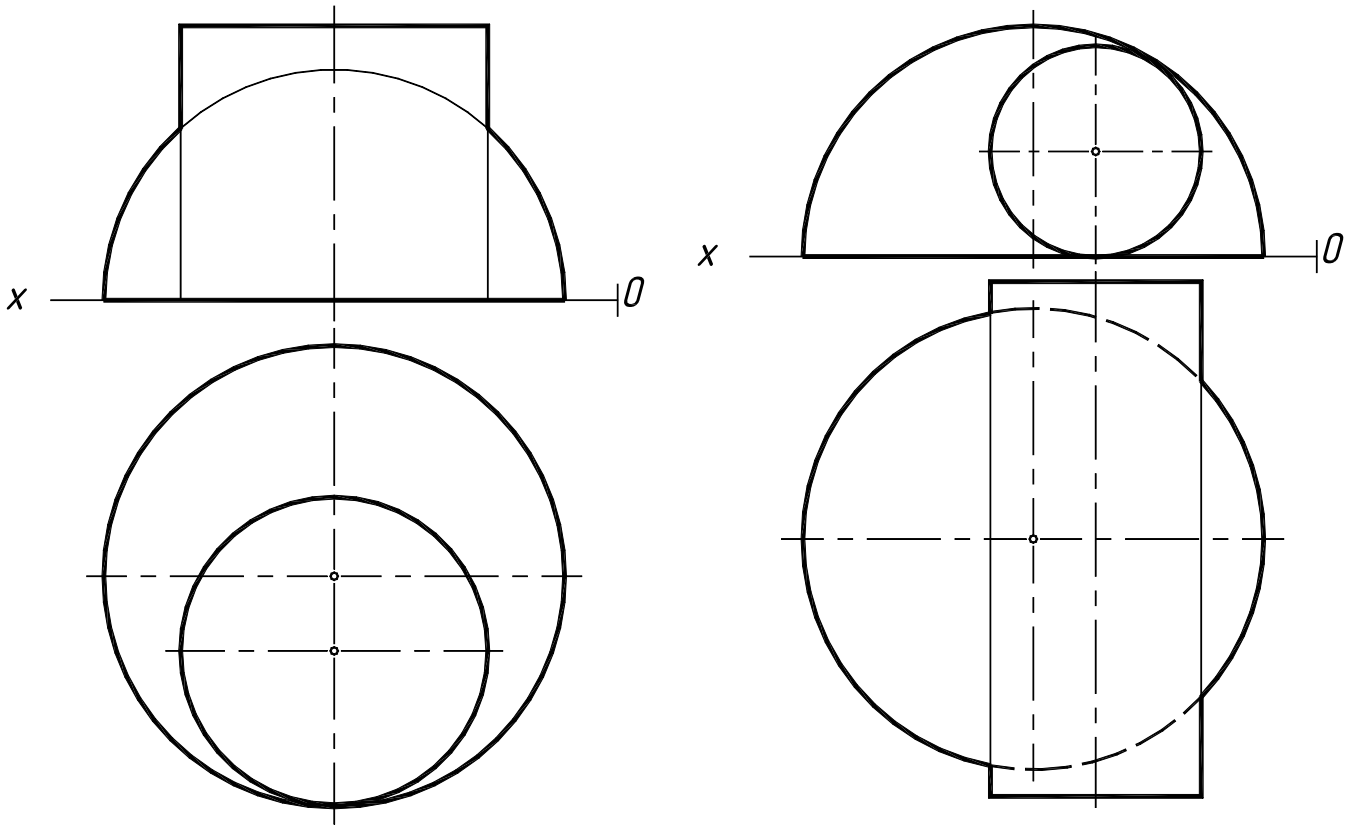
Berilgan ikki sirtning o‘zaro kesishish chizig‘i yasalsin va ko‘rinishligi aniqlansin.





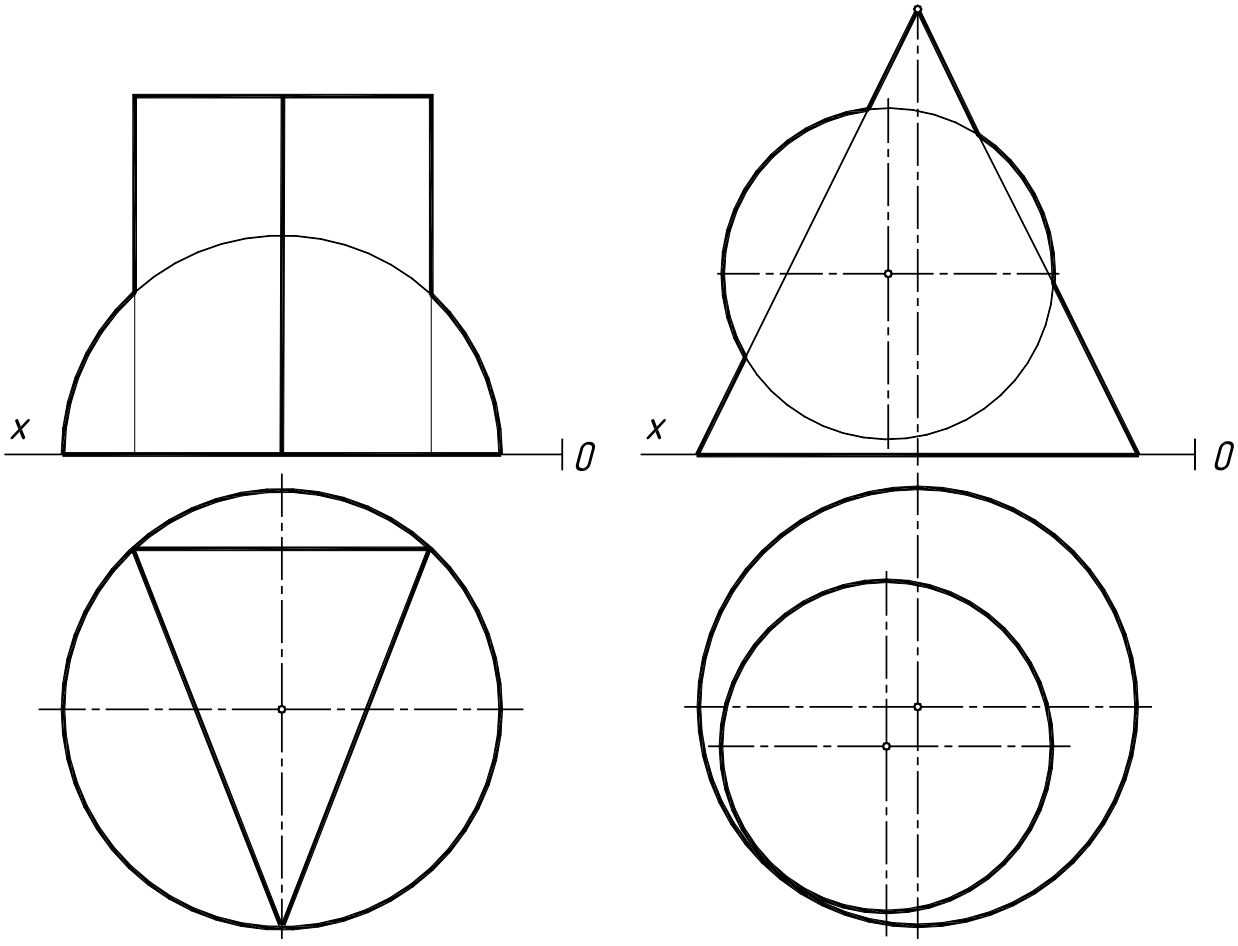
4-masala

Berilgan ikki sirtning o‘zaro kesishish chizig‘i yasalsin va ko‘rinishligi aniqlansin.



5-masala

Berilgan ikki sirtning o‘zaro kesishish chizig‘i yasalsin va ko‘rinishligi aniqlansin.

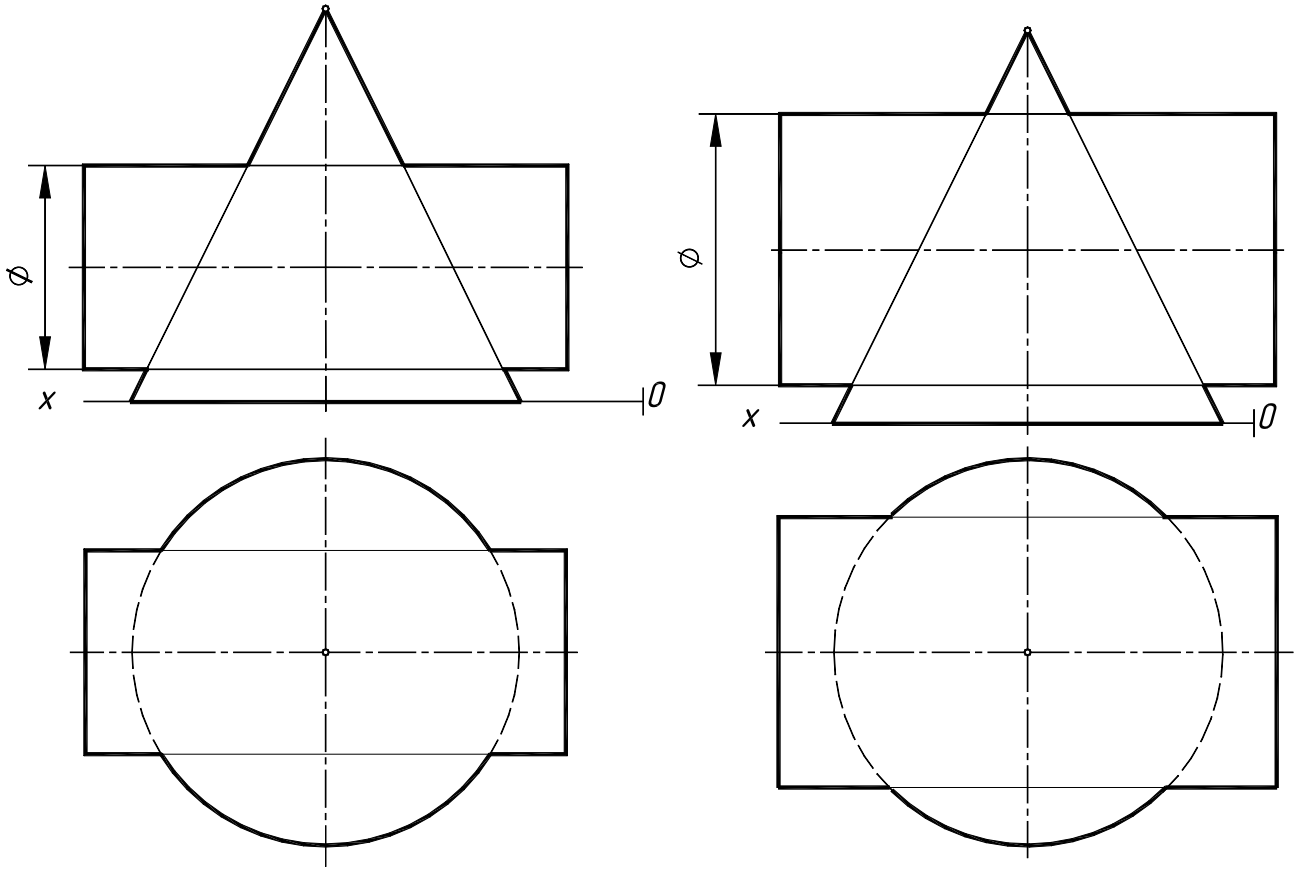


17-mashg‘ulot

Mavzu: Sirtlarning o‘zaro kesishuvi. Yordamchi kesuvchi sferalar usuli.

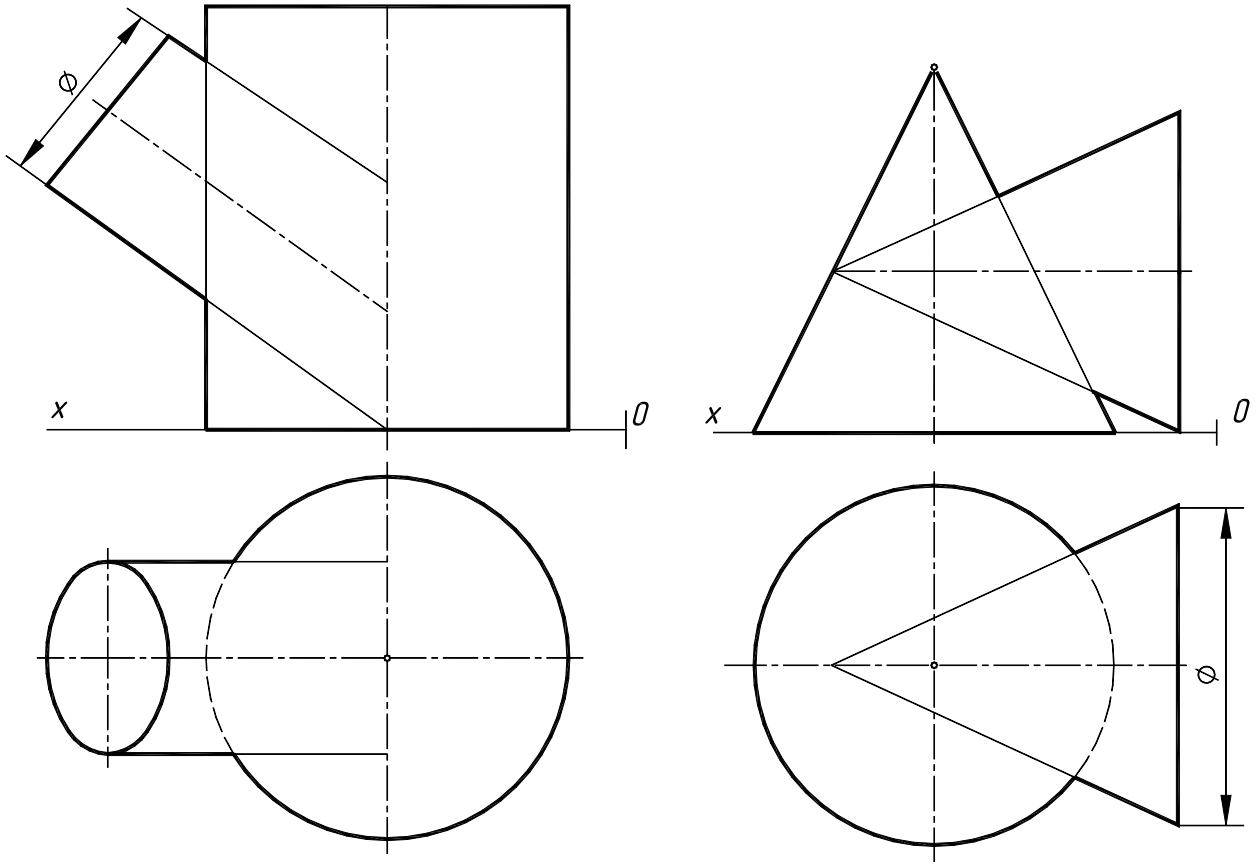
1-masala

Berilgan ikki sirtning o‘zaro kesishish chizig‘i yasalsin va uning ko‘rinishligi aniqlansin.



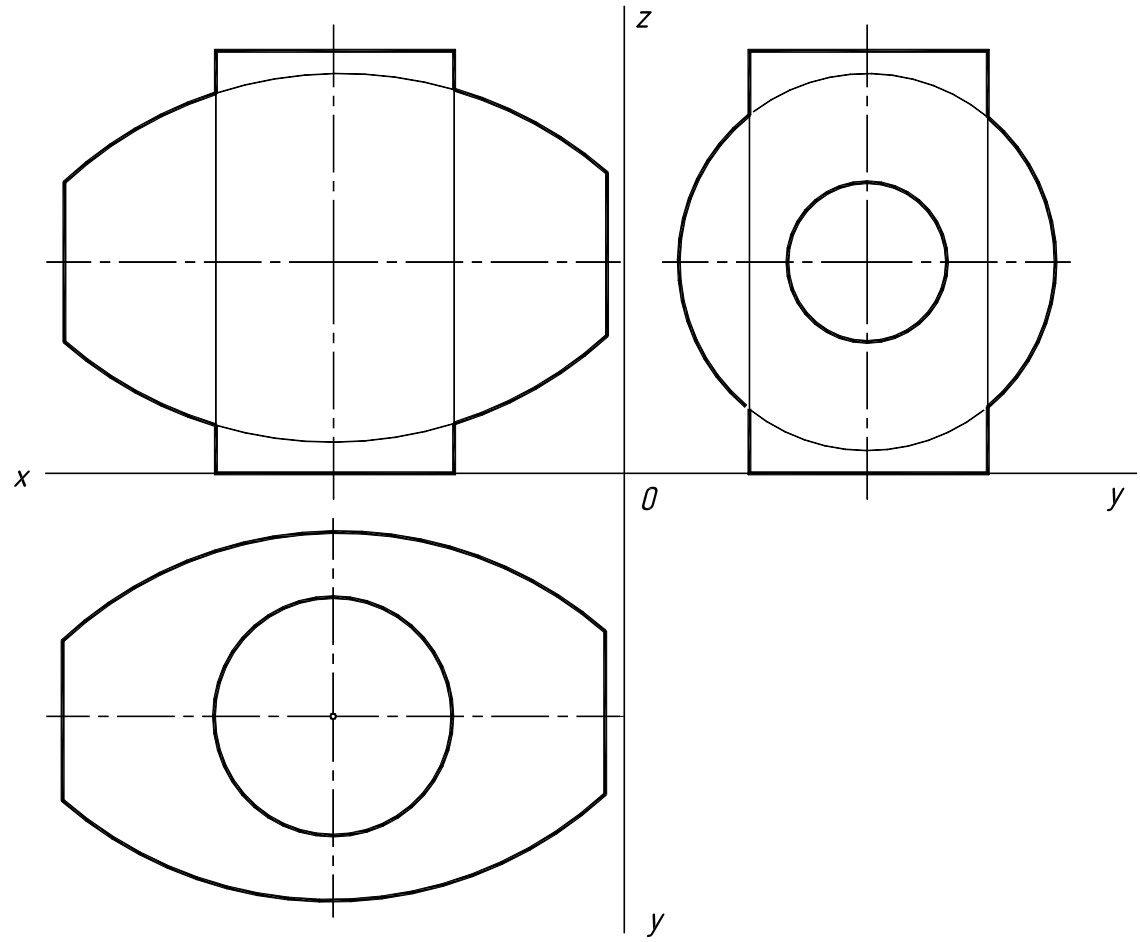
2-masala

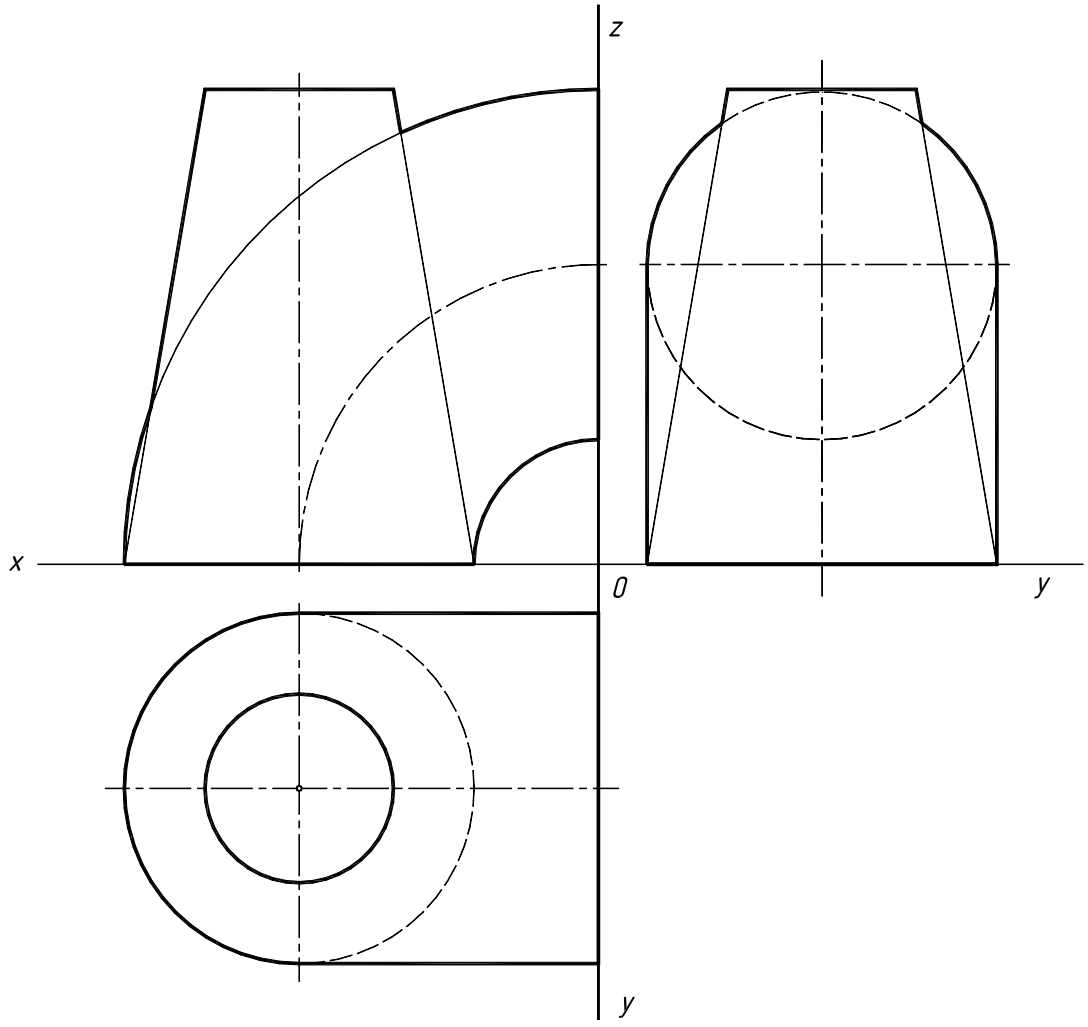
Berilgan ikki sirtning o‘zaro kesishish chizig‘i yasalsin va uning ko‘rinishligi aniqlansin.



3-masala

Berilgan ikki sirtning o‘zaro kesishish chizig‘i yasalsin va uning ko‘rinishligi aniqlansin.





18-mashg‘ulot

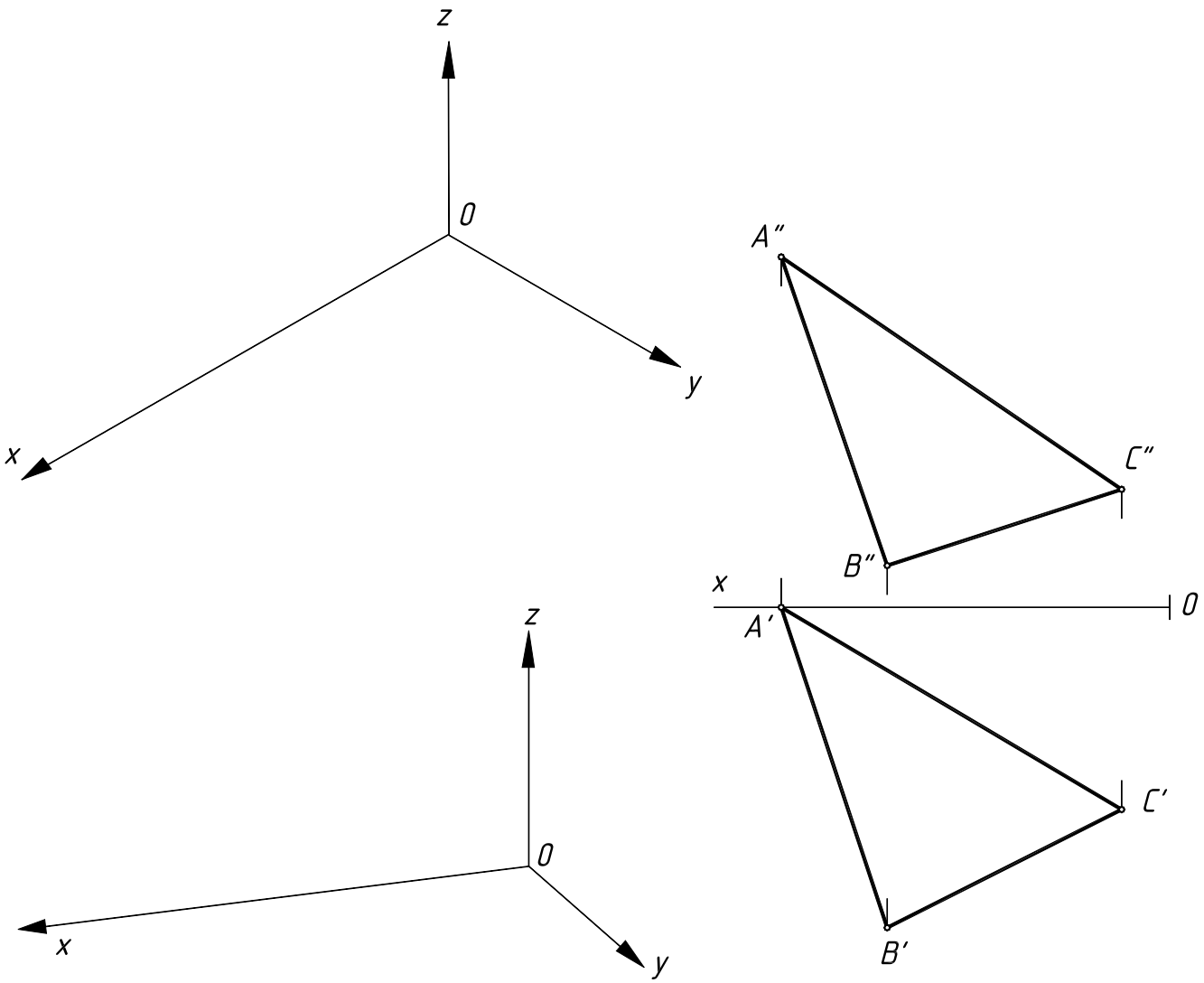
Mavzu: Aksonometrik proyeksiyalar

Mavzuni xotirada tiklash uchun savollar.

1. Aksonometrik proyeksiyalar qanday hosil qilinadi?
2. Aksonometrik o‘qlar bo‘yicha o‘zgarish koefitsentlarini tushuntirib bering?
3. Standart aksonometrik proyeksiyalarni turlarini aytib bering.
4. To‘g‘ri burchakli izometriyada aksonometrik o‘qlarning ozaro joylashuvi va bu oqlar boyicha ozgarish koefisentlarini tushintirib bering.
5. To‘g‘ri burchakli dimetriya haqida nimalar bilasiz?

1-masala

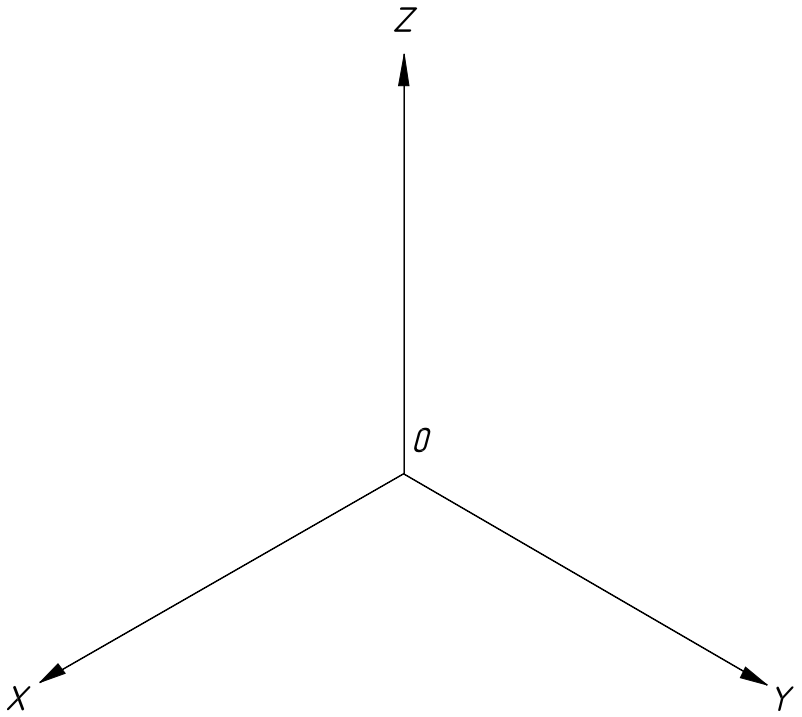
Proyeksiyalari bilan berilgan ***ABC*** uchburchakning to‘g‘ri burchakli izometriyasi va dimetriyasi yasalsin.



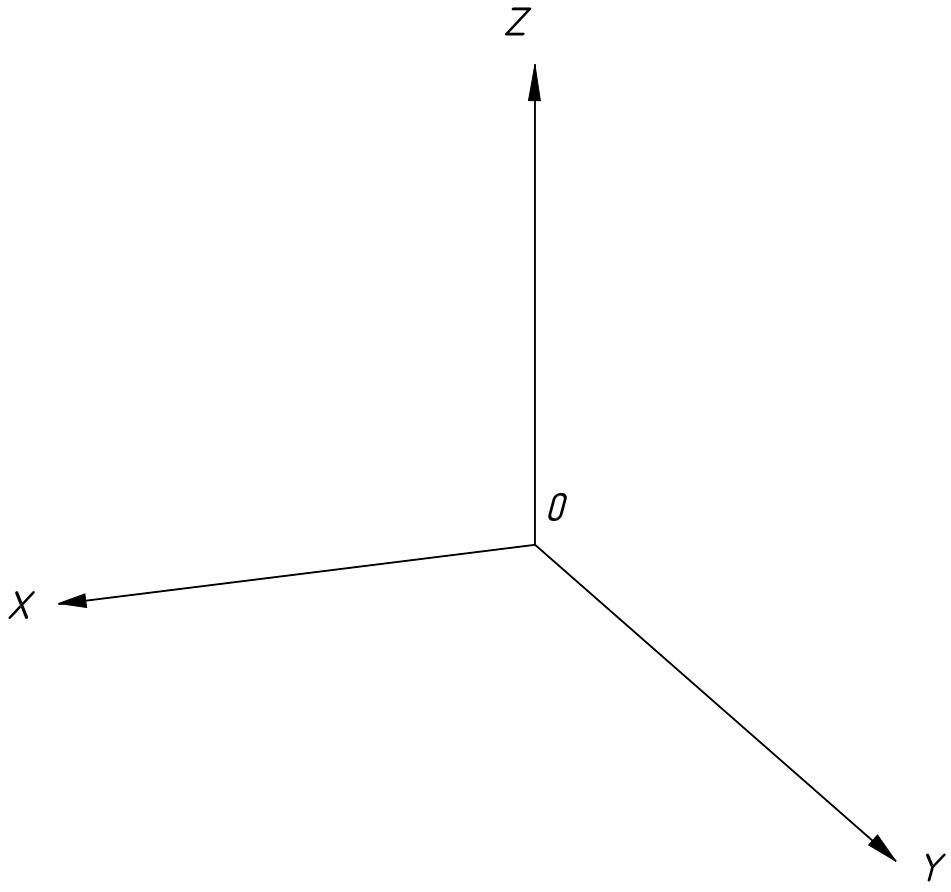
2-masala

R=30 mm ga teng bo‘lgan gorizontal, frontal va profil vaziyatdagi aylanalarning to‘g‘ri burchakli izometrik va dimetrik proyeksiyalari yasalsin.

Aylananing izometrik proyeksiyalari



Aylananing dimetrik proyeksiyalari



3-masala

Chizmasi bilan berilgan detalning to‘g‘ri burchakli izometriyasi yasalsin.