

514/07)
**O'ZBEKISTON RESPUBLIKASI OLIY VA O'RTA
MAXSUS TA'LIM VAZIRLIGI**

**Abu Rayhon Beruniy nomidagi
Toshkent davlat texnika universiteti**

T.D. Azimov

CHIZMA GEOMETRIYA

**O'zbekiston Respublikasi Oliy va o'rta maxsus ta'lim vazirligi
tomonidan oliy o'quv yurtlari talabalari uchun o'quv
qo'llanma sifatida tavsiya etilgan**

**Toshkent
«IQTISOD-MOLIYA»
2008**

Tagrizchilar:

T. Rixsiboyev – TTYSI “Chizma geometriya va muhandislik grafikasi” kafedrasi t.f.n., dotsent;
N.A. Nadirova – TDTU “Chizma geometriya va muhandislik grafikasi” kafedrasi katta o'qituvchisi

Azimov T.D.

A37 **Chizma geometriya.** Oliy texnika o'quv yurtlari uchun o'quv qo'llanma. / T.D. Azimov; O'zbekiston Respublikasi oliy va o'rta maxsus ta'lim vazirligi, Abu Rayhon Beruniy nomidagi Toshkent davlat texnika universiteti. – T.: IQTISOD-MOLIYA, 2008. - 164 b.

O'quv qo'llanmada chizma geometriya fanining amaliy mashg'ulotlari to'plami o'zbek tilida keltirilgan bo'lib, unda nuqta, to'g'ri chiziq, tekislik, ikki tekislik, to'g'ri chiziq va tekislik, sirtlar, tekisliklar bilan sirtlar kesishuvi, ikki sirt kesishuvi, proyeksiyalarni qayta tuzish, burchaklarni aniqlash, nazorat yozma ishga doir masalalarni yechish, shuningdek, olimpiada masalalaridan namunalari, mustaqil ta'lim uchun masalalar berilgan.

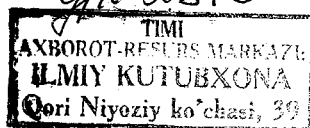
O'quv qo'llanma texnika oliy o'quv yurtlari bakalavrlari uchun tayyorlangan bo'lib, undan chizma geometriya mutaxassislari ham foydalanishlari mumkin.

BBK 22.151.3я73

ISBN 978-9943-13-075-3

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So'zboshi

Chizma geometriya umumtexnikaviy fan bo'lib, u talabalarga umummuhandislik va maxsus texnikaviy fanlarni o'rganishlarida zamin bo'ladi.

Istalgan bir yangi detal, mashina, mexanizmlarni tayyorlash uchun ularning loyihasini, ya'ni chizmasini chizish kerak bo'ladi. Hozirgi vaqtda texnika yo'nalishida ta'lim olayotgan bakalavrlar, bugungi kunni talabiga javob beradigan darajada grafik tayyorgarlikka ega bo'lishlari zarur. Ular chizmalar yordamida o'zlarini ijodiy o'ylarini, texnikaviy fikrlarini bayon qilib, amaliyotga tatbiq qila olishlari kerak. «Chizma geometriya» fanidan amaliy mashg'ulotlar to'plami o'quv qo'llanmasi kafedra professor – o'qituvchilari tomonidan o'zbek va rus tillarida o'qilayotgan ma'ruzalar matniga tegishli 19 ta amaliy mashg'ulotlarni o'tkazishga mo'ljallangan.

O'quv qo'llanma tarkibiga "Chizma geometriya" fanining barcha mavzulari bo'yicha uslubiy jihatdan masalalar kiritilgan bo'lib, hozirgi zamon yangi pedagogik texnologiyalari asosida "Nuqta", "To'g'ri chiziq" mavzulariga test savollari berilgan. Shuningdek, ikki oraliq baholash uchun ijodiy yozma nazorat ishi tuzilgan. Shu bilan birga, yakuniy yozma ish savollaridan namunaviy masalalarning yechimi va algoritmi, Respublikamizda o'tkaziladigan olimpiada masalalaridan namunalar, mustaqil ta'lim uchun bir qator masalalar kiritilgan.

O'quv qo'llanmaning chizma geometriyadan masalalar yechishga oid uslubiy ko'rsatmalari va talablari

Mazkur o'quv qo'llanma asosan chizma geometriyadan o'tkaziladigan amaliyot darslari uchun tuzilganligi sababli talabalardan:

1. Masalalar yechish uchun alohida katakli daftar tutishlari va shu daftarning har bir betida ikkitadan masala yechishni rejalashtirishlari;

2. Har bir masalaning grafik berilishini nomlash, ularning matnli shartlari, yechish algoritmlarini batafsil bayon qilishlari;

3. Masalalarni grafik aniq bajarish uchun chizmachilik o'quv qurollari - 30° , 45° li uchburchaklik chizg'ichlar, sirkul, lekalolar, shuningdek, masalalarni rangli grafik bezash uchun havo rang qalam - grafik berilishi uchun, qora - yasash chiziqlari uchun, qizil - javobi uchun ishlatilishi;

4. Masalalarning grafik berilishi va ularni yechish jarayonida chiziq turlaridan:

a) uzluksiz asosiy tutash yo'g'on chiziqlar - $S=0,5 \div 1,4 \text{ mm}$ - masalaning grafik berilishi, javobi, ko'rinuvchi kontur va kesishish chiziqlari uchun, chizma formatiga qarab;

b) shtrix chiziqlar - $S/3 \div S/2$ - ko'rinmas kontur va ko'rinmas kesishish chiziqlari uchun;

v) uzluksiz ingichka tutash chiziqlar - $S/4$ - bog'lovchi va yasash chiziqlari uchun qo'llanishi talab qilinadi.

Chizma geometriya epyurida yechiladigan har bir masala o'zining shu epyurida fazoviy geometrik xususiyatlarini aniq ko'rishini talab qilishi bois talabalardan:

1) har bir masalani avvalo fazoda yechishni, ya'ni:

a) masalaning shartiga ko'ra epyurida berilgan geometrik shakllar elementlarining fazoviy shakllari va fazodagi joylanishlarini tasvirlashni ko'z oldiga keltira bilish;

b) masalalarni fazoda yechish tartibini aniqlash va fazoviy yechimini ko'rsatish;

v) fazoviy yechim asosida masalalarning epyurdagi yechimini ishlab chiqish talab qilinadi.

O'quv qo'llanmadagi masalalarni yechish uchun ma'ruzalar va chizma geometriya darsliklaridan ma'lum bo'lgan quyidagi asosiy topshiriqlarni bajarishlari zarur:

1. To'g'ri chiziqning haqiqiy uzunligini topish;
2. To'g'ri chiziq izlarini aniqlash;
3. Tekislikda umumiy vaziyatdagi to'g'ri chiziq, gorizontaal, frontal o'tkazish;
4. Tekislikda nuqta tanlash;
5. Nuqta orqali umumiy vaziyatdagi tekislik o'tkazish;
6. To'g'ri chiziq orqali gorizontaal, frontal proyeksiyalovchi tekisliklar o'tkazish;
7. Ikki parallel yoki kesishuvchi chiziqlar bilan berilgan tekisliklarning izlarini o'tkazish;
8. Berilgan nuqta orqali tekislikka parallel tekislik o'tkazish;
9. Izlari bilan berilgan ikki tekislikning kesishish chizig'ini yasash;
10. Berilgan nuqta orqali tekislikka parallel to'g'ri chiziq o'tkazish;
11. Berilgan nuqta orqali to'g'ri chiziqqa parallel tekislik o'tkazish;
12. To'g'ri chiziqning tekislik bilan uchrashish nuqtasini topish;
13. Nuqtadan tekislikka perpendikular o'tkazish;
14. Nuqtadan berilgan to'g'ri chiziqqa perpendikular tekislik o'tkazish;
15. Nuqtadan berilgan tekislikka perpendikular tekislik o'tkazish;
16. Kesmaning haqiqiy uzunligini aylantirish usulidan foydalanib, topish;
17. Tekislikni proyeksiyalar tekisligiga joylashtirish;
18. Kesmaning haqiqiy uzunligini joylashtirish usulida topish;
19. Kesmaning haqiqiy uzunligini proyeksiyalar tekisligini almashtirish usulidan foydalanib, topish;
20. Chizikli burchakning haqiqiy kattaligini aniqlash;
21. Ko'pyoqlik sirtida nuqta tanlash;
22. Sirlarni to'g'ri chiziq bilan uchrashish nuqtasini aniqlash;
23. Sirlarni tekislik bilan kesishish chiziqlarini aniqlash;
24. Sirlarning o'zaro kesishish chizig'ini aniqlashni har bir talaba puxta o'zlashtirgan bo'lishi talab qilinadi.

Chizma geometriya fanining amaliy darslarini puxta o'zlashtirish uchun talabalar nazariy mavzularni o'rganib, tahlil qilib kelishlari shart.

1-dars . KXYAT standartlari:

GOST 2.301-68. Chizma formatlari.

GOST 2.302-68. Masshtablar.

GOST 2.303-68. Chiziqlar.

2-dars. GOST 2.304-81. Shriftlar.

Sarvaraqli bajarish.

ToshDTU

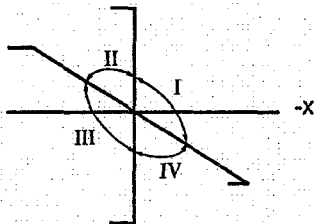
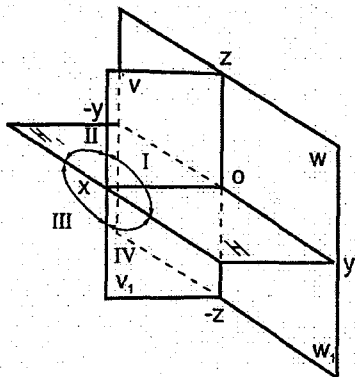
"Chizma geometriya va muhandislik grafikasi"
kafedrasi

CHIZMALAR TO'PLAMI

Shifr: 35-05 NGF

Bajardi: Alimov K.A.

2007 – 2008 o'quv yili



$a - A'$

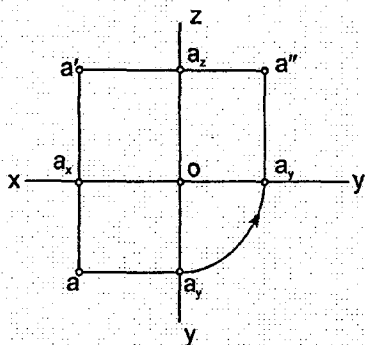
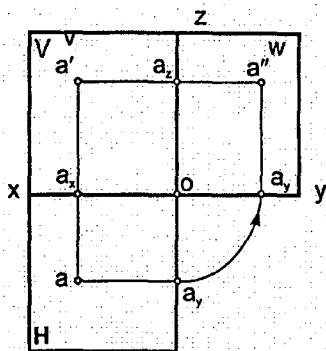
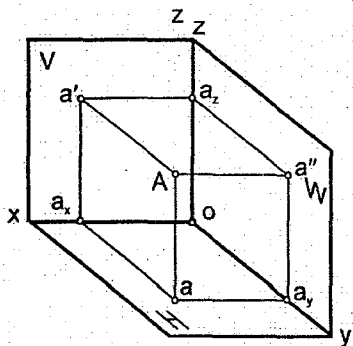
$a' - A''$

$a'' - A'''$

$$|AH| = |Aa| = |a'ax| = Z_A$$

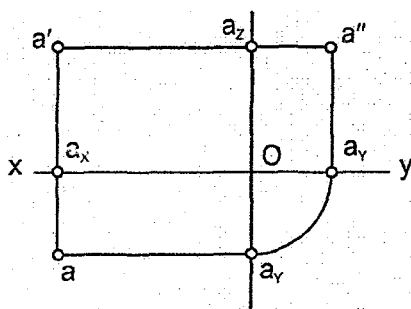
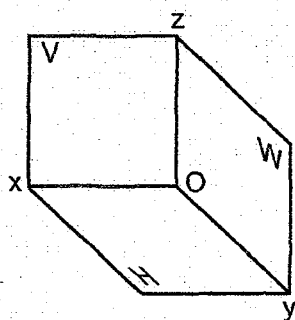
$$|AV| = |Aa'| = |aax| = Y_A$$

$$|AW| = |Aa''| = |a'ax| = X_A$$

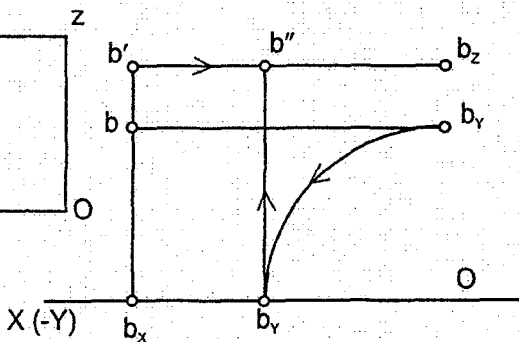
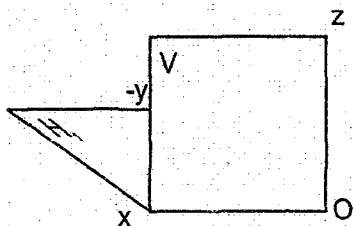


1-misol. Berilgan har bir nuqtaning koordinatalari bo'yicha tegishli oktantlarda ularning fazoviy tasviri va tekis chizmasi chizilsin.

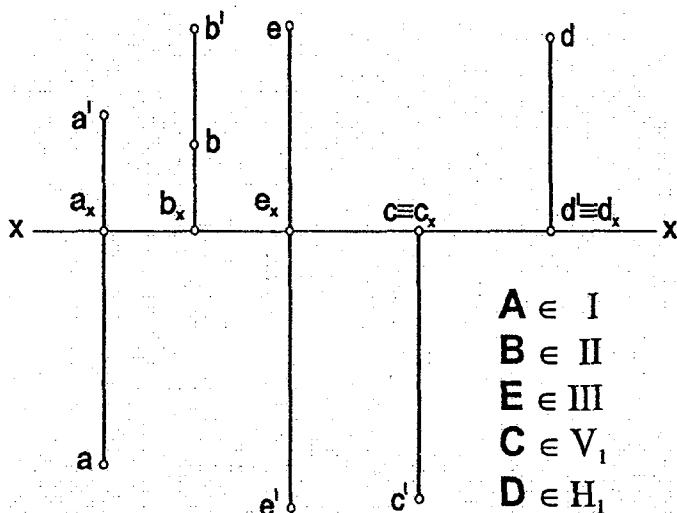
$A (50;20;35)$



$B (60;-30;40)$



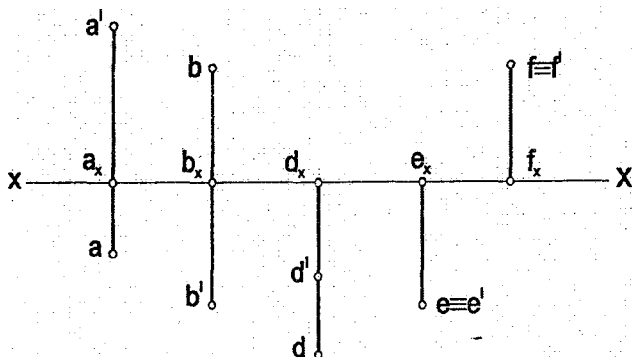
2-misol. Nuqtalarning tekis chizmalarida berilgan proyeksiyalariga binoan ularning har biri fazoning qaysi choraklarida joylashganligi aniqlansin. Javobi simbolika bilan yozilsin.



3-misol. Berilgan har bir nuqtaning koordinatalari bo'yicha, uning fazoviy tasviri va tekis chizmasi tegishli oktantda chizilsin.

A (40;20;30)	D (40;50;60)	S (50;-50;50)	M (0;0;20)
B (40;-60;30)	E (40;40;40)	P (40;0;50)	N (0;50;0)
C (40;-20;-50)	F (50;30;0)	Q (30;0;0)	

4-misol. Nuqtalarning tekis chizmasida berilgan proyeksiyalariga binoan ularning har biri fazoning qaysi choragida joylashganligini chizmada berilgan nuqtalardan o'qing. Javobi simbolika bilan yozilsin.



5-misol. Berilgan nuqtalarning qaysi biri V frontal proyeksiyalar tekisligiga yaqin, qaysi biri H gorizontal proyeksiyalar tekisligidan baland joylashgan?

6-misol. A (40,30,40) nuqta berilgan. Aniqlash kerak:

a) $A=S(v)(B)$ A nuqtaga, V proyeksiya tekislikka nisbatan, simmetrik bo'lgan B nuqtaning tekis chizmasi;

b) $A=S(h)(C)$

d) $A=S(o_y)(E)$

c) $A=S(o_x)(D)$

e) $A=S(o)(F)$

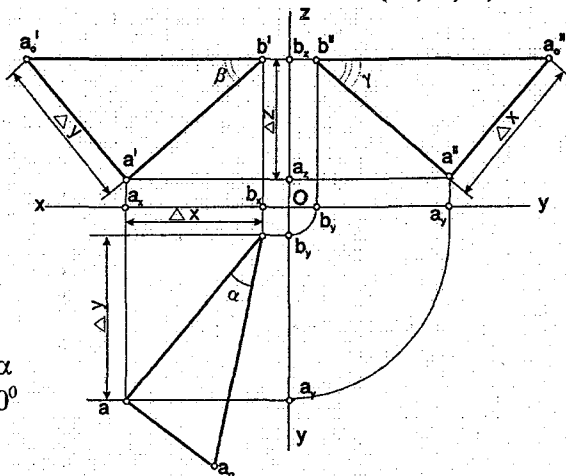
3-dars

Mavzu: Nuqta

Mavzu:	NUQTA					Variant:	0
Masalaning sharti	JAVOBLAR						
	1	2	3	4	5		
1. Qaysi nuqta $\in H$?							
2. Qaysi chizmada nuqta $\in$ bissektor tekisligiga?							
3. Qaysi nuqta W ga yaqin joylashgan?							
4. Qaysi chizmada nuqta $\in [Ox)$?							
5. Qaysi chizmada nuqta $A = S_{[Ox]}(B)$?							

1 - misol. Koordinatalari bilan berilgan AB to'g'ri chiziq kesma-sining epyuri chizilsin. AB kesmaning haqiqiy uzunligi va proyeksiyalar tekisliklariga nisbatan og'ish burchaklari aniqlansin.

A (55;60;10),
B (10;10;45)



$$[AC] \parallel [ab]$$

$$|AC| = |ab|$$

$$[AB] \wedge H = \alpha$$

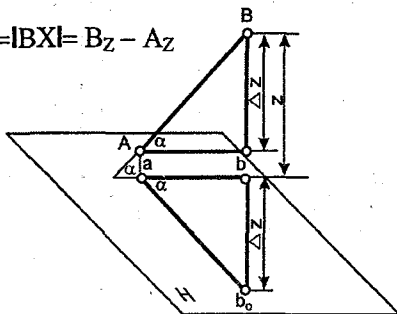
$$[AB] \wedge [AC] = \alpha$$

$$[ab] \wedge [bb_0] = 90^\circ$$

$$|ab_0| = |AB|$$

$$[ab] \wedge [ab_0] = \alpha$$

$$\Delta Z = |Bb| - |Aa| = |BX| = B_z - A_z$$



$$\Delta Z = |b'b_x| - |a'a_x| = |b'c'| = b_z - a_z = 45 - 10 = 30$$

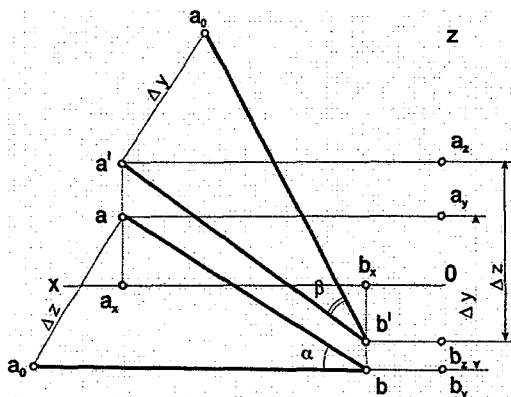
$$\Delta Y = |aa_y| - |bb_y| = |aa'| = a_y - b_y = 60 - 10 = 50$$

$$\Delta X = |a'a_x| - |b'b_x| = |a'c'| = a_x - b_x = 55 - 10 = 45$$

$$\begin{aligned} |aa_0| &= \Delta Z; |a_0b| = AB; [a_0b] \wedge [ab] = \alpha; \alpha = (AB) \wedge H \\ |a'a_0| &= \Delta Y; |a'_0b'| = AB; [a'_0b'] \wedge [a'b'] = \beta; \beta = (AB) \wedge V \\ |a''a''_0| &= \Delta X; |a''_0b''| = AB; [a''_0b''] \wedge [a''b''] = \gamma; \gamma = (AB) \wedge W \end{aligned}$$

2 - misol. Koordinatalari bilan berilgan AB to'g'ri chiziq kesmasining epyuri chizilsin. AB kesmaning haqiqiy uzunligi va proyeksiyalar tekisliklariga nisbatan og'ish burchaklari aniqlansin.

$$A (70; -20; 40), B (20; 30; -20)$$



$$\Delta X = a_x - b_x = 40 - (-20) = 60$$

$$|a_0b| = |AB|; [a_0b] \wedge [ab] = \alpha; \alpha = (AB) \wedge H$$

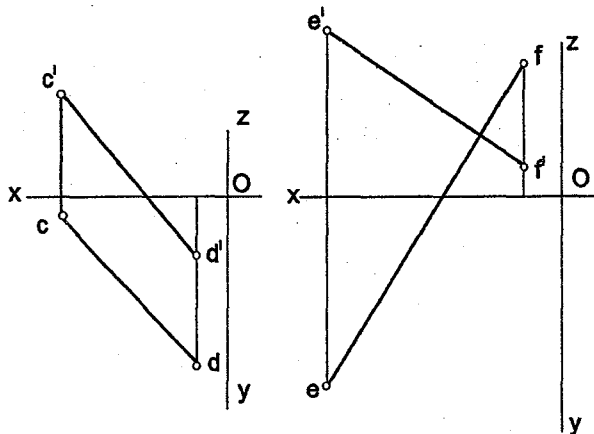
$$\Delta Y = a_y - b_y = -40 - 30 = -50$$

$$|a'_0b'| = |AB|; [a'_0b'] \wedge [a'b'] = \beta; \beta = (AB) \wedge V$$

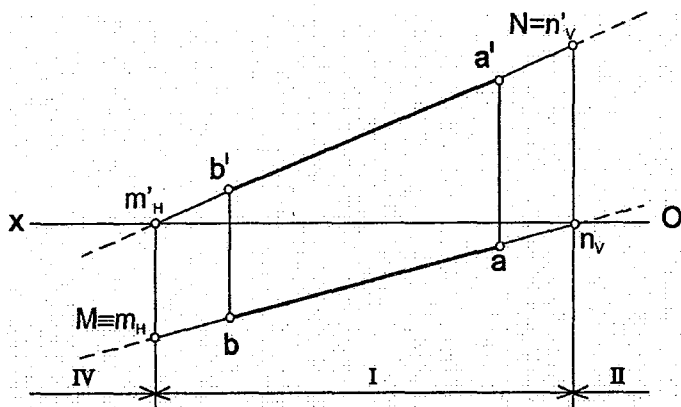
3. A (70;10;40),
B (20;50;-20)

4. A (70;30;40),
B (30;-10;20)

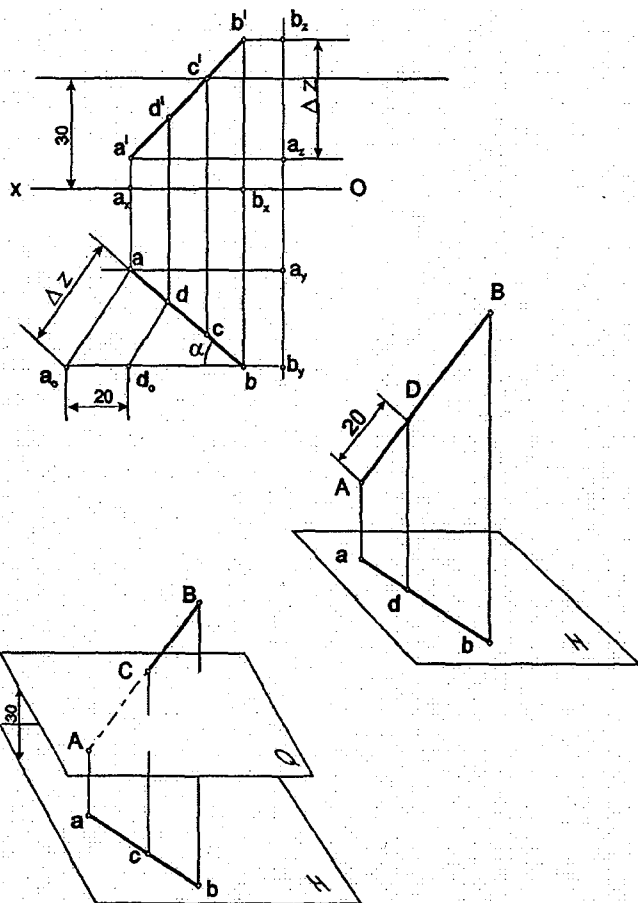
5. A (60;-30;50),
B (10;-60;10)



6 - misol. AB to'g'ri chiziqning izlari aniqlansin va fazoning qaysi choraklaridan o'tishi ko'rsatilsin.



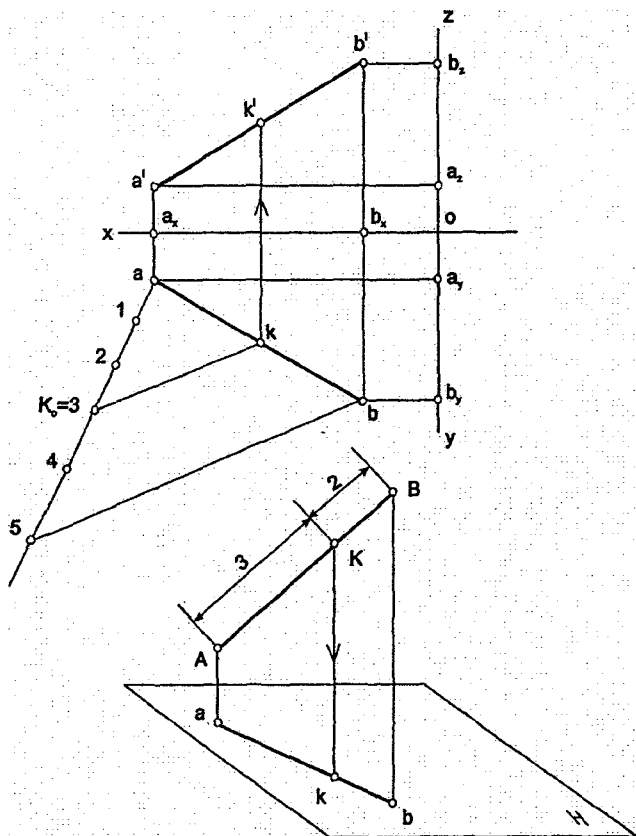
7 - misol. AB to'g'ri chiziqda H tekislikdan 30 mm uzoqlikda yotuvchi C nuqta va A uchidan 20 mm uzoqlikda yotuvchi D nuqta topilsin.



8- misol. AB kesmada uni $\frac{[AK]}{[KB]} = \frac{3}{2}$ nisbatda bo'luvchi K nuqta aniqlansin.

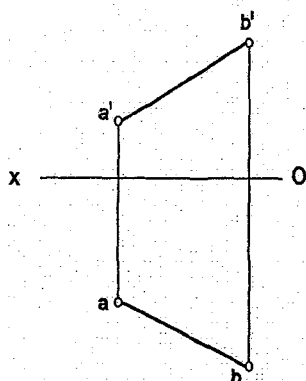
A(70; 10; 10)

B(20; 35; 40)

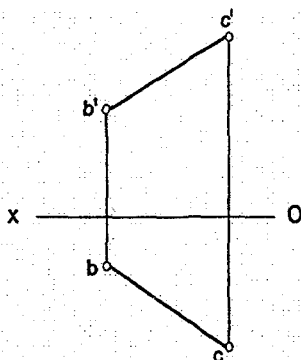


9-misol. AB to'g'ri chiziqning izlari aniqlansin va fazoning qaysi choraklaridan o'tishi ko'rsatilsin.

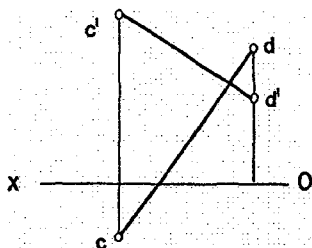
9.1 A(50; 50; 15)
B(20; 85; 35)



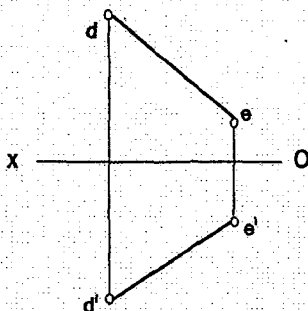
9.2 B(50; 15; 30)
C(10; 55; 55)

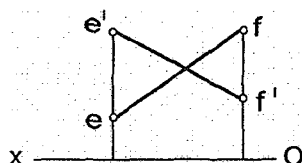
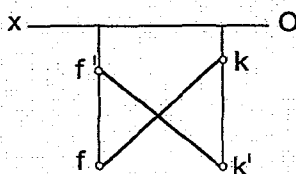


9.3 C(60; 20; 45)
D(25; -10; 20)



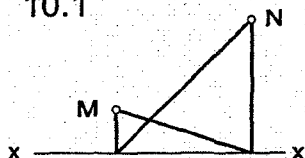
9.4 D(80; -45; -50)
E(40; -15; -25)



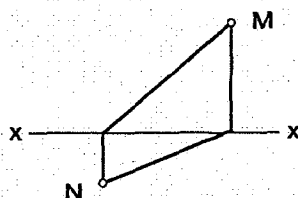
9.5 $E(90; -10; 35)$ $F(45; -35; 15)$ 9.6 $F(70; 30; -10)$ $K(25; 10; -35)$ 

10-misol. BC to'g'ri chiziqning izlarini bilib, uning proyeksiyalari chizilsin, so'ng ko'rinar-ko'rinmas qismlari va fazoning qaysi choraklaridan o'tishi ko'rsatilsin.

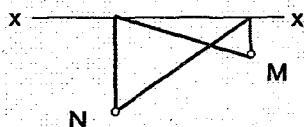
10.1



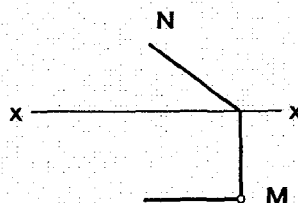
10.2



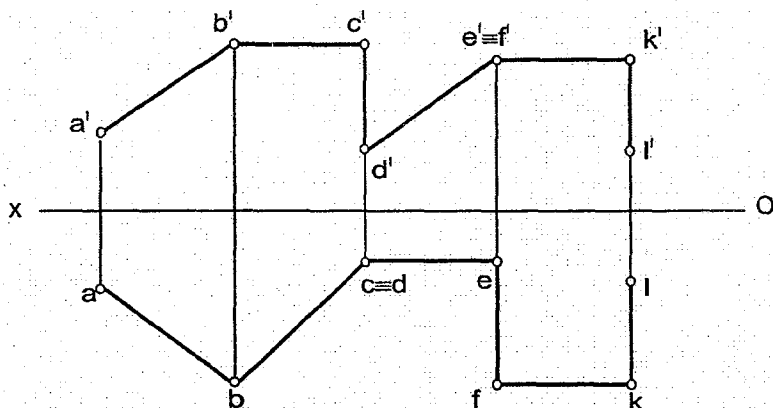
10.3



10.4



11- misol. Berilgan siniq chiziqning uzunligi topilsin va uning har bir kesmasi fazoda proyeksiyalar tekisligiga nisbatan qanday vaziyatda joylashganligi aniqlansin.



12- misol. Koordinatalari orqali berilgan to'g'ri chiziqning tekis chizmasi chizilsin, so'ngra to'g'ri chiziqning izlari aniqlansin va fazoning qaysi choraklaridan o'tishi ko'rsatilsin.

a) A(10; 30; 70)
B(70; 60; 20)

b) E(60; 40; 20)
F(10; 40; 40)

б) C(60; 50; 40)
D(20; 10; 40)

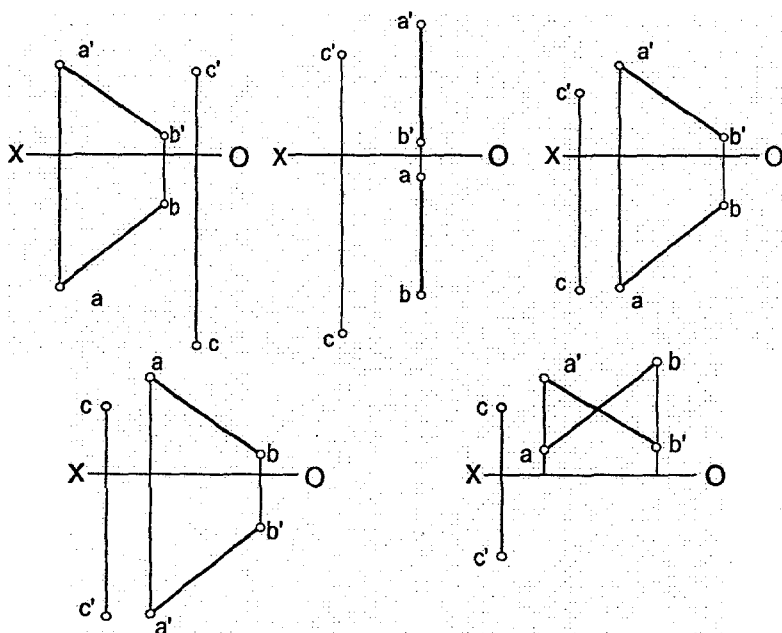
г) K(40; 20; 35)
L(40; 60; 60)

Mavzu:	TO'G'RI CHIZIQ				Variant:	0
Masalaning sharti	J A V O B L A R					
	1	2	3	4	5	
1. Qaysi chizmada BC kesmaning uchlaridan biri V tekisligiga tegishli?						
2. Qaysi chizmada nuqta $K \in (BC)$ V va H tekisliklaridan baravar uzoqlikda yotadi?						
3. Qaysi chizmada $(BC) \parallel (KP)$?						
4. Qaysi chizmada $(BC) \cap (KP)$?						
5. Qaysi chizmada $(BC) \wedge (KP) = 90^\circ$?						

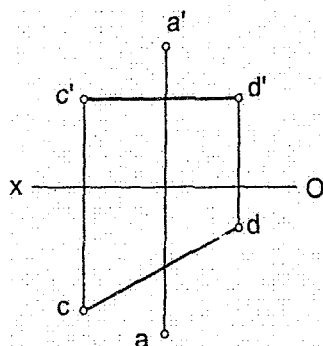
Kesishuvchi to'g'ri chiziqlar

1 – misol. Berilgan AB to'g'ri chiziq va C nuqta. C nuqtadan o'tgan va AB to'g'ri chiziqni kesib o'tuvchi:

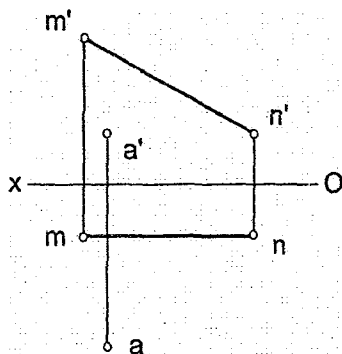
- a) umumiy vaziyatdagi EF
- b) gorizontall FD
- v) frontal DK to'g'ri chizig'i chizilsin.



2 - misol. A nuqta orqali CD to'g'ri chiziqqa perpendikular va uni kesib o'tuvchi AB to'g'ri chiziq o'tkazilsin. Algoritmi batafsil ko'rilsin.

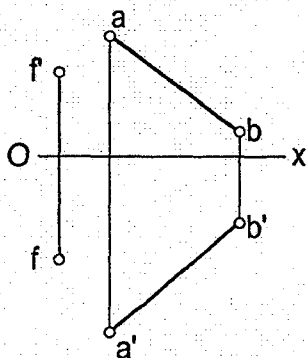
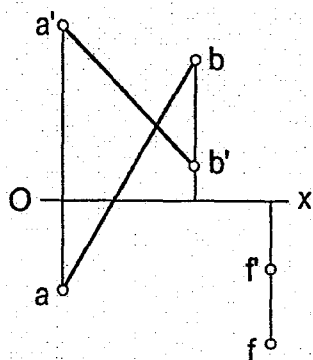
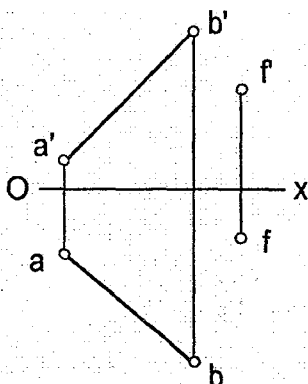
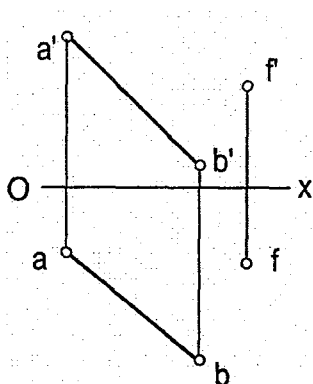


3 - misol. A nuqtadan MN to'g'ri chiziqqacha bo'lgan masofa topilsin. MN to'g'ri chiziqqa markazi A nuqta bo'lgan urinma sfera o'tkazilsin.

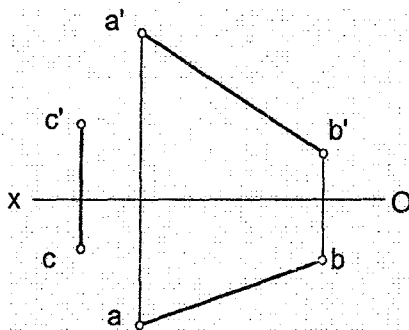


Parallel to'g'ri chiziqlar

1 - misol. Berilgan AB to'g'ri chiziq va F nuqta. F nuqtadan o'tgan va AB to'g'ri chiziq'iga parallel bo'lgan CD to'g'ri chiziq o'tkazilsin.

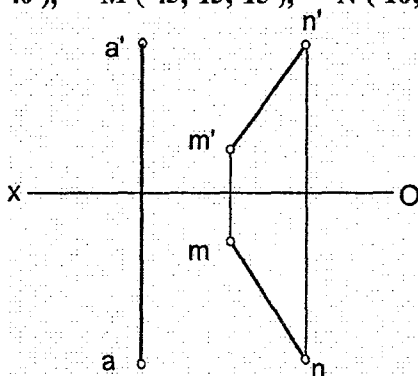


2-misol. C nuqta orqali H tekisligiga parallel va AB to'g'ri chiziqni kesib o'tuvchi CD to'g'ri chiziq o'tkazilsin.

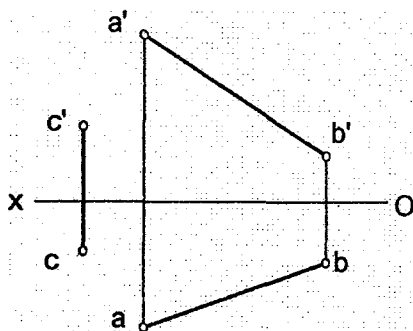


3 - misol. A nuqta orqali MN to'g'ri chiziqqa parallel qilib uzunligi 50 mm li kesma o'tkazilsin.

A (65; 35; 40), M (45; 15; 15), N (10; 45; 40).

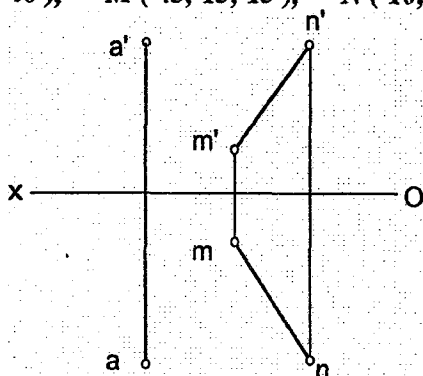


2-misol. C nuqta orqali H tekisligiga parallel va AB to'g'ri chiziqni kesib o'tuvchi CD to'g'ri chiziq o'tkazilsin.

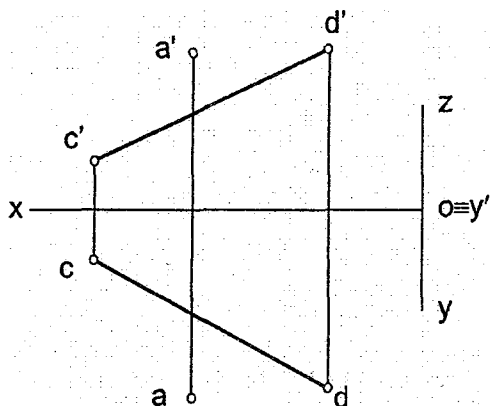


3 - misol. A nuqta orqali MN to'g'ri chiziqqa parallel qilib uzunligi 50 mm li kesma o'tkazilsin.

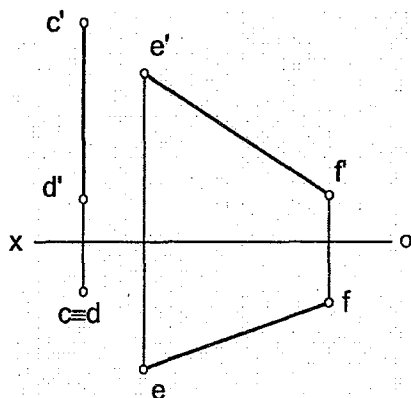
A (65; 35; 40), M (45; 15; 15), N (10; 45; 40).



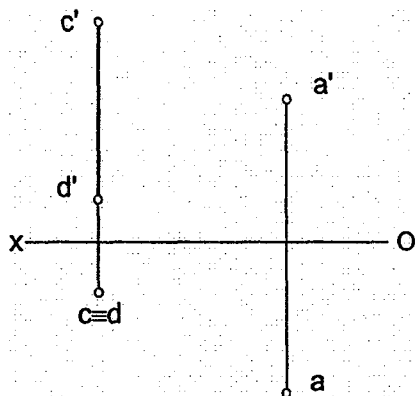
1 - misol. A nuqta orqali berilgan CD to'g'ri chiziqlari va OY proyeksiya o'qini kesib o'tuvchi AB to'g'ri chiziq o'tkazilsin.



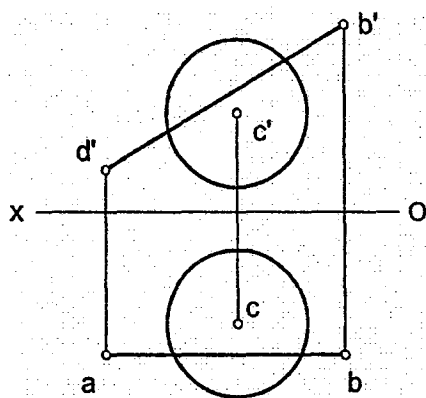
2 - misol. CD va EF to'g'ri chiziqlarga perpendikular va ularni kesib o'tuvchi AB to'g'ri chiziq o'tkazilsin.



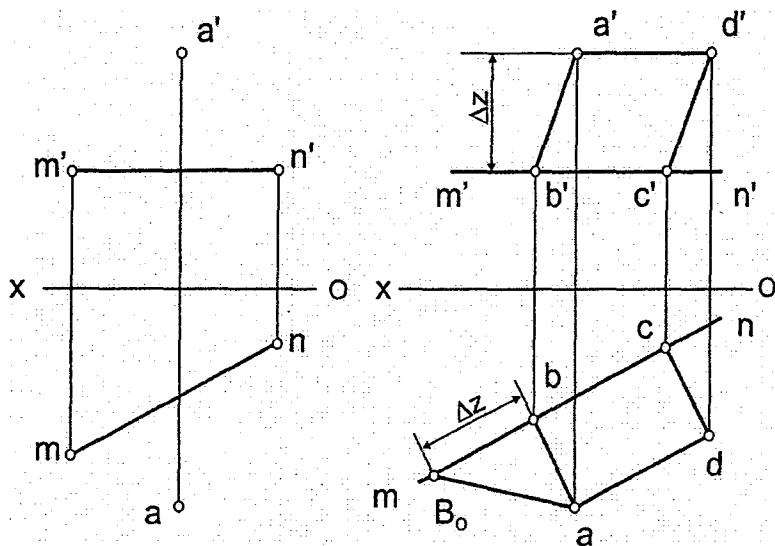
3 - misol. A nuqta orqali CD to'g'ri chiziqdan 30 mm uzoqlikda o'tuvchi AB gorizontali chiziq o'tkazilsin.



4 - misol. AB to'g'ri chiziqlarning shar sirti bilan kesishish nuqtasi topilsin.



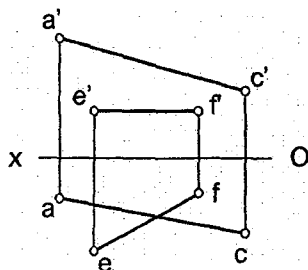
1 - misol. BC tomoni MN chiziqda yotuvchi ABCD kvadrat chizilsin.



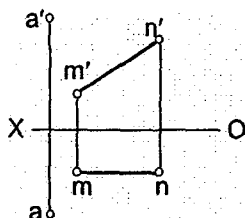
Masalani yechish algoritmi

1. $[AB] \perp (MN) \wedge [AB] \cap (MN)$
2. $|AB| = |aB_0|$
3. $|BC| = |AB| \Rightarrow |bc| = |aB_0|$
4. $[CD] \parallel [AB] \wedge |CD| = |AB|$
5. $[AD] \parallel [BC]$

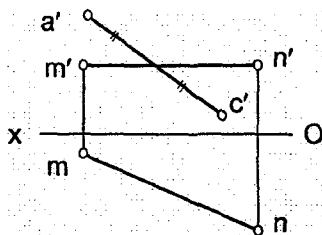
2 - misol. B uchi to'g'ri burchakli va EF to'g'ri chiziqda yotuvchi to'g'ri burchakli ABC uchburchak chizilsin.



3 - misol. BC tomoni MN chiziqda yotuvchi $ABCD$ kvadrat chizilsin.



4 - misol. BD diagonali MN chiziqda bo'lgan $ABCD$ kvadrat chizilsin.



1- misol. Berilgan A va B nuqtalarning koordinatalari asosida AB to'g'ri chiziq kesmasining tekis chizmasi chizilsin, AB kesmaning haqiqiy uzunligi va uning har bir proyeksiyalar tekisliklariga nisbatan og'ish burchaklari aniqlansin.

A(10; 10; 50)

B(40; 30; 10)

2- misol. AB to'g'ri chiziqda H tekislikdan 40 mm uzoqlikda yotuvchi C nuqta va A uchidan 20 mm uzoqlikda yotuvchi D nuqta aniqlansin.

A(90; 45; 10)

B(30; 10; 55)

3- misol. AB kesmada uni $\frac{[AK]}{[KB]} = \frac{3}{2}$ nisbatda bo'luvchi K nuqta aniqlansin.

A(80; 50; 20)

B(30; 10; 55)

$Q(Q_V, Q_H)$?

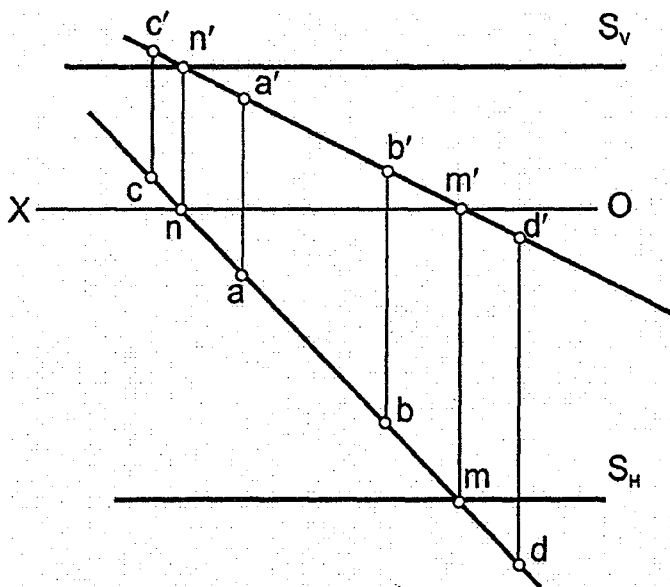
$$Q \subset I, II, III, IV$$

A ∈ I, C ∈ II, D ∈ IV, E ∈ III

$$2. T(T_H, T_V) \subset (AB) \wedge T \perp H$$

Mustaqil ravishda bajarilsin.

$$3. S(S_H, S_V) \subset (AB) \wedge S \perp W$$



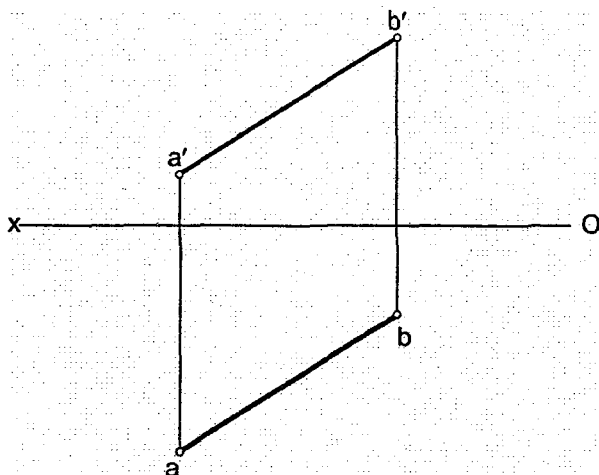
$$S(S_H, S_V) \subset (AB) \wedge S \perp W \Rightarrow S_V, S_H \parallel (ox) \wedge M \in S_H \wedge N \in S_V$$

$$S \subset \Pi, I, IV$$

$$A \in I, C \in \Pi, D \in IV$$

1 - misol. AB to'g'ri chiziqli orqali mumkin bo'lgan xususiy holatdagi tekisliklar o'tkazilsin.

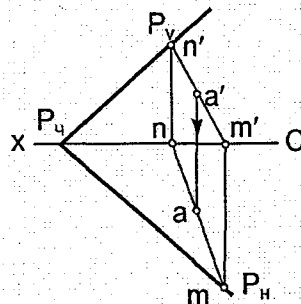
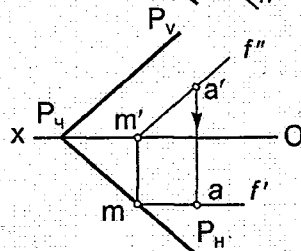
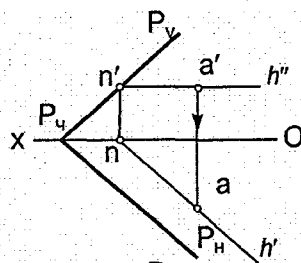
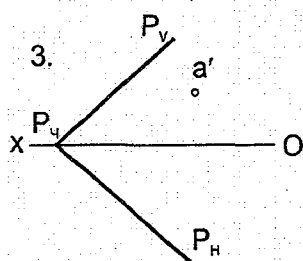
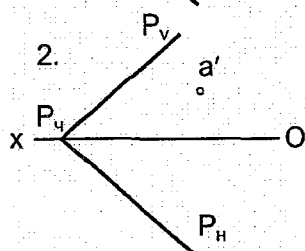
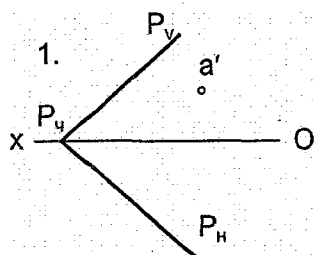
Har bir tekislik uchun AB to'g'ri chiziqli o'tayotgan choraklarda joylashgan va shu chiziqli yotuvchi bittadan ixtiyoriy nuqta tanlab olinsin.



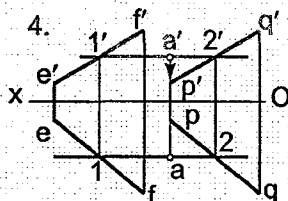
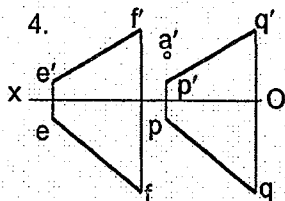
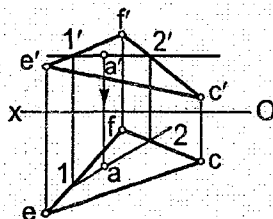
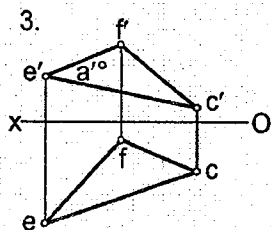
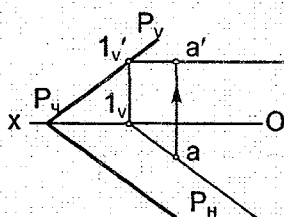
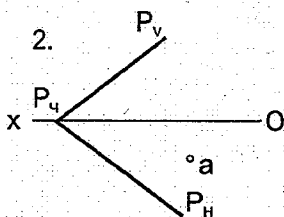
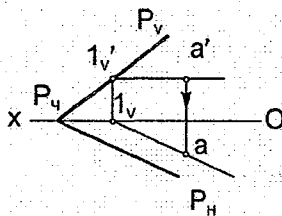
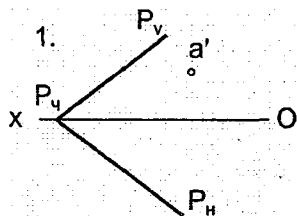
1 - misol. P tekislikda yotuvchi nuqtaning yetishmagan proyeksiyasi topilsin:

Masalani yechish uchun tekislikning quyidagi chiziqlaridan foydalanilsin:

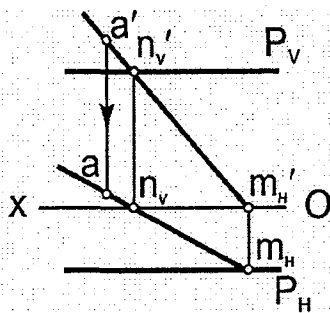
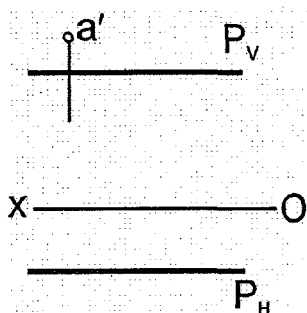
1) gorizontall 2) frontal 3) umumiy holatdagi to'g'ri chiziq



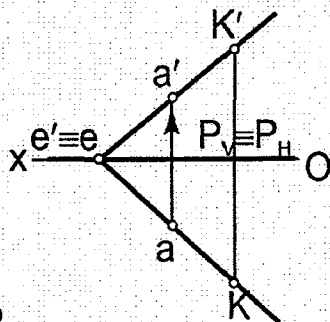
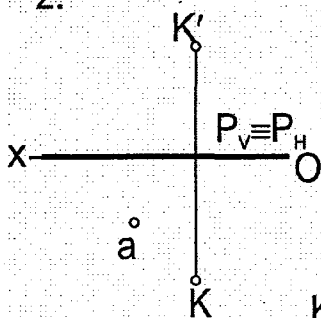
2 - misol. Berilgan tekislikning A nuqtasi orqali uning gorizontali o'tkazilsin.



3 - misol. Profil proyeksiyalovchi tekislikka tegishli nuqtalarning yetishmagan proyeksiyalari umumiy holatdagi to'g'ri chiziqlar yordamida topilsin.

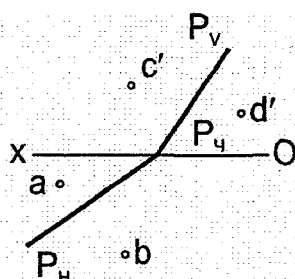
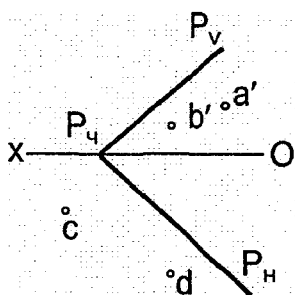


2.

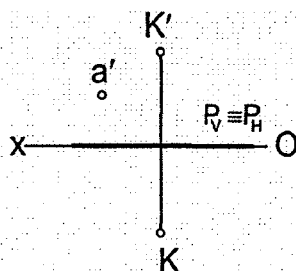
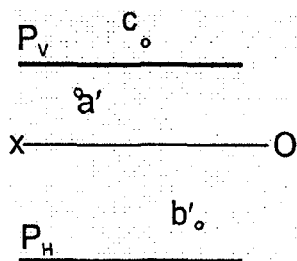
 $K \in P$

1 - misol. P tekislikda yotuvchi va bir proyeksiyasi berilgan A, B, C, D , nuqtalarning yetishmagan proyeksiyalari frontal yoki gorizontal chiziqlar orqali topilsin.

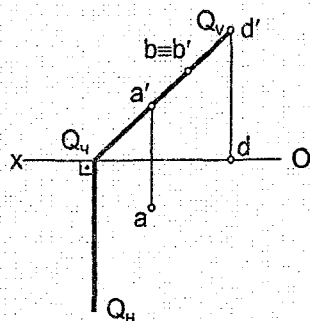
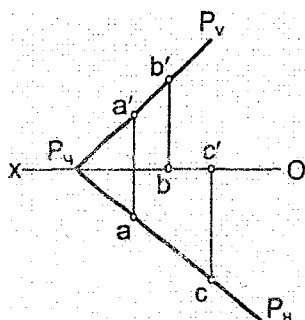
A va D – gorizontal, B va C - frontal orqali topilsin.



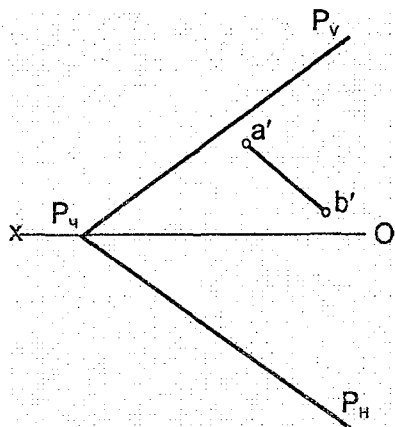
2 - misol. Profil proyeksiyalovchi tekislikka tegishli A, B va C nuqtalarning yetishmagan proyeksiyalari umumiy holatdagi to'g'ri chiziqlar yordamida topilsin.



3 - misol. Berilgan nuqtalarning tekislikka tegishli-tegishli emasligi aniqlansin.



4 - misol. P tekislikka tegishli AB to'g'ri chiziqling yetishmagan proyeksiyasi chizilsin.



1 - Nazorat ishi**Bilet №0**

1-masala. AB to'g'ri chiziqning gorizontal va frontal izlari aniqlansin va fazoning qaysi choraklaridan o'tishi ko'rsatilsin:

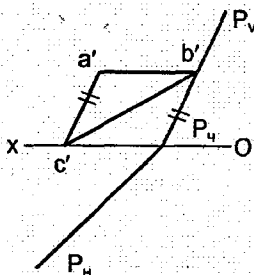
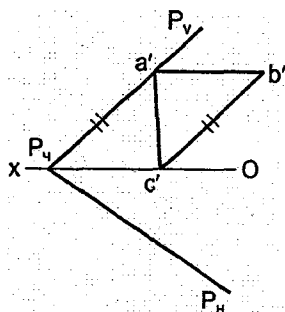
Nuqtalarning koordinatalari : A (35,65,45), B (60,40,20).

2-masala. AB to'g'ri chiziq kesmaning haqiqiy uzunligi va V tekisligi bilan hosil qiluvchi og'ish burchagi aniqlansin.

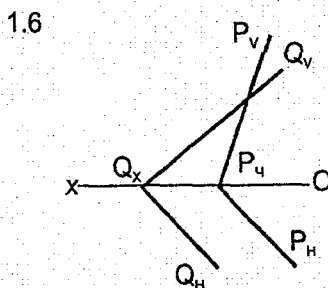
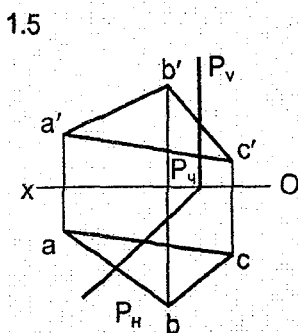
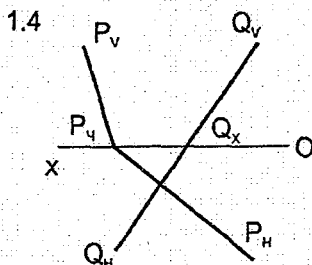
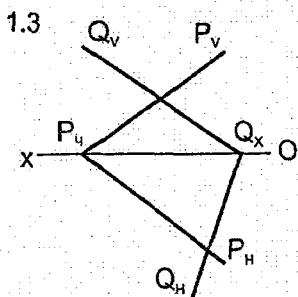
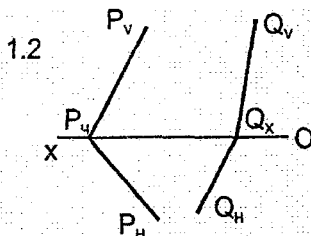
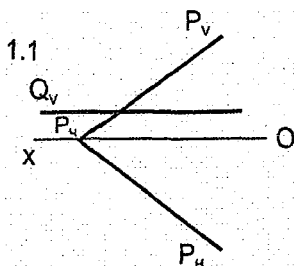
3-masala. AB to'g'ri chiziqda B uchidan 20 mm uzoqlikda C nuqta olinsin va undan AB to'g'ri chiziqqa perpendikular va H tekislikni M nuqtada kesuvchi CM frontal chiziq o'tkazilsin.

4-masala. AB kesmani $AD : DB = 5 : 4$ nisbatda bo'luvchi va D nuqta orqali applikata o'qini E nuqtada kesib o'tuvchi DE gorizontal chiziq o'tkazilsin.

5-masala. P tekislikka tegishli uchburchak ABC ning yetishmagan proyeksiyasi chizilsin.

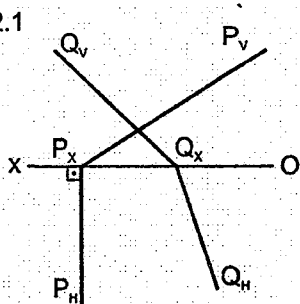


1 - misol. Berilgan tekisliklarning o'zaro kesishuv chizig'ining proyeksiyalari chizilsin.

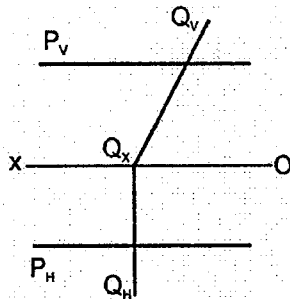


2 - misol. Berilgan tekisliklarning o'zaro kesishuv chizig'ining proyeksiyalari aniqlansin.

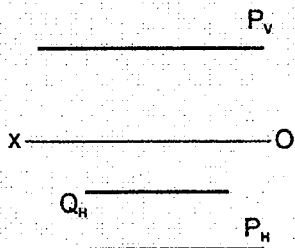
2.1



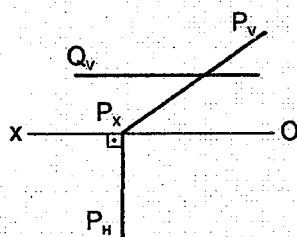
2.2



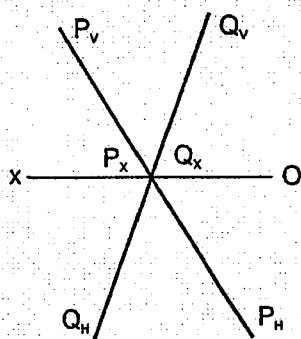
2.3



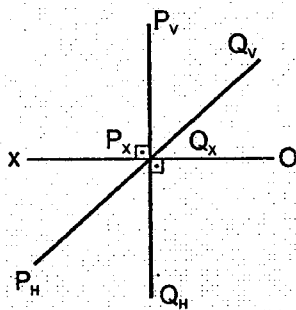
2.4



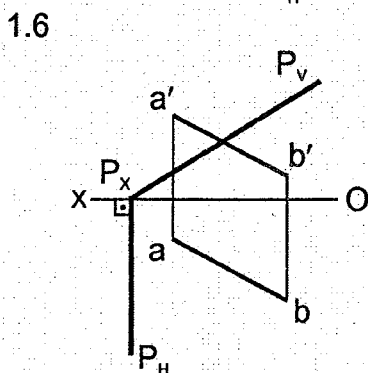
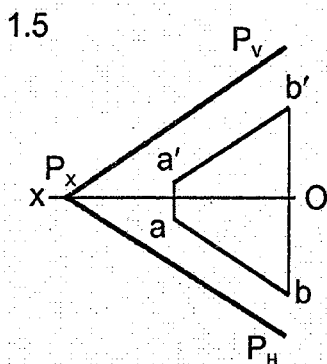
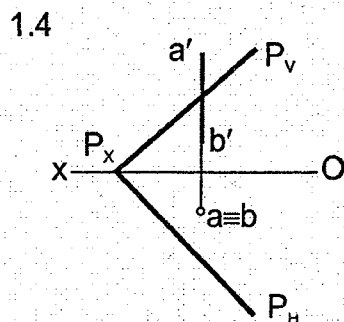
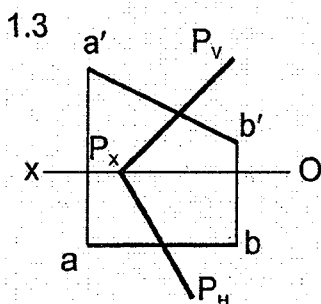
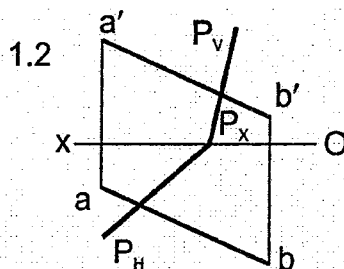
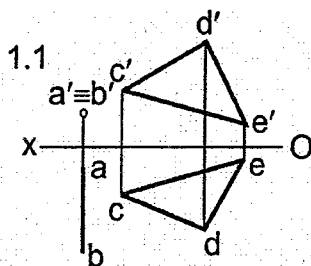
2.5



2.6

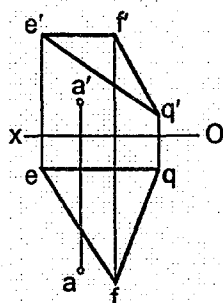


1 - misol. AB to'g'ri chiziq bilan berilgan tekisliklarning kesishish nuqtasi topilsin.

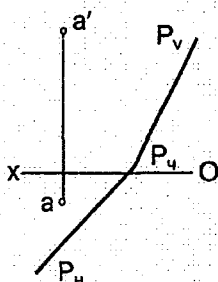


2 - misol. A nuqta orqali berilgan tekislikka perpendikular chiziq o'tkazilsin va unga 30 mm uzunlikdagi kesma o'lchab qo'yilsin.

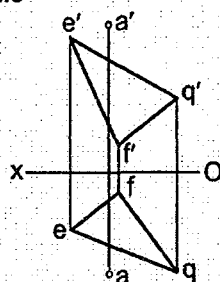
2.1



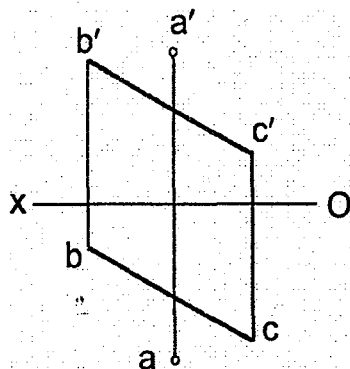
2.2



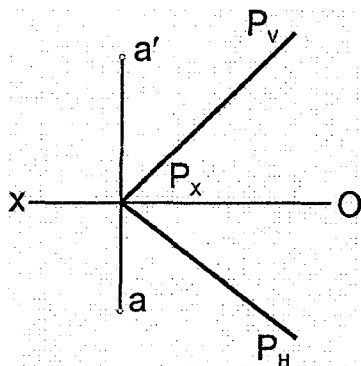
2.3



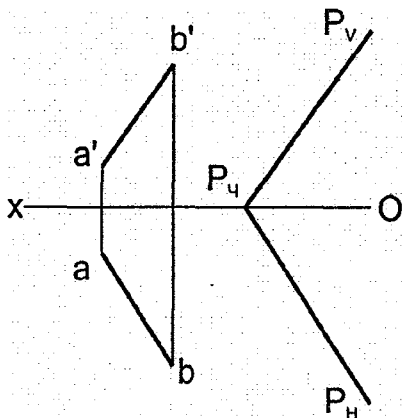
3 - misol. A nuqta orqali BC to'g'ri chiziqqa perpendikular bo'lgan P tekislik izlari bilan o'tkazilsin.



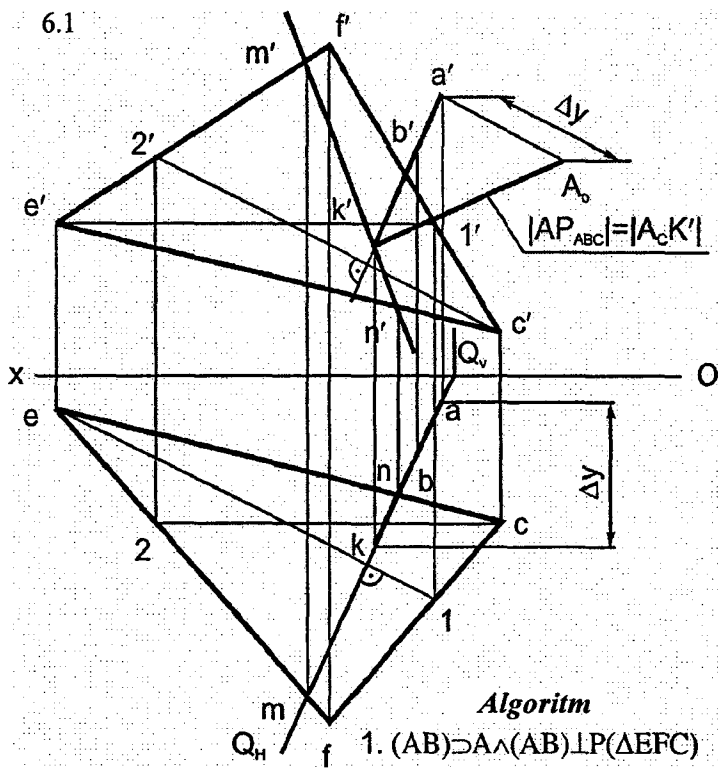
4 - misol. A nuqta P tekislikka proyeksiyalansin.



5 - misol. AB to'g'ri chiziq orqali berilgan P tekislikka perpendikular bo'lgan Q tekislikning izlari o'tkazilsin.



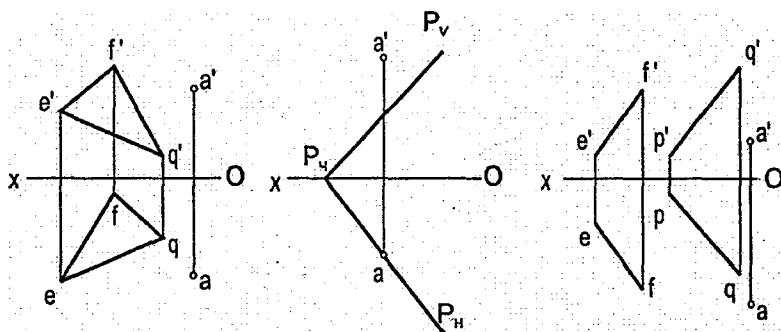
6.1



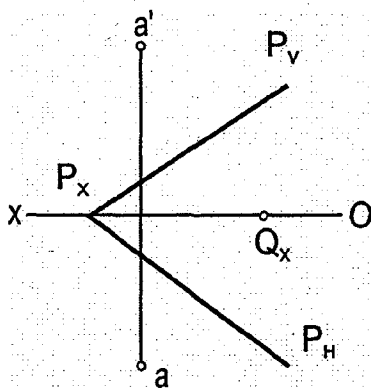
Algorithm

1. $(AB) \supset A \wedge (AB) \perp P(\Delta EFC)$
2. $(AB) \cap P = K$
 - 2.1 $Q(Q \vee Q_H) \supset (AB) \wedge Q \perp H$
 - 2.2 $\Theta \cap P(\Delta EFC) = (MN)$
 - 2.3 $(MN) \cap (AB) = K$
3. $|AK| = |AP(\Delta EFC)|$

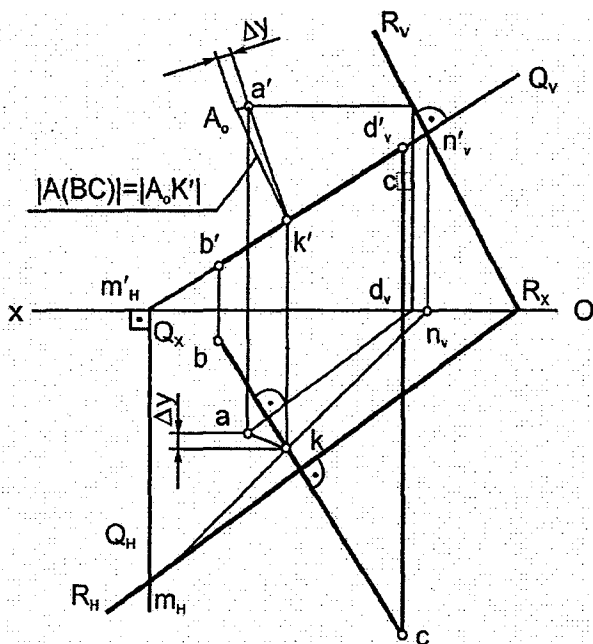
7 - misol. A nuqtadan berilgan tekislikkacha bo'lgan masofa aniqlansin.



8 - misol. A nuqta orqali berilgan P tekislikka perpendikular va Q_x nuqtadan o'tuvchi Q tekislikning izlari o'tkazilsin.



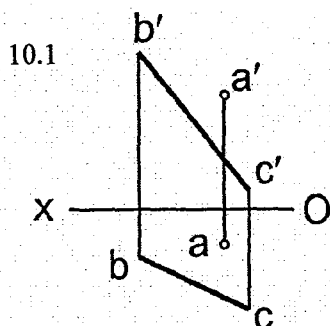
9 - misol. A nuqtadan BC to'g'ri chiziqqacha bo'lgan masofa aniqlansin.



Algorithm

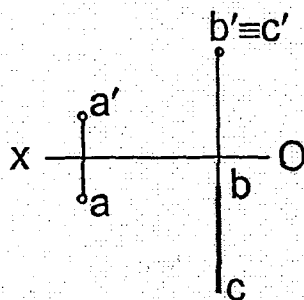
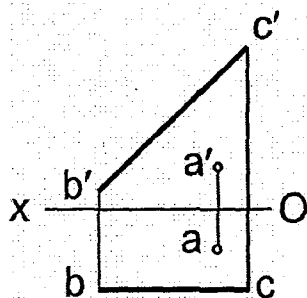
1. $A \in R(R_v R_h) \perp (BC)$
 - 1.1 $(AD) \in A \wedge (AD) \parallel H \wedge (AD) \perp (BC)$
 - 1.2 $R_v \in D \wedge R_v \perp (b'c')$
 - 1.3 $R_v \in R_x \wedge R_v \perp (bc)$
 3. $[AK] = A_0K'$
 4. $|AK| = |A(BC)|$
2. $(BC) \cap R(R_v R_h) = K$
 - 2.1 $R(R_v R_h) \supset (BC) \wedge Q \perp V$
 - 2.2 $Q \cap R = (MN)$
 - 2.3 $(MN) \cap (BC) = K$

10- misol. A nuqtadan BC to'g'ri chiziqqacha bo'lgan masofa aniqlansin.



10.2

9.3

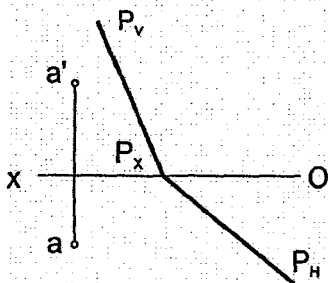


12- dars

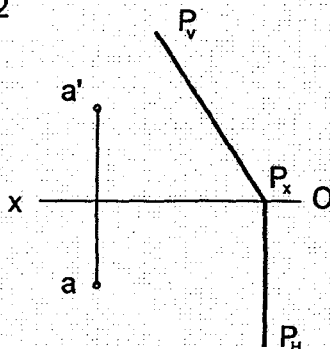
Mavzu: To'g'ri chiziq bilan tekislikning va ikki tekislikning parallelligi

1 - misol. A nuqta orqali berilgan P va H tekisliklarga parallel AB to'g'ri chiziq o'tkazilsin va unga 30 mm uzunlikda kesma o'lchab qo'yilsin.

1.1

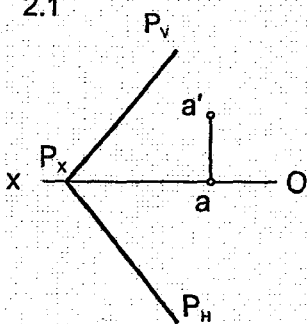


1.2

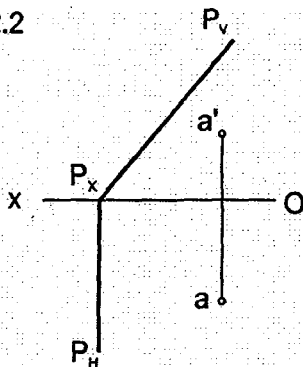


2 - misol. A nuqta orqali berilgan P tekislikka parallel bo'lgan G tekislikning izlari o'tkazilsin.

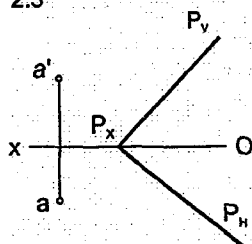
2.1



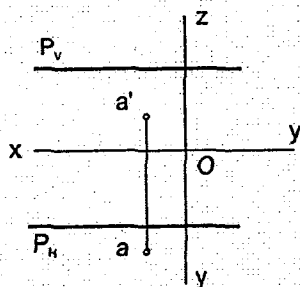
2.2



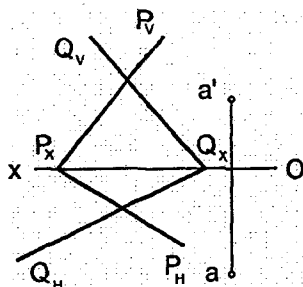
2.3



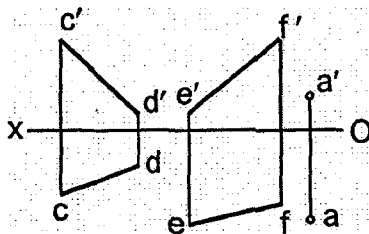
2.4



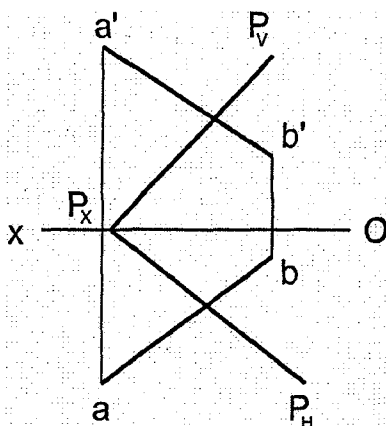
3 - misol. A nuqta orqali berilgan tekisliklarga parallel to'g'ri chiziq o'tkazilsin.



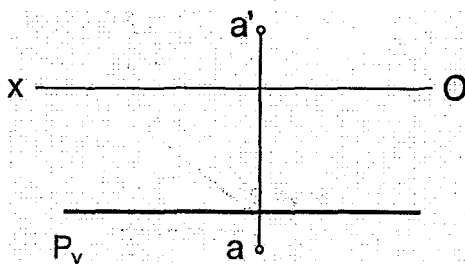
4 - misol. A nuqta orqali berilgan CD va EF ayqash chiziqlarga parallel bo'lgan tekislikning izlari o'tkazilsin.



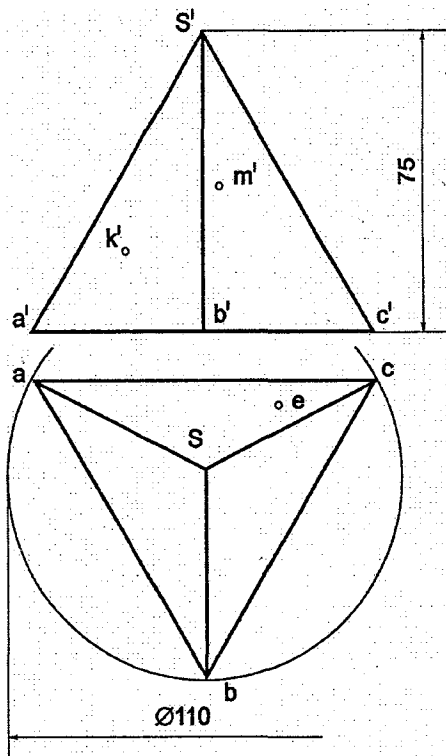
5 - misol. Berilgan tekislikdan 20 mm uzoqlikda AB to'g'ri chiziqqa tegishli C nuqta topilsin.



6 - misol. Berilgan P tekislikdan 15 mm va A nuqtadan 25 mm uzoqlikda yotuvchi nuqtalar to'plami chizilsin.

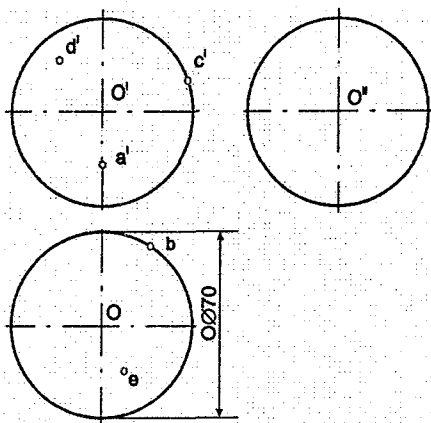


1 - misol. Geometrik jismlarning sirtida yotuvchi nuqtalarning berilgan proyeksiyalari bo'yicha ularning yetishmagan proyeksiyalari aniqlansin.



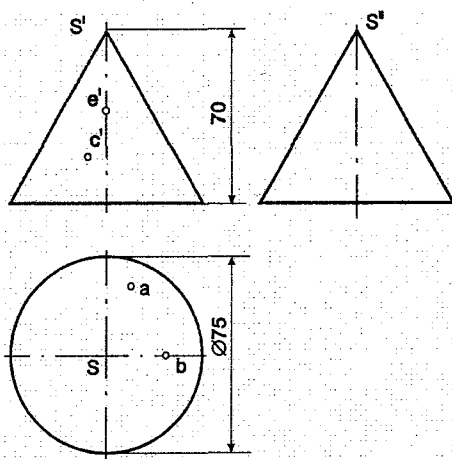
1 - rasm.

2 - misol.



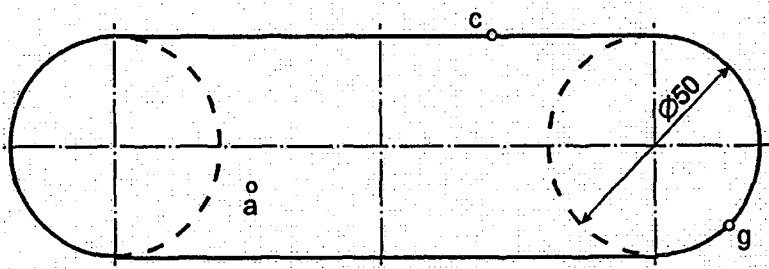
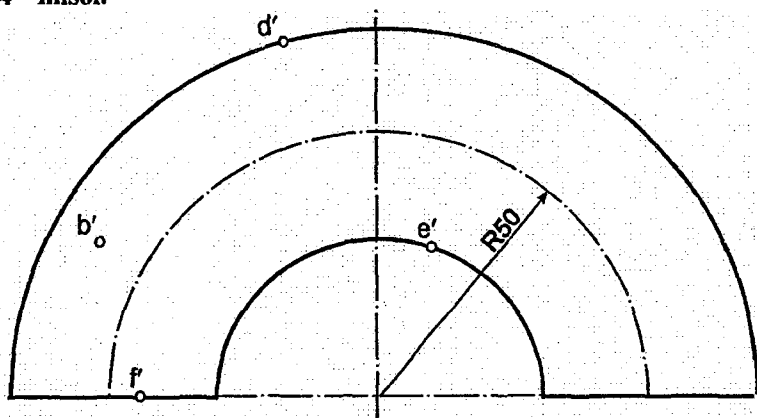
2 - rasm.

3 - misol.



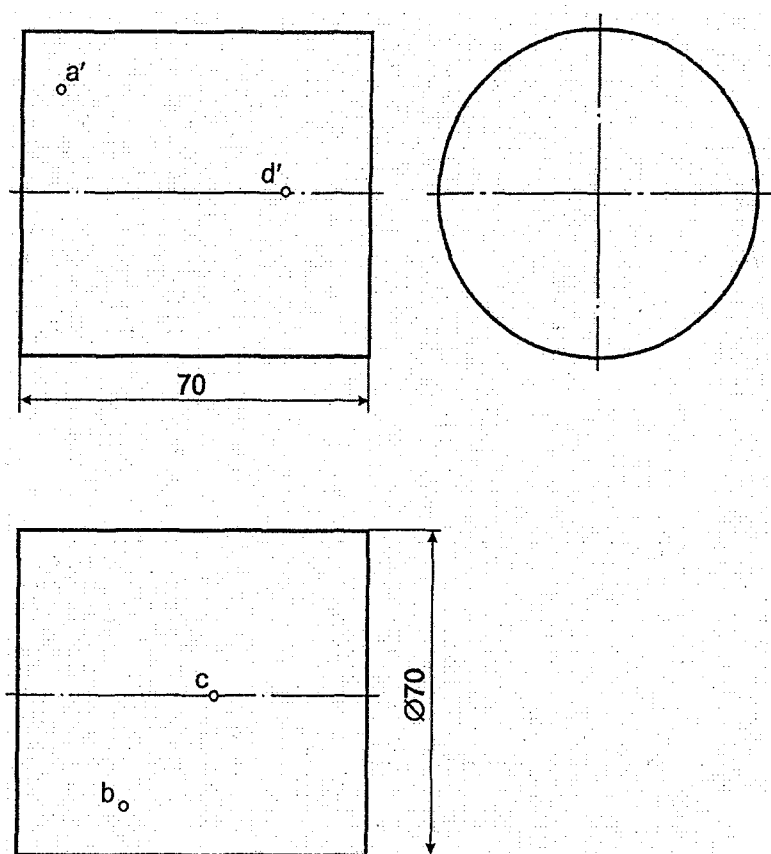
3 - rasm.

4 - misol.



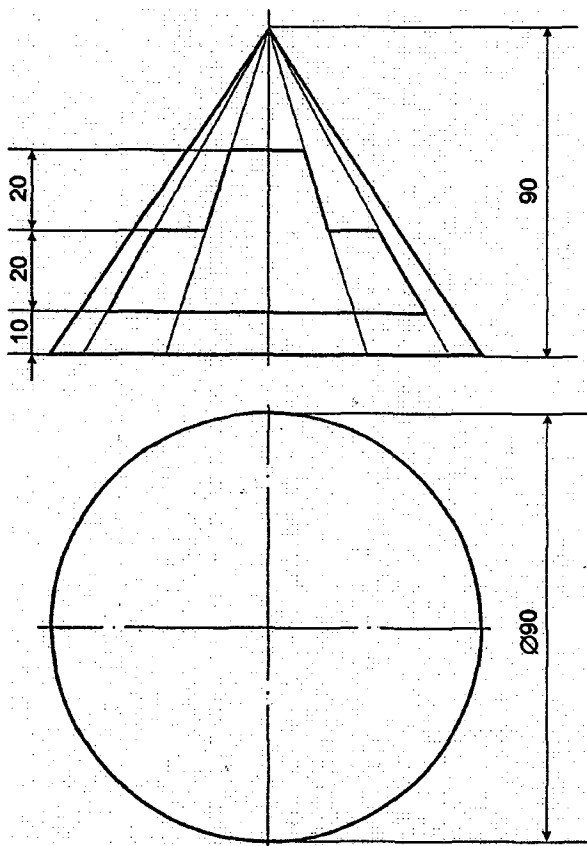
4 - rasm

5 - misol.

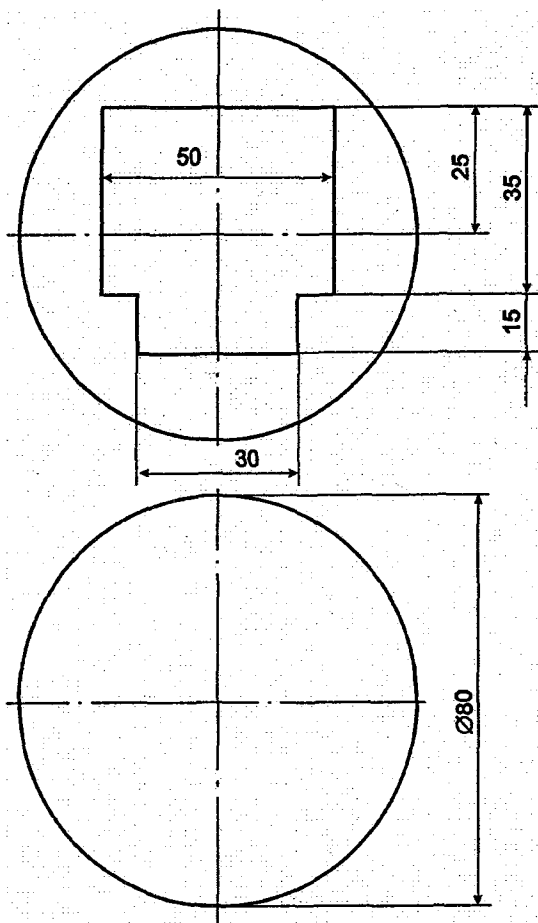


5 - rasm

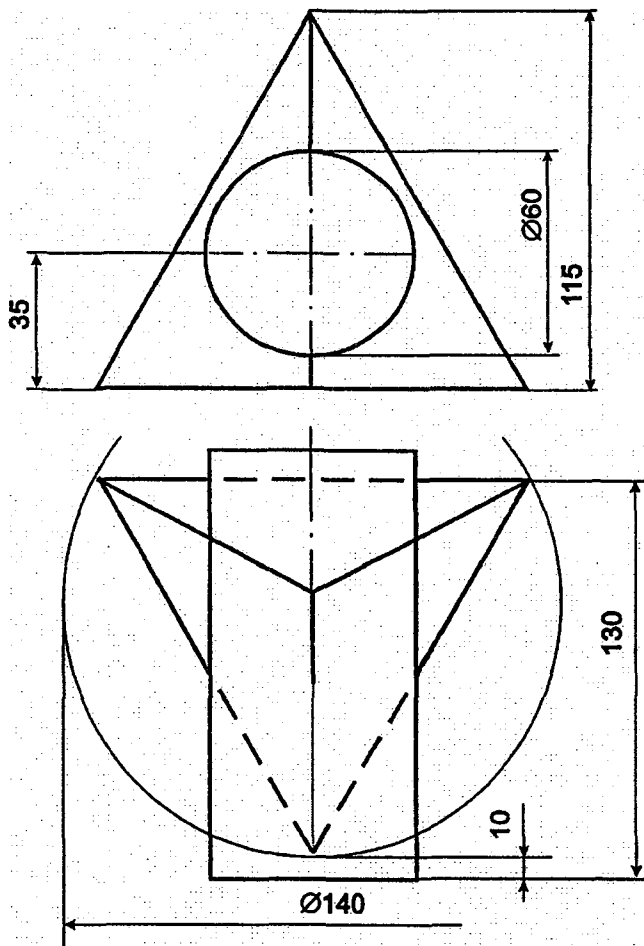
1 - misol. Konusning ko'rinar sirtiga tegishli figuraning frontal proyeksiyasi bo'yicha uning gorizontal proyeksiyasi aniqlansin.



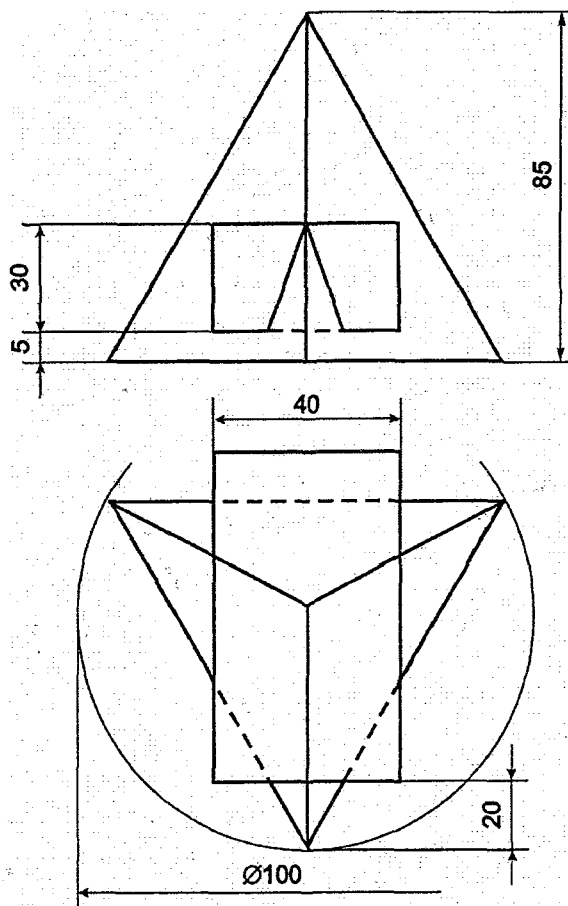
2 - misol. Teshikli sferaning gorizontaal proyeksiyasi aniqlansin.



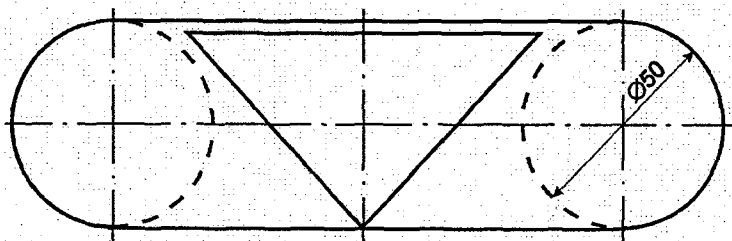
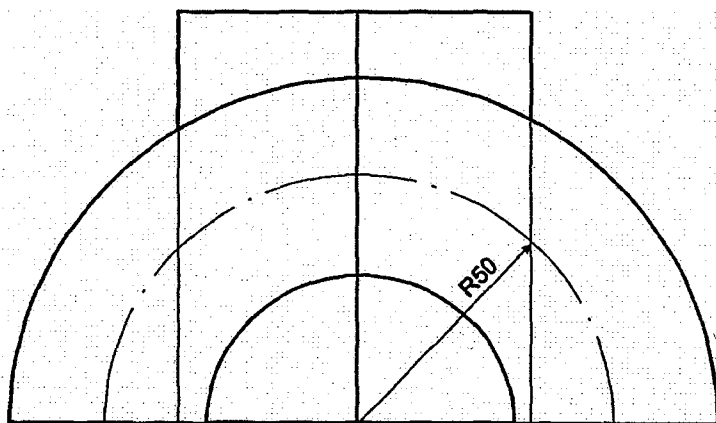
3 - misol. Geometrik jismlar bilan berilgan sirtlarning kesishgan chizig'ining proyeksiyalari aniqlansin.



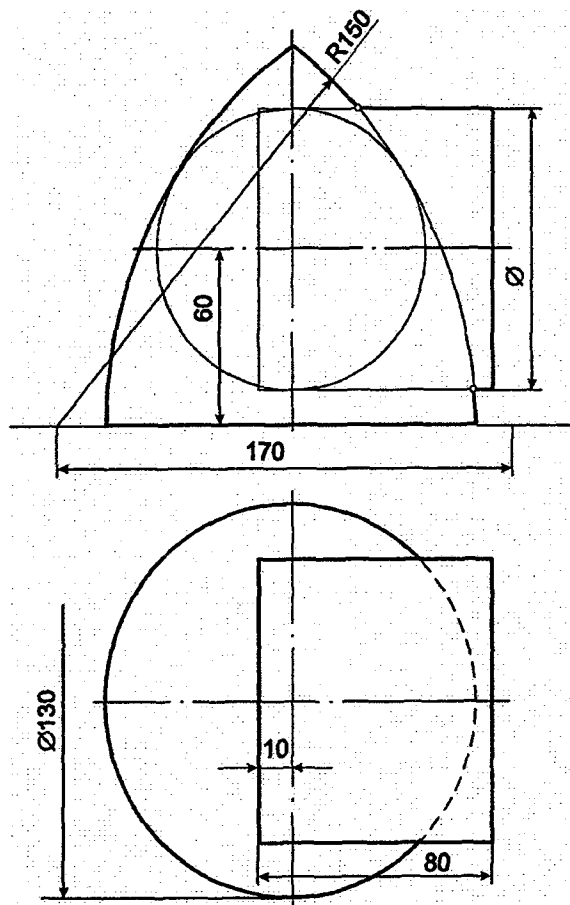
4 - misol. Berilgan geometrik sirtlarning kesishgan chizig'ining proyeksiyalari aniqlansin.



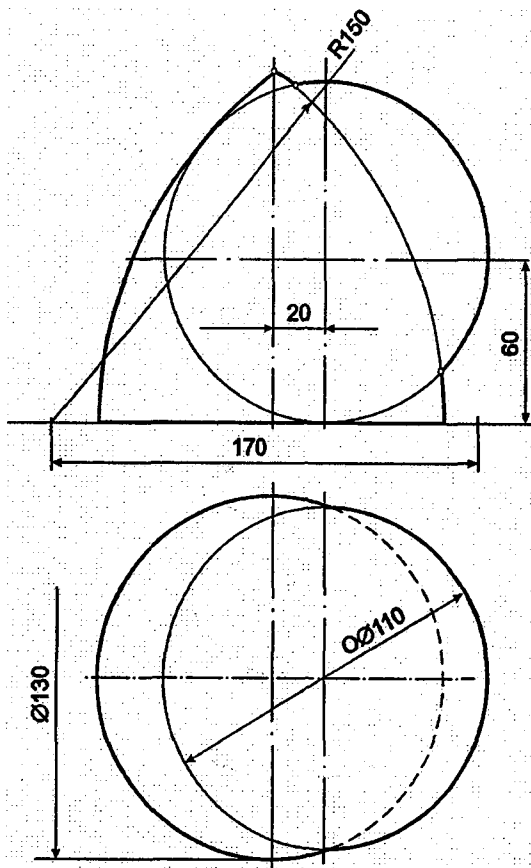
5 - misol. Geometrik sirtlarning kesishgan chizig'ining proyeksiyalari aniqlansin.



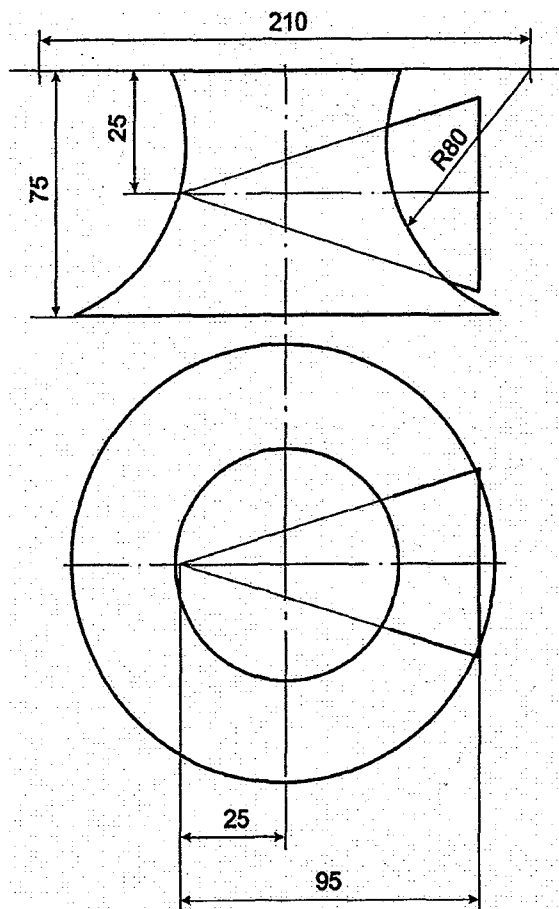
6 - misol. Geometrik sirtlarning kesishgan chizig'ining proyeksiyalari aniqlansin.



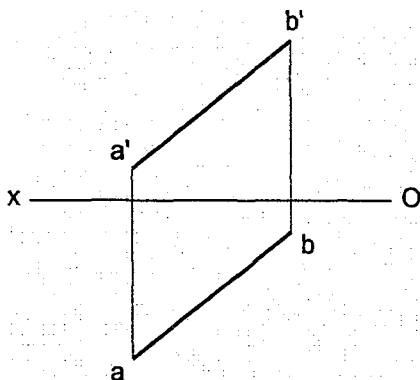
7 - misol. Geometrik jismlar sirtlarining o'zaro kesishish chizig'ining proyeksiyalari yordamchi sfera (shar)lar usuli bilan aniqlansin.



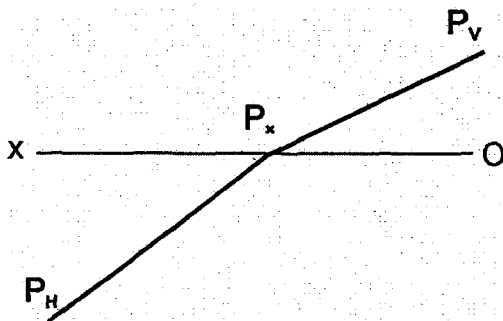
8 - misol. Geometrik jismlar sirtlarining o'zaro kesishish chizig'ining proyeksiyalari yordamchi sfera (shar)lar usuli bilan chizilsin.



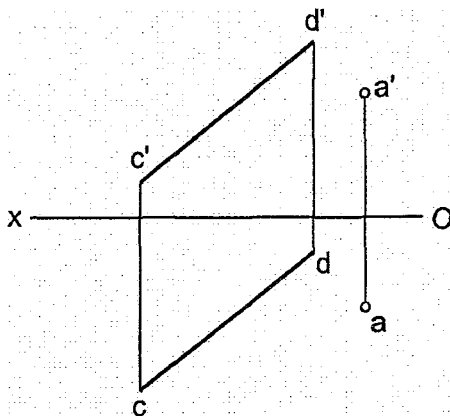
1 - misol. AB to'g'ri chiziqning H tekislikka og'ish burchagi aniqlansin.



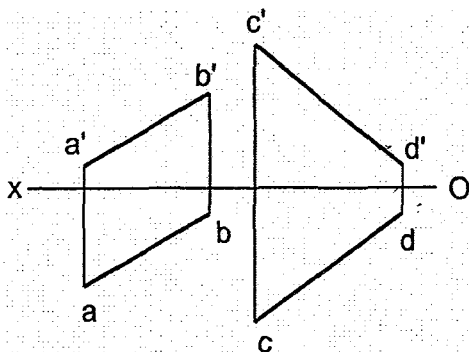
2 - misol. P tekislikning H proyeksiyalar tekisligiga og'ish burchagi chizilsin.



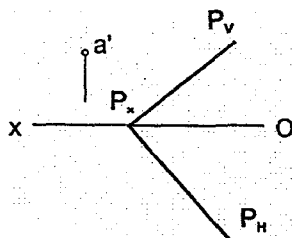
3 - misol. A nuqtadan CD to'g'ri chiziqqacha bo'lgan masofa aniqlansin.



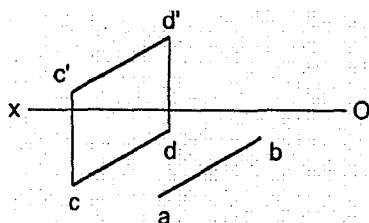
4 - misol. AB va CD ayqash to'g'ri chiziqlar orasidagi masofa aniqlansin.



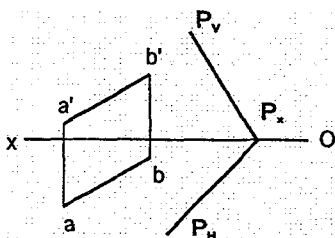
5 - misol. P tekislikdan 20 mm uzoqlikda yotuvchi A nuqtaning yetishmagan proyeksiyasi aniqlansin.



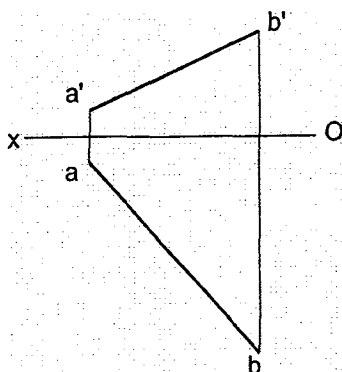
6 - misol. CD to'g'ri chiziqqa parallel va undan 20 mm uzoqlikda o'tuvchi AB to'g'ri chiziq kesmasining yetishmagan proyeksiyasi aniqlansin.



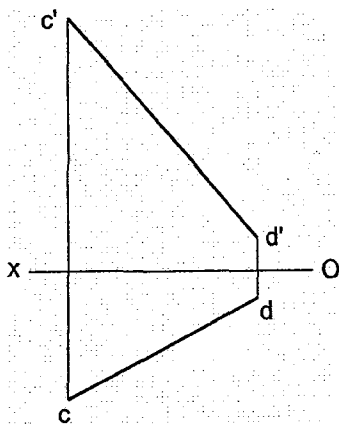
7 - misol. P tekislikdan 20 mm uzoqlikda AB to'g'ri chiziqda yotuvchi C nuqta aniqlansin.



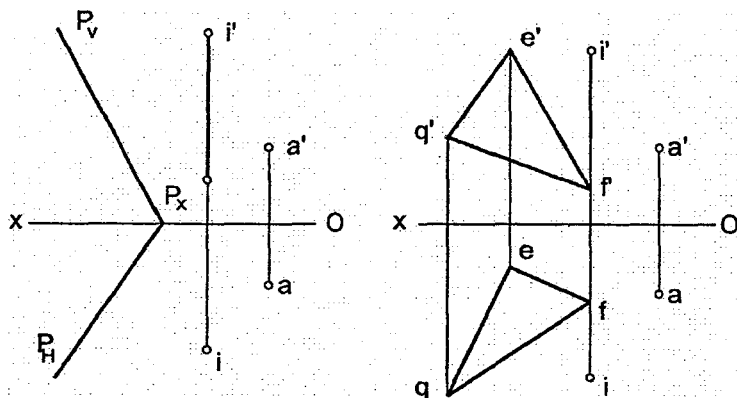
1 - misol. AB to'g'ri chiziqning H tekislikka og'ish burchagi aniqlansin.



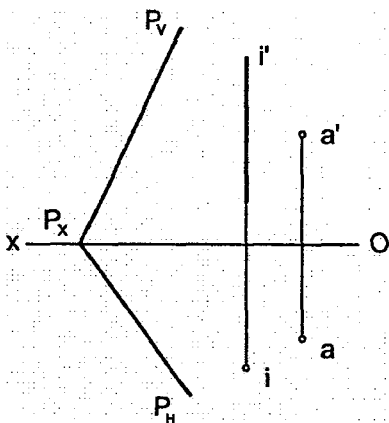
2 - misol. CD to'g'ri chiziqning V tekislikka og'ish burchagi aniqlansin.



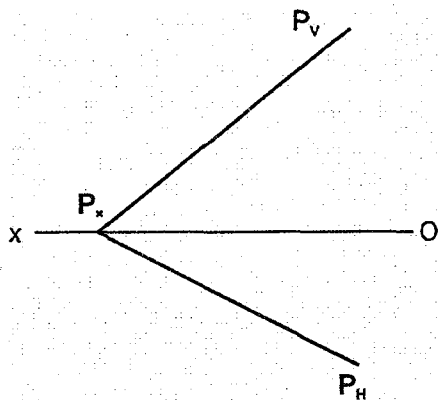
3 - misol. Berilgan i o'q atrofida aylantirish bilan A nuqta P tekislikka joylashtirilsin.



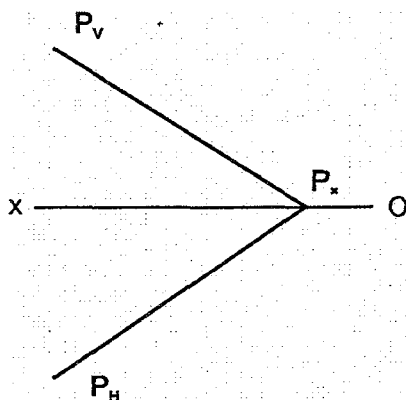
4 - misol. P tekislik berilgan i o'q atrofida A nuqta bilan jipslashguncha aylantirilsin.



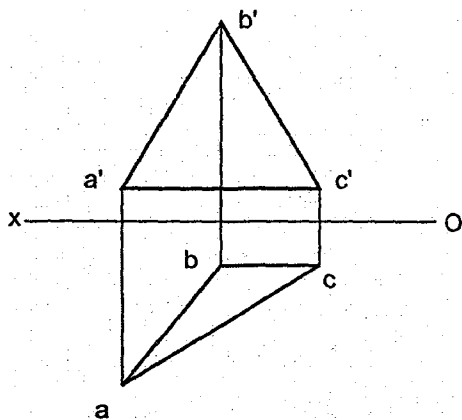
5 - misol. Aylantirish usuli bilan berilgan P tekislikning H proyeksiyalar tekisligiga og'ish burchagi aniqlansin.



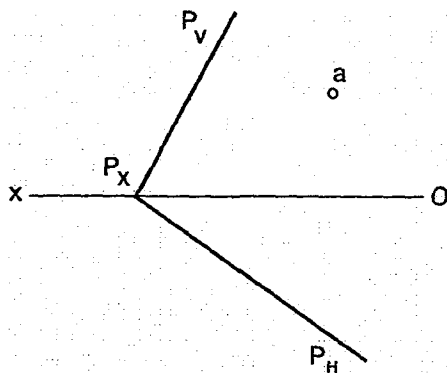
6 - misol. Aylantirish usuli bilan P tekislik profil – proyeksiyalovchi tekislik holatiga keltirilsin.



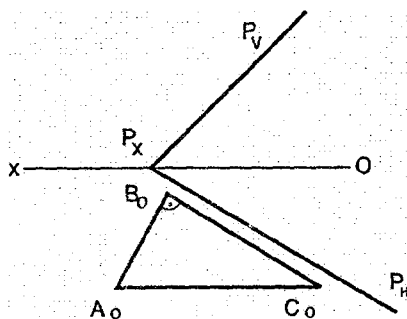
1 - misol. Aylantirish usuli bilan ABC uchburchakning haqiqiy ko'rinishi aniqlansin.



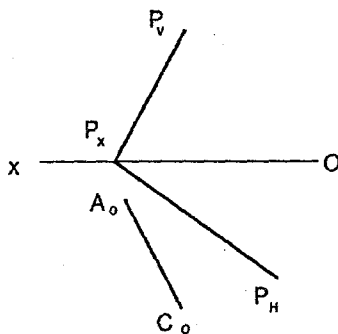
2 - misol. P tekislikda markazi A nuqta va radiusi 15 mm ga teng bo'lgan aylananing proyeksiyalari chizilsin.



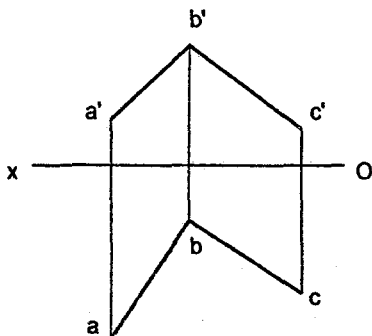
3 - misol. P tekislikka tegishli uchburchak ABC ning H tekisligi bilan joylashgan holati berilgan, uning gorizontal va frontal proyeksiyalari chizilsin.



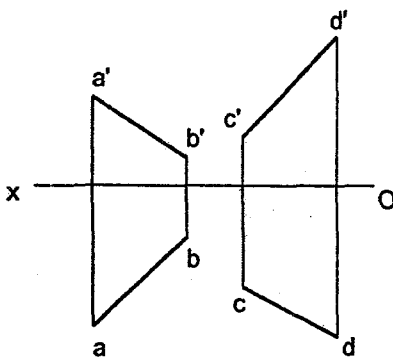
4 - misol. P tekisligida B uchi tekislikning gorizontal izida yotuvchi to'g'ri burchakli ABC uchburchak chizilsin. A_0C_0 gipotenuza AC ning joylashgan holati.



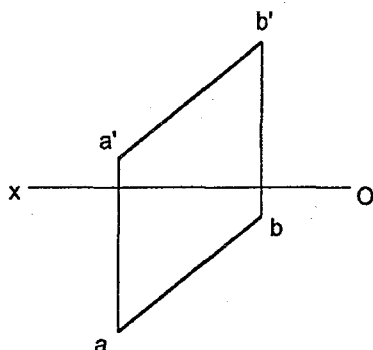
1 - misol. AB va BC kesishgan to'g'ri chiziqlar orasidagi burchakning haqiqiy qiymati aniqlansin.



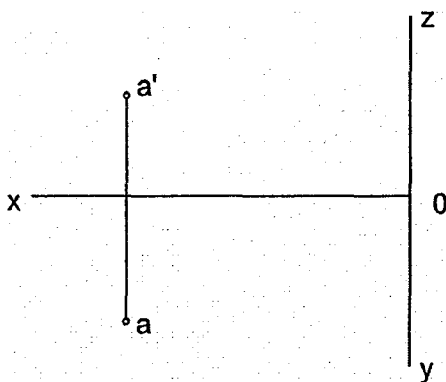
2 - misol. AB va CD uchrashmas to'g'ri chiziqlar orasidagi burchakning haqiqiy qiymati aniqlansin.



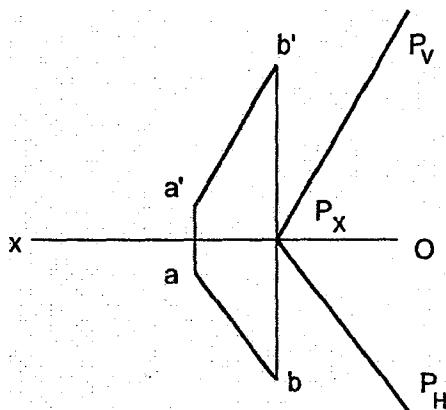
3 - misol. AB va OX o'q orasidagi burchakning haqiqiy qiymati aniqlansin.



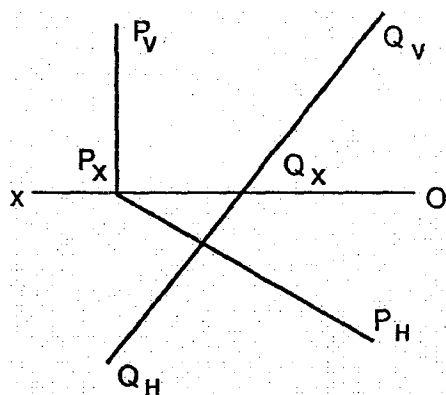
4 - misol. A nuqta orqali OY o'qini 60° burchak ostida kesib o'tuvchi AB to'g'ri chiziqli chizilsin.



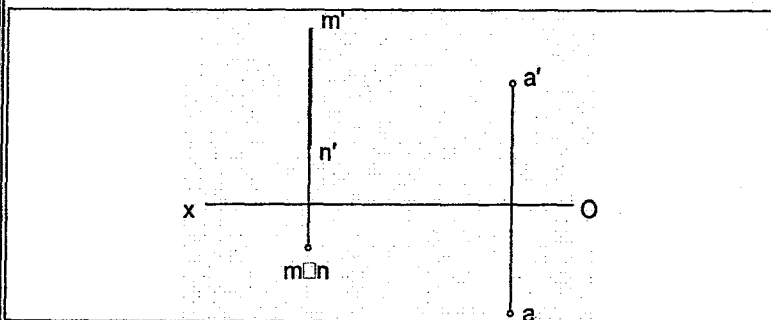
5 - misol. AB to'g'ri chiziq bilan P tekislik orasidagi burchakning haqiqiy qiymati aniqlansin.



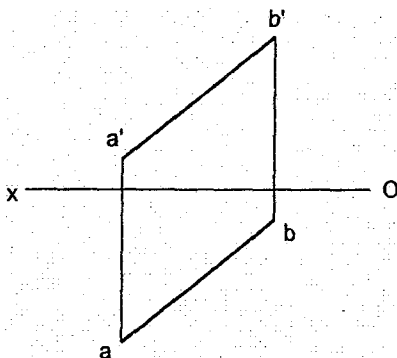
6 - misol. Q va P tekisliklar orasidagi burchakning haqiqiy qiymati aniqlansin.



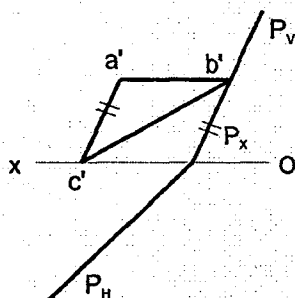
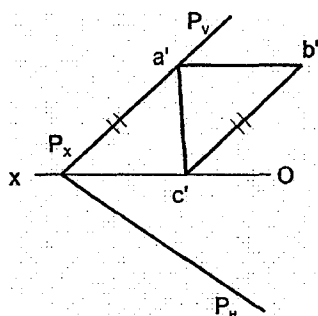
7 - misol. A nuqta orqali MN to'g'ri chiziqdan 30 mm uzoqda va H tekisligi bilan 60° burchak hosil qiluvchi to'g'ri chiziq o'tkazilsin.



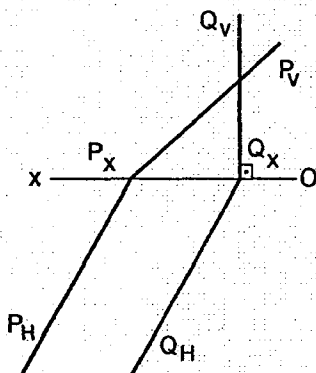
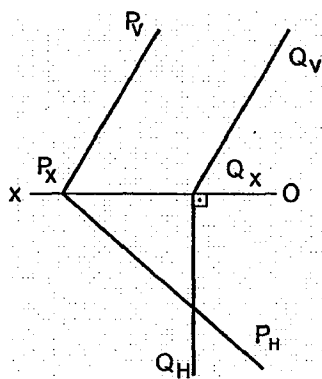
8 - misol. AB to'g'ri chiziq orqali H tekisligi bilan 60° burchak hosil qiluvchi P tekislik o'tkazilsin.



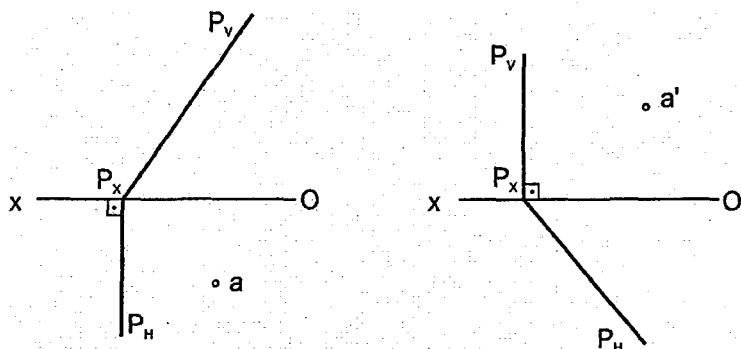
1 - misol. P tekislikka tegishli ABC uchburchakning gorizontaal proyeksiyasi aniqlansin.



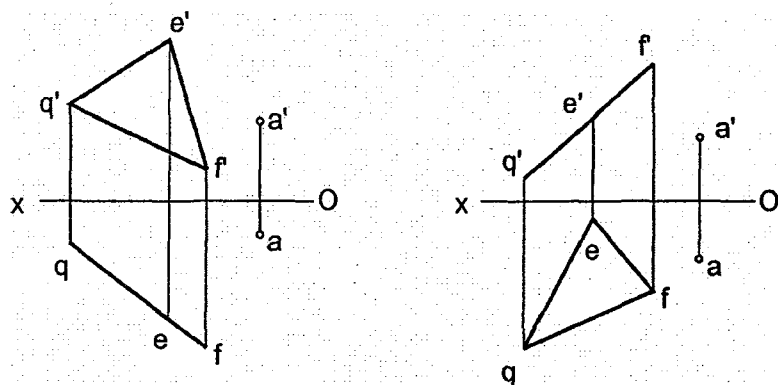
2 - misol. Berilgan P va Q tekisliklarning o'zaro kesishish chizig'ining proyeksiyalari aniqlansin.



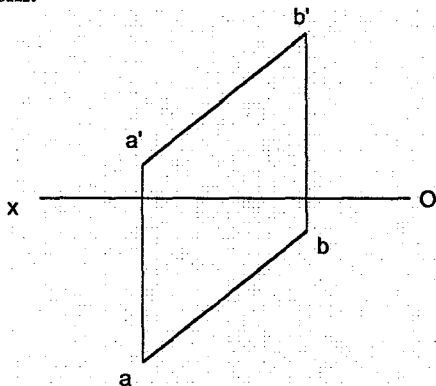
3 - misol. Berilgan P tekislikdan 30 mm uzoqlikda yotuvchi A nuqtaning yetishmagan proyeksiyasi aniqlansin.



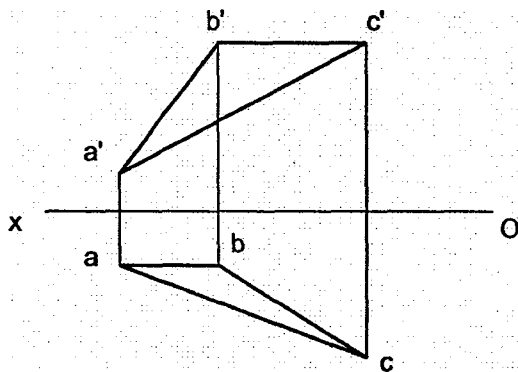
4 - misol. A nuqta berilgan P tekislikka proyeksiyalansin.



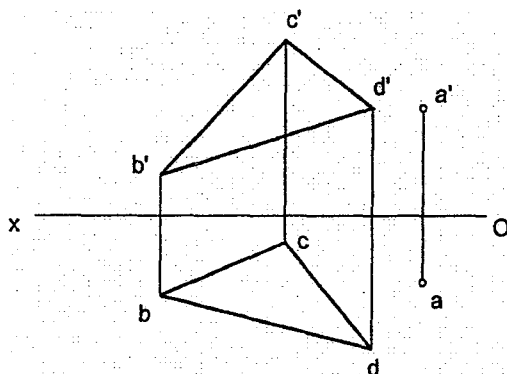
1 - misol. AB to'g'ri chiziqli kesmasining uzunligi aylantirish usuli bilan aniqlansin.



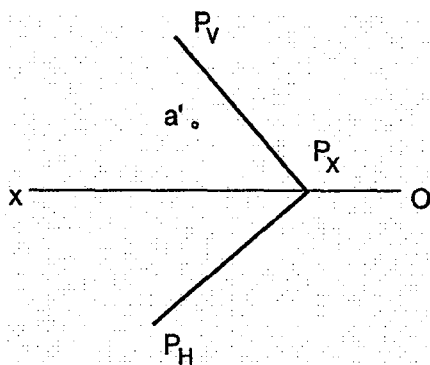
2 - misol. Aylantirish usuli bilan ABC uchburchakning haqiqiy ko'rinishi aniqlansin.



3 - misol. A nuqtadan BCD uchburchak tekisligigacha bo'lgan masofa almashtirish usuli bilan aniqlansin.



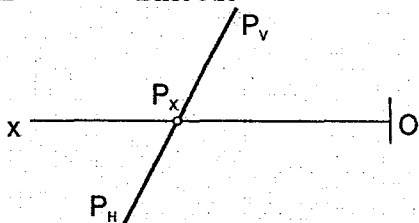
4 - misol. P tekisligida yotuvchi A nuqta H tekislikka joylash- tirilsin.



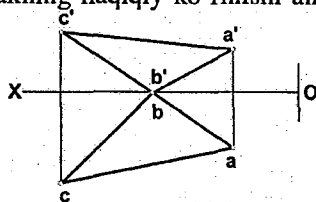
Nazorat ishi №2

Bilet №0

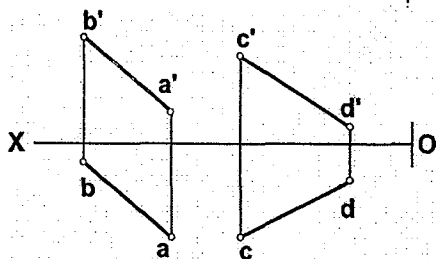
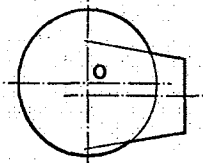
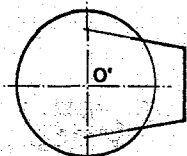
1. Parallel proyeksiyalash usulining xossalarini tushuntirib bering.
2. P tekislikdan 30 mm. uzoqlikda unga parallel bo'lgan tekislik chizilsin.



3. ABC uchburchakning haqiqiy ko'rinishi aniqlansin.



4. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari aniqlansin.
5. AB to'g'ri chiziqda CD to'g'ri chiziqdan 40 mm uzoqlikdagi nuqtaning proyeksiyalari chizilsin.

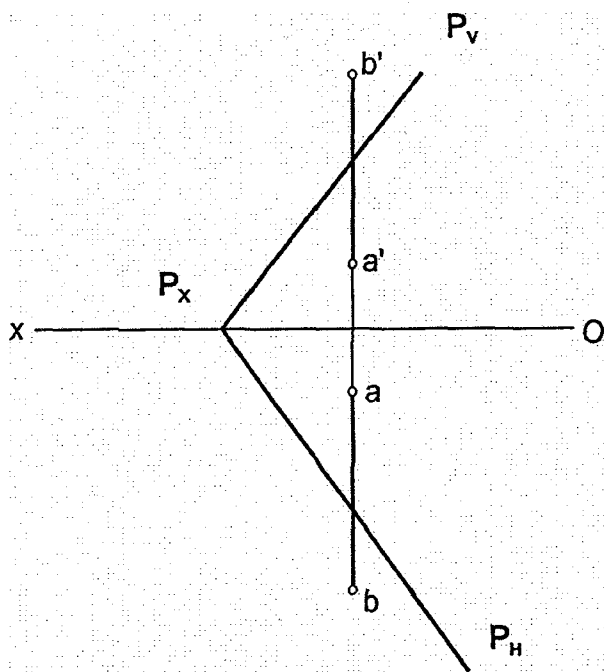


Masalalarni yechish namunasi

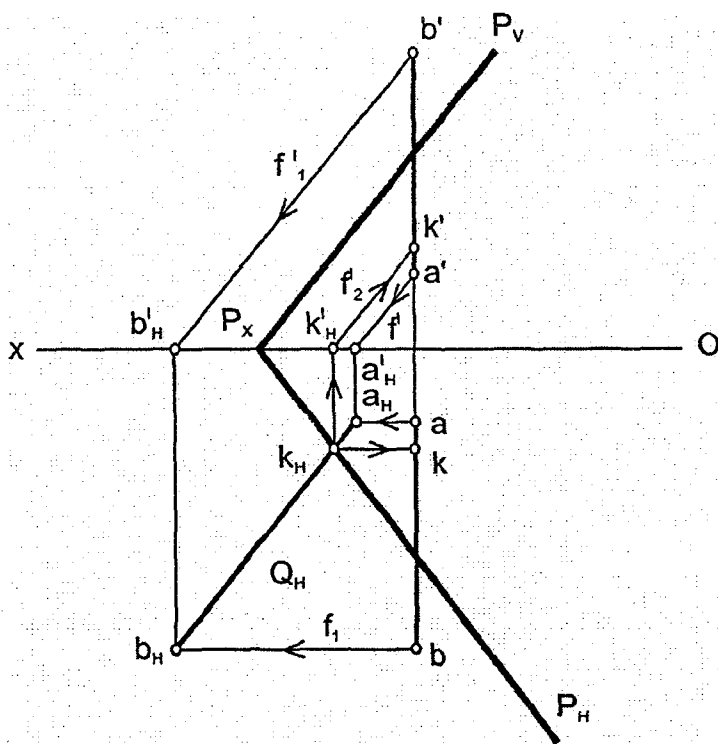
1-masala. Profil holatda berilgan $[AB]$ to'g'ri chiziq kesmasini umumiy vaziyatdagi $P(P_H, P_V)$ tekisligi bilan kesishgan nuqtasi topilsin.

Berilgan: $[AB] \wedge P(P_V, P_H)$

Top.kerak: $[AB] \cap P = (\bullet) K (k', k)$



Yakuniy yozma ishga doir masalalar



Masalani yechish algoritmi

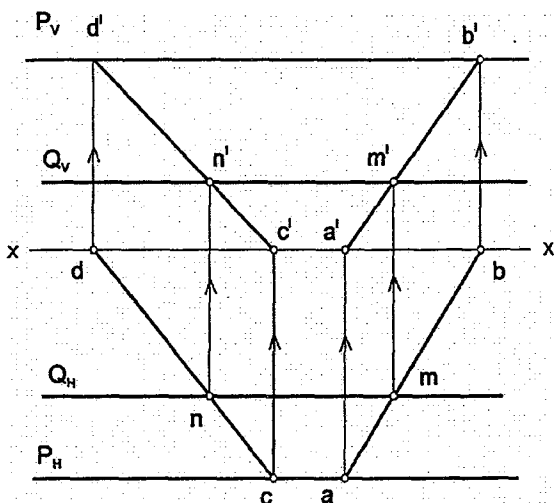
1. $(\bullet)AB \supset f_{01} \parallel P_v \wedge (\bullet)B \subset f_{01} \parallel P_v$
2. $f_0 \cap H = A_H \wedge f_{01} \cap H = B_H$
3. $(\bullet)A_H \cup (\bullet)B_H = [A_H B_H]$
4. $[A_H B_H] \cap P_H = (\bullet)K_H$
5. $(\bullet)K_H \subset f_{02} \Rightarrow f_{02} \cap [AB] = (\bullet)K \Rightarrow f_2' \cap (a'b') = K' \wedge f_2 \cap (ab) = K$

Yakuniy yozma ishga doir masalalar

2-masala. Berilgan profil proyeksiyalovchi tekislik $P(P_H, P_V)$ bilan frontal tekislikning $Q(Q_H)$ kesilish chizig'i topilsin.

Berilgan: $P(P_H, P_V) \perp W \perp Q(Q_H) \parallel V$

Top.k-k: $(MN) = P \cap Q$

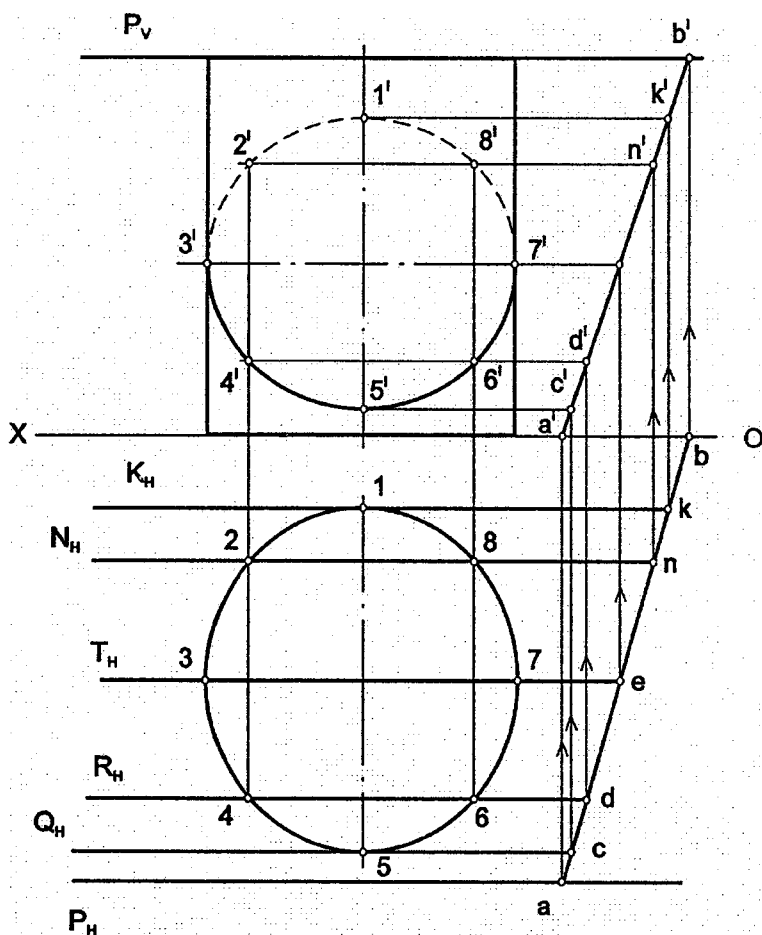


Masalani yechish algoritmi

1. $(AB) \subset P$.
2. $(AB) \cap Q = (\bullet)M$
3. $(CD) \subset P$
4. $(CD) \cap Q = (\bullet)N$
5. $(\bullet)M \cup (\bullet)N = (MN)$

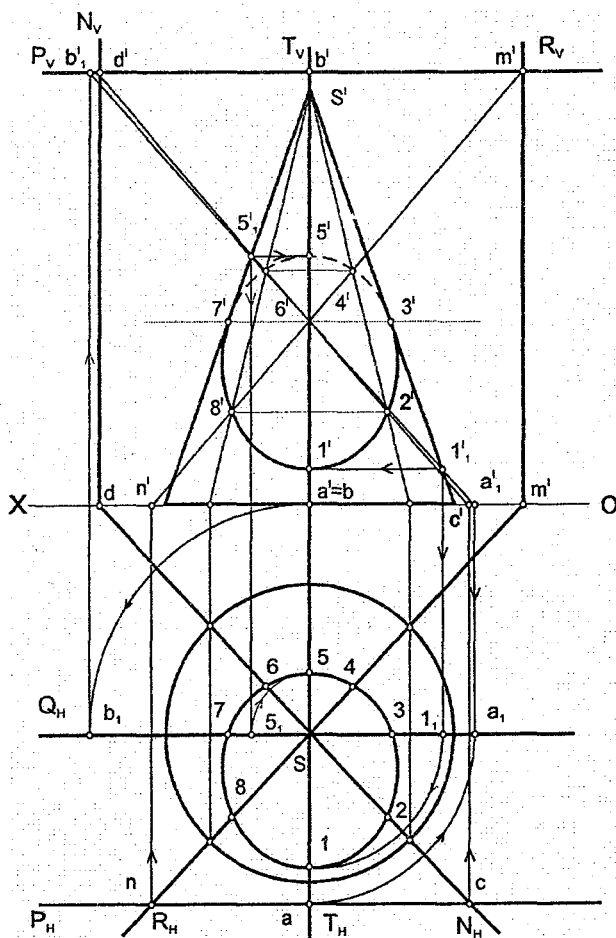
Yakuniy yozma ishga doir masalalar

3-masala. To'g'ri doiraviy silindr sirtini izlari bilan berilgan profil proyeksiyalovchi $P(P_H, P_V)$ tekislik bilan kesishish chizig'i chizilsin.



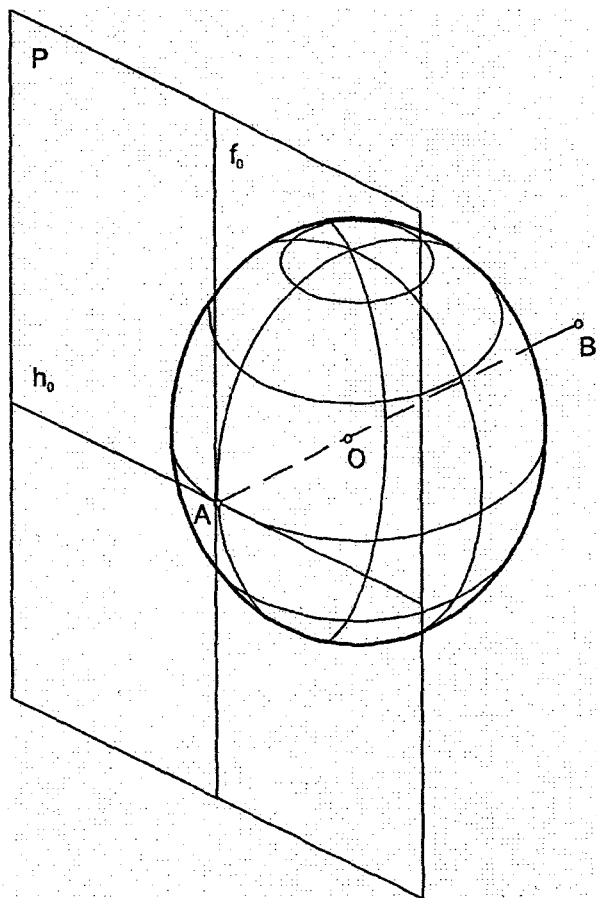
Yakuniy yozma ishga doir masalalar

4-masala. To'g'ri doiraviy konus sirtini izlari bilan berilgan profil proyeksiyalovchi $P(P_H, P_V)$ tekislik bilan kesishish chizig'i aniqlansin.

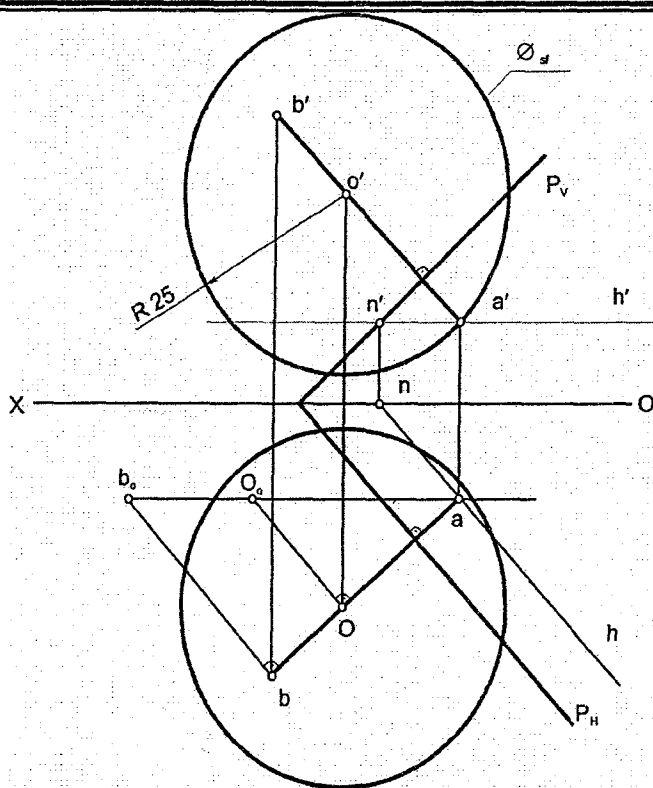


Yakuniy yozma ishga doir masalalar

5-masala. $P(P_H, P_V)$ tekislikning A nuqtasiga urinuvchi sfera sirtining proyeksiyalari chizilsin. Sferaning radiusi $R=25\text{ mm}$, $A \in P$.



Yakuniy yozma ishga doir masalalar

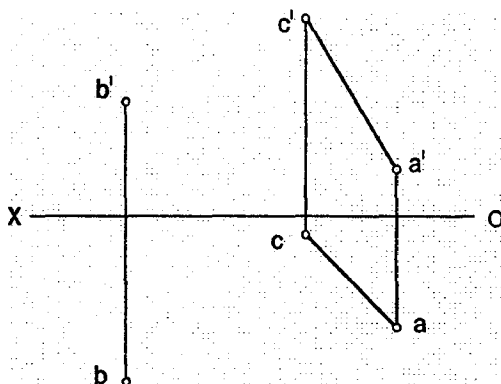


Masalani yechish algoritmi

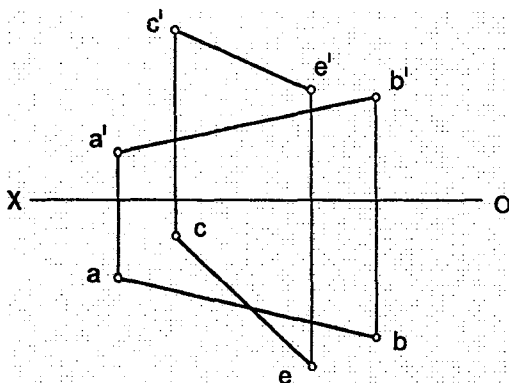
1. $(\cdot)A \in h_o \Rightarrow (\cdot)a' \in h' \parallel [ox] \wedge a \in h \parallel P_h$
2. $(\cdot)A \in [AB] \perp P \Rightarrow (\cdot)a' \in a \in [a'b'] \perp P_v \wedge (\cdot)a \in [ab] \perp P_h \wedge \forall (\cdot)B$
3. $|aB_o| = [AB]$
4. $|aO_o| = [AB] = 25 \text{ mm}$
5. $(\cdot)O \in \emptyset_{sf} = 25 \text{ mm} \wedge \emptyset_{sf} \cup (\cdot)A \in P$

Yakuniy yozma ishga doir masalalar

6-masala. CA to'g'ri chiziqqa nisbatan B nuqtaga simmetrik nuqta topilsin.

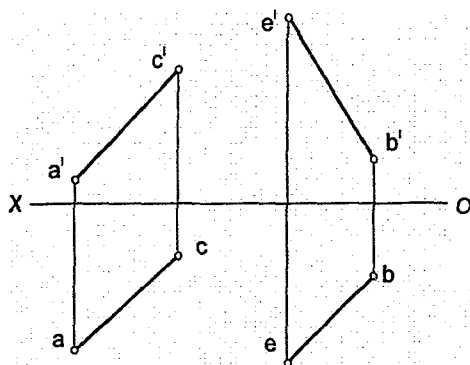


7-masala. Profil proyeksiyasidan foydalanmay, AB va CE to'g'ri chiziqlarni kesib o'tadigan va OX o'qqa parallel bo'lgan to'g'ri chiziq o'tkazilsin.

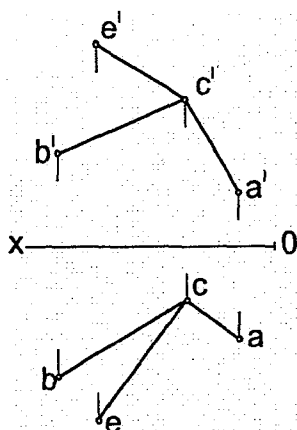


Yakuniy yozma ishga doir masalalar

8-masala. AC kesmani asos qilib, uchi BE to'g'ri chiziqda yotadigan teng yonli uchburchak chizilsin.

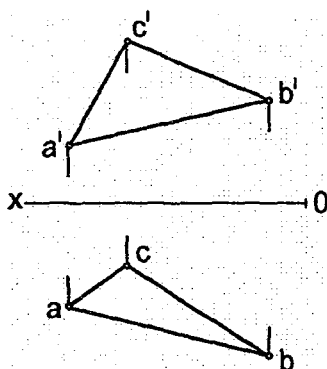


9-masala. CE to'g'ri chiziqda ABC tekislikdan 40 mm uzoqlikda nuqta topilsin.

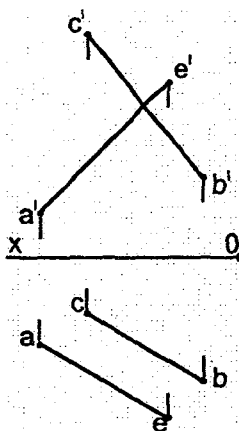


Yakuniy yozma ishga doir masalalar

10-masala. Asosi uchburchak ABC bo'lgan va balandligi 70 mm ga teng to'g'ri prizma chizilsin.

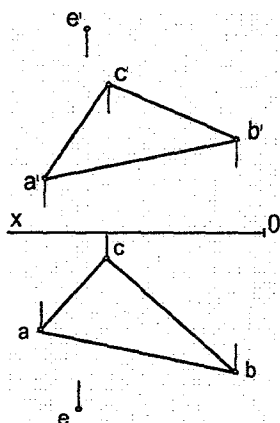


11-masala. AE kesmani katet qilib, to'g'ri burchagining uchi A nuqtada bo'lgan va uchinchi uchi CB to'g'ri chiziqda yotuvchi to'g'ri burchakli uchburchak chizilsin.

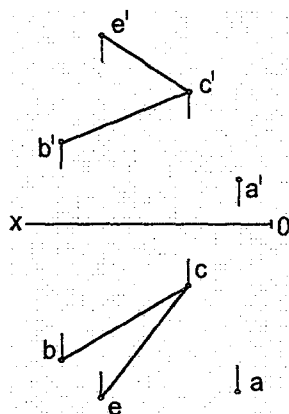


Yakuniy yozma ishga doir masalalar

12-masala. ABE tekislikka nisbatan E nuqtaga simmetrik nuqta topilsin.

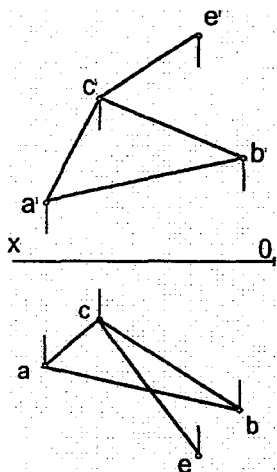


13-masala. A nuqtadan BCE tekislikkacha bo'lgan masofaning haqiqiy uzunligi aniqlansin.

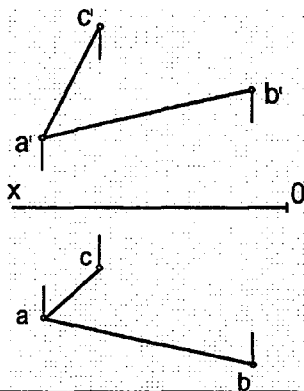


Yakuniy yozma ishga doir masalalar

14-masala. ABC tekislikda CE to'g'ri chiziqlarning to'g'ri burchakli proyeksiyasi chizilsin.

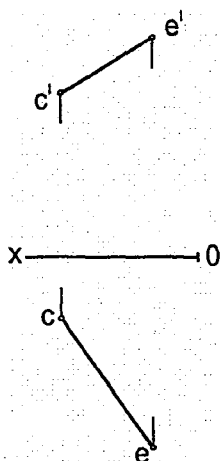


15-masala. Tomonlaridan birini AB kesma qilib, diagonalining yo'nalishi CA chizig'ida yotgan romb chizilsin.

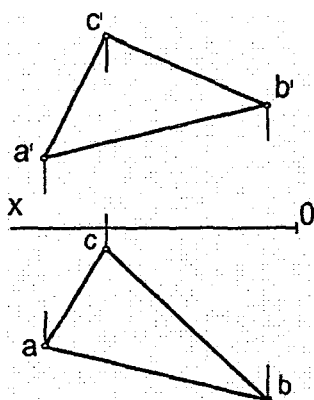


Yakuniy yozma ishga doir masalalar

16-masala. CE to'g'ri chiziq bo'ylab uning E nuqtasidan ikki tomoniga uzunligi 40 mm bo'lgan kesmalar chizilsin.

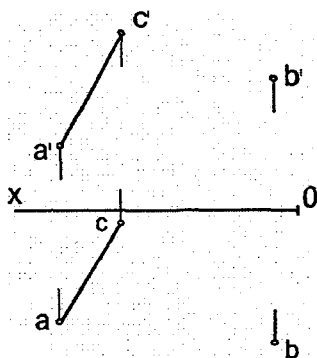


17-masala. ABC uchburchakning B uchidan o'tuvchi balandlikning haqiqiy uzunligi topilsin.

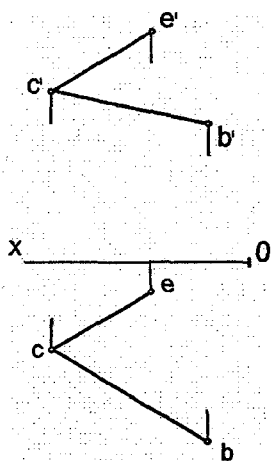


Yakuniy yozma ishga doir masalalar

18-masala. B nuqtadan AC to'g'ri chiziqqacha bo'lgan masofaning haqiqiy uzunligi aniqlansin.

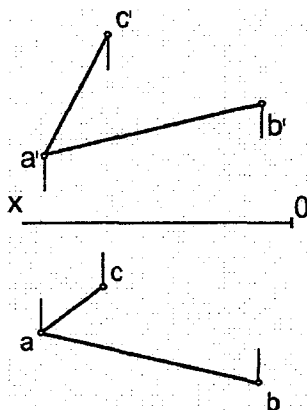


19-masala. Kateti CE kesmaga teng bo'lgan va gipotenuzasi CB to'g'ri chiziqda o'tgan to'g'ri burchakli uchburchak chizilsin.

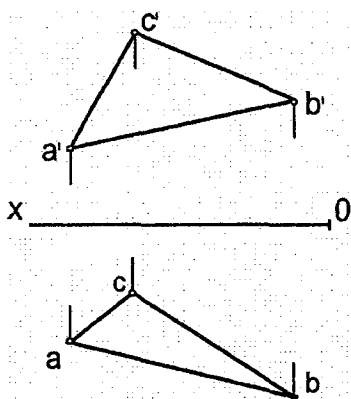


Yakuniy yozma ishga doir masalalar

20-masala. Tomonlaridan birini AC kesma qilib, qo'shni tomonning yo'nalishi AB to'g'ri chiziqda bo'lgan rombning proyeksiyalari chizilsin.

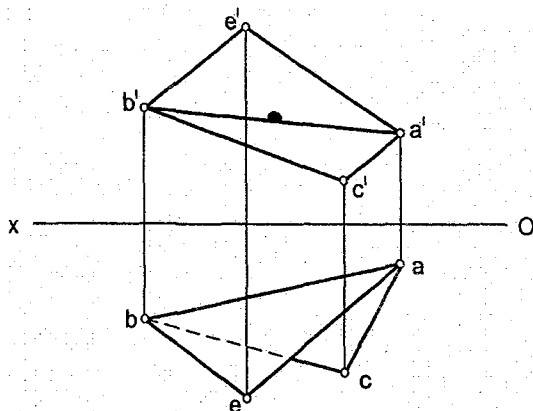


21-masala. ABC tekislikning H va V tekisliklarga og'ish bur-chaklarining haqiqiy qiymati topilsin.

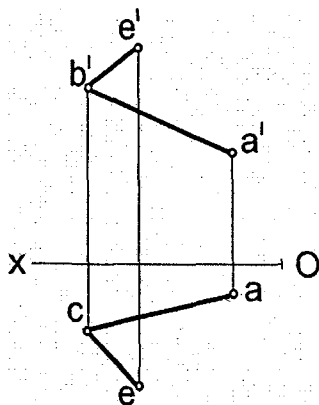


Yakuniy yozma ishga doir masalalar

22-masala. Almashtirish usulidan foydalanib, ABC va ABE tekisliklar orasidagi burchakning haqiqiy qiymati topilsin.

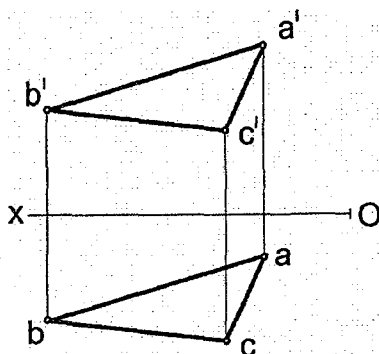


23-masala. Almashtirish usulidan foydalanib, ABE burchak tomonlariga urinma bo'lgan, radiusi 15 mm li aylana yoyining markazi va urinish nuqtalari topilsin.

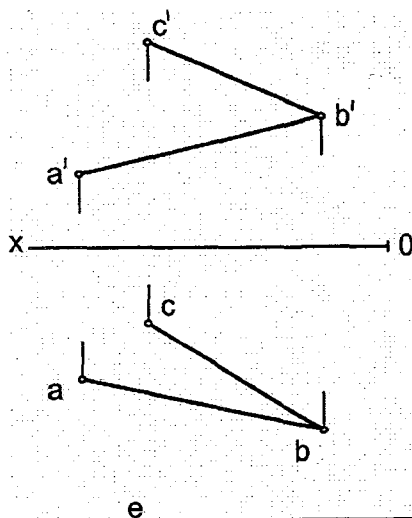


Yakuniy yozma ishga doir masalalar

24-masala. Aylantirish usulidan foydalanib, ABC uchburchak ichiga chizilgan urinma aylananing markazi topilsin.

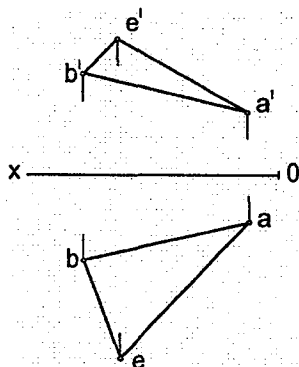


25-masala. Almashtirish usulidan foydalanib, ABC tekislikdan 30 mm uzoqlikda tekislik o'tkazilsin.

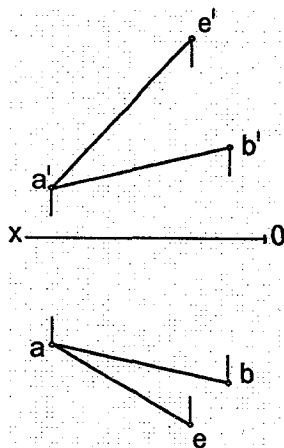


Yakuniy yozma ishga doir masalalar

26-masala. Almashtirish usulidan foydalanib, ABE uchburchakning haqiqiy ko'rinishi aniqlansin.

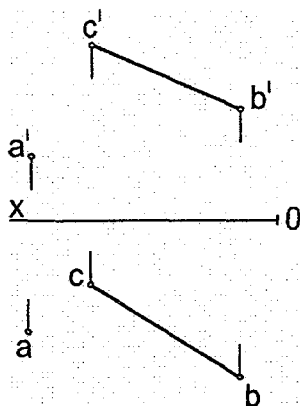


27-masala. Almashtirish usulidan foydalanib, yon tomonlaridan biri AB kesma va asosi AE to'g'ri chiziqda yotuvchi teng yonli uchburchak chizilsin.

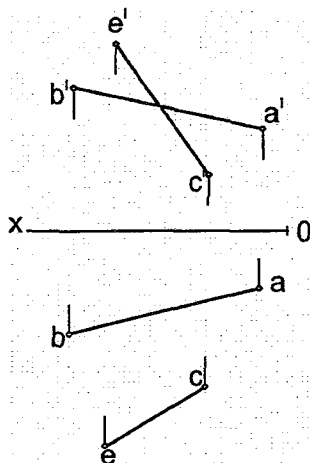


Yakuniy yozma ishga doir masalalar

28-masala. Almashtirish usulidan foydalanib, A nuqtadan BC to'g'ri chiziqqacha bo'lgan masofaning haqiqiy uzunligi topilsin.

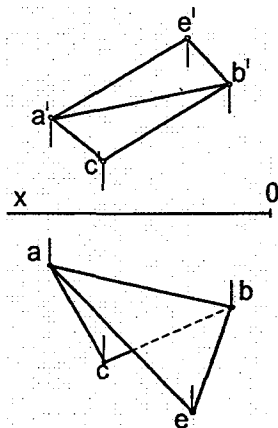


29-masala. Almashtirish usulidan foydalanib, AB va CE ayqash to'g'ri chiziqlar orasidagi masofaning haqiqiy uzunligi topilsin.

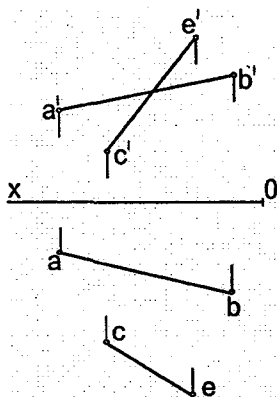


Yakuniy yozma ishga doir masalalar

30-masala. Almashtirish usulidan foydalanib, AB qirra orasidagi ikki yoqli burchak tomonlaridan 15 mm uzoqlikda to'g'ri chiziqli o'tkazilsin.

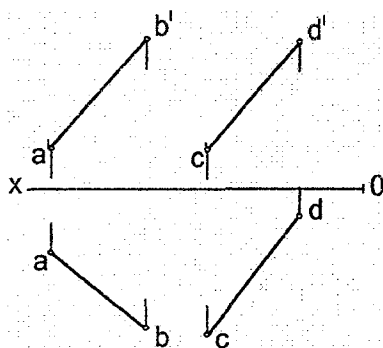


31-masala. Almashtirish usulidan foydalanib, AB to'g'ri chiziqli CE to'g'ri chiziqdan 40 mm uzoqlikda nuqtalar topilsin.

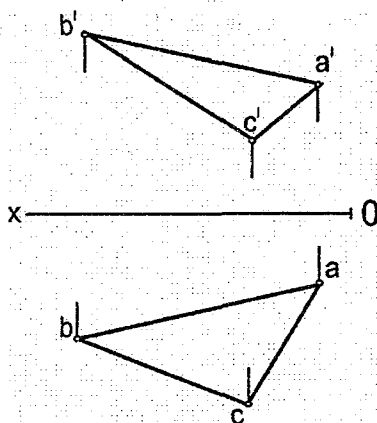


Yakuniy yozma ishga doir masalalar

32-masala. Almashtirish usulidan foydalanib, AB va CD ayqash to'g'ri chiziqlarning AB to'g'ri chizig'ini kesib o'tuvchi va CD to'g'ri chizig'idan 40 mm uzoqlikda unga parallel to'g'ri chiziq o'tkazilsin.

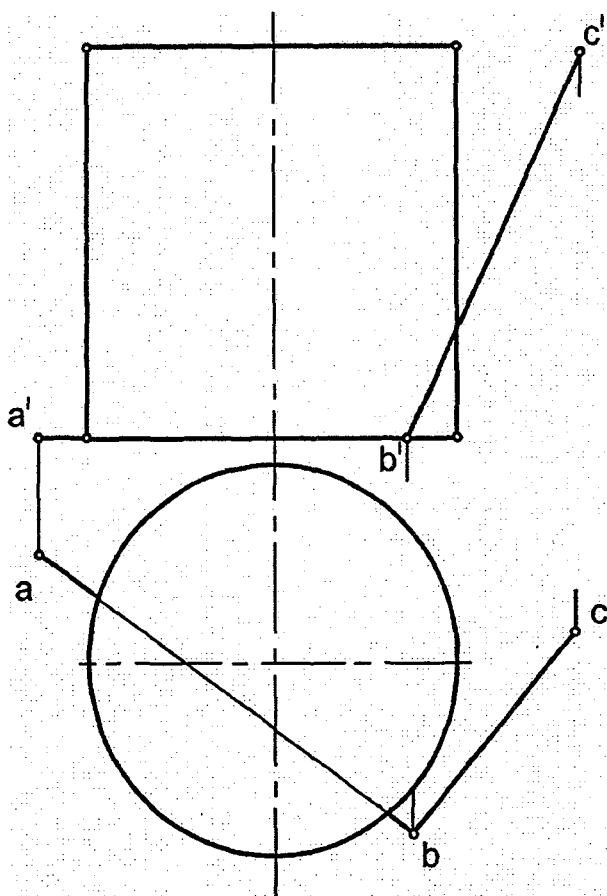


33-masala. Almashtirish usulidan foydalanib, ABC uchburchakning tashqarisiga urinma chizilgan aylananing markazi topilsin.



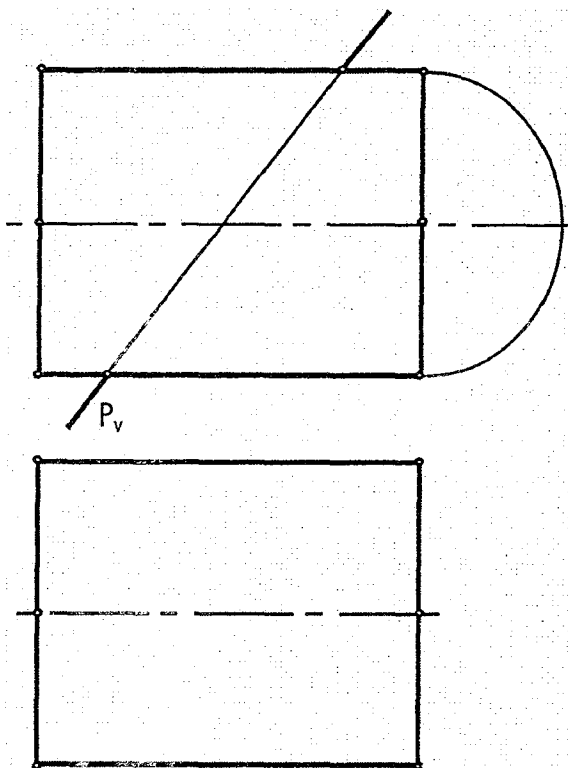
Yakuniy yozma ishga doir masalalar

34-masala. Berilgan sirtning ABC tekisligi bilan kesishgan chizig'ining proyeksiyalari chizilsin. Tekislik shaffof deb qabul qilinsin.



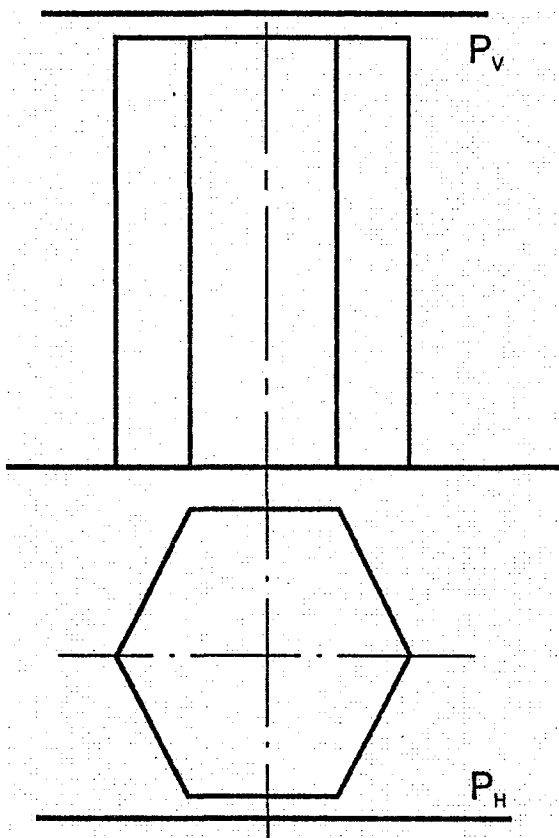
Yakuniy yozma ishga doir masalalar

35-masala. Berilgan sirtni P tekislik bilan kesishgan chizig'ining gorizontal proyeksiyasi va uning haqiqiy ko'rinishi topilsin. Tekislikni shaffof deb qabul qilish kerak.



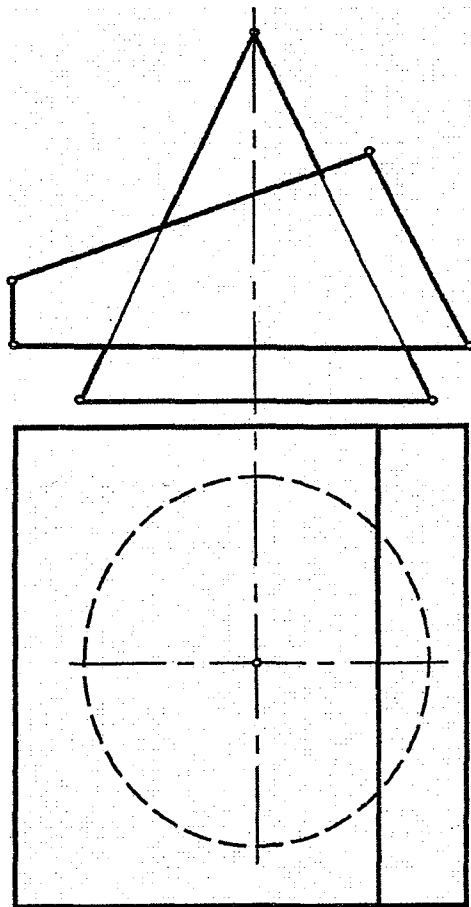
Yakuniy yozma ishga doir masalalar

36-masala. Profil proyeksiyasidan foydalanmay, berilgan sirt bilan $P(P_H, P_V)$ tekislikning kesishgan chizig'ining proyeksiyalari topilsin. Tekislikni shaffof deb qabul qilish kerak.



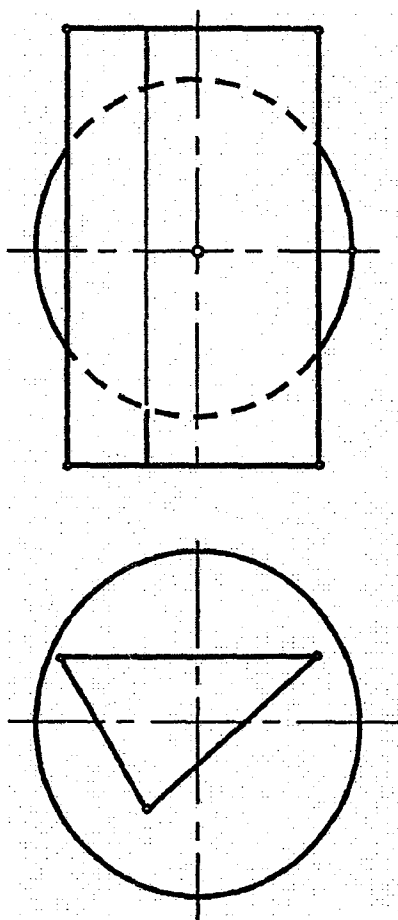
Yakuniy yozma ishga doir masalalar

37-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



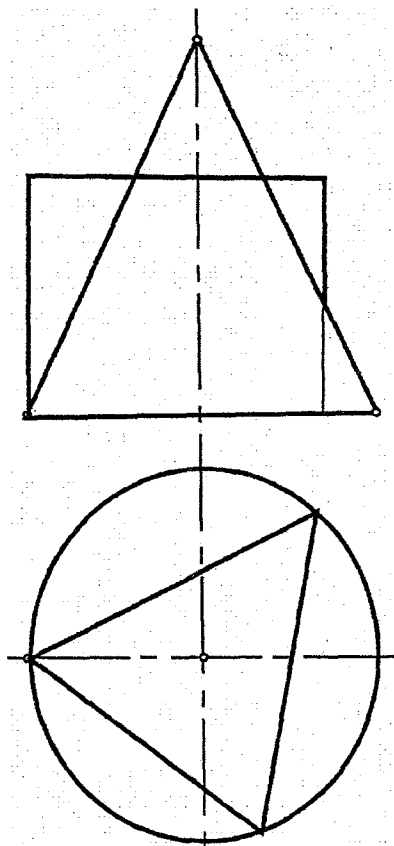
Yakuniy yozma ishga doir masalalar

38-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



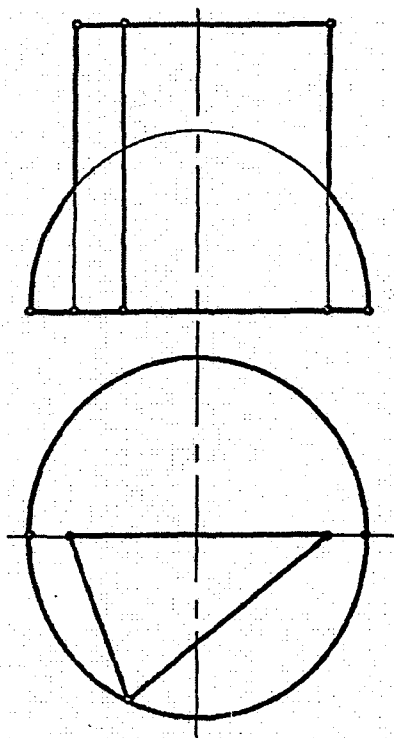
Yakuniy yozma ishga doir masalalar

39-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



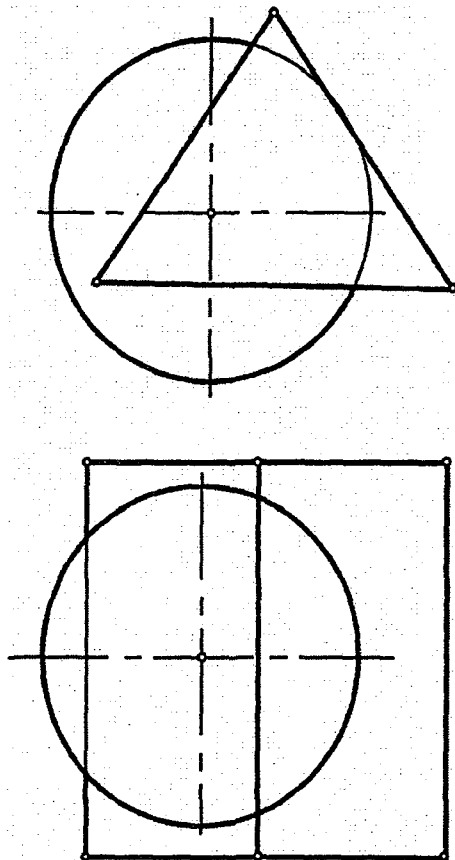
Yakuniy yozma ishga doir masalalar

40-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



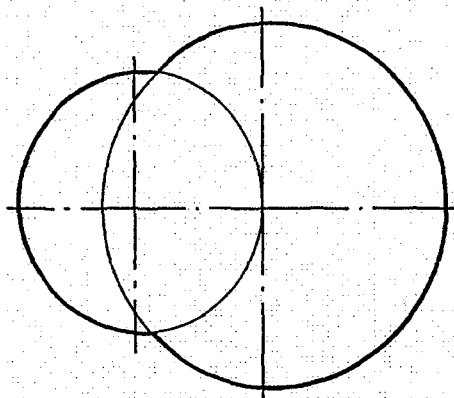
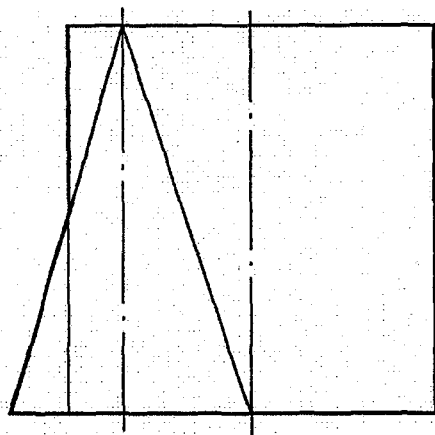
Yakuniy yozma ishga doir masalalar

41-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



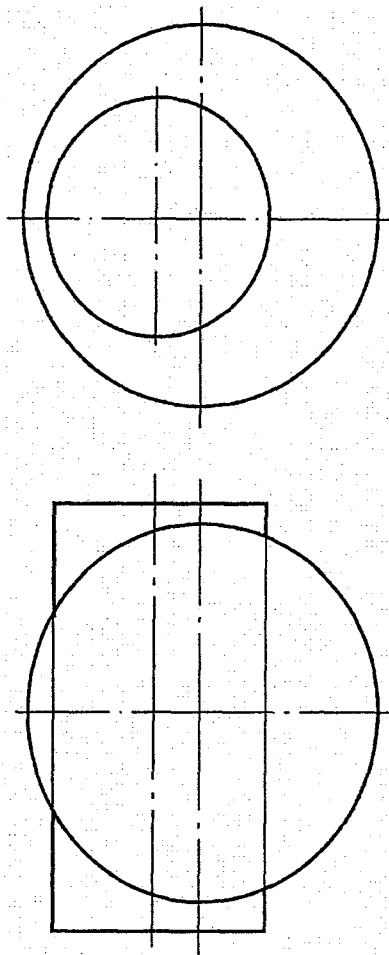
Yakuniy yozma ishga doir masalalar

42-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



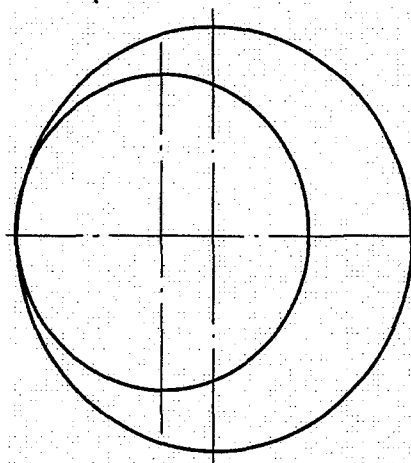
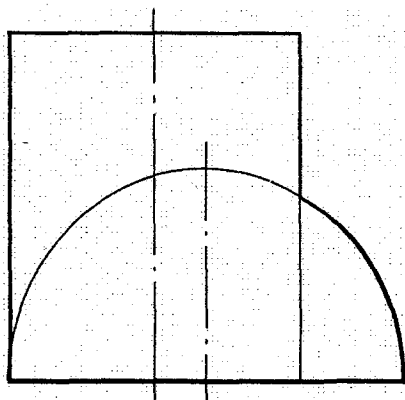
Yakuniy yozma ishga doir masalalar

43-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



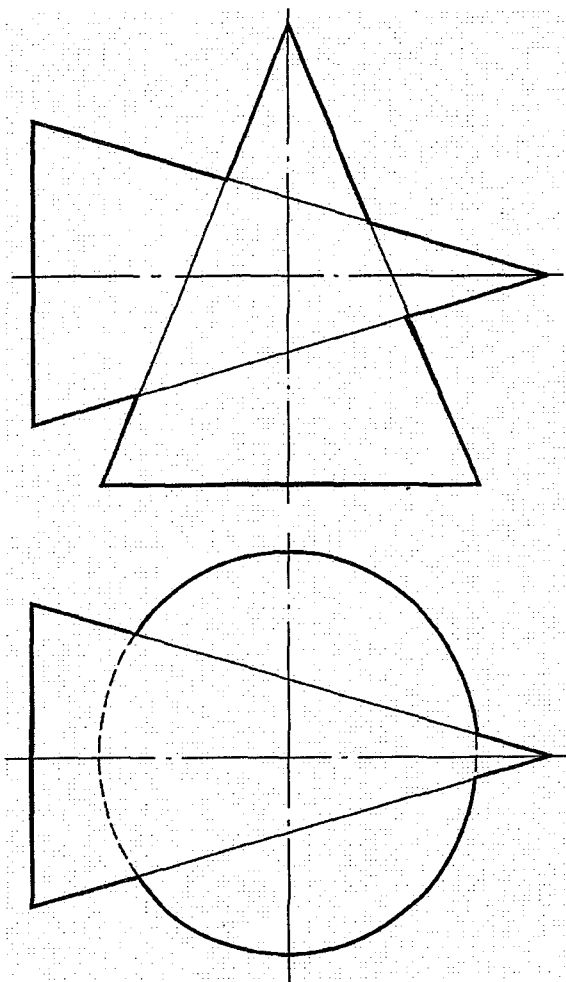
Yakuniy yozma ishga doir masalalar

44-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



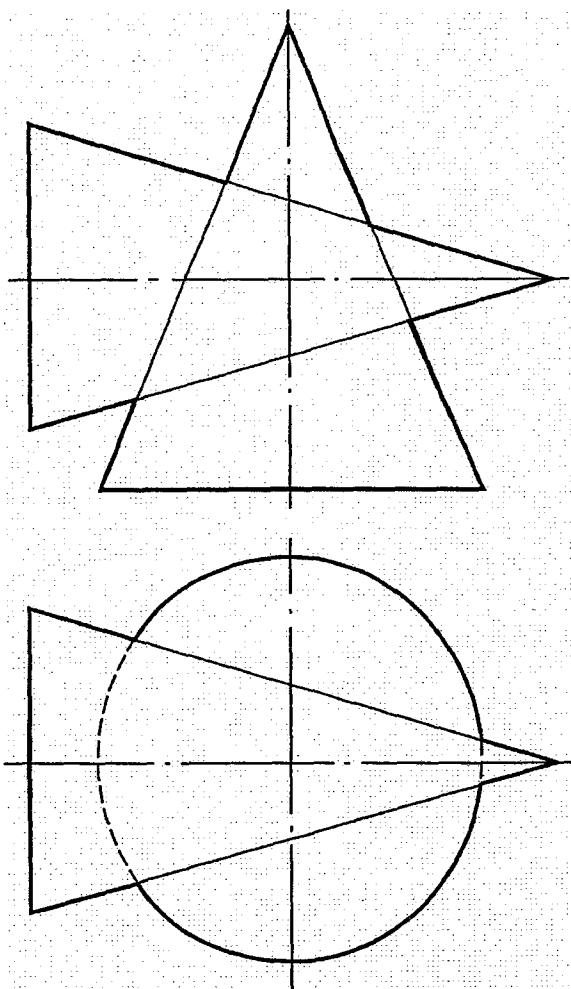
Yakuniy yozma ishga doir masalalar

45-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



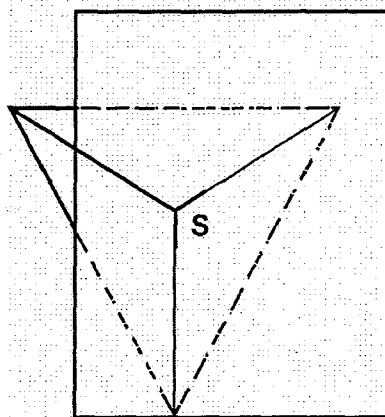
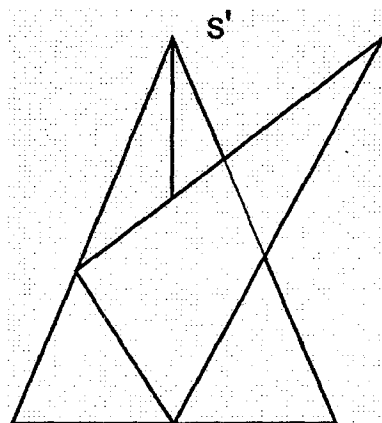
Yakuniy yozma ishga doir masalalar

45-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



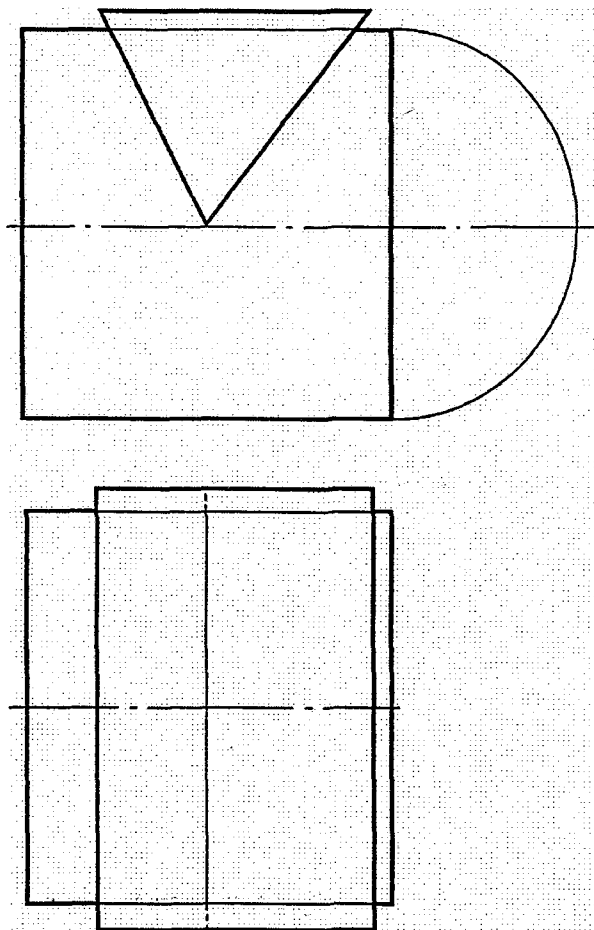
Yakuniy yozma ishga doir masalalar

47-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



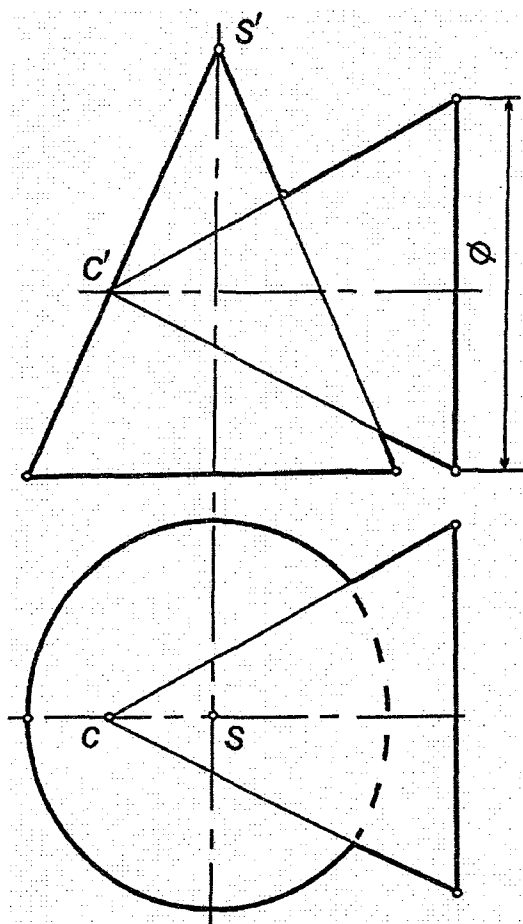
Yakuniy yozma ishga doir masalalar

48-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



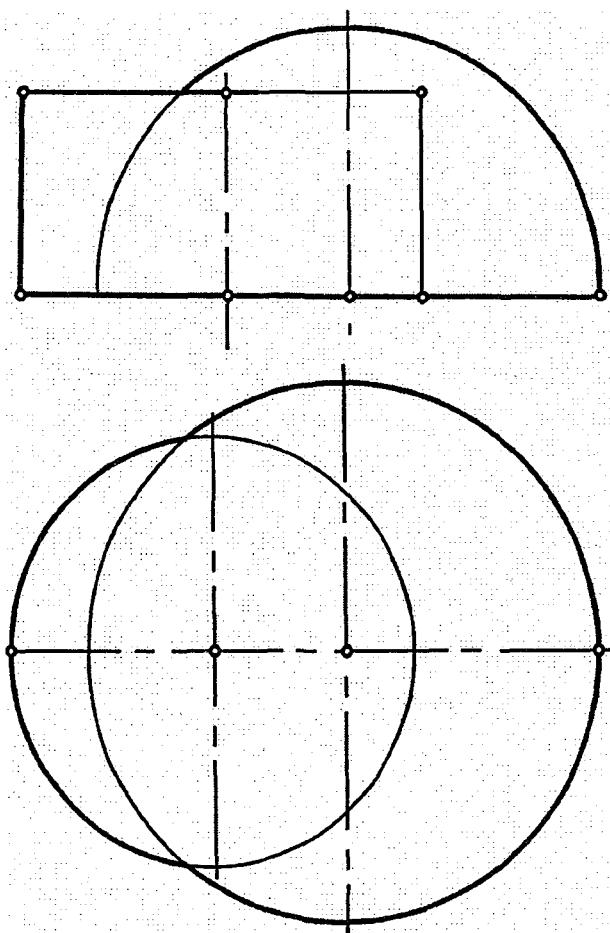
Yakuniy yozma ishga doir masalalar

49-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



Yakuniy yozma ishga doir masalalar

50-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.



Olimpiada masalalari

ToshDTU miqyosida "Chizma geometriya va muhandislik grafikasi" fani bo'yicha o'tkaziladigan "Olimpiada" masalalariga qo'yiladigan talablar va reyting ballarining mezonlari.

I. Chizma geometriya fanidan (ikkita masala)

- | | |
|---|-----------|
| 1. Masalaning fazoviy yechimi sxemasini ko'rsatish | – 4 ball |
| 2. Masalani yechish tartibi (algoritmi)ni tuzish | – 4 ball |
| 3. Masalaning grafik yechilishi yechimlarini ko'rsatish | – 20 ball |
| 4. Chiziqlarni Davlat standartlariga muvofiq qalinlashtirish | – 2 ball |
| 5. Masaladagi harfli va raqamli belgilarni shrift № 3, 5 bilan yozish | – 2 ball |
| 6. Masalaning nechta yechimga egaligi | – 3 ball |

$35 \times 2 = 70$ ball

II. Muhandislik grafika fanidan (bitta misol)

- | | |
|--|-----------|
| 1. Geometrik jismning berilgan profil proyeksiyasi bo'yicha uch ko'rinishini yasash. | – 15 ball |
| 2. Foydali qirg'ima va kesimlarni bajarish. | – 5 ball |
| 3. Chiziqlarni standartga muvofiq qalinlashtirish | – 5 ball |
| 4. Jismning zarur o'lchamlarini qo'yish. | – 5 ball |

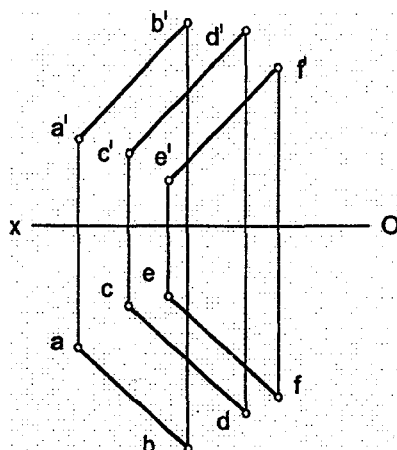
30 ball

JAMI:

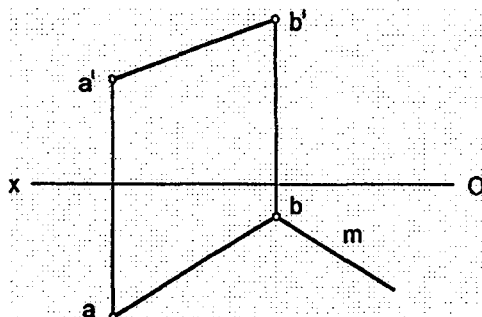
100 ball

Olimpiada masalalari

1-masala. O'zaro parallel AB , CD , va EF to'g'ri chiziqlardan barobar uzoqlikda o'tgan parallel MN to'g'ri chiziqning proyeksiyalari chizilsin.

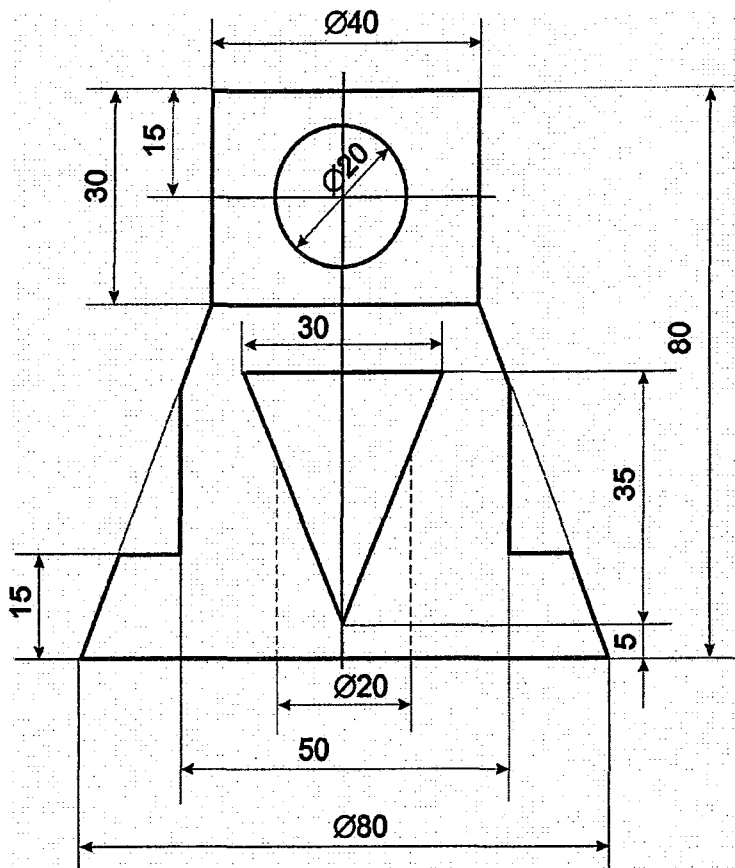


2-masala. Agar kvadratning bir tomoni AB , ikkinchi tomonining yo'nalishi m chiziq berilgan bo'lsa, $ABCD$ kvadratning proyeksiyalari chizilsin.



Olimpiada masalalari

3-masala. Berilgan geometrik jismning frontal proyeksiyasi bo'yicha gorizontaal va profil proyeksiyalari chizilsin. Kerakli qirqim va kesimlar bajarilsin. O'lchamlar qo'yilsin.



Mustaqil ta'lim masalalari

I. Geometrik figuralarni proyeksiyalash

1-masala. Berilgan nuqtalarning koordinatalari orqali gorizonta va frontal proyeksiyalari chizilsin.

$A(20;25;10)$; $B(15;-15;-20)$; $C(-10;20;15)$;
 $D(25;10;-25)$; $E(10;-25;25)$

2-masala. Berilgan: A nuqta ($x=20$, $y=15$, $z=10$)

Aniqlash kerak: gorizonta proyeksiyalar tekisligiga nisbatan A nuqtaga simmetrik bo'lgan B nuqtaning epyurini.

3-masala. Berilgan A nuqta ($x=25$, $y=-15$, $z=15$)

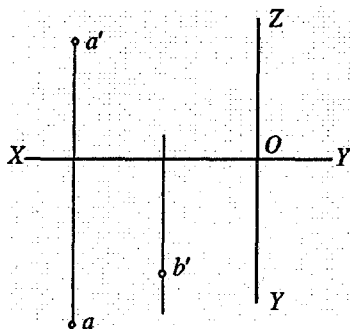
Aniqlash kerak: frontal proyeksiyalar tekisligiga nisbatan A nuqtaga simmetrik bo'lgan B nuqtaning epyurini.

4-masala. Berilgan A nuqta ($x=10$, $y=-20$, $z=-25$)

Aniqlash kerak: X proyeksiya o'qiga nisbatan A nuqtaga simmetrik bo'lgan B nuqtaning epyurini.

Mustaqil ta'lim masalalari

5-masala. A nuqta va B nuqtaning frontal proyeksiyasi berilgan. Agarda A va B nuqtalar orasidagi masofa 30 mm ga teng bo'lsa, B nuqta fazoning qaysi choragida joylashgan?



6-masala. AB to'g'ri chiziq kesmasining gorizontal va frontal izlari aniqlansin. Agarda to'g'ri chiziq kesmasi:

- a) Umumiy vaziyatda bo'lsa;
- b) Gorizontal proyeksiyalar tekisligiga parallel bo'lsa;
- c) Frontal proyeksiyalar tekisligiga parallel bo'lsa;
- d) Gorizontal proyeksiyalar tekisligiga perpendikular bo'lsa;
- e) Frontal proyeksiyalar tekisligiga perpendikular bo'lsa;
- f) Profil proyeksiyalar tekisligiga perpendikular bo'lsa;

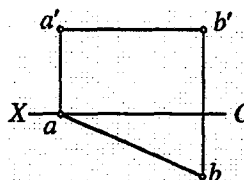
Mustaqil ta'lim masalalari

7-masala. AB kesmalarning epyuri, so'roqlarga javob berib, o'qilsin.

1) [AB] kesma fazoning (?) choragida joylashgan, u (?) proyeksiyalar tekisligiga parallel, A uchi (?) proyeksiyalar tekisligiga tegishli; (a) chizma)

2) [AB] kesma fazoning (?) choragida joylashgan, A uchi (?) proyeksiyalar tekisligiga tegishli; (b) chizma)

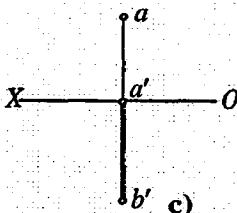
3) [AB] kesma fazoning (?) choragida joylashgan, u (?) proyeksiyalar tekisligiga perpendikular, A uchi (?) proyeksiyalar tekisligiga tegishli; (c) chizma)



a)



b)

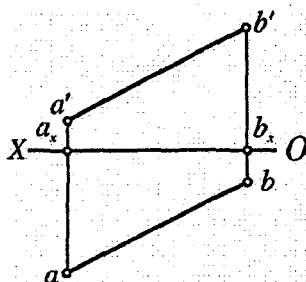


c)

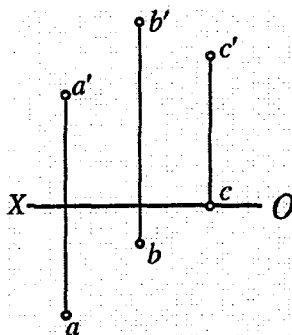
Mustaqil ta'lim masalalari

II. Ortogonal proyeksiyalarni qayta tuzish usullari

8-masala. Proyeksiyalar tekisligini almashtirib, $[AB]$ kesma frontal proyeksiyalar tekisligiga parallel vaziyatga keltirilsin.

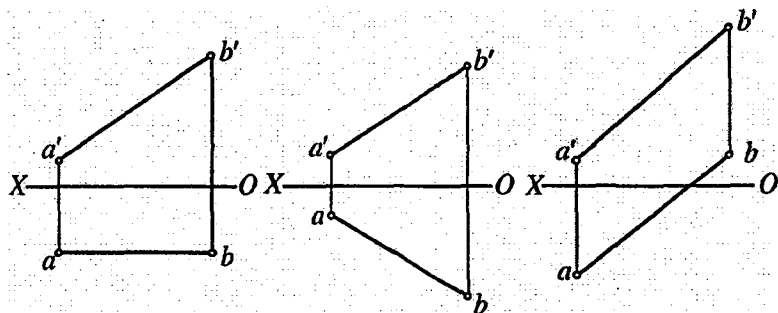


9-masala. A, B, C nuqtalarning proyeksiyalari yangi proyeksiyalar tekisligi tizimida chizilsin.

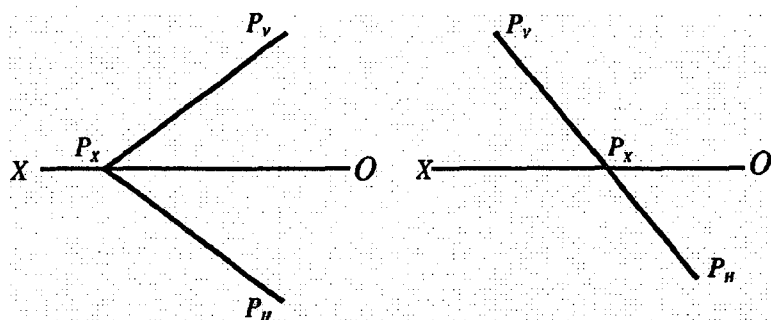


Mustaqil ta'lim masalalari

10-masala. Proyeksiyalar tekisligini almashtirib, $[AB]$ kesma horizontal proyeksiyalovchi vaziyatga keltirilsin.

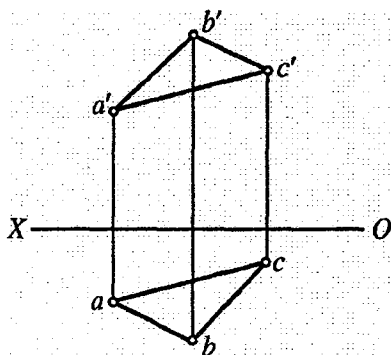


11-masala. Proyeksiyalar tekisligini almashtirib, P tekisligining yangi izi shunday chizilsinki, u yangi proyeksiyalar tizimida horizontal proyeksiyalovchi vaziyatga kelsin.



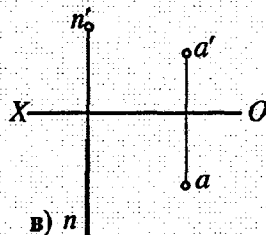
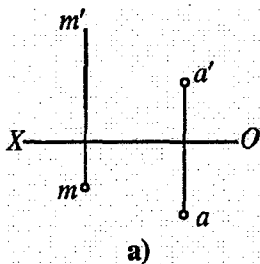
Mustaqil ta'lim masalalari

12-masala. Proyeksiyalar tekisliklarini almashtirib, ABC uchbur-chakning uchlaridan o'tuvchi aylana og'irlik markazi aniqlansin.



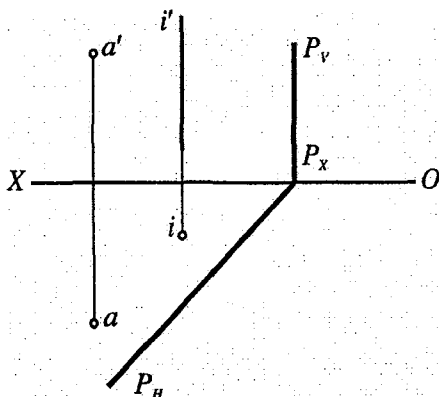
13-masala. Soat strelkasi yo'nalishida A nuqta 90° burchakka aylantirilsin.

- a) gorizontal proyeksiyalovchi m o'q atrofida;
- b) frontal proyeksiyalovchi n o'q atrofida;

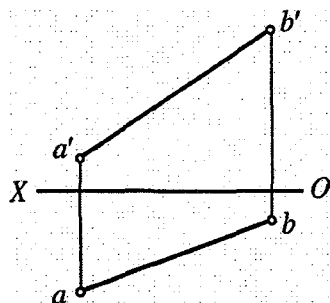


Mustaqil ta'lim masalalari

14-masala. Berilgan i o'q atrofida aylantirib, A nuqta P tekislikka joylashtirilsin.

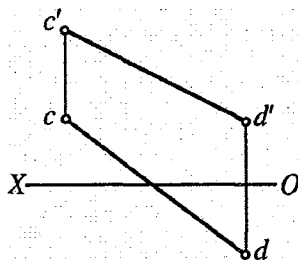


15-masala. V ga perpendikular o'q atrofida aylantirib, [AB] kesma gorizontaal proyeksiyalar tekisligiga parallel vaziyatga keltirilsin.

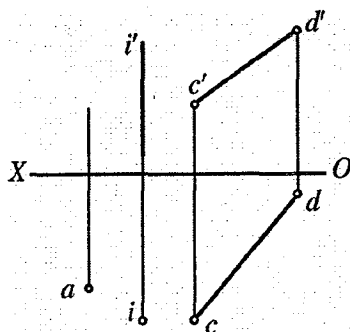


Mustaqil ta'lim masalalari

16-masala. O'q atrofida aylantirib, $[CD]$ kesma frontal proyeksiyalar tekisligiga parallel vaziyatga keltirilsin.

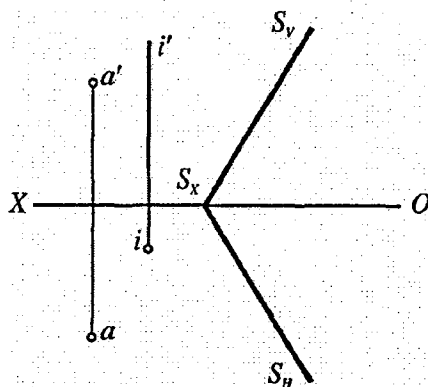


17-masala. Berilgan i o'q atrofida aylantirib, A nuqtaning CD to'g'ri chiziqqa tegishli vaziyatga keltirilsin va frontal proyeksiyasi aniqlansin.

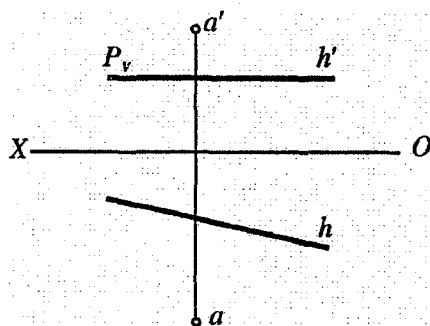


Mustaqil ta'lim masalalari

18-masala. Berilgan i o'q atrofida aylantirib, A nuqta S tekislikka joylashtirilsin.

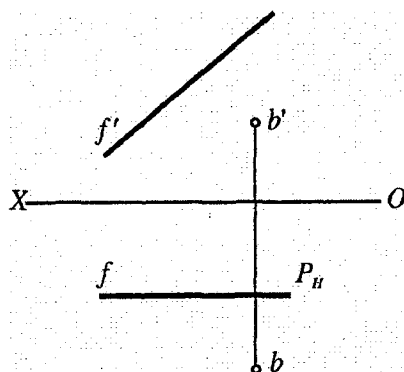


19-masala. A nuqta $h_0(h, h')$ gorizontaal atrofida aylantirib, P gorizontaal tekislikka joylashtirilsin.

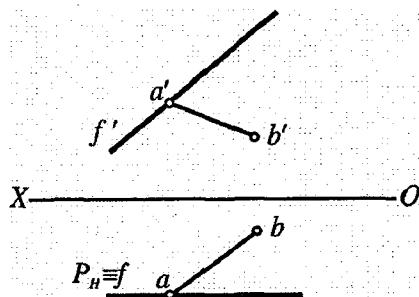


Mustaqil ta'lim masalalari

20-masala. B nuqta $f_0(f, f')$ frontal atrofida aylantirilib, frontal P tekislikka joylashtirilsin.

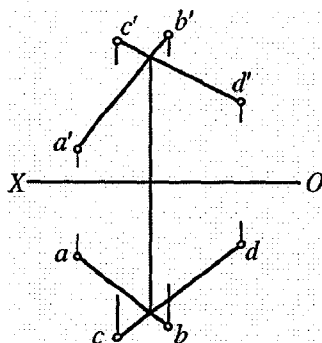


21-masala. $[AB]$ kesma frontal o'q f atrofida aylantirilib, ($A \in f_0$), frontal P tekislikka joylashtirilsin.

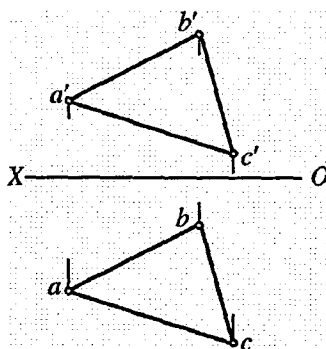


Mustaqil ta'lim masalalari

22-masala. AB va CD kesishuvchi to'g'ri chiziqlar orqali berilgan tekislikni uning frontal chizig'i atrofida aylantirib, frontal proyeksiyalar tekisligiga parallel vaziyatga keltiring.

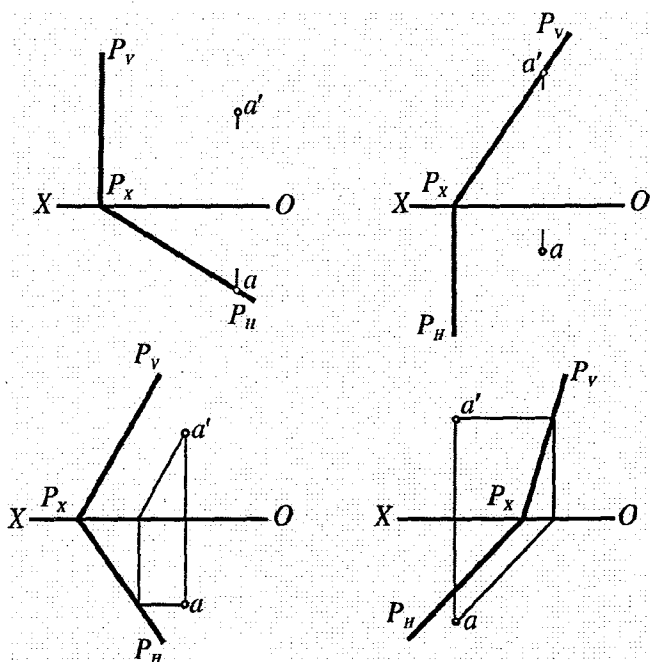


23-masala. ABC tekislikni gorizontal chizig'i atrofida aylantirib, uchburchak ichiga chizilgan urinma aylananing markazi topilsin.



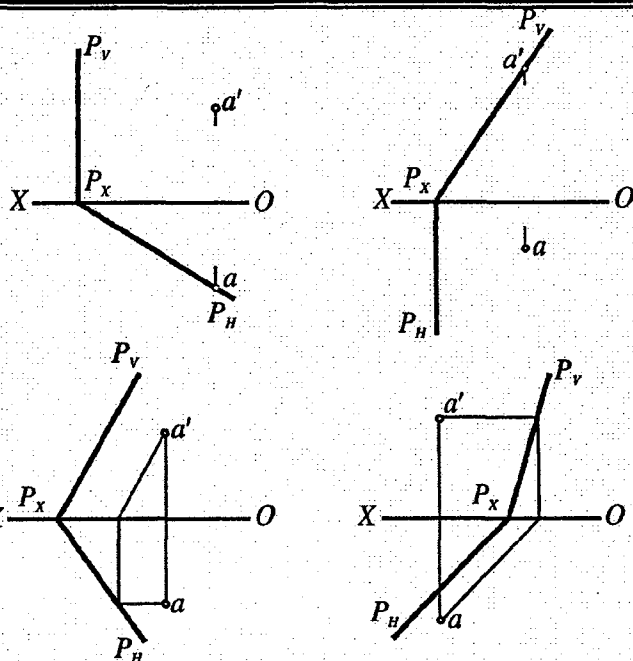
Mustaqil ta'lim masalalari

24-masala. P tekislik gorizontal proyeksiyalar tekisligiga joylashtirilsin va A nuqtani joylashgan vaziyati aniqlansin.

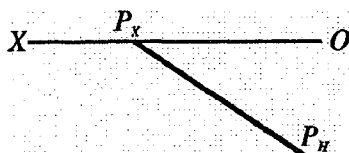


25-masala. P tekislik frontal proyeksiyalar tekisligiga joylashtirilsin va A nuqtaning joylashgan vaziyati aniqlansin.

Mustaqil ta'lim masalalari

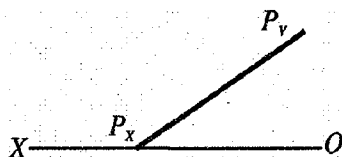


26-masala. Agar fazoda tekislik izlari P_H va P_v orasidagi burchak ma'lum bo'lib, 45° ga teng bo'lsa, P tekislikning frontal izi chizilsin.

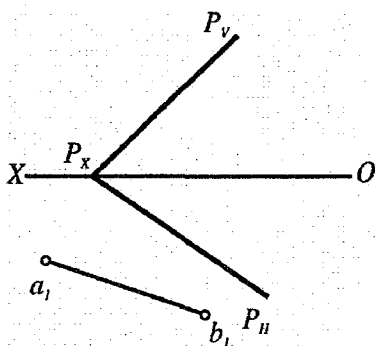


Mustaqil ta'lim masalalari

27-masala. Agar fazoda tekislikning gorizontal va frontal izlari orasidagi burchak ma'lum bo'lib, 60° ga teng bo'lsa, P tekislikning gorizontal izi chizilsin.

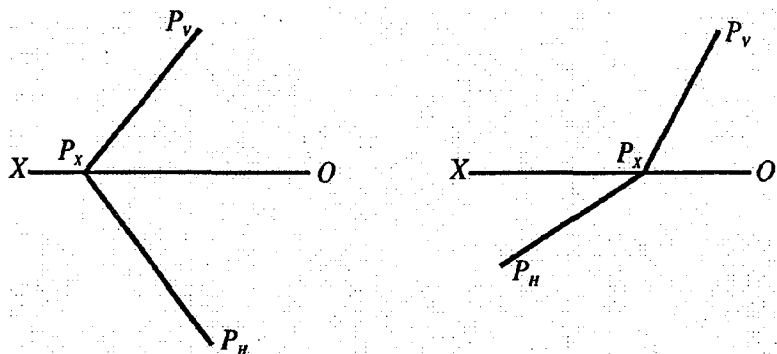


28-masala. P tekislikka tegishli $[AB]$ kesmaning gorizontal proyeksiyalar tekisligiga joylashgan vaziyati ma'lum $[a_1, b_1]$, kesmaning gorizontal va frontal proyeksiyalari chizilsin.

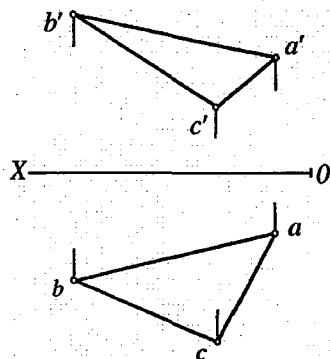


Mustaqil ta'lim masalalari

29-masala. Umumiy vaziyatda berilgan P tekislik izlariga urinma bo'lgan $R=30\text{ mm}$ li aylananing proyeksiyalari chizilsin.



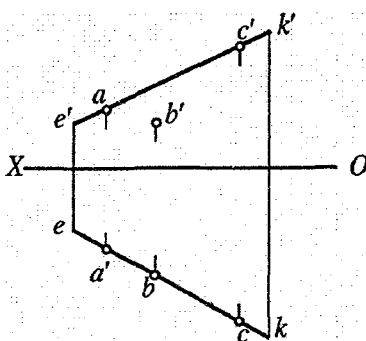
30-masala. Almashtirish usulidan foydalanib, ABC uchburchakning tashqarisiga urinma chizilgan aylananing markazi topilsin.



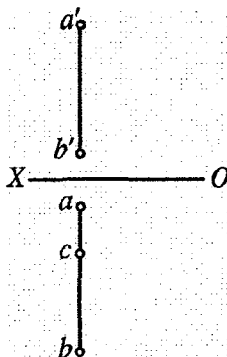
Mustaqil ta'lim masalalari

III. Vaziyatga oid masalalar

31-masala. A, B, C nuqtalarning qaysi biri KE to'g'ri chiziqqa tegishlilikini aniqlang.

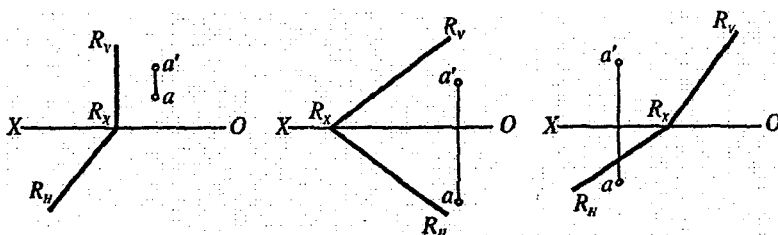


32-masala. $[AB]$ kesma orqali berilgan to'g'ri chiziqda C nuqtaning proyeksiyasi aniqlansin. C nuqtaning gorizontaal proyeksiyasi ma'lum va $C \in [AB]$.

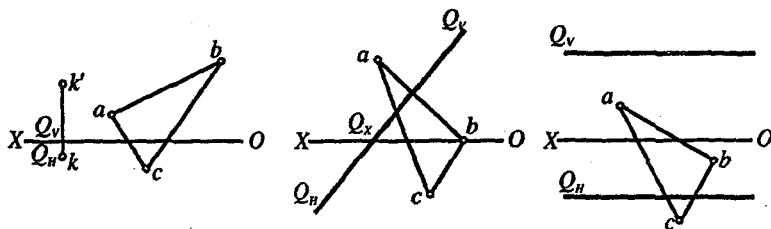


Mustaqil ta'lim masalalari

33-masala. A nuqta va R tekislik berilgan. A nuqtaning R tekislikka tegishliligini aniqlang.

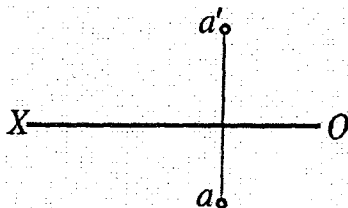


34-masala. Q tekislikka tegishli uchburchak ABC ni berilgan gorizontal proyeksiyasi orqali frontal proyeksiyasini chizing. $\triangle ABC \in Q$

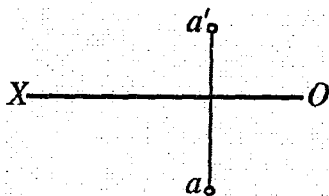


Mustaqil ta'lim masalalari

35-masala. A nuqta orqali ixtiyoriy bo'lgan gorizontal proyeksiyalovchi tekislik o'tkazilsin.

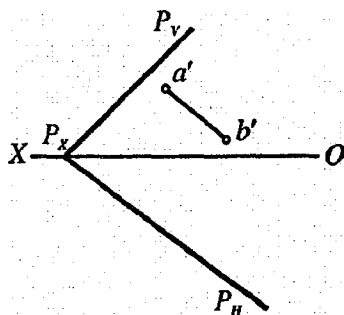


36-masala. A nuqta orqali x o'qiga parallel tekislikning izlari o'tkazilsin.

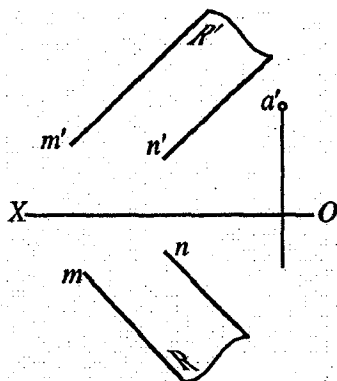


Mustaqil ta'lim masalalari

37-masala. P tekislikka tegishli (AB) to'g'ri chiziqning gorizontal proyeksiyasi chizilsin.

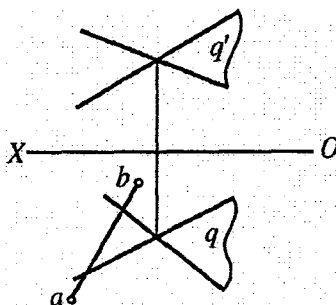


38-masala. R tekislikka tegishli A nuqta orqali tekislikning gorizontali o'tkazilsin.

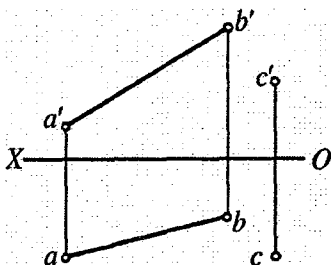


Mustaqil ta'lim masalalari

39-masala. Q tekislikka tegishli (AB) to'g'ri chiziqlarning gorizontal proyeksiyasi ma'lum, frontal proyeksiyasi aniqlansin.

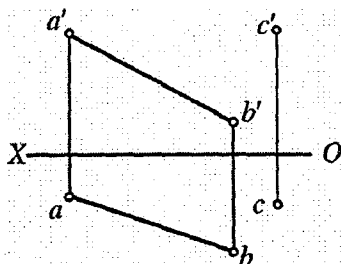


40-masala. Berilgan AB kesmani kesuvchi C nuqta orqali o'tuvchi gorizontal proyeksiyalar tekisligiga parallel bo'lgan EK to'g'ri chiziq o'tkazilsin.

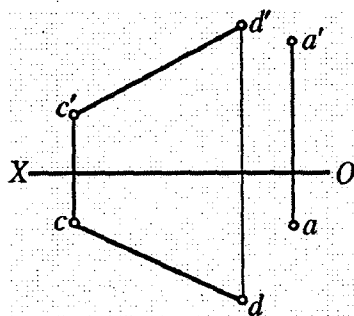


Mustaqil ta'lim masalalari

41-masala. C nuqta orqali (AB) to'g'ri chiziqni va Ox o'qini kesib o'tuvchi to'g'ri chiziq o'tkazilsin.

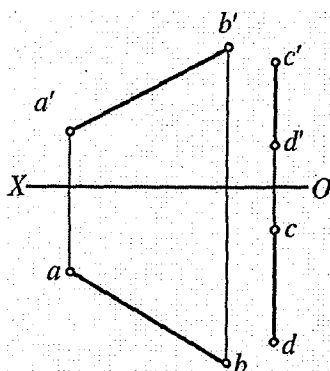


42-masala. A nuqta orqali frontal proyeksiyalar tekisligiga parallel va (CD) to'g'ri chiziqni kesib o'tuvchi to'g'ri chiziq o'tkazilsin.

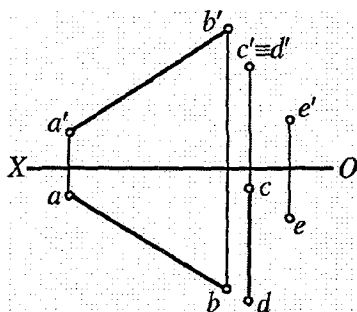


Mustaqil ta'lim masalalari

43-masala. Berilgan $[AB]$ va $[CD]$ kesmalarni kesuvchi gorizontaal proyeksiyalar tekisligiga parallel bo'lgan to'g'ri chiziq o'tkazilsin.

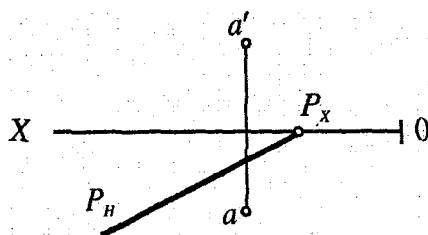


44-masala. Berilgan $[AB]$ va $[CD]$ kesmalarni kesib, E nuqta orqali o'tuvchi (EK) to'g'ri chiziq o'tkazilsin.

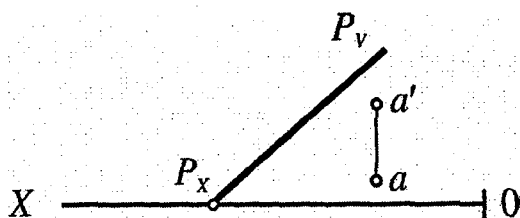


Mustaqil ta'lim masalalari

45-масала. A nuqta P tekislikka tegishli, P tekislikning frontal izi chizilsin.

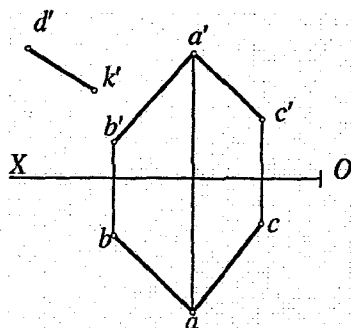


46-масала. A nuqta P tekislikka tegishli, P tekislikning gorizonttal izi chizilsin.

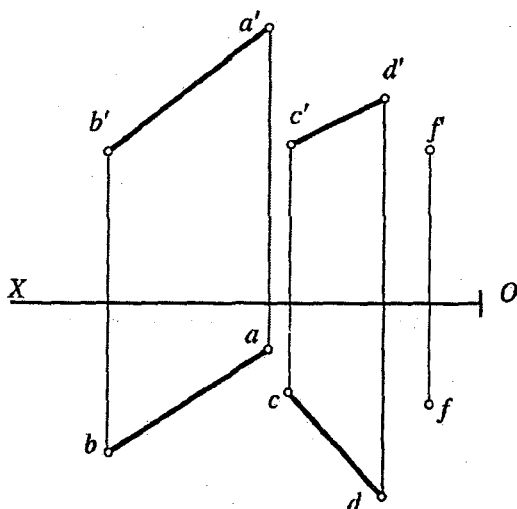


Mustaqil ta'lim masalalari

47-масала. Berilgan ABC tekislikka tegishli DK to'g'ri chiziqlarning yetishmagan proyeksiyasi chizilsin.

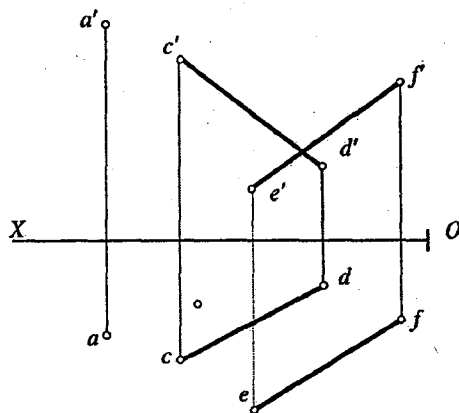


48-масала. CD to'g'ri chiziqlarning ABF tekislik bilan uchrashish nuqtasi aniqlansin.

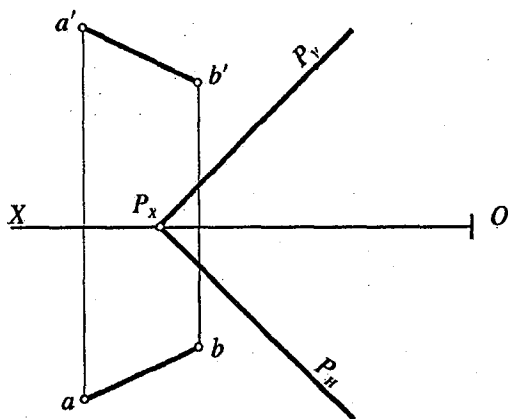


Mustaqil ta'lim masalalari

49-масала. CD to'g'ri chiziqning AEF tekislik bilan uchrashish nuqtasi aniqlansin.

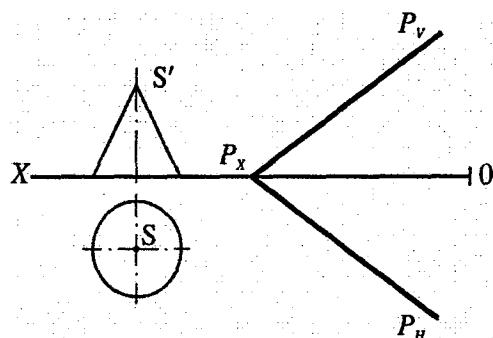


50-масала. AB to'g'ri chiziqning P tekislik bilan kesishish nuqtasining proyeksiyalari aniqlansin.

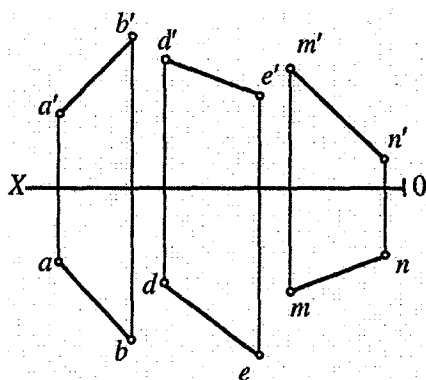


Mustaqil ta'lim masalalari

51-масала. Konus sirtida P tekislikka parallel to'g'ri chiziqlar o'tkazilsin.

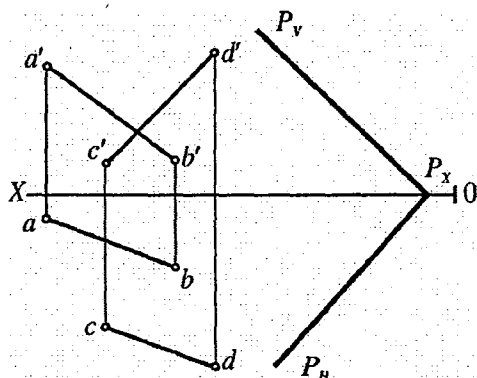


52-масала. Uchta ayqash AB , DE , MN chiziqlar berilgan, ularni kesib o'tuvchi to'g'ri chiziq o'tkazilsin.

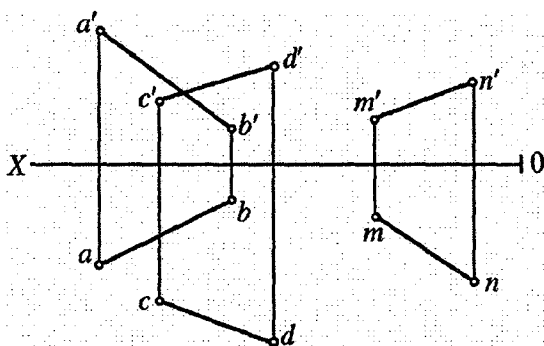


Mustaqil ta'lim masalalari

53-масала. P tekislikka perpendikular bo'lgan va AB, CD ayqash chiziqlarni kesib o'tuvchi MN to'g'ri chiziq o'tkazilsin.

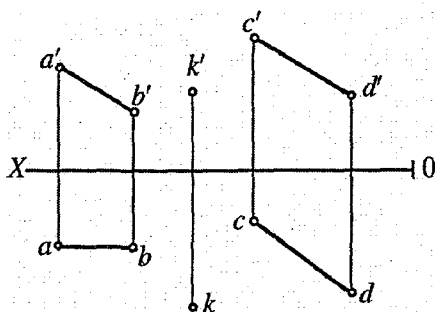


54-масала. AB va CD chiziqlarni kesib o'tuvchi va MN to'g'ri chiziqqa parallel bo'lgan to'g'ri chiziq o'tkazilsin.

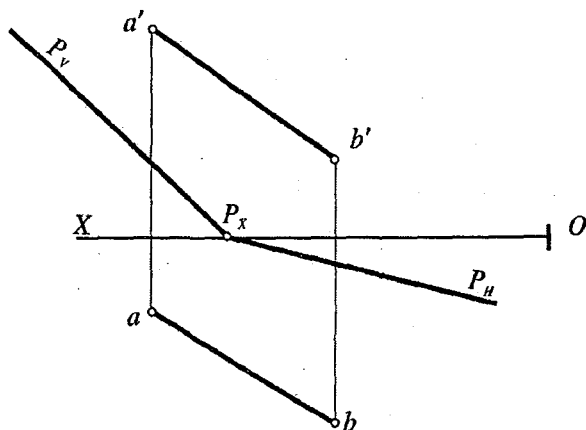


Mustaqil ta'lim masalalari

55-masala. K nuqta orqali CD to'g'ri chiziqqa perpendikular bo'lgan va AB to'g'ri chiziqni kesib o'tuvchi to'g'ri chiziq o'tkazilsin.

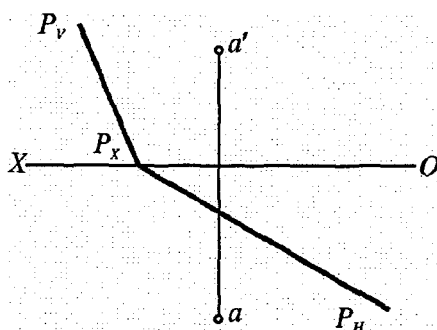


56-masala. AB to'g'ri chiziqning P tekislik bilan kesishish nuqtasining proyeksiyalari aniqlansin.

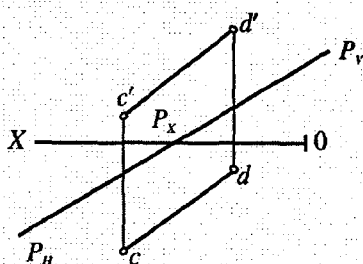
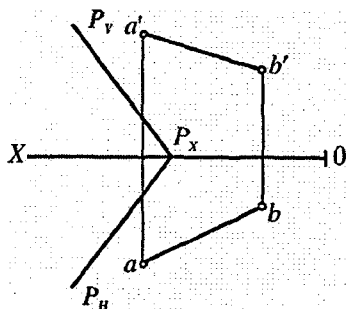


Mustaqil ta'lim masalalari

57-масала. A nuqta orqali berilgan P tekislikka perpendikular bo'lgan Q tekislik o'tkazilsin.



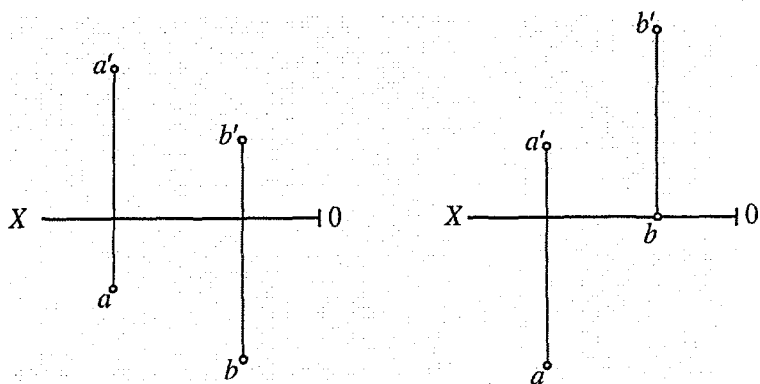
58-масала. AB to'g'ri chiziqli orqali berilgan P tekislikka perpendikular bo'lgan Q tekislik o'tkazilsin.



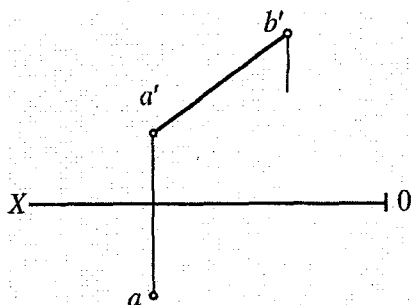
Mustaqil ta'lim masalalari

IV. O'lchovli masalalar

59-масала. A va B nuqtalar orasidagi masofa aniqlansin.

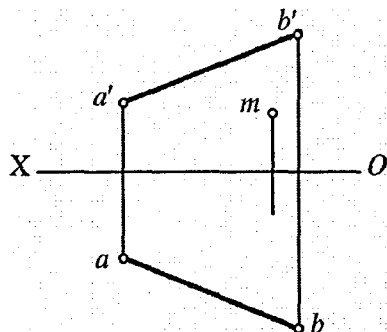


60- масала. Agar AB kesmaning uzunligi ma'lum bo'lib, 35 mm ga teng bo'lsa, uning gorizontal proyeksiyasi aniqlansin.

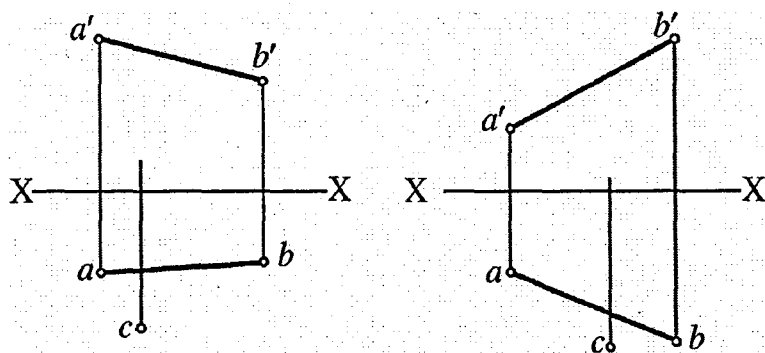


Mustaqil ta'lim masalalari

61-масала. AB kesmaning uchlaridan baravar uzoqlikda joylashgan M nuqtaning gorizontial proyeksiyasi aniqlansin.

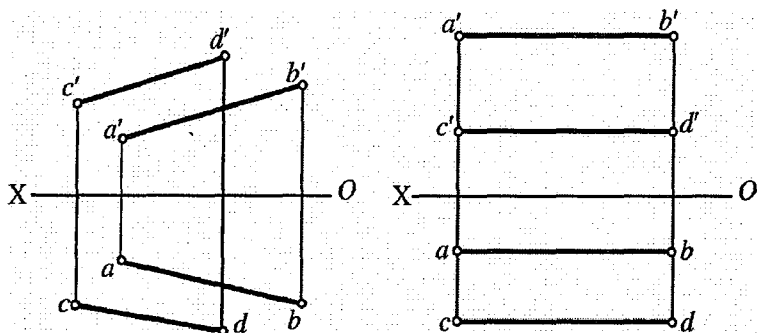


62-масала. Agar nuqta AB to'g'ri chiziqdan 20 mm uzoqlikda joylashgan bo'lsa, C nuqtaning frontal proyeksiyasi aniqlansin.

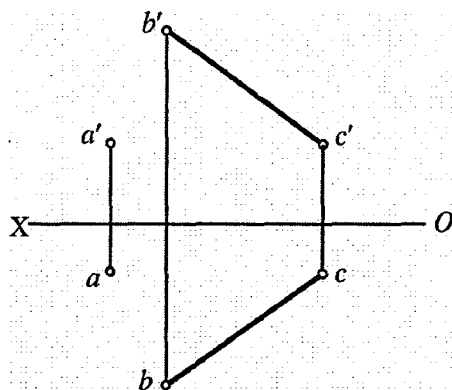


Mustaqil ta'lim masalalari

63-масала. O'zaro parallel AB va CD to'g'ri chiziqlar orasidagi masofa aniqlansin.

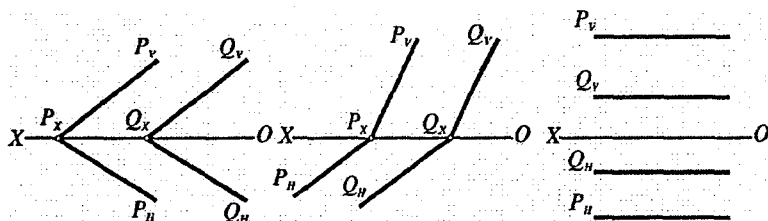


64-масала. A nuqtadan 20 mm masofada, BC to'g'ri chiziqdan 25 mm masofada va unga parallel bo'lgan DE to'g'ri chiziqning proyeksiyalari chizilsin.

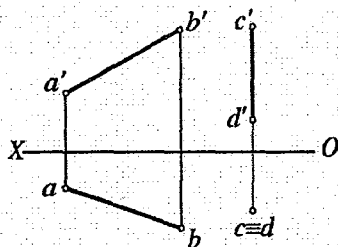
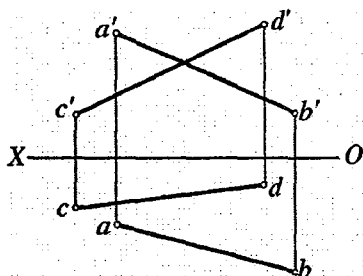


Mustaqil ta'lim masalalari

65-masala. O'zaro parallel P va Q tekisliklar orasidagi masofa aniqlansin.

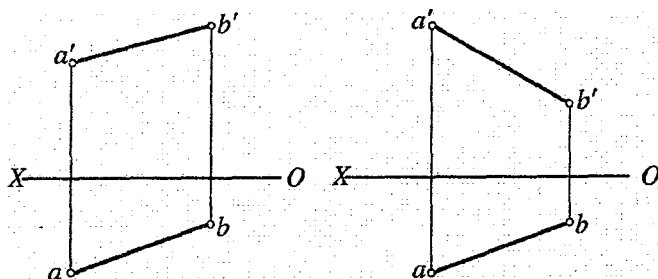


66-masala. AB va CD ayqash to'g'ri chiziqlar orasidagi masofa aniqlansin.

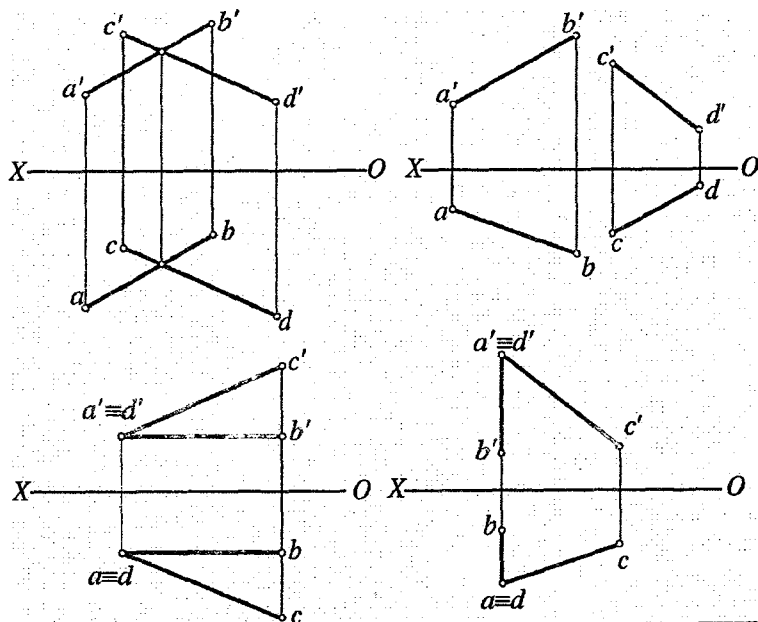


Mustaqil ta'lim masalalari

67-masala. AB to'g'ri chiziq va OX proyeksiyalar o'qi orasidagi masofa aniqlansin.

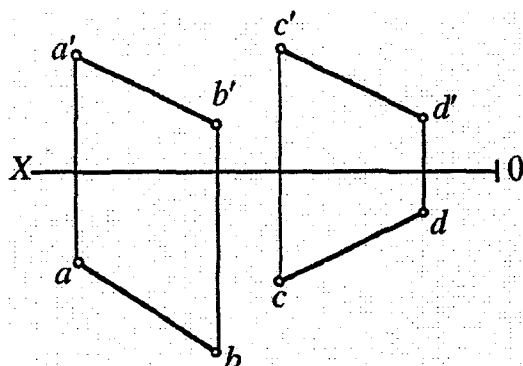


68-masala. AB va CD to'g'ri chiziqlar orasidagi burchak aniqlansin.

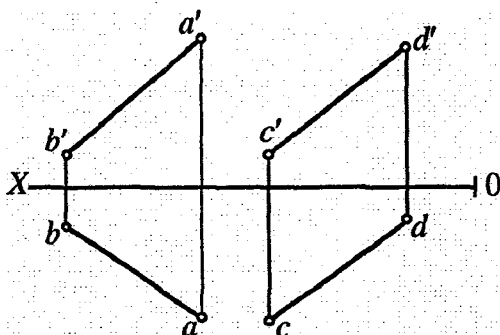


Mustaqil ta'lim masalalari

69-masala. AB to'g'ri chiziqda CD to'g'ri chiziqdan 40 mm uzoqlikda joylashgan nuqta topilsin.

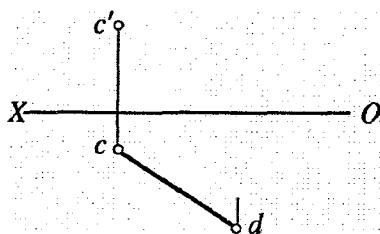


70-masala. AB va CD ayqash to'g'ri chiziqlarning AB to'g'ri chiziqni kesib o'tuvchi va CD to'g'ri chiziqdan 20 mm uzoqlikda unga parallel to'g'ri chiziq o'tkazilsin.

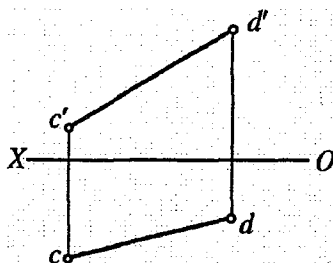


Mustaqil ta'lim masalalari

71-masala. Agar CD kesmaning uzunligi 30 mm ga teng bo'lsa, uning frontal proyeksiyasi aniqlansin.

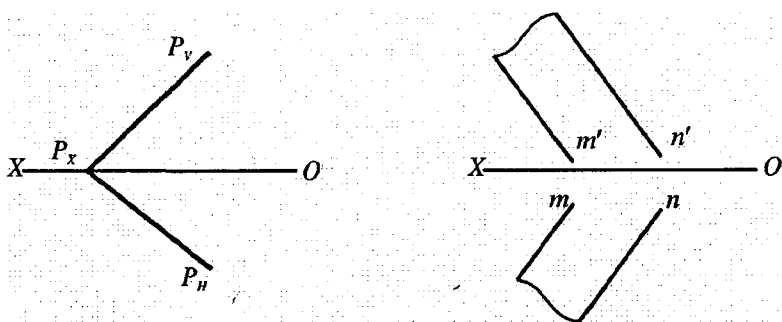


72-masala. CD to'g'ri chiziqda gorizontal proyeksiyalar tekisligidan 20 mm masofada A nuqtani va frontal proyeksiyalar tekisligidan 15 mm masofada B nuqtaning proyeksiyalarini aniqlang.

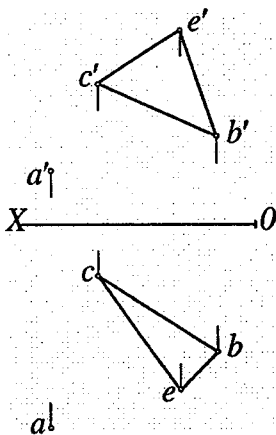


Mustaqil ta'lim masalalari

73-masala. P tekislikda gorizontal proyeksiyalar tekisligidan 20 mm masofada bo'lgan A nuqta aniqlansin.

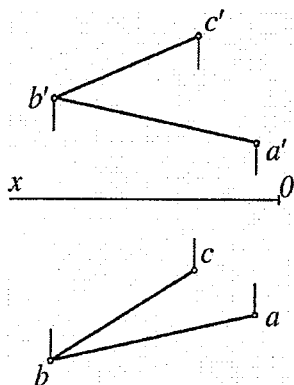


74-masala. A nuqtadan BCE tekislikkacha bo'lgan masofaning haqiqiy uzunligi aniqlansin.

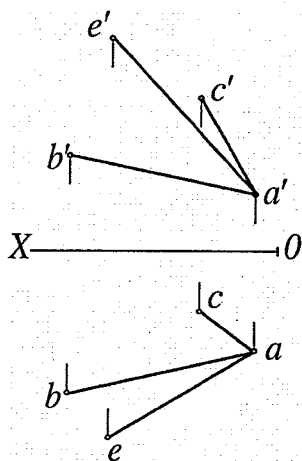


Mustaqil ta'lim masalalari

75-масала. ABC tekislikdan 40 mm uzoqlikda va unga parallel bo'lgan tekislik o'tkazilsin.

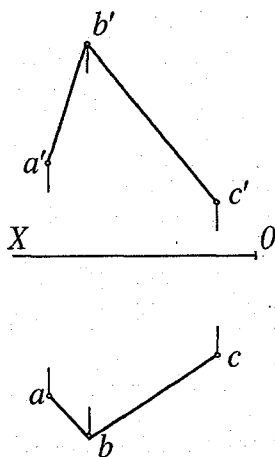


76-масала. AE to'g'ri chiziqda ABC tekislikdan 40 mm uzoqlikda bo'lgan nuqta topilsin.

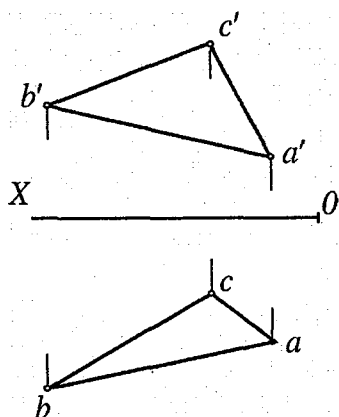


Mustaqil ta'lim masalalari

77-масала. ABC tekislikdan 40 mm uzoqlikda unga parallel tekislik o'tkazilsin.

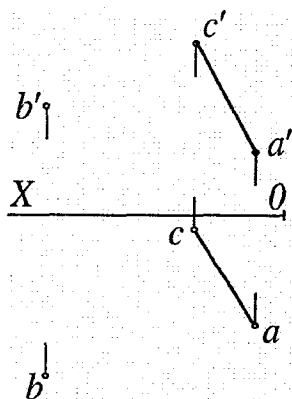


78-масала. Asosi ABC uchburchak bo'lgan, balandligi 40 mm ga teng to'g'ri prizma proyeksiyalari chizilsin.

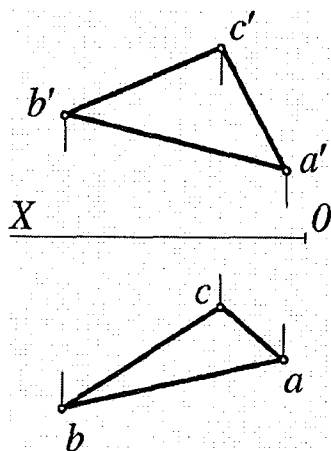


Mustaqil ta'lim masalalari

79-масала. B nuqtadan CA to'g'ri chiziqqacha bo'lgan masofaning haqiqiy uzunligi aniqlansin.



80-масала. ABC uchburchakning B uchidan o'tuvchi balandligining haqiqiy uzunligi topilsin.



Adabiyotlar

1. Davlat standartlari. GOSTlar. KXYaT. Asosiy qoidalar.
2. Azimov T.D. Chizma geometriya. Oliy texnika o'quv yurtlari uchun o'quv qo'llanma. — T.: ToshDTU, 2005.
3. Xorunov R., Akbarov A.A. Chizma geometriyadan masalalar yechish metodlari. — T.: «O'qituvchi», 1995.
4. Azimov T.D. «Chizma geometriya» fanidan ma'ruzalar matni. — T.: ToshDTU, 2005.
5. Azimov T.D. va boshqalar. Chizma geometriyadan amaliy darslar uchun o'quv qo'llanma. — T.: ToshDTU, 2003.
6. Azimov T.D. Fayziyev T.R., Alimova D.K., Mirzaraimova V.T. «Chizma geometriya» fanidan oraliq nazorat savollari to'plami. — T.: ToshDTU, 2007.
7. Xodjimuxamedov B.R., Karimova V.N., Mavjudov S.S. «Chizma geometriya» fanidan «Nuqta» mavzusiga oid testlar to'plami. — T.: ToshDTU, 2006.
8. Xojimuxamedov B.R., Yakubova M.M., Sobirova D.U. «Chizma geometriya» fanidan «To'g'ri chiziq» mavzusiga oid testlar to'plami. — T.: ToshDTU, 2006.
9. Azimov T.D., Mirzaraimova V.T. Chizma geometriyadan shaxsiy uy vazifalarini bajarish yuzasidan uslubiy ko'rsatmalar. I qism. — T.: ToshDTU, 2003.
10. Azimov T.D., Mirzaraimova V.T., Abdurahmonov Sh. Chizma geometriyadan shaxsiy uy vazifalarini bajarish yuzasidan uslubiy ko'rsatmalar. II qism. — T.: ToshDTU, 2004.
11. Umarov A.R., Azimov T.D., Alimova D.K., Raximov A.M. Tasvirlarni o'zgartirish usullari. — T.: ToshDTU, 2004.
12. Murodov Sh. va boshqalar. Chizma geometriya kursi. — T.: «O'qituvchi», 2006.
13. Xorunov R. Chizma geometriya kursi. — T.: «O'qituvchi», 1999.
14. Qirg'izboyev Yu. Chizma geometriya. — T.: «O'qituvchi», 1976.
15. Азимов Т.Д. Конспект лекции по «Начертательной геометрии». — T.: TGTU, 2001.
16. Ismatullayev R. Chizma geometriya. Oliy o'quv yurtlari uchun o'quv qo'llanma. — T.: TDPU, I qism, 2005.
17. Ismatullayev R. Chizma geometriya. Oliy o'quv yurtlari uchun metodik qo'llanma. — T.: TDPU, II qism, 2006.
18. Raxmonov I., Abduraxmonov A. Chizmachilikdan ma'lumotnomalar. — T.: «O'zbekiston», 2006.

19. Чекмарев А.А. Начертательная геометрия и черчение. — М.: ВЛАДОС, 2005.

20. Гордон В.О., Семенцов-Огиевский М.А. Курс начертательной геометрии. — М.: «Машиностроение», 1988.

21. Азимов Т.Д., Файзиев Т.Р., Собирова Д.У., Мавжудов С.С. Сборник вопросов по 1-му промежуточному контролю знаний студентов по начертательной геометрии. — Т.: ТГТУ, 2002.

22. Sobitov E. Chizma geometriya qisqa kursi. — Т.: «O'qituvchi», 1993.

23. Davletov S. Chizma geometriya. Oliy texnika o'quv yurtlari uchun o'quv qo'llanma. — Т.: TTYSI, 2006.

24. Abdullayev U.A. Chizma geometriyadan masalalar to'plami. — Т.: «O'qituvchi», 1999.

25. Abdullayev U.A. Chizma geometriya va chizmachilik asoslari. — Т.: «O'qituvchi», 1997.

26. Бубенников А.В., Громов М.Я. Начертательная геометрия. — М.: «Машиностроение», 1985.

MUNDARIJA

So'zboshi.....	3
1,2-dars.....	6
3-dars.....	7
4-dars.....	12
5-dars.....	24
6-dars.....	28
7-dars.....	31
8-dars.....	34
9-dars.....	39
10-dars.....	40
11-dars.....	42
12-dars.....	50
13-dars.....	53
14-dars.....	57
15-dars.....	59
16-dars.....	65
17-dars.....	68
18-dars.....	71
19-dars.....	77
Yakuniy yozma ishga doir masalalar.....	83
Olimpiada masalalari.....	120
Mustaqil ta'lim masalalari.....	123

Azimov T.D.

CHIZMA GEOMETRIYA

O'quv qo'llanma

Muharrir *H.Teshaboyev*
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Bosishga ruxsat etildi 11.07.2008. Qog'oz bichimi 60x84¹/₁₆.
Hisob-nashr tabog'i 10,25. Adadi 1000.
Buyurtma № 103.

«IQTISOD-MOLIYA» nashriyotida tayyorlandi.
100084, Toshkent, Kichik halqa yo'li ko'chasi, 7-uy.
Hisob-shartnoma 54-2008.

«Toshkent tezkor bosmaxonasi» MCHJ da chop etildi
100200. Toshkent, Radial tor ko'chasi 10 uy.