

T.D. AZIMOV

# CHIZMA

# GEOMETRIYA



“IQTISOD-MOLIYA”

22. 151. 3273

A 37

**O'ZBEKISTON RESPUBLIKASI OLIY VA O'RTA  
MAXSUS TA'LIM VAZIRLIGI**

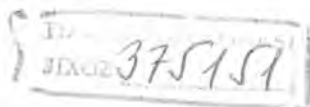
**Abu Rayhon Beruniy nomidagi  
Toshkent davlat texnika universiteti**

**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



**Taqrizchilar:** **T. Rixsiboyev** – TTYSI “Chizma geometriya va muhandislik grafikasi” kafedrası t.f.n., dotsent; **N.A. Nadirova** – TDTU “Chizma geometriya va muhandislik grafikasi” kafedrası 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 namunalar, 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**

## 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 ikkita dan 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 -  $30^\circ$ ,  $45^\circ$  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, gorizonta, fronta o'tkazish;
4. Tekislikda nuqta tanlash;
5. Nuqta orqali umumiy vaziyatdagi tekislik o'tkazish;
6. To'g'ri chiziq orqali gorizonta, fronta 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. Sirtlarni to'g'ri chiziq bilan uchrashish nuqtasini aniqlash;
23. Sirtlarni tekislik bilan kesishish chiziqlarini aniqlash;
24. Sirtlarning 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.

Sarvaraqni bajarish.

*ToshDTU*

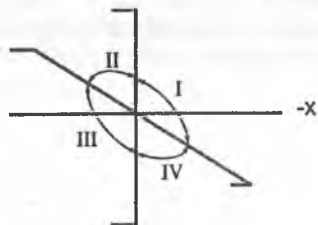
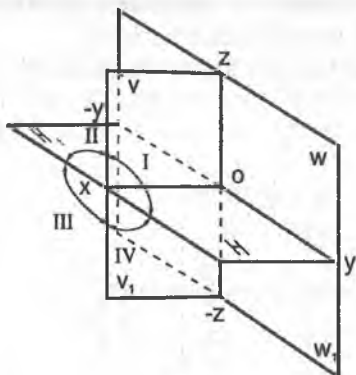
*"Chizma geometriya va muhandislik grafikasi"  
kafedrası*

**CHIZMALAR TO'PLAMI**

*Shifr: 35-05 NGF*

*Bajardi: Alimov K.A.*

*2007 -- 2008 o'quv yili*

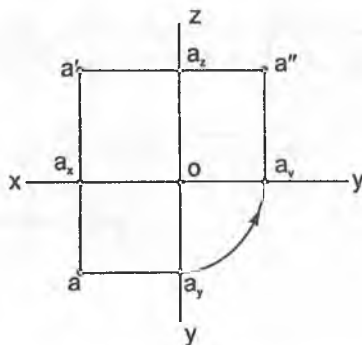
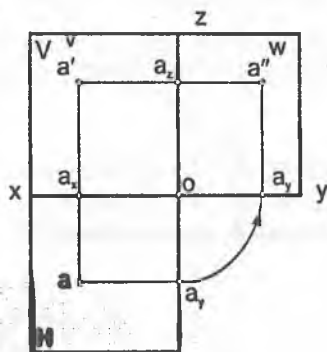
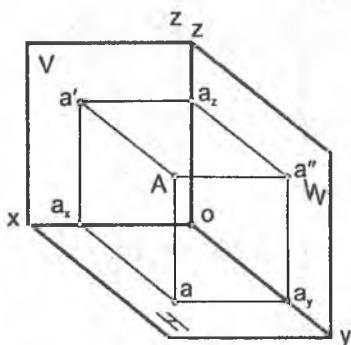


$a - A'$   
 $a' - A''$   
 $a'' - A'''$

$$|AHI| = |AAa| = |a'ax| = Z_A$$

$$|AVI| = |AAa'| = |aax| = Y_A$$

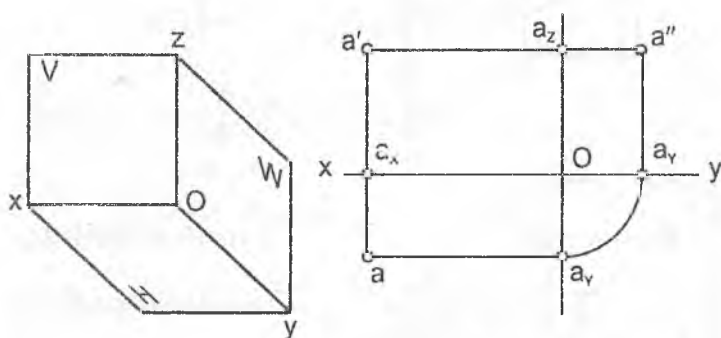
$$|AWI| = |AAa''| = |a'ax| = X_A$$



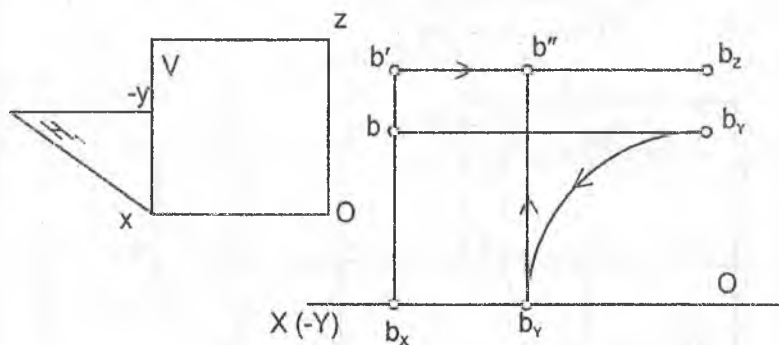


1-misol. Berilgan har bir nuqtaning koordinatalari bo'yicha tegishli oktantlarda ularning fazoviy tasviri va tekis chizmasi chizilsin.

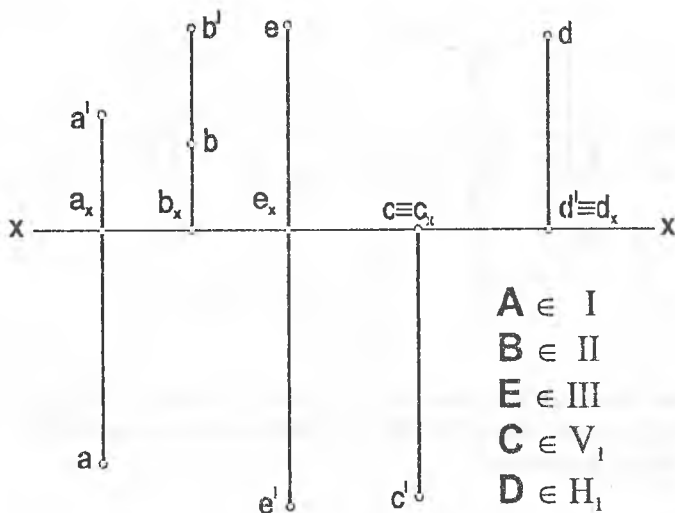
*A (50;20;35)*



*B (60;-30;40)*



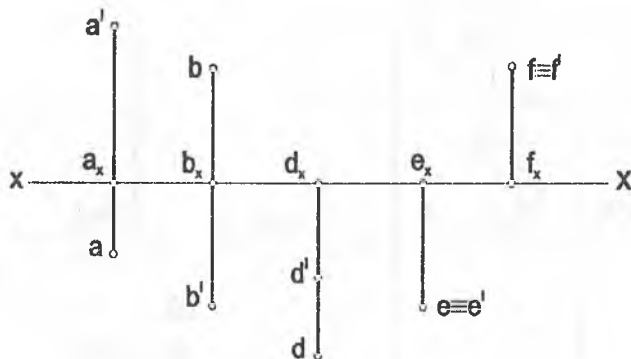
**2-misol.** Nuqtalarning tekis chizmalarida berilgan proyeksiyalariga binoan ularning har biri fazoning qaysi choraklarida joylashganligi aniqlansin. Javobi simbolika bilan yozilsin.



**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 bi-noan ularning har biri fazoning qaysi choragida joylashganligini chiz-mada berilgan nuqtalardan o'qing. Javobi simvolika bilan yozilsin.



5-misol. Berilgan nuqtalarning qaysi biri V frontal proyeksiyalar tekisligiga yaqin, qaysi biri H gorizontaal proyeksiyalar tekisligi-dan baland joylashgan?

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

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

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

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

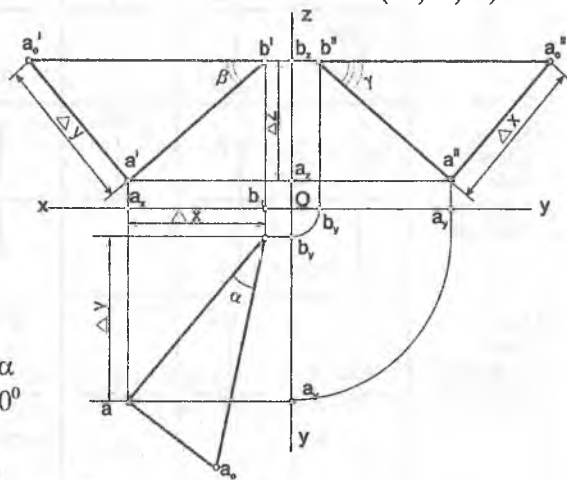
c)  $A=S(ox)(D)$

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

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 $A = S_{[Ox)}(B)$ ?						

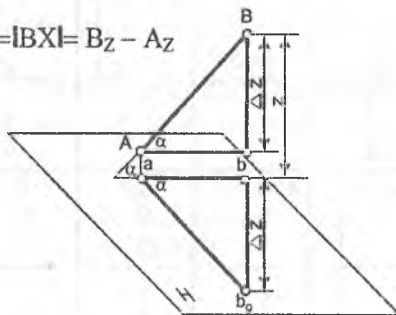
1 - misol. Koordinatalari bilan berilgan AB to'g'ri chiziq kesma-sining epyuri chizilsin. AB kesmaning haqiqiy uzunligi va pro-yeksiyalar tekisliklariga nisbatan og'ish burchaklari aniqlansin.

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



- $[AC] \parallel [ab]$   
 $|AC| = |ab|$   
 $[AB] \wedge H = \alpha$   
 $[AB] \wedge [AC] = \alpha$   
 $[ab] \wedge [bb_0] = 90^\circ$   
 $|ab_0| = |AB|$   
 $[ab] \wedge [ab_0] = \alpha$

$$\Delta Z = |Bb| - |Aa| = |BX| = B_Z - A_Z$$



$$\Delta Z = |b'b_0| - |a'a_0| = |b'c'| = b_z - a_z = 45 - 10 = 30$$

$$\Delta Y = |aa_0| - |bb_0| = |aa'| = a_y - b_y = 60 - 10 = 50$$

$$\Delta X = |a'a_0| - |b'b_0| = |a'c'| = a_x - b_x = 55 - 10 = 45$$

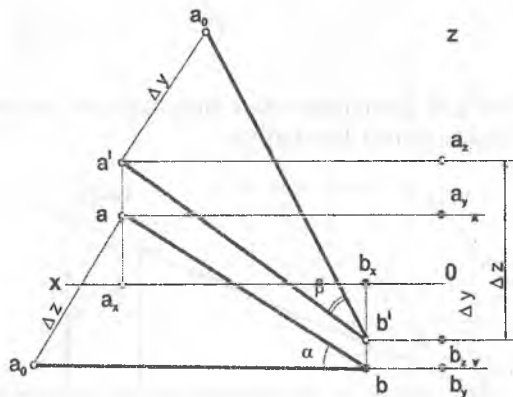
$$|aa_0| = |\Delta Z|; |a_0b| = |AB|; [a_0b] \wedge [ab] = \alpha; \alpha = (AB) \wedge H$$

$$|a'a_0| = |\Delta Y|; |a'_0b'| = |AB|; [a'_0b'] \wedge [a'b'] = \beta; \beta = (AB) \wedge V$$

$$|a''a''_0| = |\Delta X|; |a''_0b''| = |AB|; [a''_0b''] \wedge [a''b''] = \gamma; \gamma = (AB) \wedge W$$

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.

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



$$\Delta X = a_z - b_z = 40 - (-20) = 60$$

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

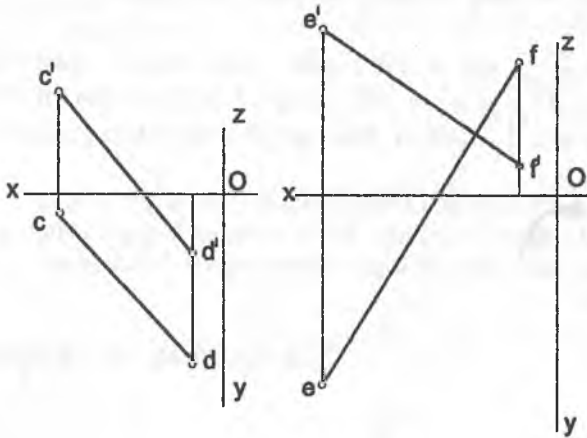
$$\Delta Y = a_y - b_y = -40 - 30 = -50$$

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

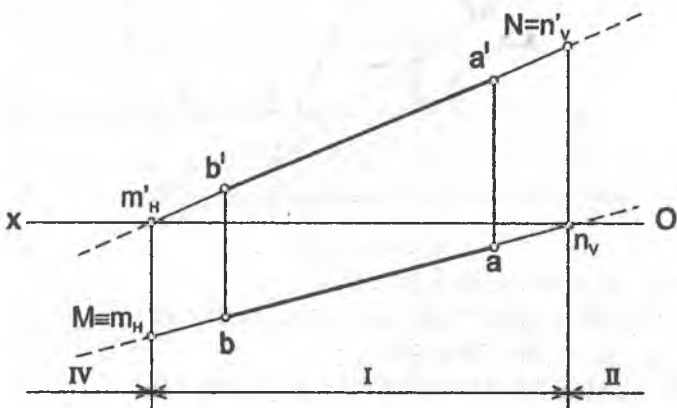
3. A (70;10;40),  
B (20;50;-20)

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

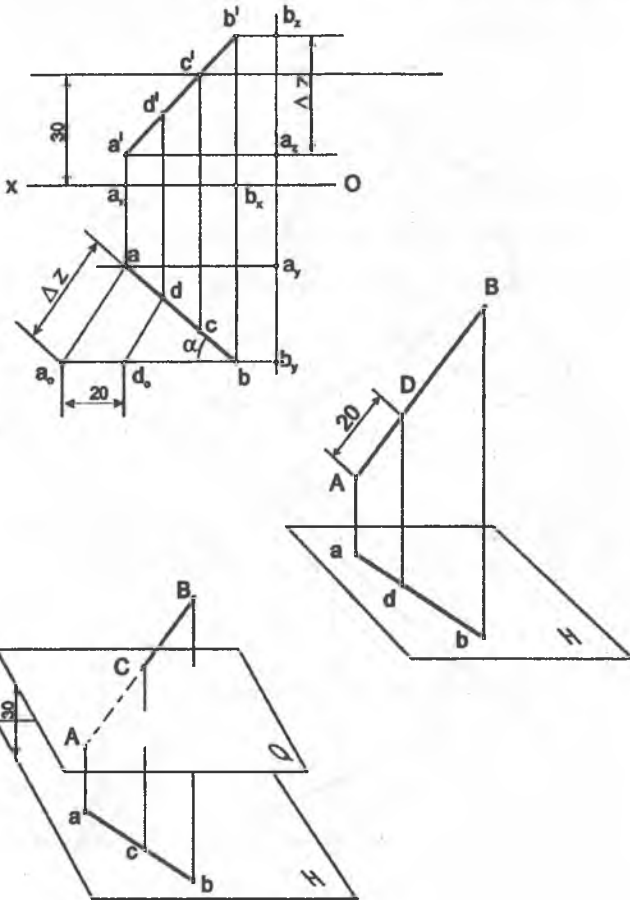
5. A (60;-30;50),  
B (10;-60;10)



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.

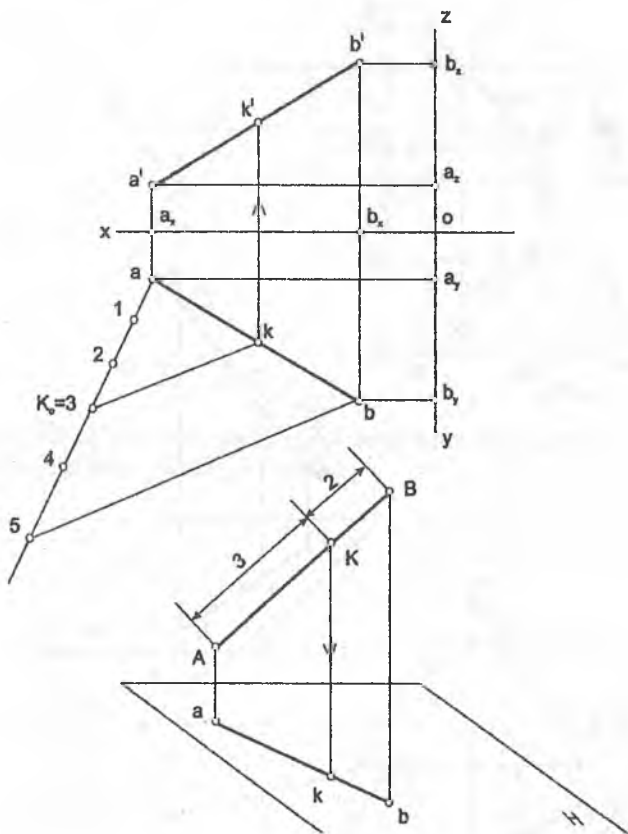




8- misol. AB kesmada uni  $\frac{[AK]}{[KB]} = \frac{3}{2}$  nisbatda bo'luvchi K nuqta aniqlansin.

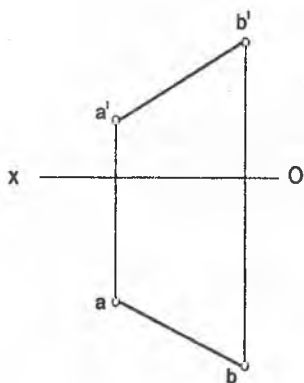
A(70; 10; 10)

B(20; 35; 40)

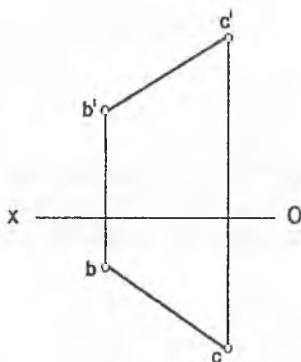


9-misol. AB to'g'ri chiziqning izlari aniqlansin va fazoning qaysi choraklaridan o'tishi ko'rsatilsin.

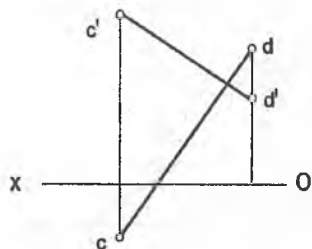
9.1 A(50; 50; 15)  
B(20; 85; 35)



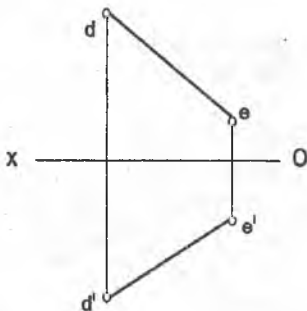
9.2 B(50; 15; 30)  
C(10; 55; 55)



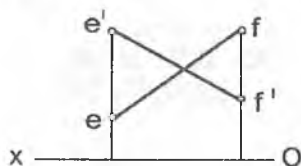
9.3 C(60; 20; 45)  
D(25; -10; 20)



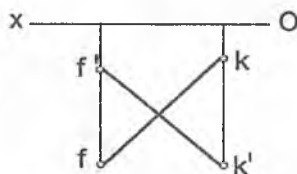
9.4 D(80; -45; -50)  
E(40; -15; -25)



9.5  $E(90; -10; 35)$   
 $F(45; -35; 15)$

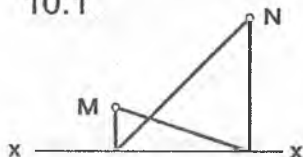


9.6  $F(70; 30; -10)$   
 $K(25; 10; -35)$

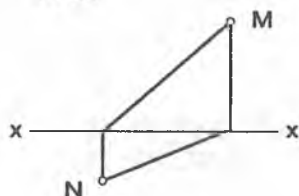


**10-misol.** BC to'g'ri chiziqning izlarini bilib, uning proyeksiyalari chizilsin, so'ng ko'rinar-ko'rinmas qismlari va fazoning qaysi choraklaridan o'tishi ko'rsatilsin.

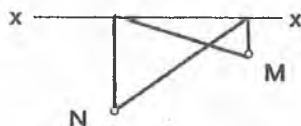
10.1



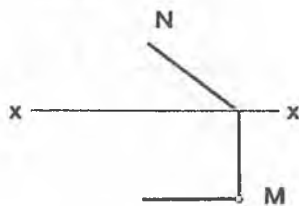
10.2



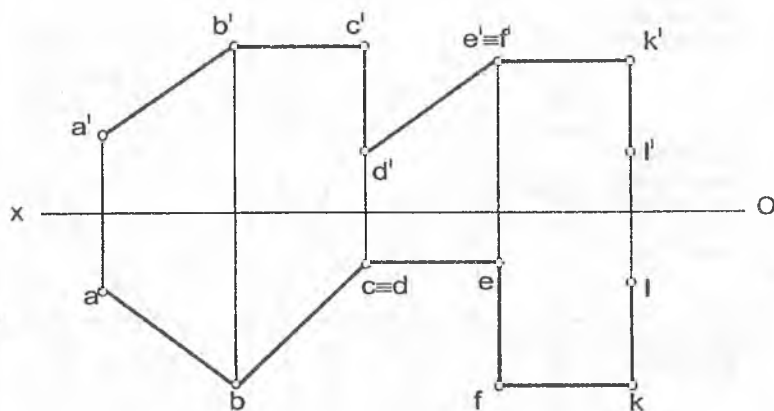
10.3



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) E(60; 40; 20) |
| B(70; 60; 20)    | F(10; 40; 40)    |
| б) C(60; 50; 40) | г) K(40; 20; 35) |
| D(20; 10; 40)    | L(40; 60; 60)    |

4-dars

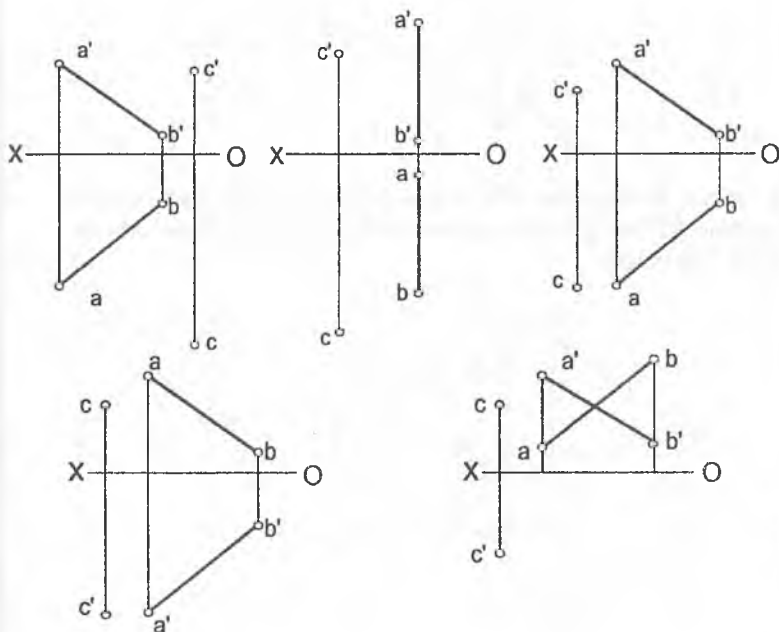
Mavzu: To'g'ri chiziq

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 uchlariidan biri V tekisligiga tegishli?						
2. Qaysi chizmada nuqta K ∈ (BC) V va H tekisliklaridan baravar uzoqlikda yotadi?						
3. Qaysi chizmada (BC) ∥ (KP) ?						
4. Qaysi chizmada (BC) ∩ (KP) ?						
5. Qaysi chizmada (BC) ⊥ (KP) = 90° ?						

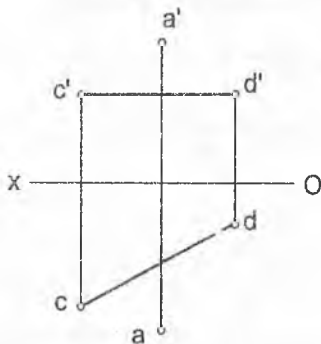
*Kesishuvchi to'g'ri chiziqlar*

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

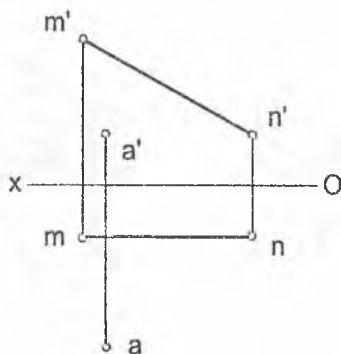
- a) umumiy vaziyatdagi EF  
 b) gorizontal FD  
 v) frontal DK to'g'ri chizig'i chizilsin.



**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.

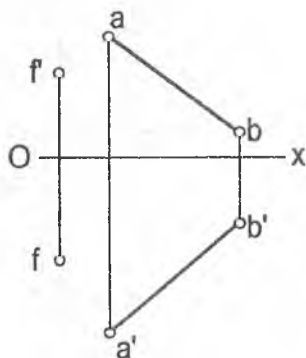
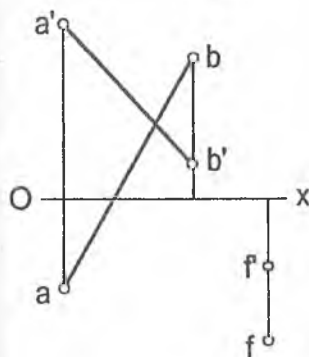
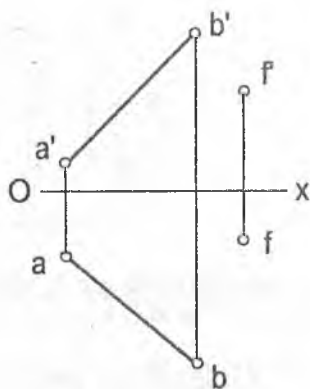
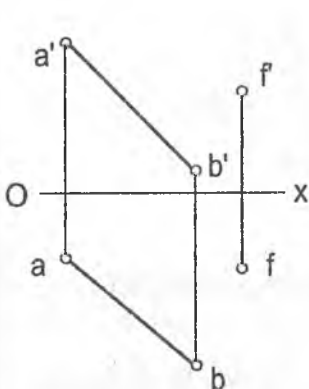


**3 - misol.** A nuqtadan MN to'g'ri chiziqqacha bo'lgan masofa topilsin. MN to'g'ri chiziqqa markazi A nuqta bo'lgan urinma sfera o'tkazilsin.



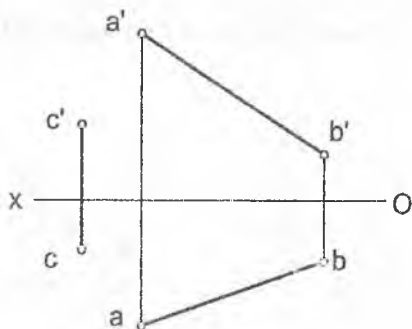
*Parallel to'g'ri chiziqlar*

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.



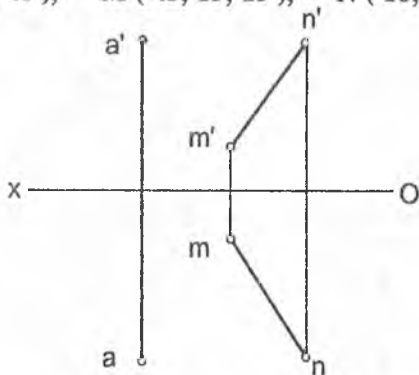


2-misol. C nuqta orqali H tekisligiga parallel va AB to'g'ri chiziqni kesib o'tuvchi CD to'g'ri chiziq o'tkazilsin.

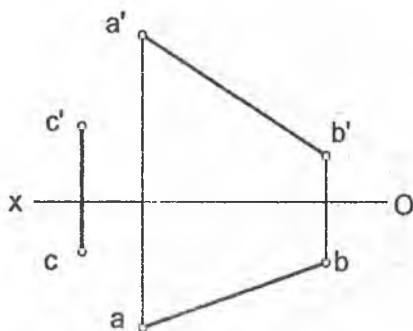


3 - misol. A nuqta orqali MN to'g'ri chiziqqa parallel qilib uzunligi 50 mm li kesma o'tkazilsin.

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

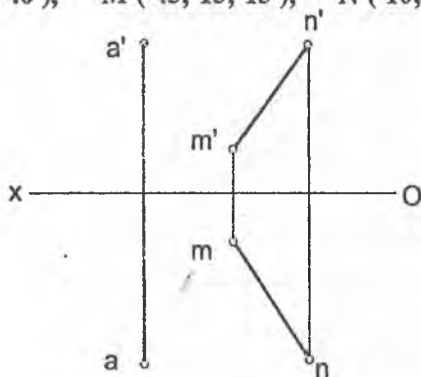


2-misol. C nuqta orqali H tekisligiga parallel va AB to'g'ri chiziqni kesib o'tuvchi CD to'g'ri chiziq o'tkazilsin.

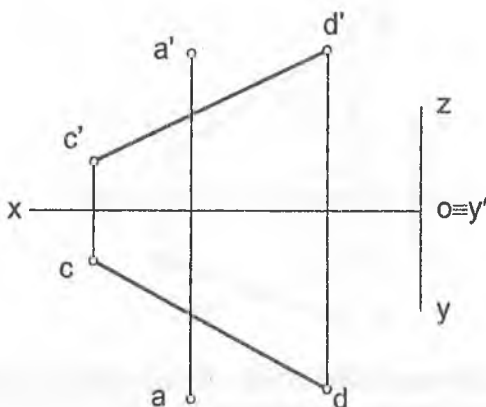


3 - misol. A nuqta orqali MN to'g'ri chiziqqa parallel qilib uzunligi 50 mm li kesma o'tkazilsin.

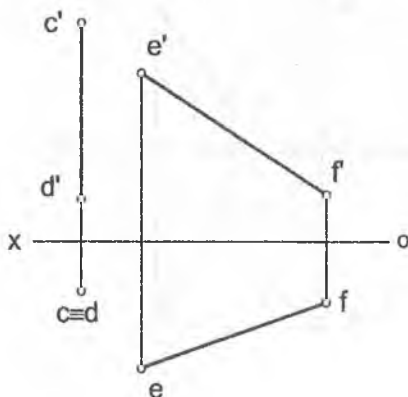
A ( 65; 35; 40 ), M ( 45; 15; 15 ), N ( 10; 45; 40 ).



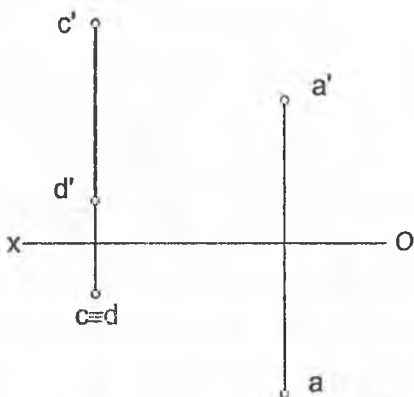
1 - misol. A nuqta orqali berilgan  $CD$  to'g'ri chiziqni va  $OY$  proyeksiya o'qini kesib o'tuvchi  $AB$  to'g'ri chiziq o'tkazilsin.



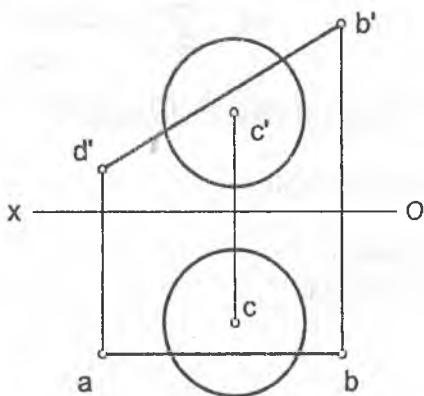
2 - misol.  $CD$  va  $EF$  to'g'ri chiziq'larga perpendikular va ularni kesib o'tuvchi  $AB$  to'g'ri chiziq o'tkazilsin.



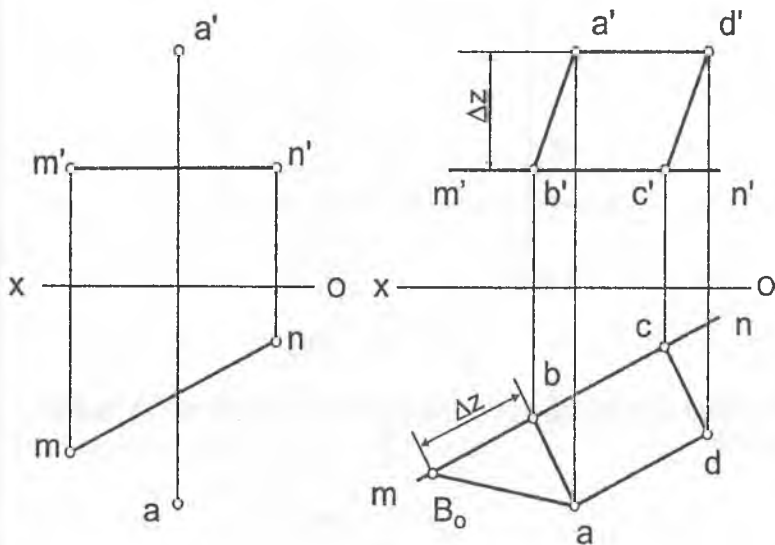
3 - misol. A nuqta orqali CD to'g'ri chiziqdan 30 mm uzoqlikda o'tuvchi AB gorizontal chiziq o'tkazilsin.



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



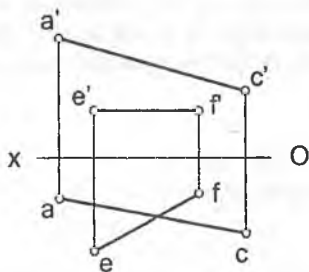
1 - misol. BC tomoni MN chiziqda yotuvchi ABCD kvadrat chizilsin.



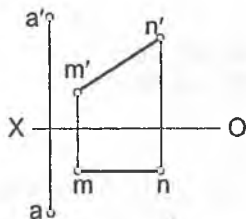
Masalani yechish algoritmi

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.  $[AD] \parallel [BC]$

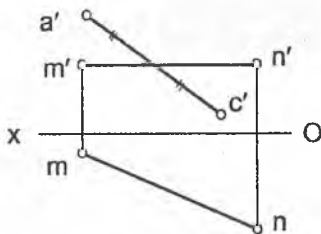
2 - misol. B uchi to'g'ri burchakli va  $EF$  to'g'ri chiziqda yotuvchi to'g'ri burchakli  $ABC$  uchburchak chizilsin.



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.

$$A(90; 45; 10)$$

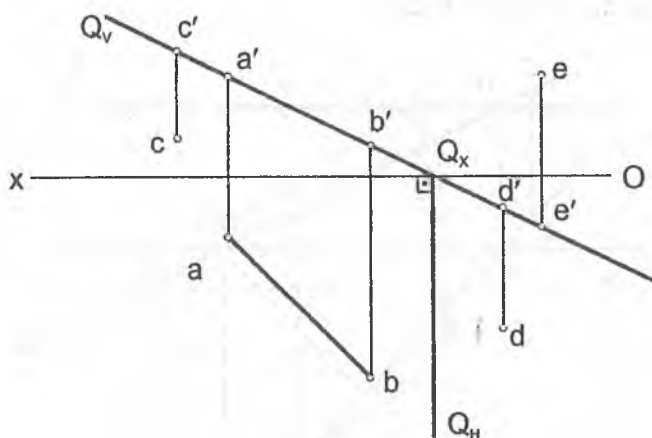
$$B(30; 10; 55)$$

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

$$A(80; 50; 20)$$

$$B(30; 10; 55)$$

**1 - misol.**  $AB$  to'g'ri chiziq orqali mumkin bo'lgan xususiy holatdagi tekisliklar o'tkazilsin.  
Har bir tekislik uchun fazoning har qaysi burchaklarida joylashgan va ulardan o'tuvchi bittadan ixtiyoriy nuqta olinsin.



$$1. Q \subset (AB) \wedge Q \perp V ?$$

$$Q(Q_V, Q_H) ?$$

$$Q \subset (AB) \wedge Q \perp V \Rightarrow Q_V \equiv (a'b') \wedge Q_H \perp (Ox)$$

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

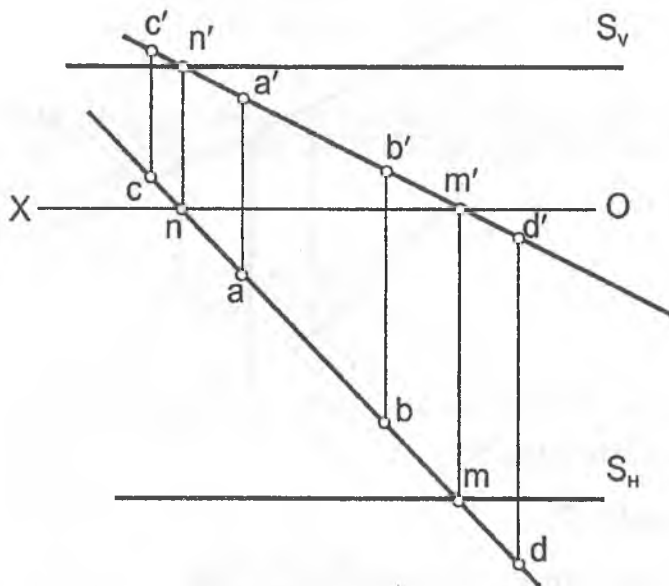
$$A \in I, C \in II, D \in IV, E \in III$$



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

Mustaqil ravishda bajarilsin.

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

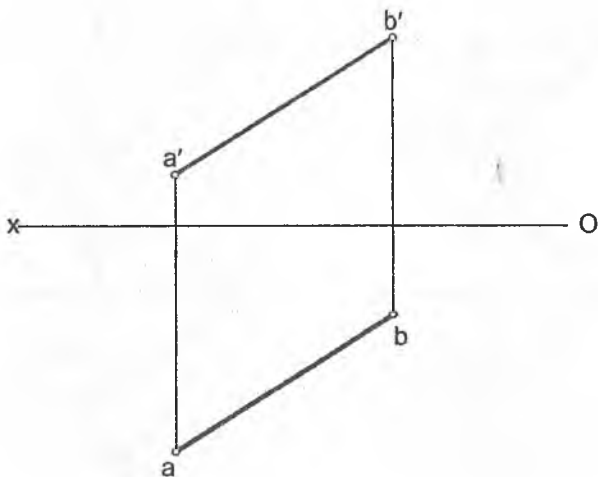


$S(S_H, S_V) \subset (AB) \wedge S \perp W \Rightarrow S_V, S_H \parallel (ox) \wedge M \in S_H \wedge N \in S_V$

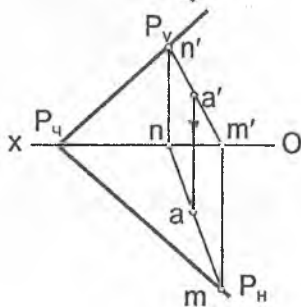
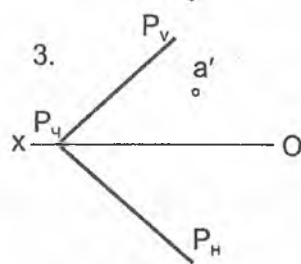
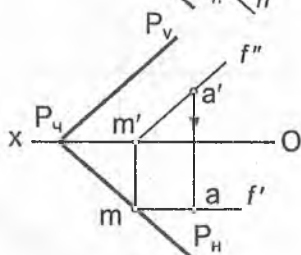
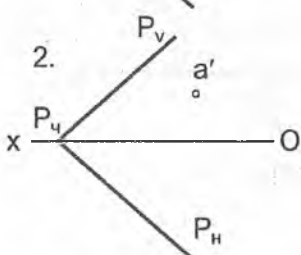
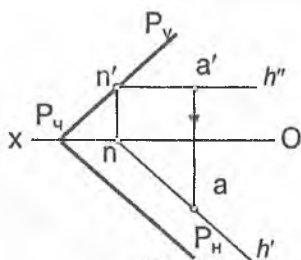
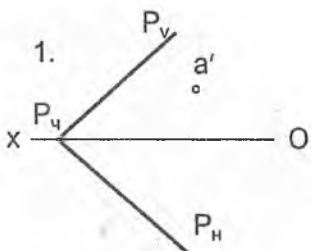
$S \subset \text{II, I, IV}$

$A \in \text{I, C} \in \text{II, D} \in \text{IV}$

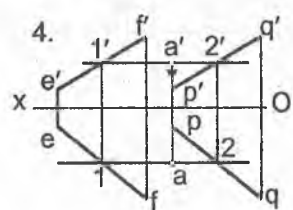
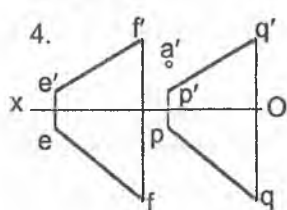
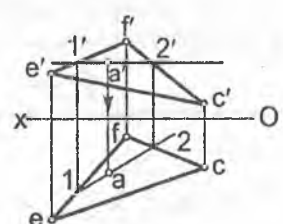
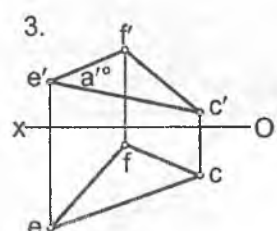
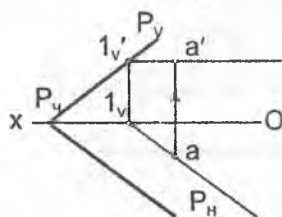
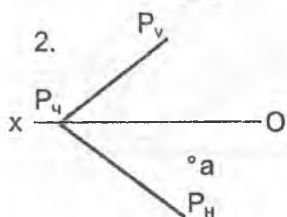
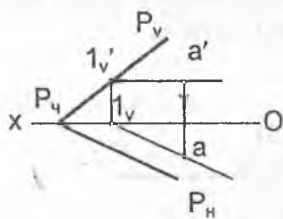
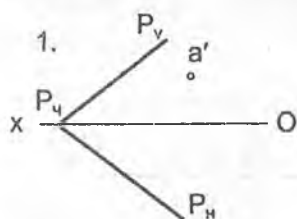
1 - misol.  $AB$  to'g'ri chiziq orqali mumkin bo'lgan xususiy holatdagi tekisliklar o'tkazilsin.  
Har bir tekislik uchun  $AB$  to'g'ri chiziq o'tayotgan choraklarda joylashgan va shu chiziqda yotuvchi bittadan ixtiyoriy nuqta tanlab olinsin.



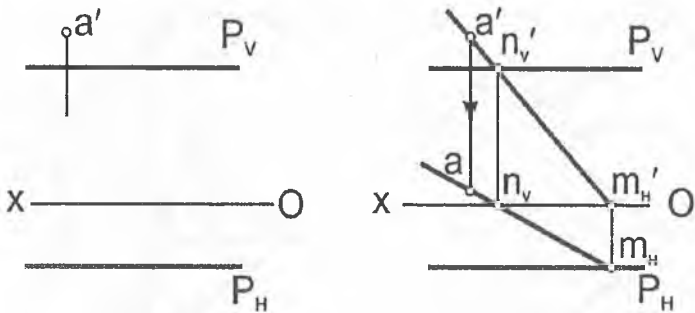
- 1 - misol.** P tekislikda yotuvchi nuqtaning yetishmagan proyeksiyasi topilsin:  
 Masalani yechish uchun tekislikning quyidagi chiziqlaridan foydalanilsin:  
 1) gorizontal 2) frontal 3) umumiy holatdagi to'g'ri chiziq



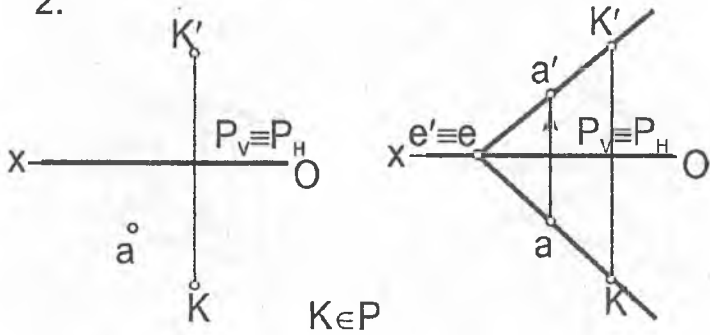
2 - misol. Berilgan tekislikning A nuqtasi orqali uning gorizontali o'tkazilsin.



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

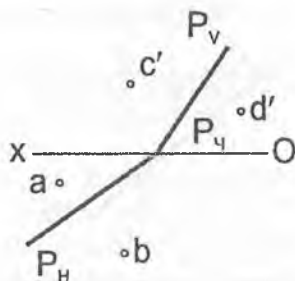
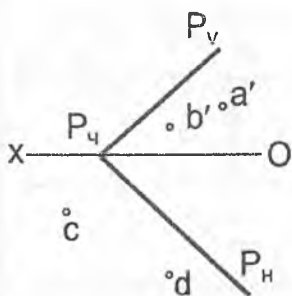


2.

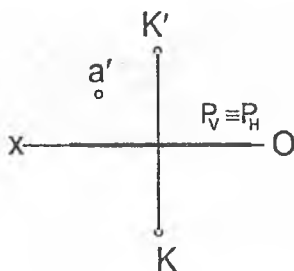
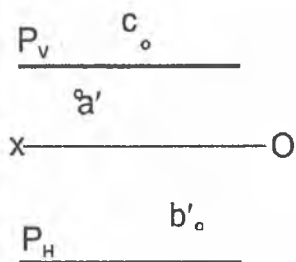


**1 - misol.** P tekislikda yotuvchi va bir proyeksiyasi berilgan A, B, C, D, nuqtalarning yetishmagan proyeksiyalari frontal yoki gorizontaal chiziqlar orqali topilsin.

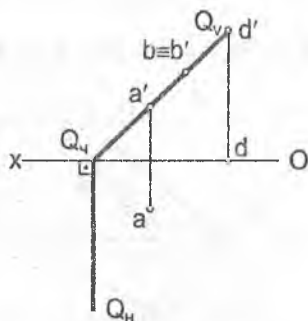
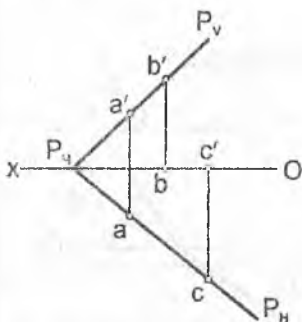
A va D – gorizontaal, B va C - frontal orqali topilsin.



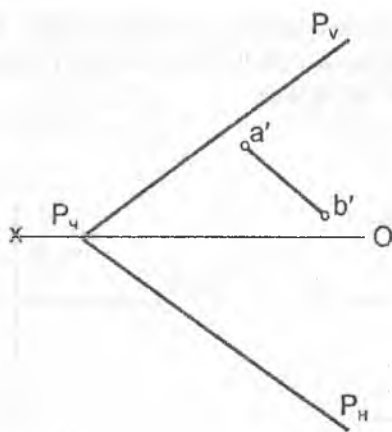
**2 - misol.** Profil proyeksiyalovchi tekislikka tegishli A, B va C nuqtalarning yetishmagan proyeksiyalari umumiy holatdagi to'g'ri chiziqlar yordamida topilsin.



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



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



**1 - Nazorat ishi****Bilet №0**

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

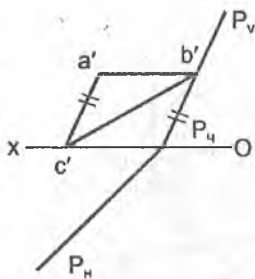
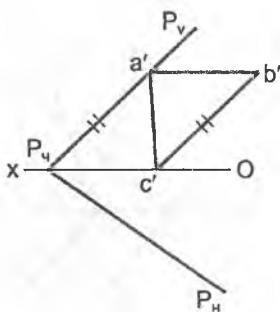
Nuqtalarning koordinatalari : A (35,65,45), B (60,40,20).

**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.

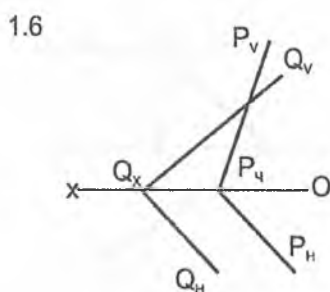
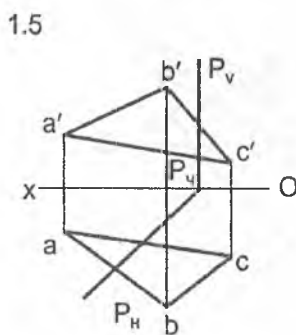
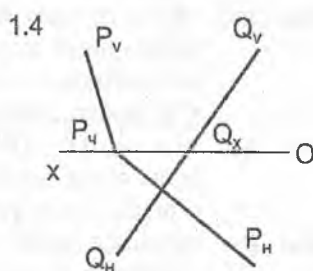
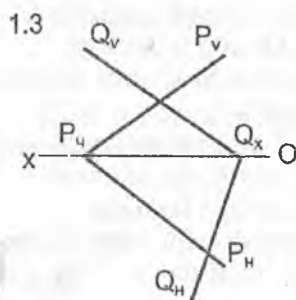
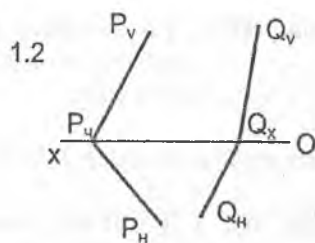
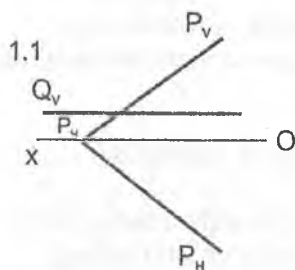
**4-masala.** AB kesmani  $AD : DB = 5 : 4$  nisbatda bo'luvchi va D nuqta orqali applikata o'qini E nuqtada kesib o'tuvchi DE gorizonta chiziq o'tkazilsin.

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

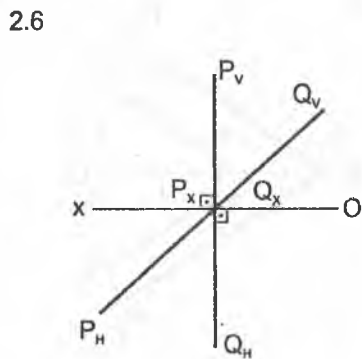
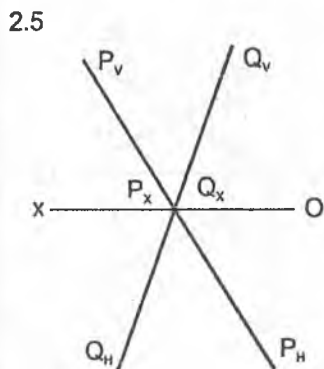
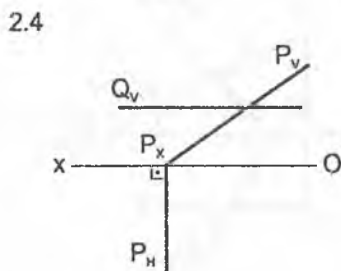
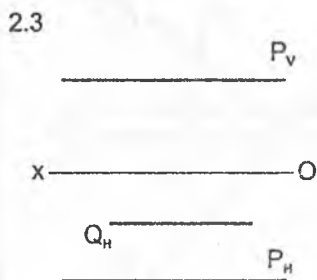
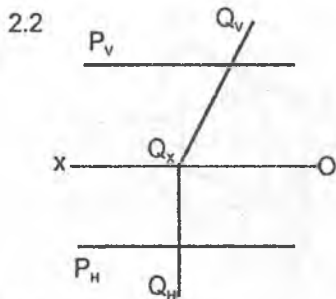
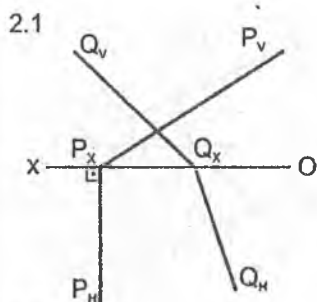




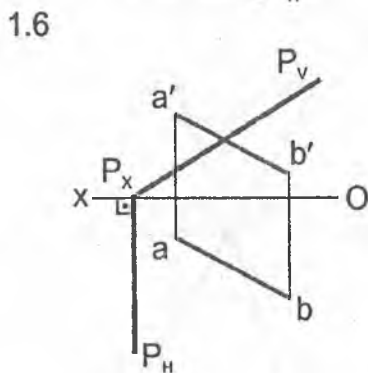
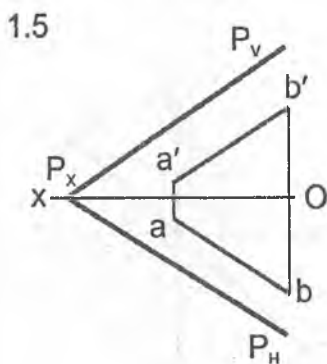
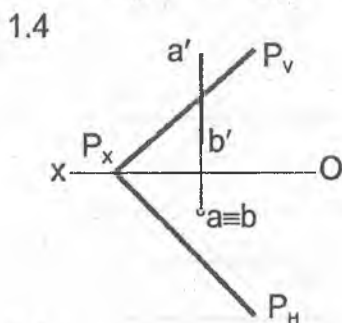
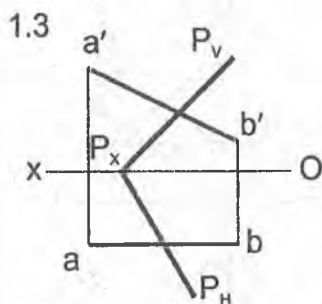
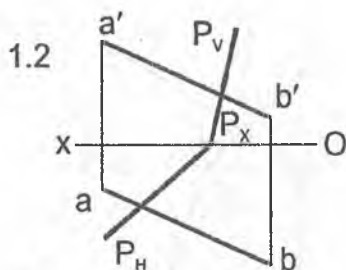
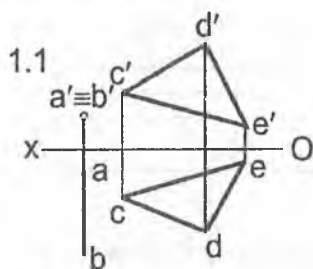
1 - misol. Berilgan tekisliklarning o'zaro kesishuv chizig'ining proyeksiyalari chizilsin.



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

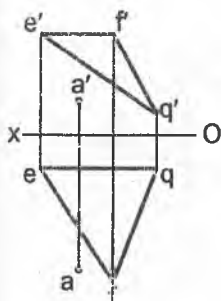


1 - misol. AB to'g'ri chiziq bilan berilgan tekisliklarning kesishish nuqtasi topilsin.

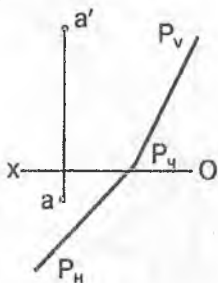


2 - misol. A nuqta orqali berilgan tekislikka perpendikular chiziq o'tkazilsin va unga 30 mm uzunlikdagi kesma o'lchab qo'yilsin.

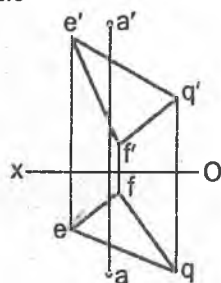
2.1



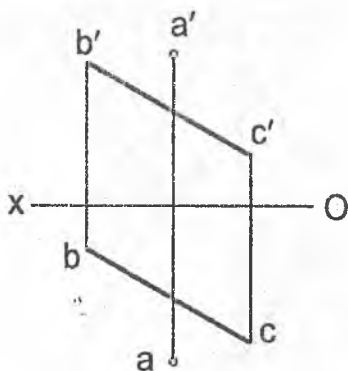
2.2



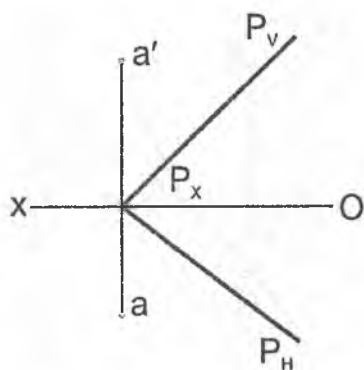
2.3



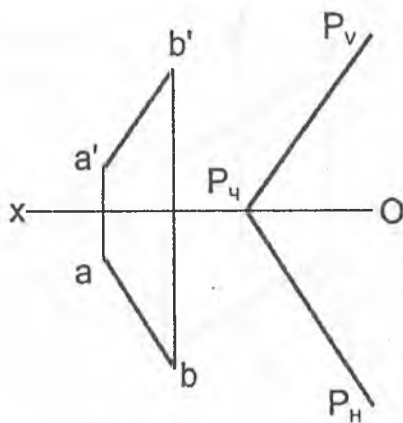
3 - misol. A nuqta orqali BC to'g'ri chiziqqa perpendikular bo'lgan P tekislik izlari bilan o'tkazilsin.



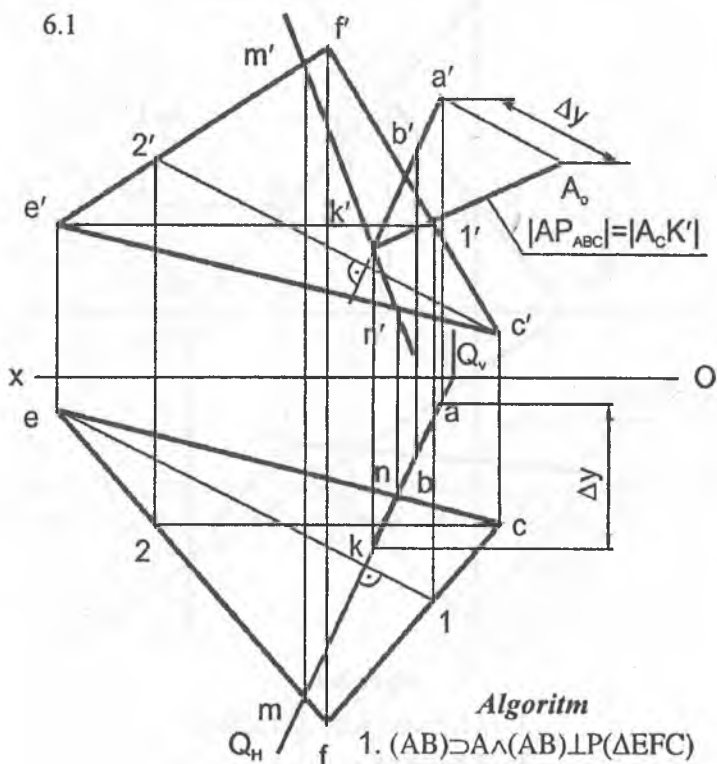
4 - misol. A nuqta  $P$  tekislikka proyeksiyalansin.



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



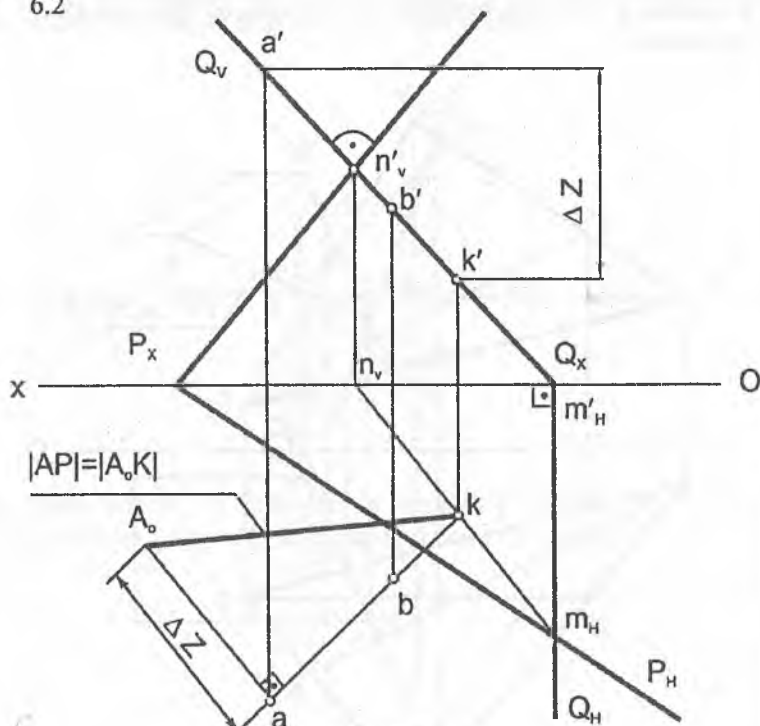
6 - misol. A nuqtadan berilgan tekislikkacha bo'lgan masofa aniqlansin.



### Algorithm

1.  $(AB) \supset A \wedge (AB) \perp P (\Delta EFC)$
2.  $(AB) \cap P = K$ 
  - 2.1  $Q(Q_v, Q_h) \supset (AB) \wedge Q \perp LH$
  - 2.2  $\theta \cap P (\Delta EFC) = (MN)$
  - 2.3  $(MN) \cap (AB) = K$
3.  $|AK| = |AP (\Delta EFC)|$

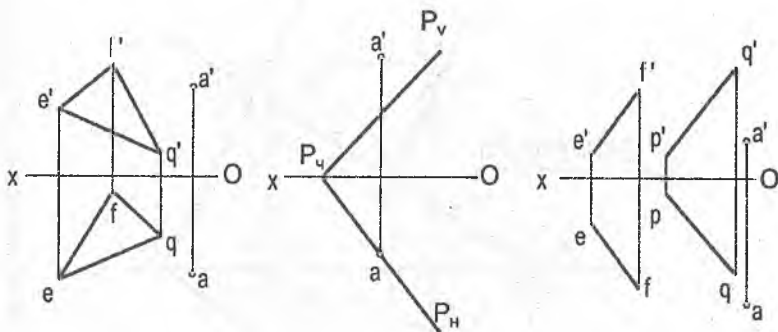
6.2



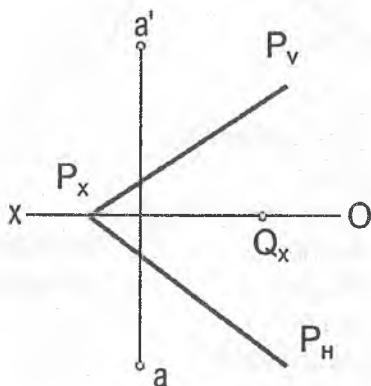
*Algorithm*

1.  $(AB) \supset A \wedge (AB) \perp P (\Delta EFC)$
2.  $(AB) \cap P = K$ 
  - 2.1  $Q(Q_v, Q_H) \supset (AB) \wedge Q \perp V$
  - 2.2  $Q \cap P = (MN)$
  - 2.3  $(MN) \cap (AB) = K$
3.  $|AK| = |AP(P_v, P_H)|$

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

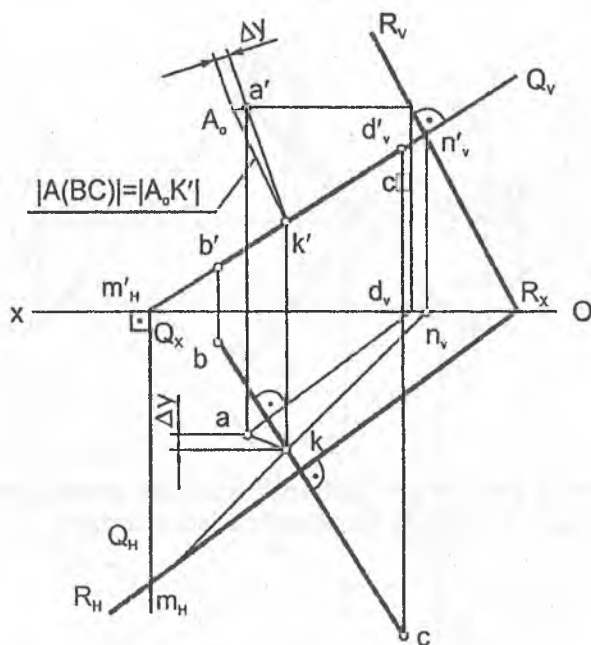


8 - misol. A nuqta orqali berilgan  $P$  tekislikka perpendikular va  $Q_x$  nuqtadan o'tuvchi  $Q$  tekislikning izlari o'tkazilsin.





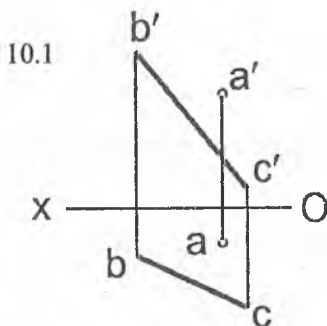
9 - misol. A nuqtadan BC to'g'ri chiziqqacha bo'lgan masofa aniqlansin.



### Algoritm

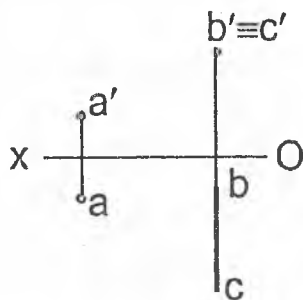
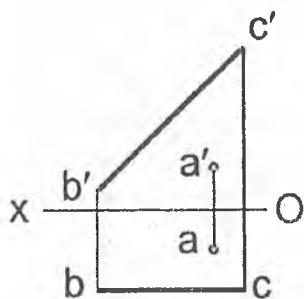
1.  $A \in R(R_v, R_H) \perp (BC)$ 
  - 1.1  $(AD) \in A \wedge (AD) \parallel H \wedge (AD) \perp (BC)$
  - 1.2  $R_v \in D \wedge R_v \perp (b'c')$
  - 1.3  $R_v \in R_x \wedge R_v \perp (bc)$
  3.  $[AK] = A_0K'$
  4.  $|AK| = |A(BC)|$
2.  $(BC) \cap R(R_v, R_H) = K$ 
  - 2.1  $R(R_v, R_H) \supset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



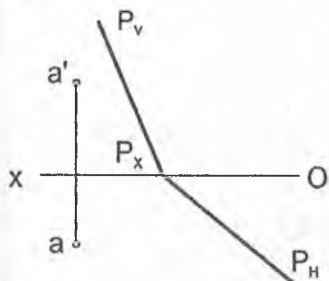
10.2

9.3

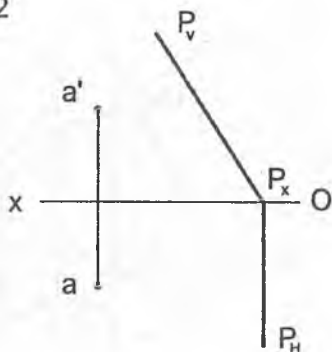


1 - misol. A nuqta orqali berilgan  $P$  va  $H$  tekisliklarga parallel  $AB$  to'g'ri chiziq o'tkazilsin va unga  $30\text{ mm}$  uzunlikda kesma o'lchab qo'yilsin.

1.1

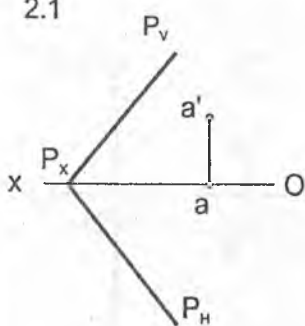


1.2

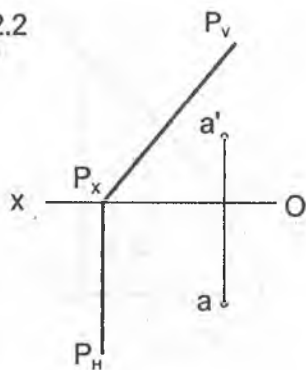


2 - misol. A nuqta orqali berilgan  $P$  tekislikka parallel bo'lgan  $G$  tekislikning izlari o'tkazilsin.

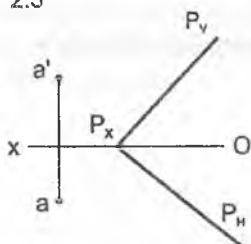
2.1



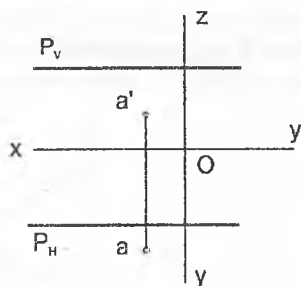
2.2



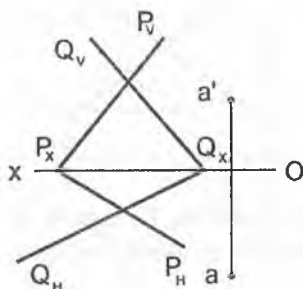
2.3



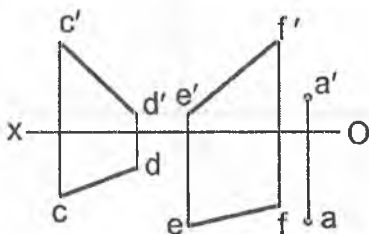
2.4



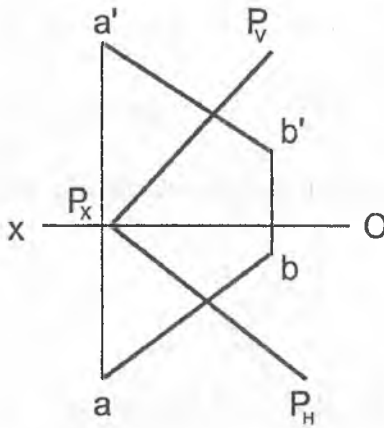
3 - misol. A nuqta orqali berilgan tekisliklarga parallel to'g'ri chiziq o'tkazilsin.



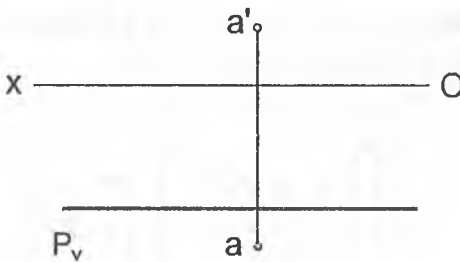
4 - misol. A nuqta orqali berilgan CD va EF ayqash chiziq'larga parallel bo'lgan tekislikning izlari o'tkazilsin.



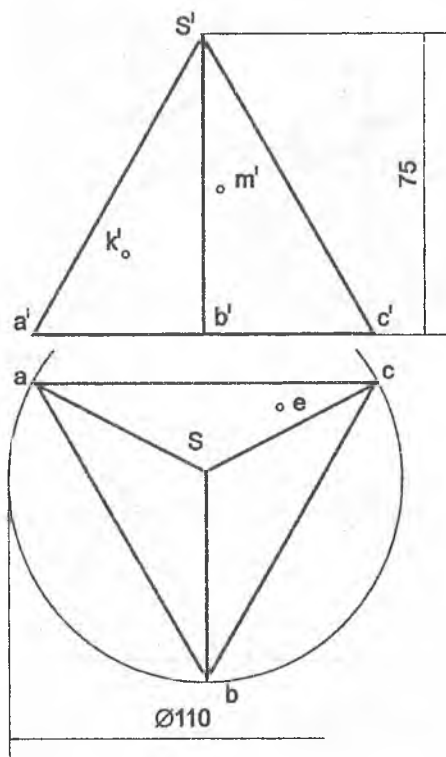
5 - misol. Berilgan tekislikdan 20 mm uzoqlikda AB to'g'ri chiziqqa tegishli C nuqta topilsin.



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

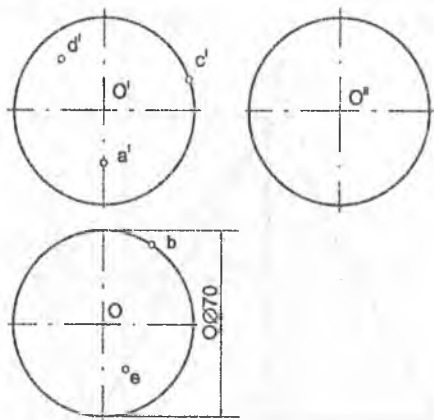


1 - misol. Geometrik jismlarning sirtida yotuvchi nuqtalarning berilgan proyeksiyalari bo'yicha ularning yetishmagan proyeksiyalari aniqlansin.



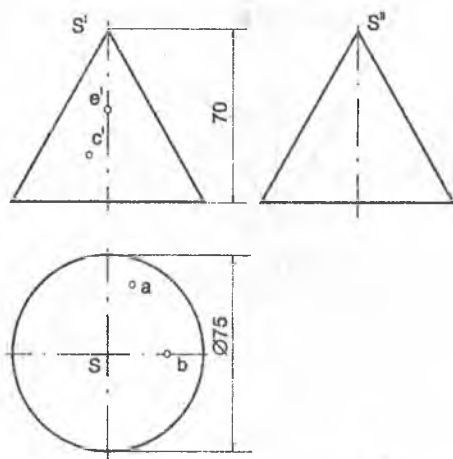
1 - rasm.

2 - misol.



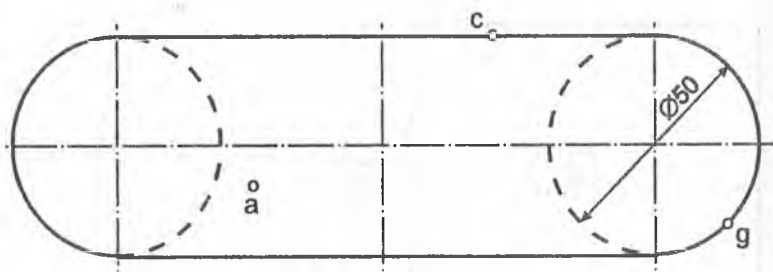
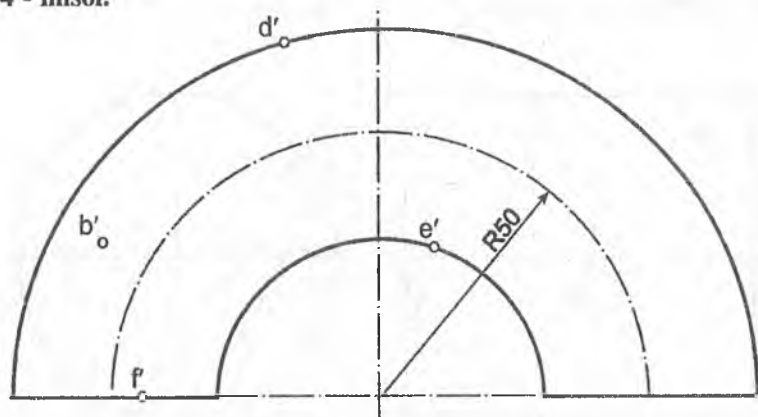
2 - rasm.

3 - misol.



3 - rasm.

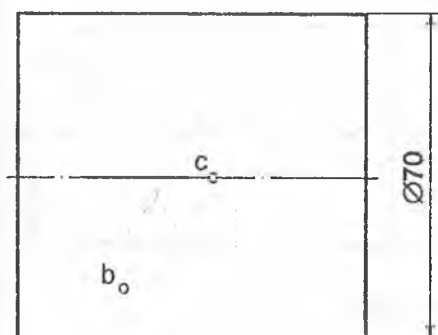
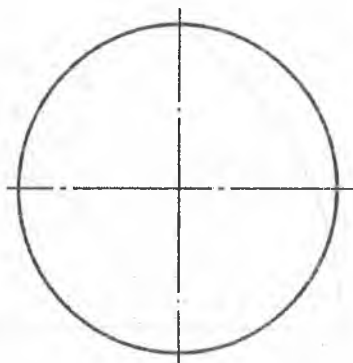
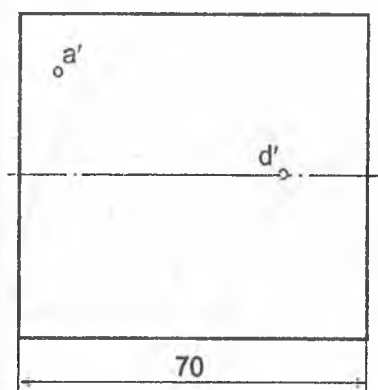
4 - misol.



4 - rasm

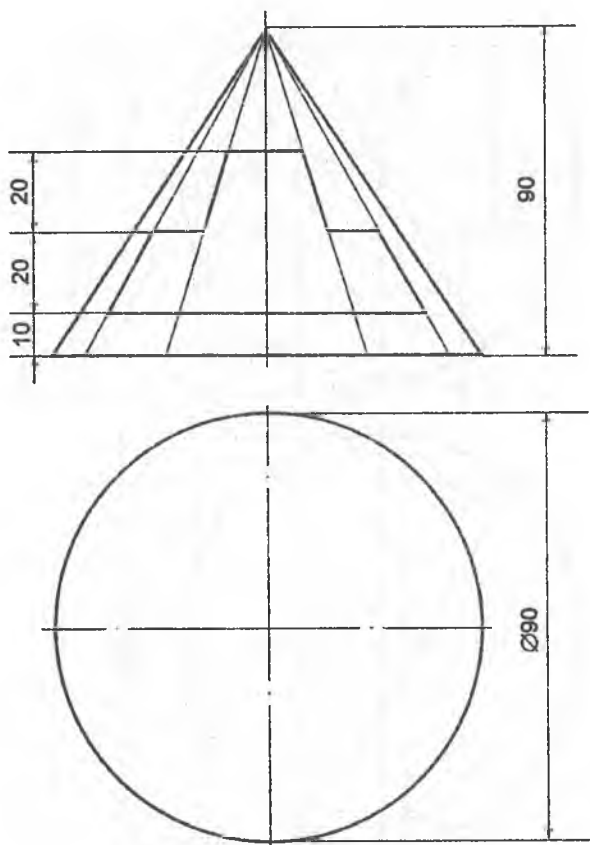


5 - misol.

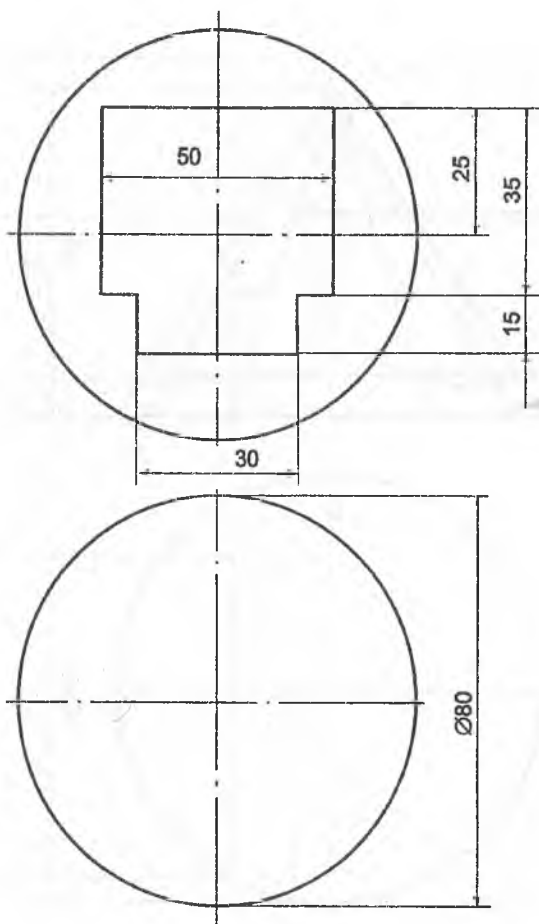


5 - rasm

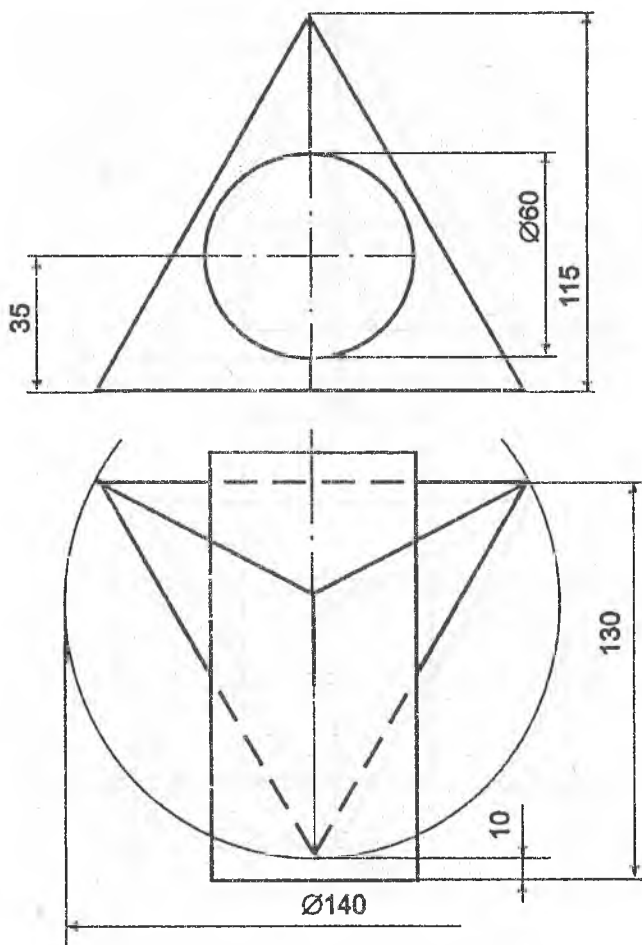
1 - misol. Konusning ko'rinar sirtiga tegishli figuraning frontal proyeksiyasi bo'yicha uning gorizontal proyeksiyasi aniqlansin.



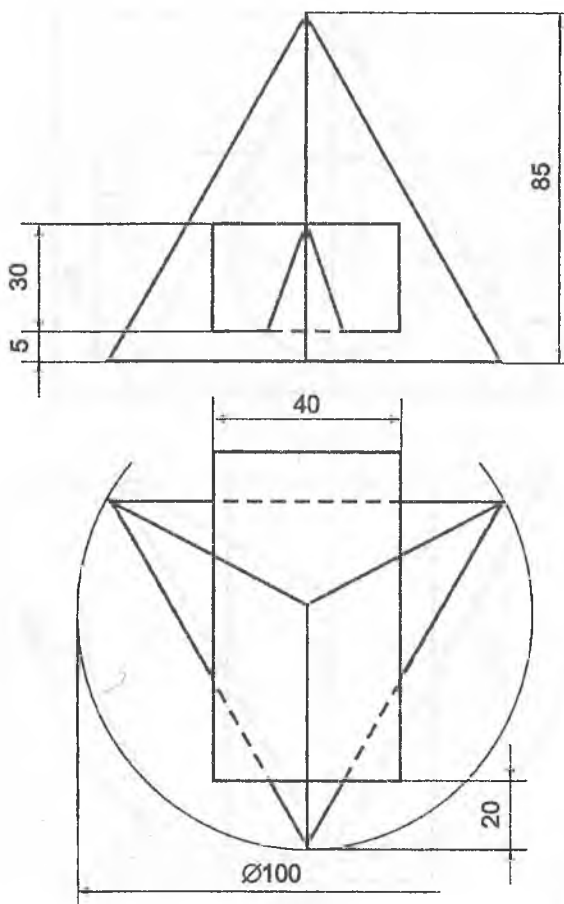
2 - misol. Teshikli sferaning gorizontaal proyeksiyasi aniqlansin.



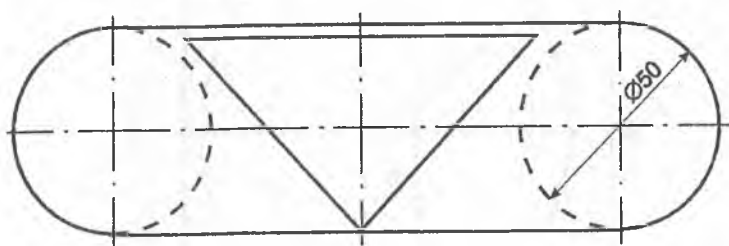
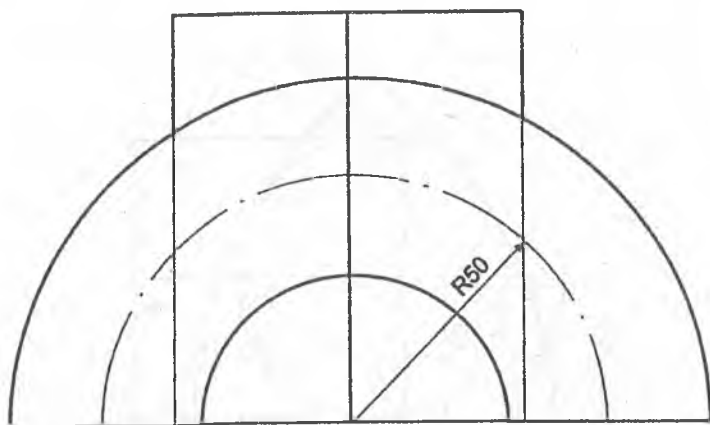
3 - misol. Geometrik jismlar bilan berilgan sirtlarning kesishgan chizig'ining proyeksiyalari aniqlansin.



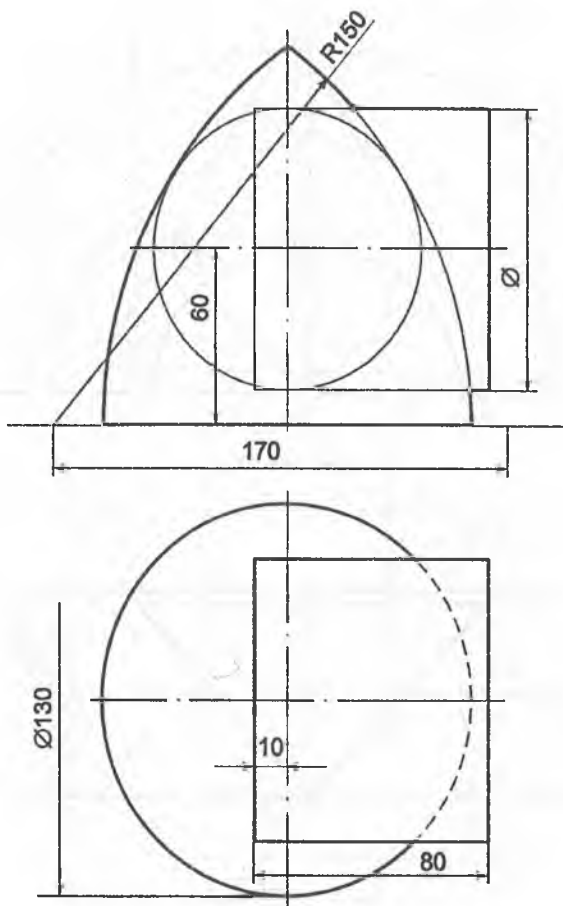
4 - misol. Berilgan geometrik sirtlarning kesishgan chizig'ining proyeksiyalari aniqlansin.



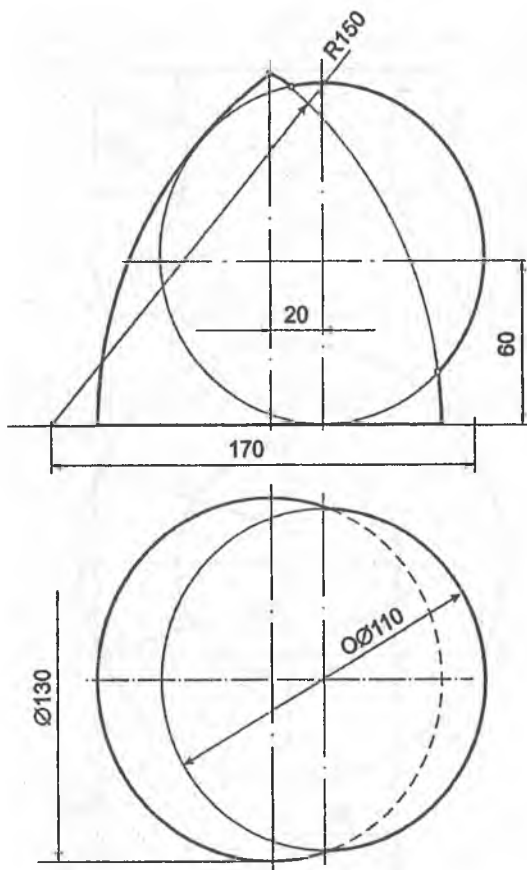
5 - misol. Geometrik sirtlarning kesishgan chizig'ining proyeksiyalari aniqlansin.



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

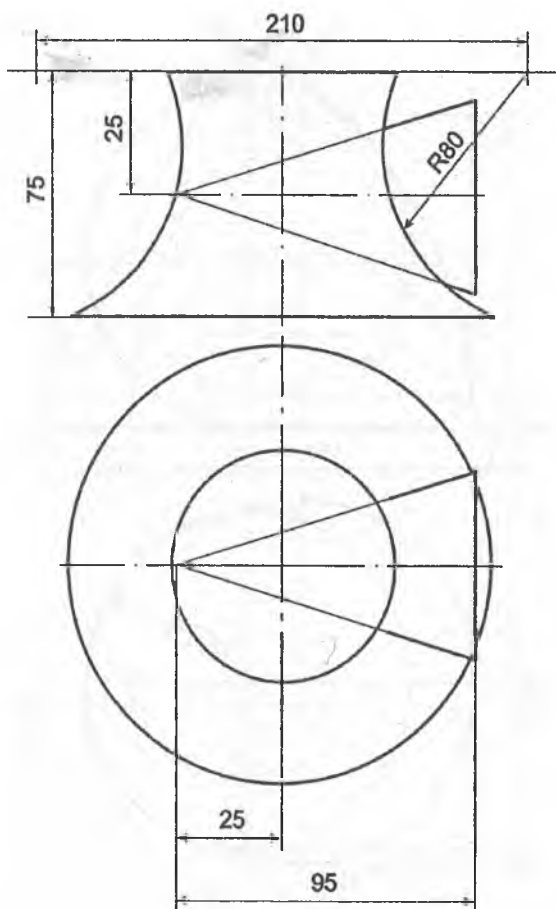


7 - misol. Geometrik jismlar sirtlarining o‘zaro kesishish chizig‘ining proyeksiyalari yordamchi sfera (shar)lar usuli bilan aniqlansin.

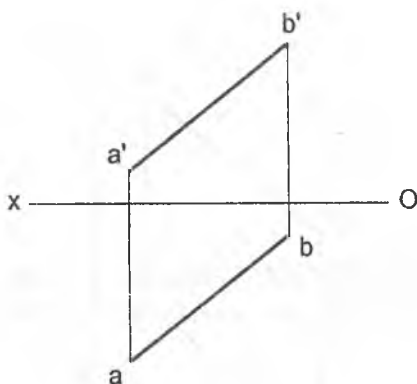




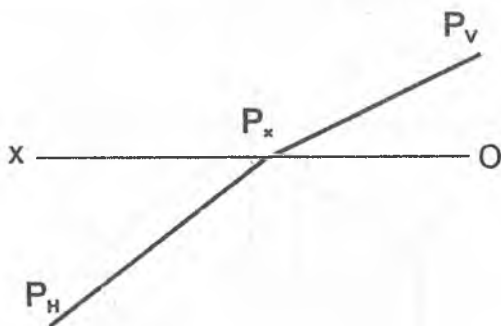
8 - misol. Geometrik jismlar sirtlarining o'zaro kesishish chizig'ining proyeksiyalari yordamchi sfera (shar)lar usuli bilan chizilsin.



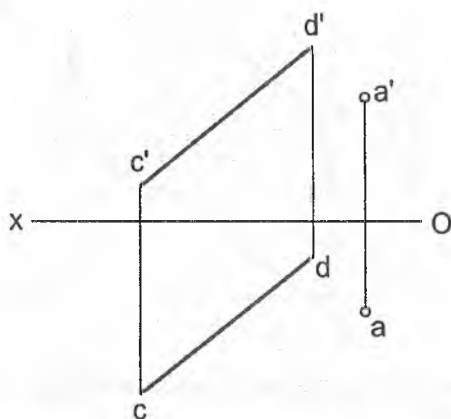
1 - misol. AB to'g'ri chiziqning H tekislikka og'ish burchagi aniqlansin.



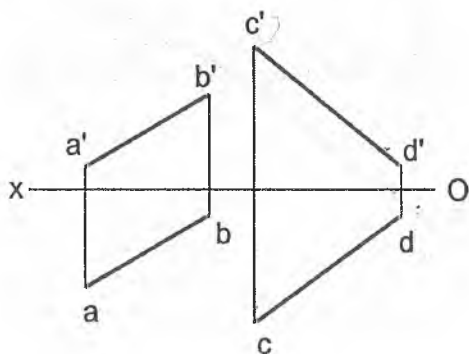
2 - misol. P tekislikning H proyeksiyalar tekisligiga og'ish burchagi chizilsin.



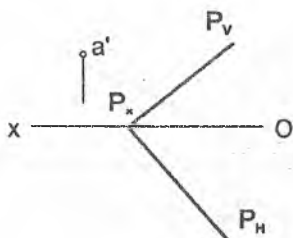
**3 - misol.** A nuqtadan CD to'g'ri chiziqqacha bo'lgan masofa aniqlansin.



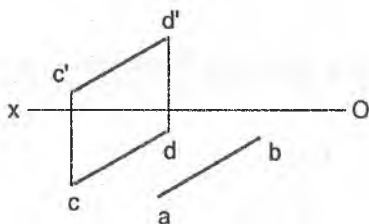
**4 - misol.** AB va CD ayqash to'g'ri chiziqlar orasidagi masofa aniqlansin.



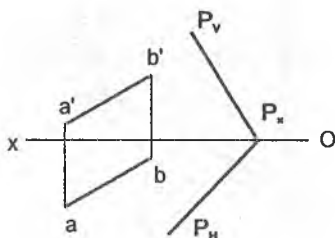
5 - misol.  $P$  tekislikdan 20 mm uzoqlikda yotuvchi  $A$  nuqtaning yetishmagan proyeksiyasi aniqlansin.



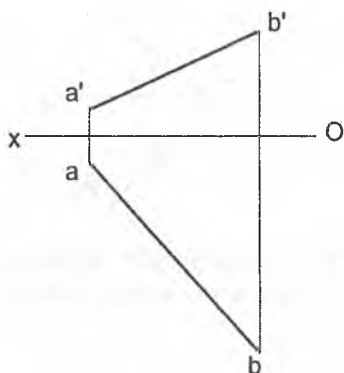
6 - misol.  $CD$  to'g'ri chiziqqa parallel va undan 20 mm uzoqlikda o'tuvchi  $AB$  to'g'ri chiziq kesmasining yetishmagan proyeksiyasi aniqlansin.



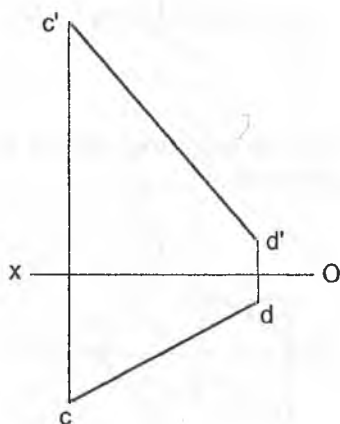
7 - misol.  $P$  tekislikdan 20 mm uzoqlikda  $AB$  to'g'ri chiziqda yotuvchi  $C$  nuqta aniqlansin.



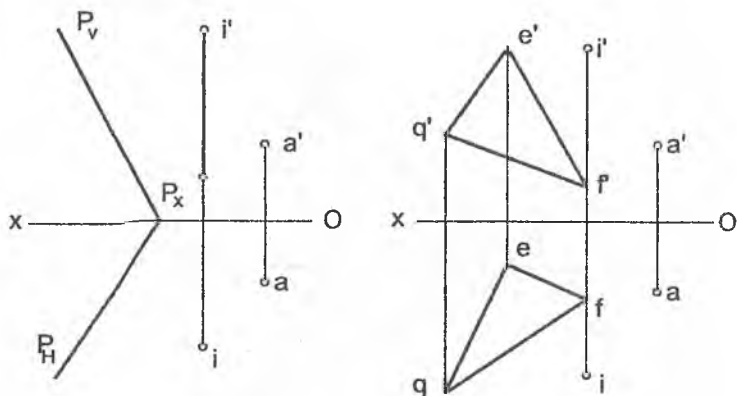
1 - misol.  $AB$  to'g'ri chiziqning  $H$  tekislikka og'ish burchagi aniqlansin.



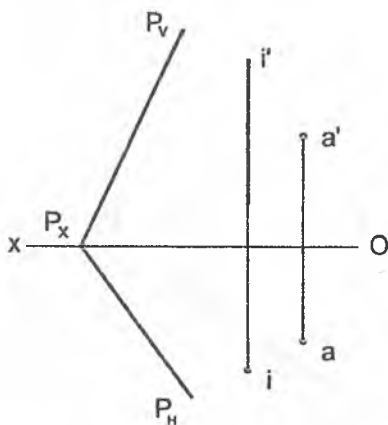
2 - misol.  $CD$  to'g'ri chiziqning  $V$  tekislikka og'ish burchagi aniqlansin.



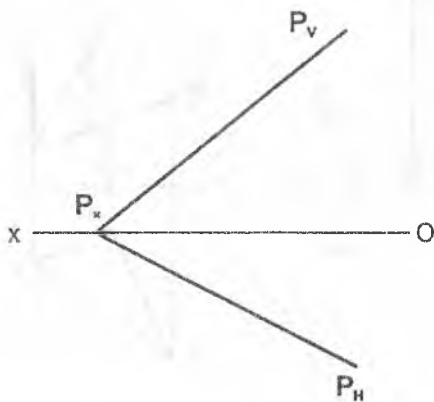
3 - misol. Berilgan  $i$  o'q atrofida aylantirish bilan A nuqta P tekislikka joylashtirilsin.



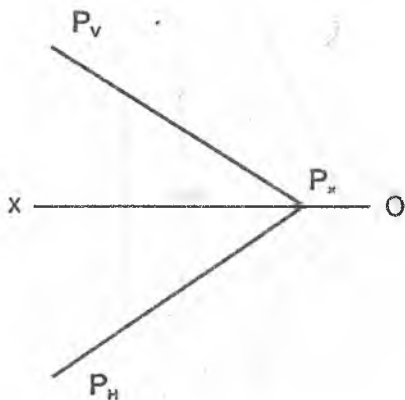
4 - misol. P tekislik berilgan  $i$  o'q atrofida A nuqta bilan jiplash-guncha aylantirilsin.



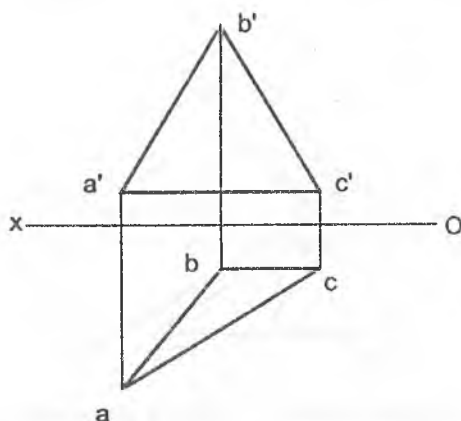
5 - misol. Aylantirish usuli bilan berilgan  $P$  tekislikning  $H$  proyeksiyalar tekisligiga og'ish burchagi aniqlansin.



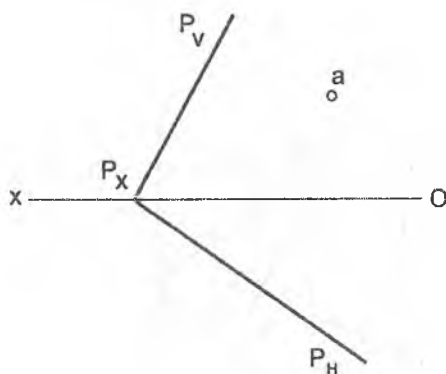
6 - misol. Aylantirish usuli bilan  $P$  tekislik profil – proyeksiyalovchi tekislik holatiga keltirilsin.



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

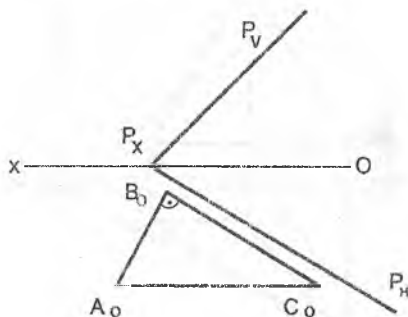


2 - misol. P tekislikda markazi A nuqta va radiusi 15 mm ga teng bo'lgan aylananing proyeksiyalari chizilsin.

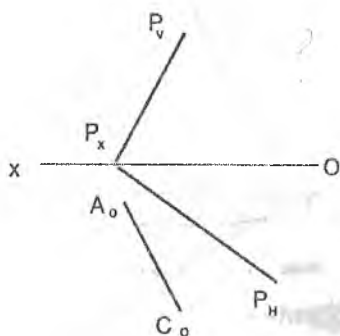




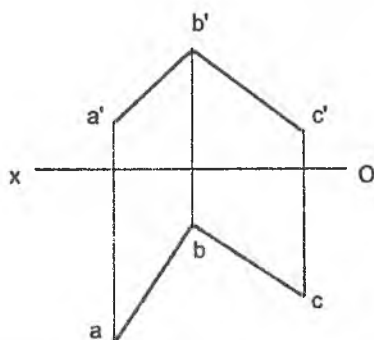
3 - misol.  $P$  tekislikka tegishli uchburchak  $ABC$  ning  $H$  tekisligi bilan joylashgan holati berilgan, uning gorizont va frontal proyeksiyalari chizilsin.



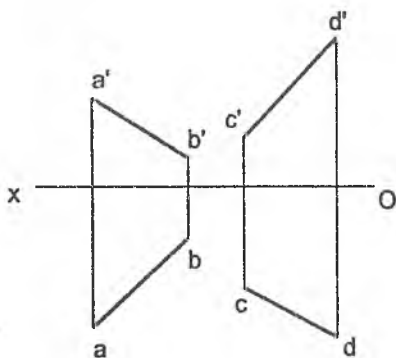
4 - misol.  $P$  tekisligida  $B$  uchi tekislikning gorizont izida yotuvchi to'g'ri burchakli  $ABC$  uchburchak chizilsin.  $A_0C_0$  gipotenuza  $AC$  ning joylashgan holati.



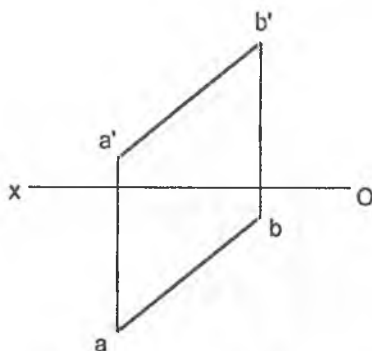
1 - misol. AB va BC kesishgan to'g'ri chiziqlar orasidagi burchakning haqiqiy qiymati aniqlansin.



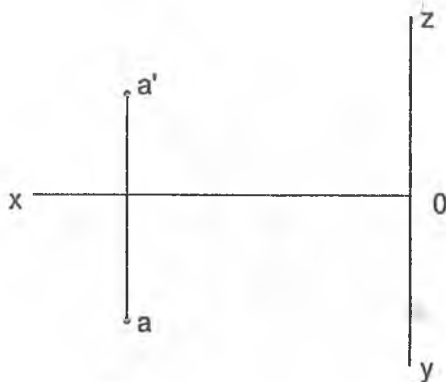
2 - misol. AB va CD uchrashmas to'g'ri chiziqlar orasidagi burchakning haqiqiy qiymati aniqlansin.



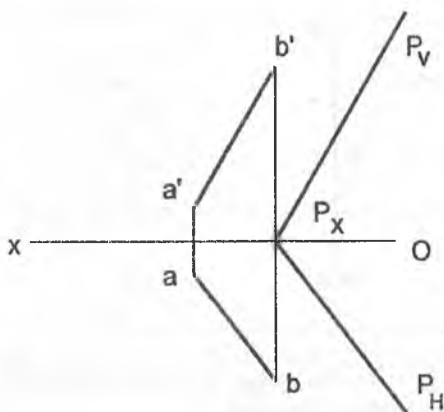
3 - misol.  $AB$  va  $OX$  o'q orasidagi burchakning haqiqiy qiymati aniqlansin.



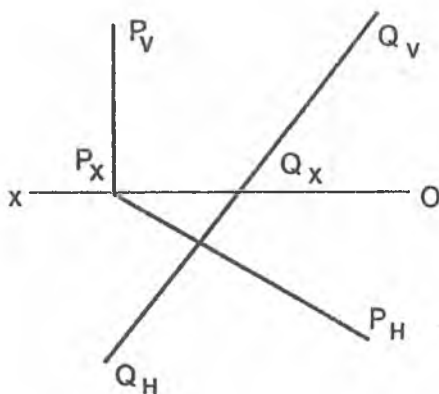
4 - misol. A nuqta orqali  $OY$  o'qini  $60^\circ$  burchak ostida kesib o'tuvchi  $AB$  to'g'ri chiziq chizilsin.



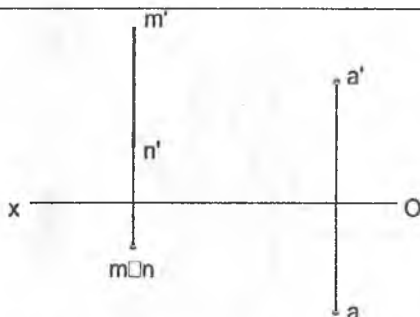
5 - misol. AB to'g'ri chiziq bilan P tekislik orasidagi burchakning haqiqiy qiymati aniqlansin.



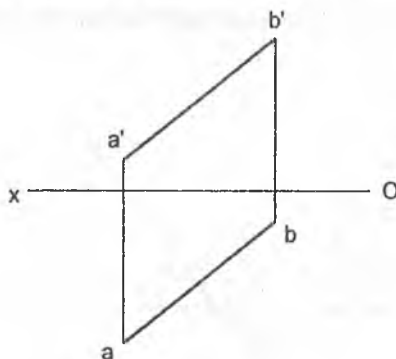
6 - misol. Q va P tekisliklar orasidagi burchakning haqiqiy qiymati aniqlansin.



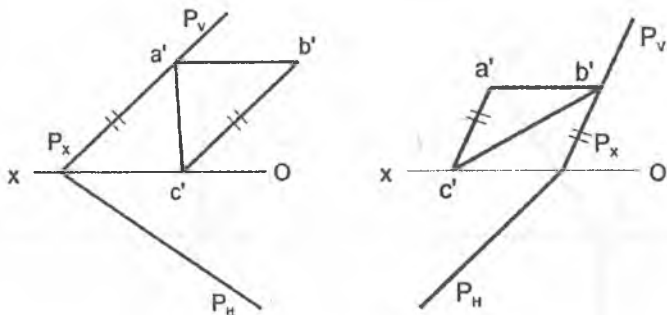
7 - misol. A nuqta orqali MN to'g'ri chiziqdan 30 mm uzoqda va H tekisligi bilan  $60^\circ$  burchak hosil qiluvchi to'g'ri chiziq o'tkazilsin.



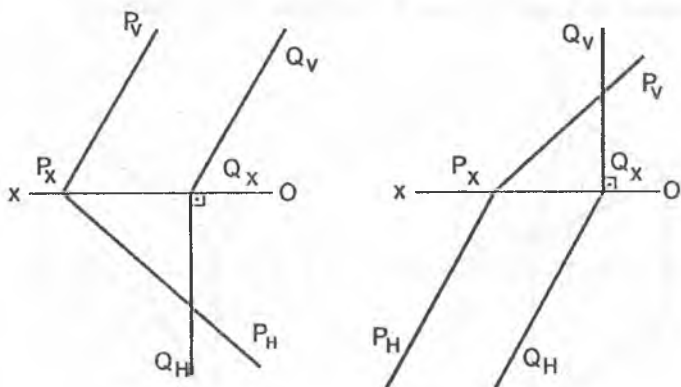
8 - misol. AB to'g'ri chiziq orqali H tekisligi bilan  $60^\circ$  burchak hosil qiluvchi P tekislik o'tkazilsin.



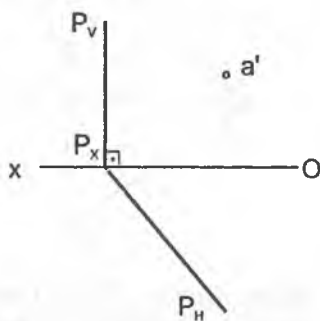
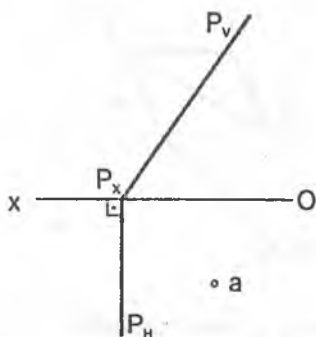
1 - misol.  $P$  tekislikka tegishli  $ABC$  uchburchakning gorizontall proyeksiyasi aniqlansin.



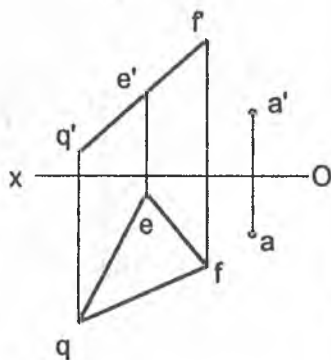
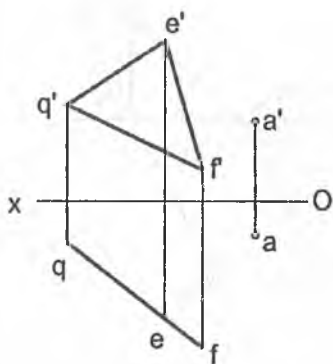
2 - misol. Berilgan  $P$  va  $Q$  tekisliklarning o'zaro kesishish chizig'ining proyeksiyalari aniqlansin.



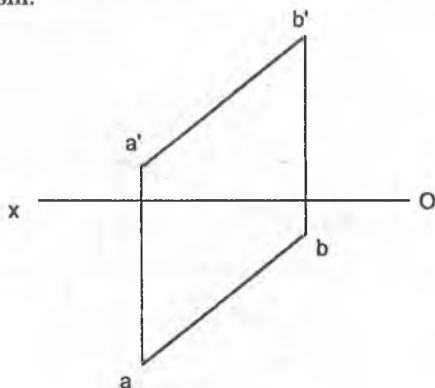
3 - misol. Berilgan  $P$  tekislikdan  $30\text{ mm}$  uzoqlikda yotuvchi  $A$  nuqtaning yetishmagan proyeksiyasi aniqlansin.



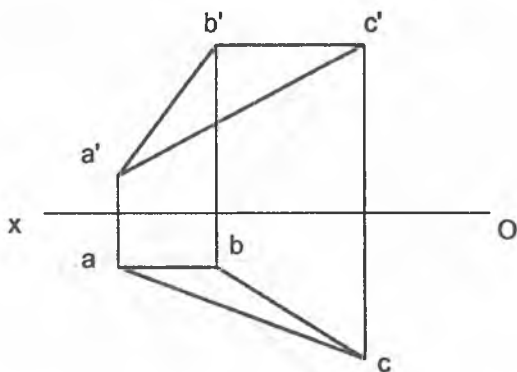
4 - misol.  $A$  nuqta berilgan  $P$  tekislikka proyeksiyalansin.



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

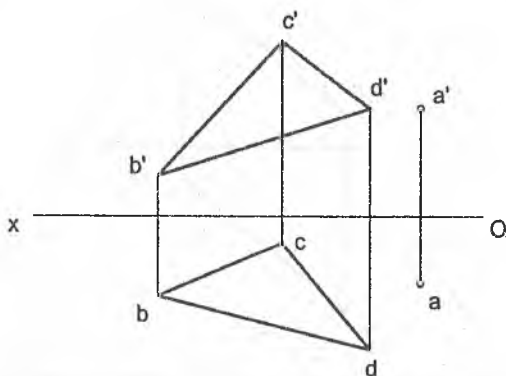


2 - misol. Aylantirish usuli bilan ABC uchburchakning haqiqiy ko'rinishi aniqlansin.

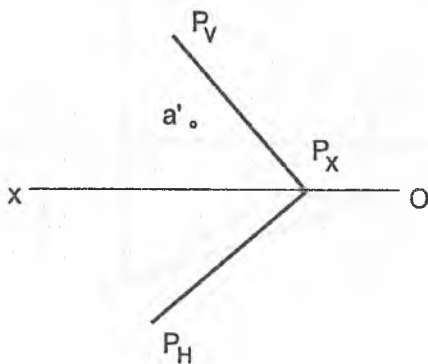




3 - misol. A nuqtadan BCD uchburchak tekisligigacha bo'lgan masofa almashtirish usuli bilan aniqlansin.



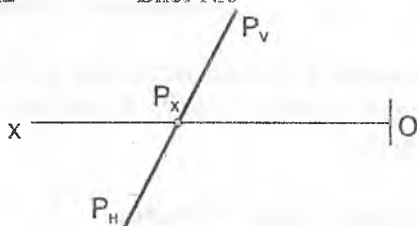
4 - misol. P tekisligida yotuvchi A nuqta H tekislikka joylash-tirilsin.



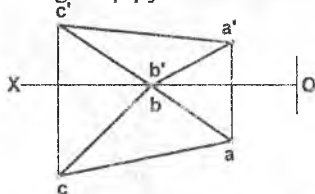
## Nazorat ishi №2

## Bilet №0

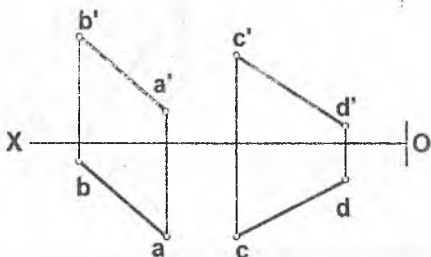
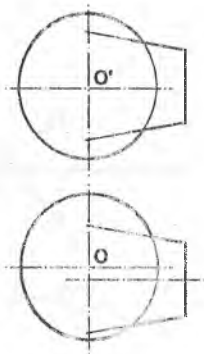
1. Parallel proyeksiyalash usulining xossalarini tushuntirib bering.
2. P tekislikdan 30 mm. uzoqlikda unga parallel bo'lgan tekislik chizilsin.



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.

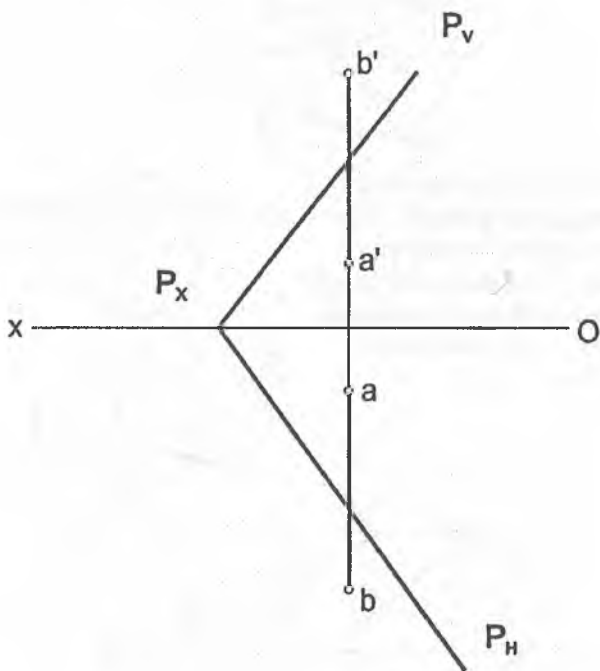


### Masalalarni yechish namunasi

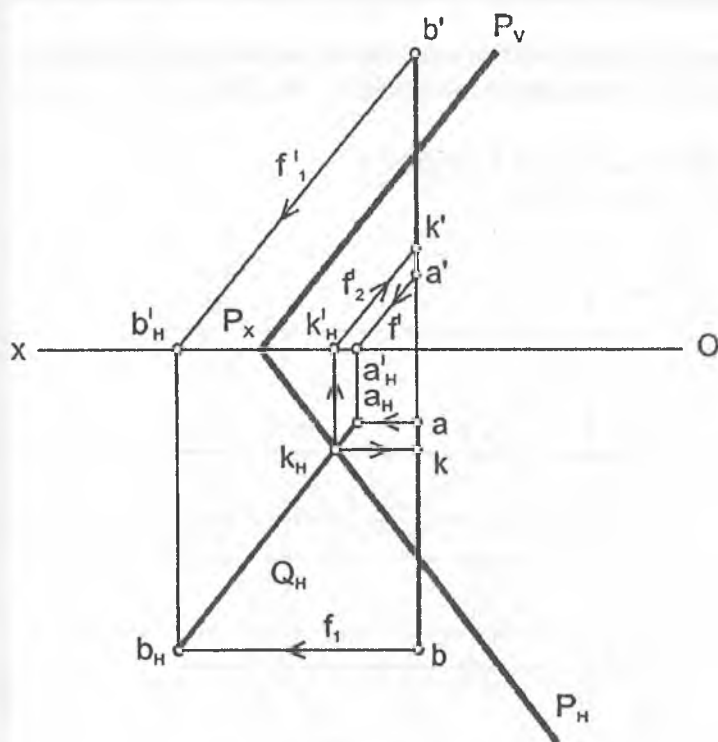
**1-masala.** Profil holatda berilgan  $[AB]$  to'g'ri chiziq kesmasini umumiy vaziyatdagi  $P(P_H, P_V)$  tekisligi bilan kesishgan nuqtasi topilsin.

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

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



## Yakuniy yozma ishga doir masalalar



*Masalani yechish tartibi*

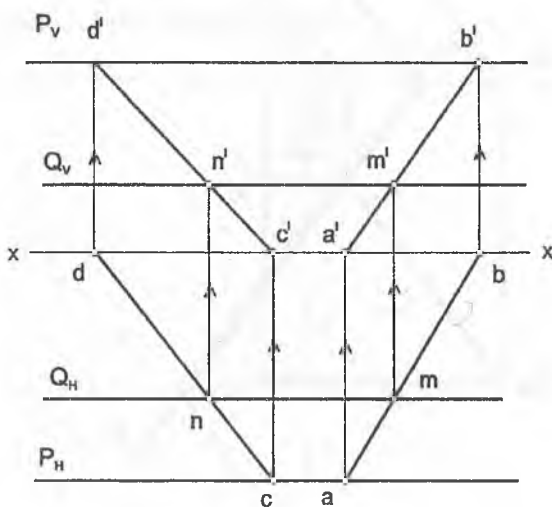
1.  $(\bullet)A \in P_v \parallel P_v \wedge (\bullet)B \in f_{01} \parallel P_v$
2.  $f_0 \cap H = A_H \wedge f_{01} \cap H = B_H$
3.  $(\bullet)A_H \cup (\bullet)B_H = [A_H B_H]$
4.  $[A_H B_H] \cap P_H = (\bullet)K_H$
5.  $(\bullet)K_H \in f_{02} \Rightarrow f_{02} \cap [AB] = (\bullet)K \Rightarrow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

## 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:  $(MN) = P \cap Q$

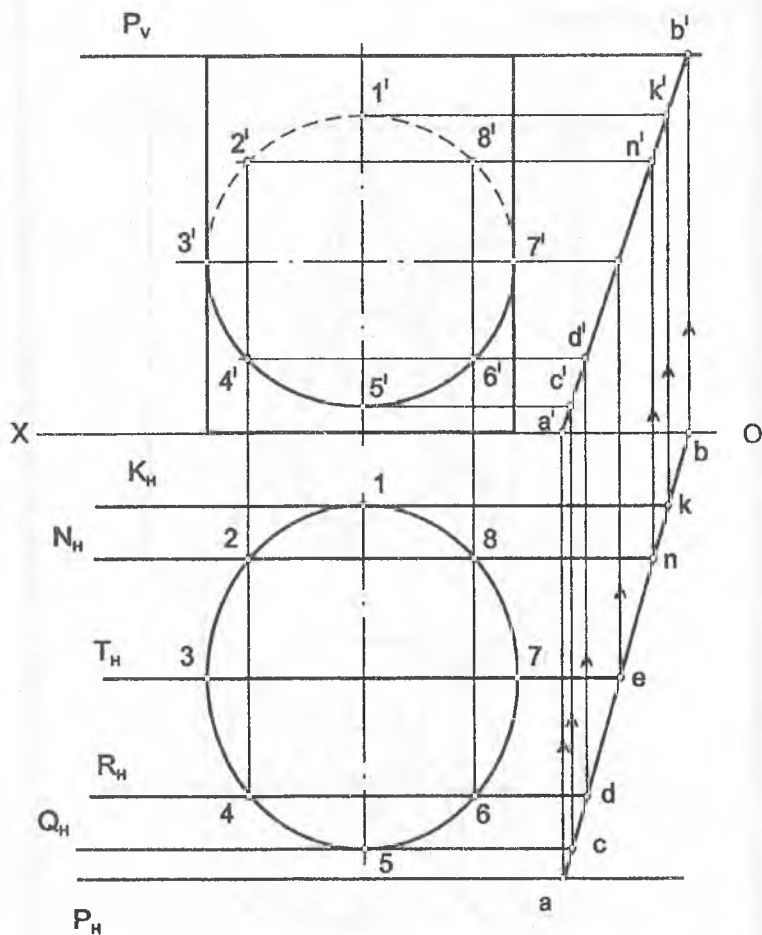


*Masalani yechish algoritmi*

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

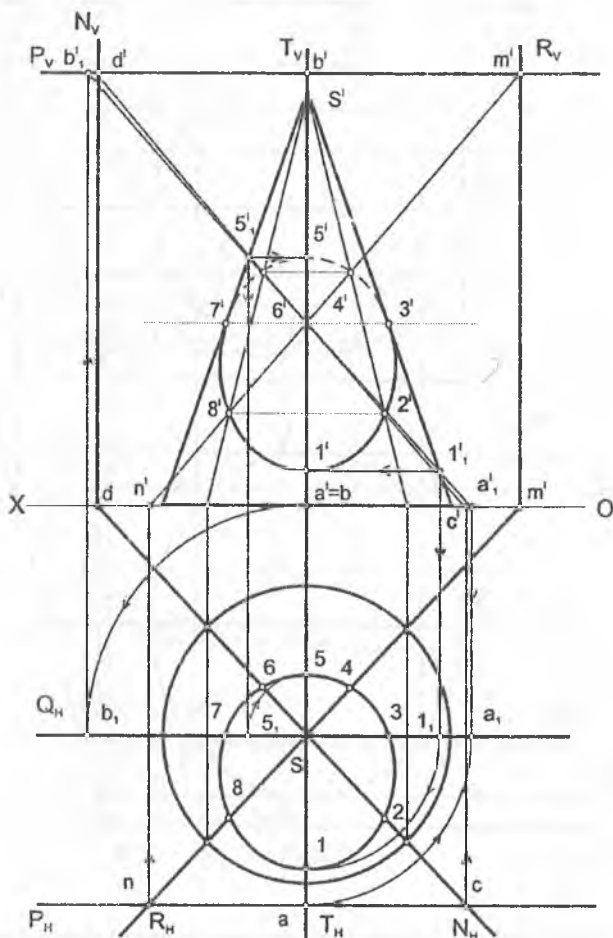
## Yakuniy yozma ishga doir masalalar

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



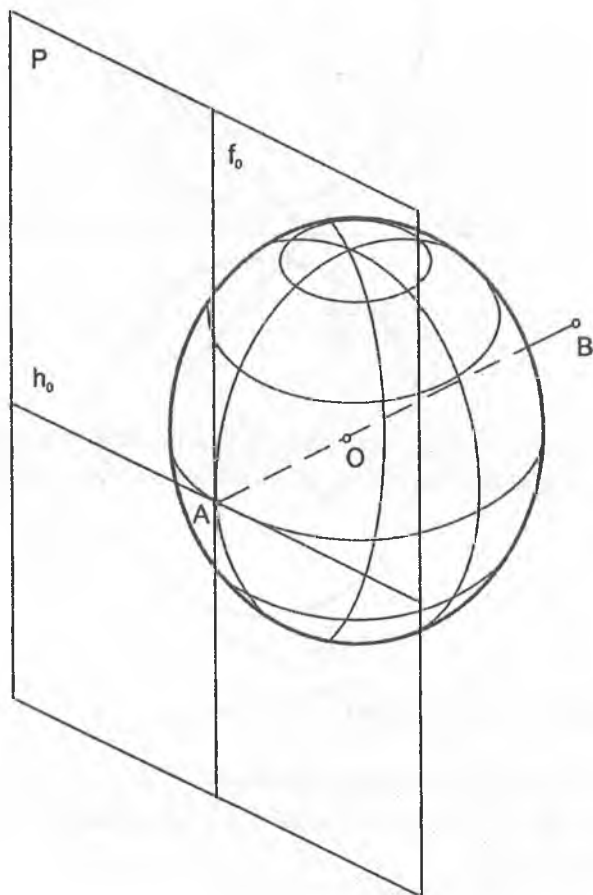
## Yakuniy yozma ishga doir masalalar

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



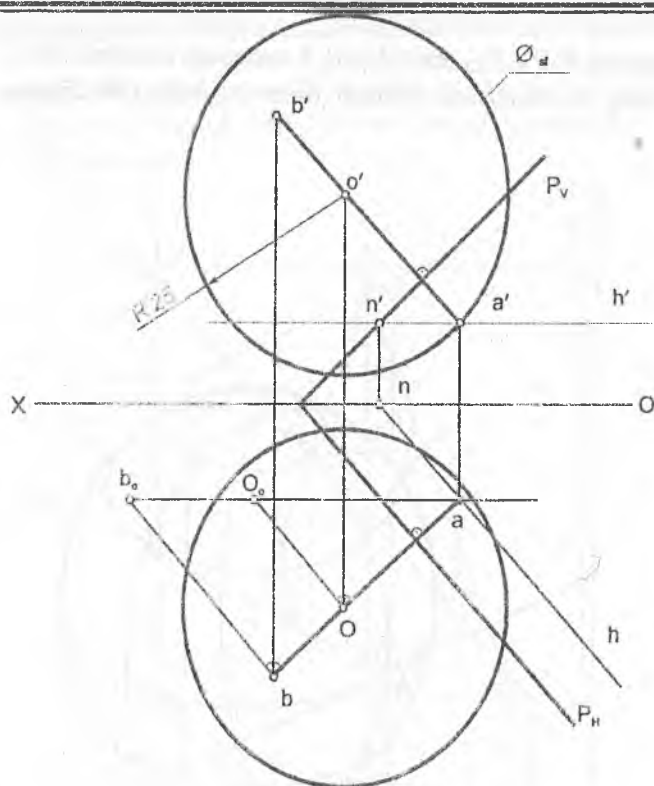
## Yakuniy yozma ishga doir masalalar

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





## Yakuniy yozma ishga doir masalalar

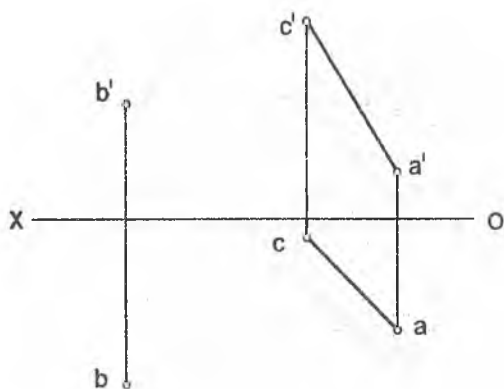


### Masalani yechish algoritmi

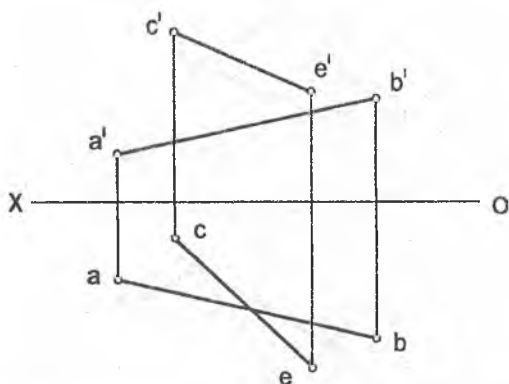
1.  $(\cdot)A \in h_v \Rightarrow (\cdot)a' \in h' \parallel ox \wedge a \in h \parallel P_H$
2.  $(\cdot)A \in [AB] \perp P \Rightarrow (\cdot)a' \in a \in [a'b'] \perp P_v \wedge (\cdot)a \in [ab] \perp P_H \wedge \forall (\cdot)B$
3.  $[aB_0] = [AB]$
4.  $[aO_0] = [AB] = 25 \text{ mm}$
5.  $(\cdot)O \in \text{O}_{sf} = 25 \text{ mm} \wedge \text{O}_{sf} \perp (\cdot)A \in P$

## Yakuniy yozma ishga doir masalalar

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

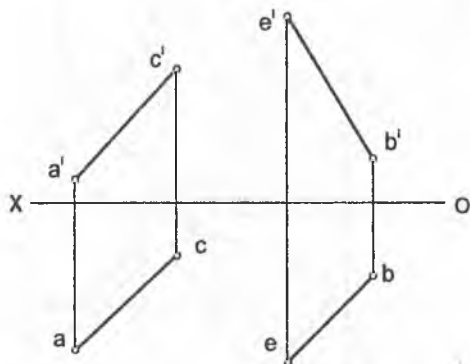


7-masala. Profil proyeksiyasidan foydalanmay, AB va CE to'g'ri chiziqlarni kesib o'tadigan va  $OX$  o'qqa parallel bo'lgan to'g'ri chiziq o'tkazilsin.

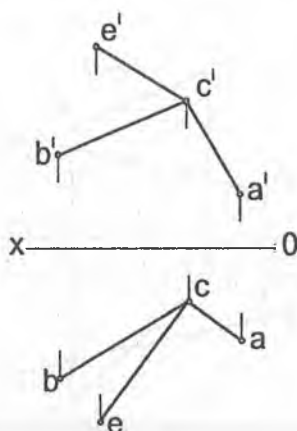


## Yakuniy yozma ishga doir masalalar

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

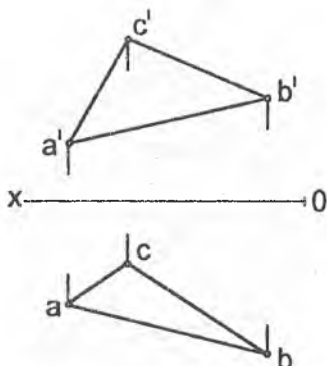


**9-masala.** CE to'g'ri chiziqda ABC tekislikdan 40 mm uzoqlikda nuqta topilsin.

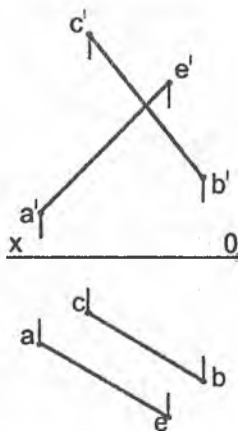


## Yakuniy yozma ishga doir masalalar

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

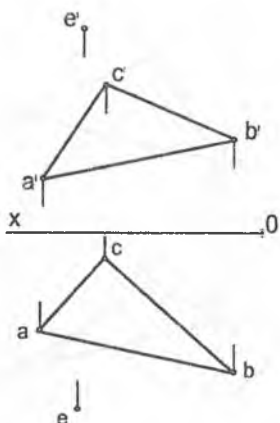


**11-masala.** AE kesmani katet qilib, to'g'ri burchagining uchi A nuqtada bo'lgan va uchinchi uchi CB to'g'ri chiziqda yotuvchi to'g'ri burchakli uchburchak chizilsin.

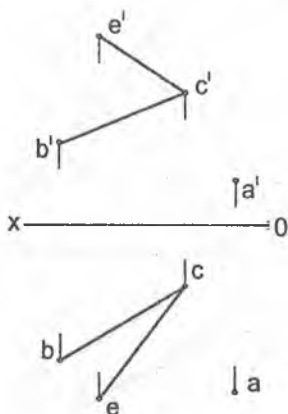


## Yakuniy yozma ishga doir masalalar

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

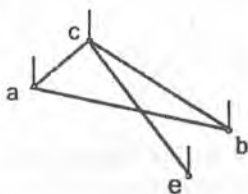
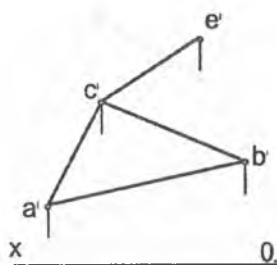


**13-masala.** A nuqtadan BCE tekislikkacha bo'lgan masofaning haqiqiy uzunligi aniqlansin.

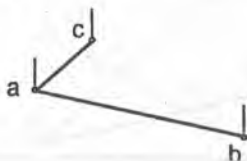
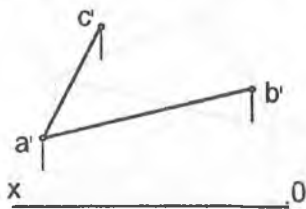


## Yakuniy yozma ishga doir masalalar

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

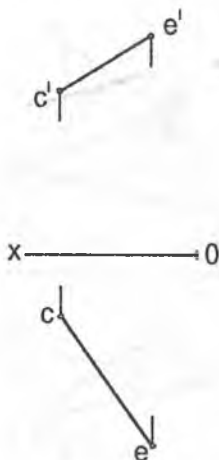


**15-masala.** Tomonlaridan birini AB kesma qilib, diagonalining yo'nalishi CA chizig'ida yotgan romb chizilsin.

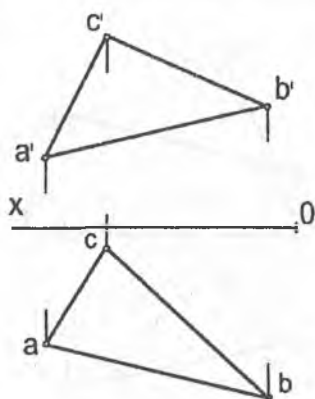


## Yakuniy yozma ishga doir masalalar

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

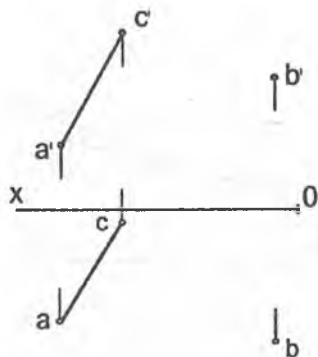


17-masala. ABC uchburchakning B uchidan o'tuvchi balandlikning haqiqiy uzunligi topilsin.

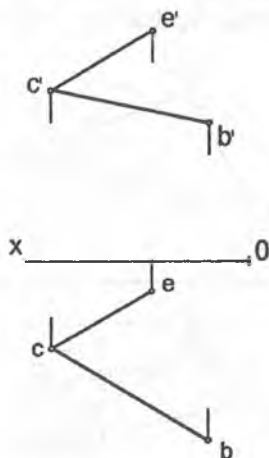


## Yakuniy yozma ishga doir masalalar

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



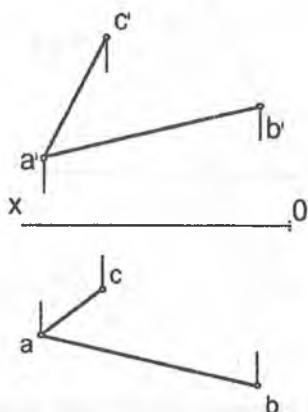
**19-masala.** Kateti  $CE$  kesmaga teng bo'lgan va gipotenuzasi  $CB$  to'g'ri chiziqda o'tgan to'g'ri burchakli uchburchak chizilsin.



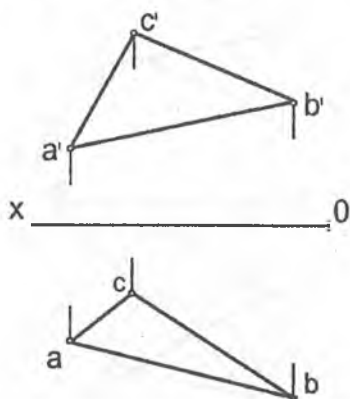


## Yakuniy yozma ishga doir masalalar

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

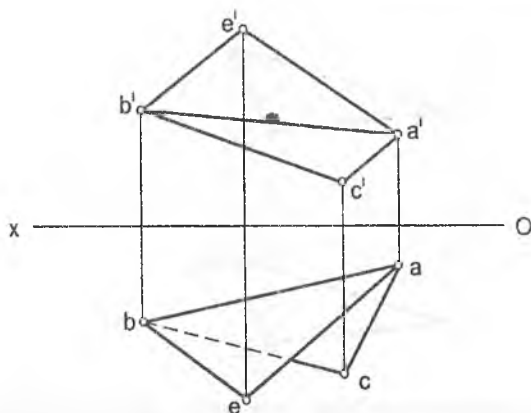


**21-masala.** ABC tekislikning H va V tekisliklarga og'ish bur-chaklarining haqiqiy qiymati topilsin.

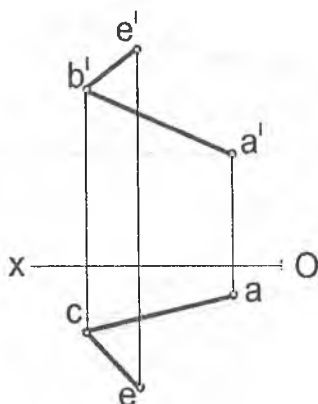


## Yakuniy yozma ishga doir masalalar

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

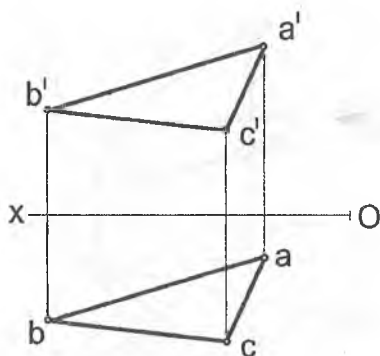


**23-masala.** Almashtirish usulidan foydalanib,  $ABE$  burchak tomonlariga urinma bo'lgan, radiusi  $15\text{ mm}$  li aylana yoyining markazi va urinish nuqtalari topilsin.

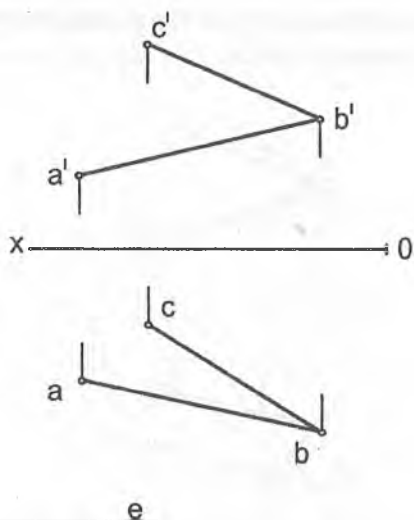


## Yakuniy yozma ishga doir masalalar

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

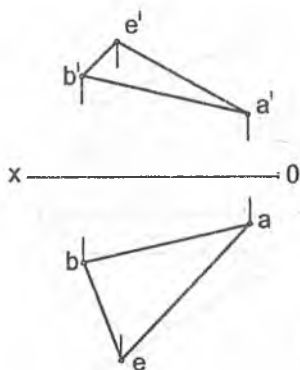


25-masala. Almashtirish usulidan foydalanib,  $ABC$  tekislikdan 30 mm uzoqlikda tekislik o'tkazilsin.

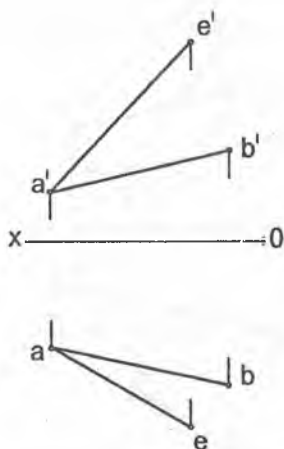


## Yakuniy yozma ishga doir masalalar

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

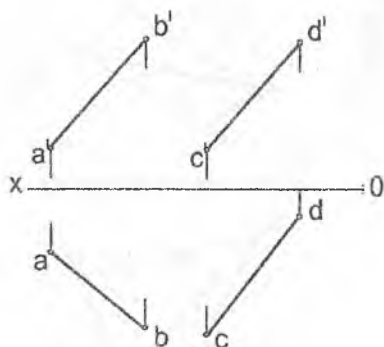


**27-masala.** Almashtirish usulidan foydalanib, yon tomonlaridan biri  $AB$  kesma va asosi  $AE$  to'g'ri chiziqda yotuvchi teng yonli uchburchak chizilsin.

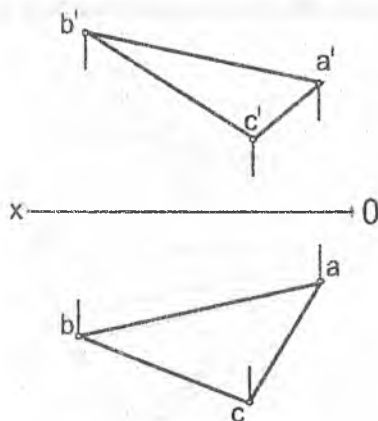


## Yakuniy yozma ishga doir masalalar

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.

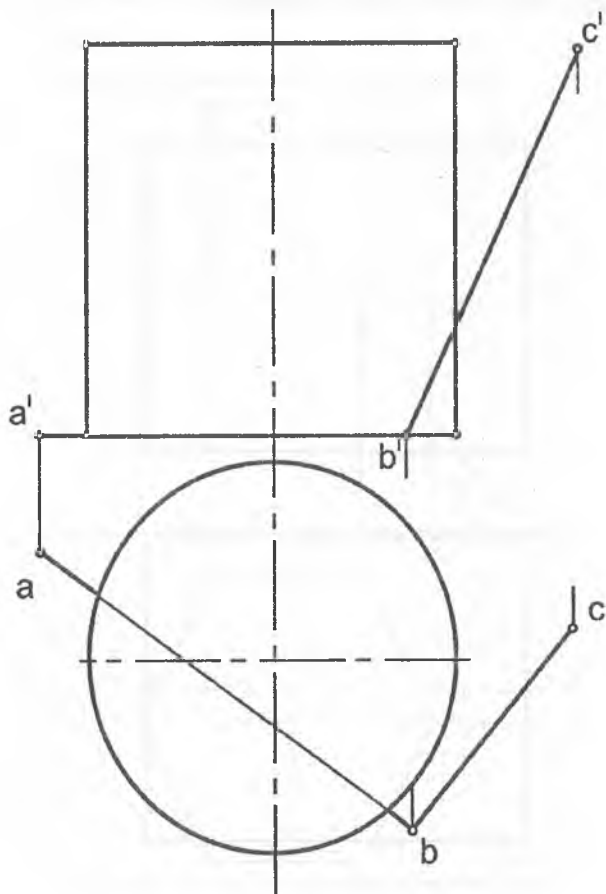


33-masala. Almashtirish usulidan foydalanib, ABC uchburchakning tashqarisiga urinma chizilgan aylananing markazi topilsin.



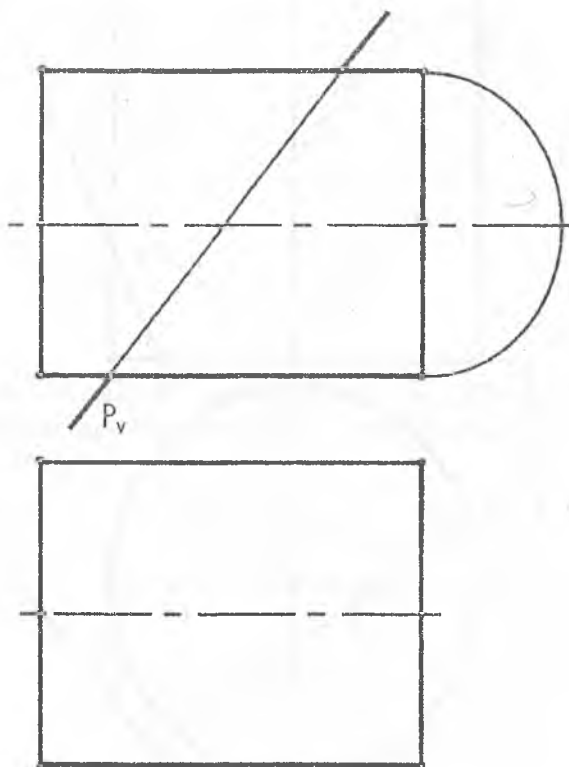
## Yakuniy yozma ishga doir masalalar

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



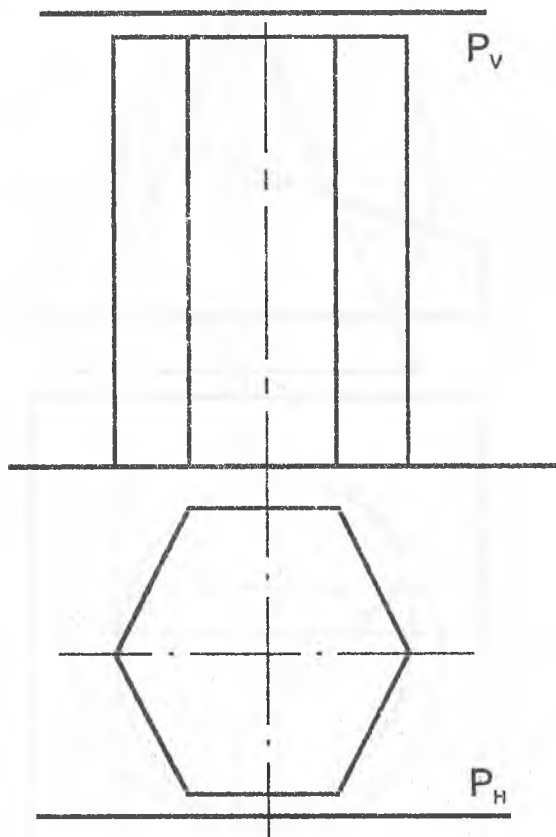
## Yakuniy yozma ishga doir masalalar

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

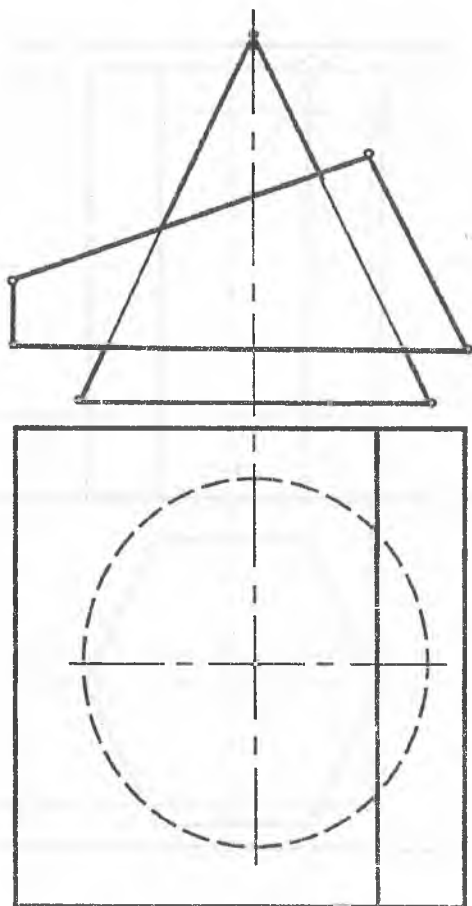
36-masala. Profil proyeksiyasidan foydalanmay, berilgan sirt bilan  $P(P_H, P_V)$  tekislikning kesishgan chizig'ining proyeksiyalari topilsin. Tekislikni shaffof deb qabul qilish kerak.





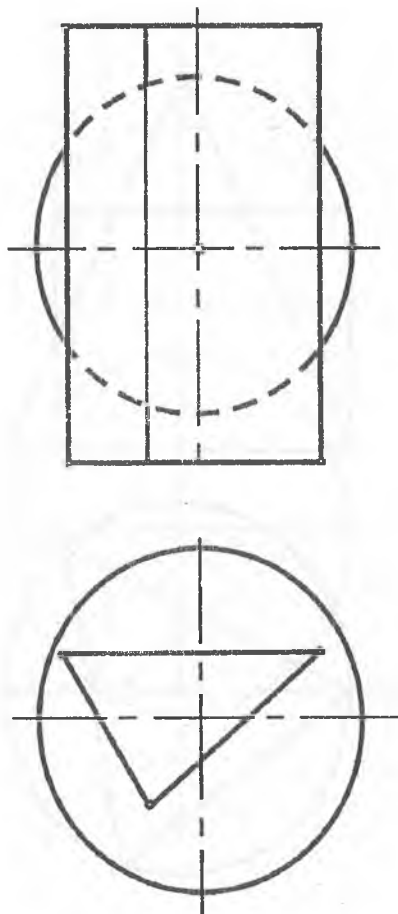
## Yakuniy yozma ishga doir masalalar

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



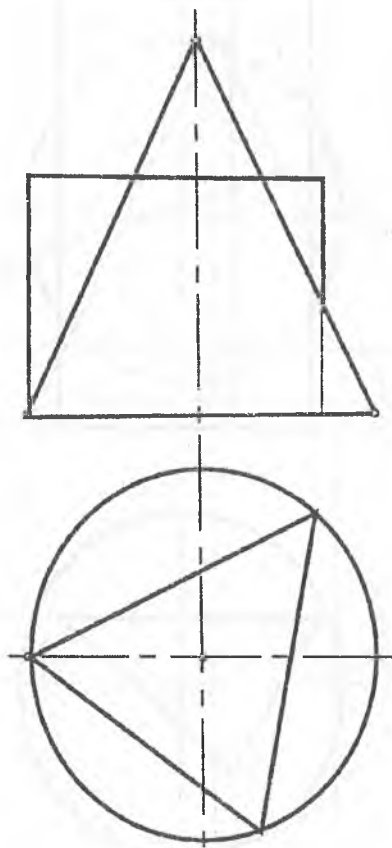
## Yakuniy yozma ishga doir masalalar

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



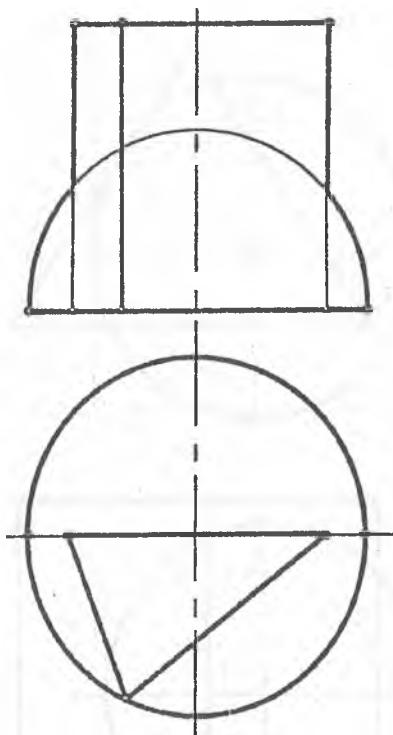
## Yakuniy yozma ishga doir masalalar

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



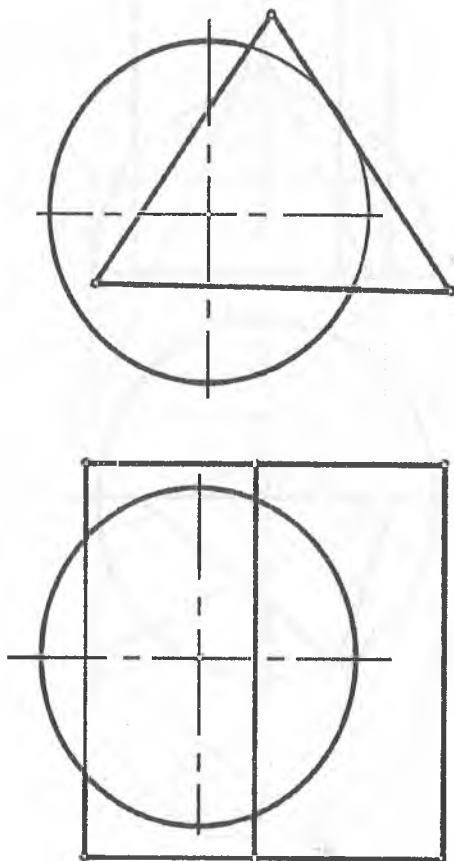
## Yakuniy yozma ishga doir masalalar

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



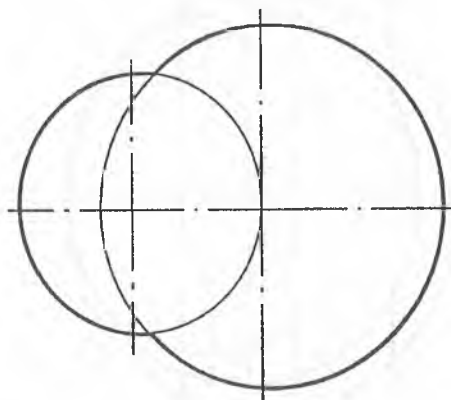
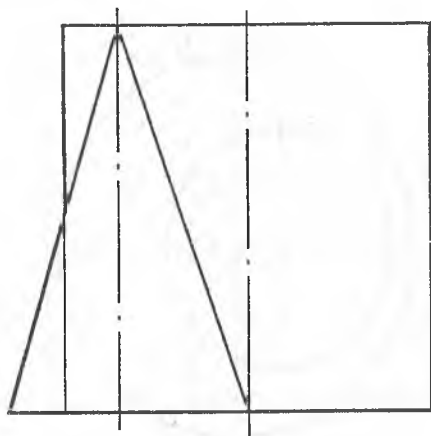
## Yakuniy yozma ishga doir masalalar

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



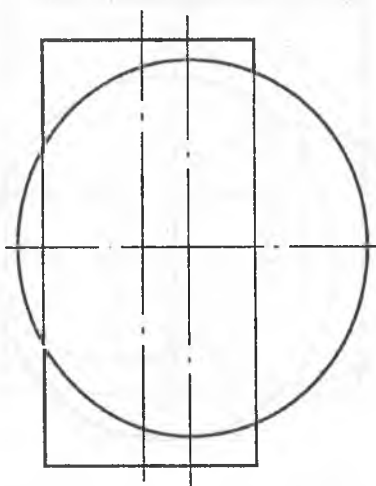
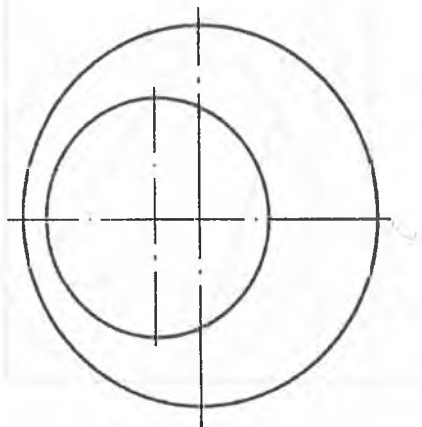
## Yakuniy yozma ishga doir masalalar

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



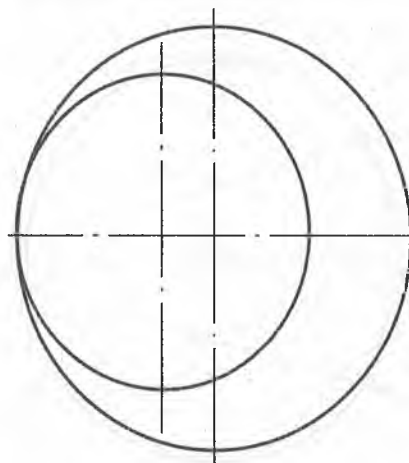
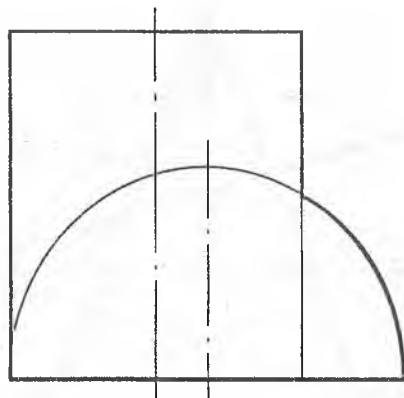
## Yakuniy yozma ishga doir masalalar

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



## Yakuniy yozma ishga doir masalalar

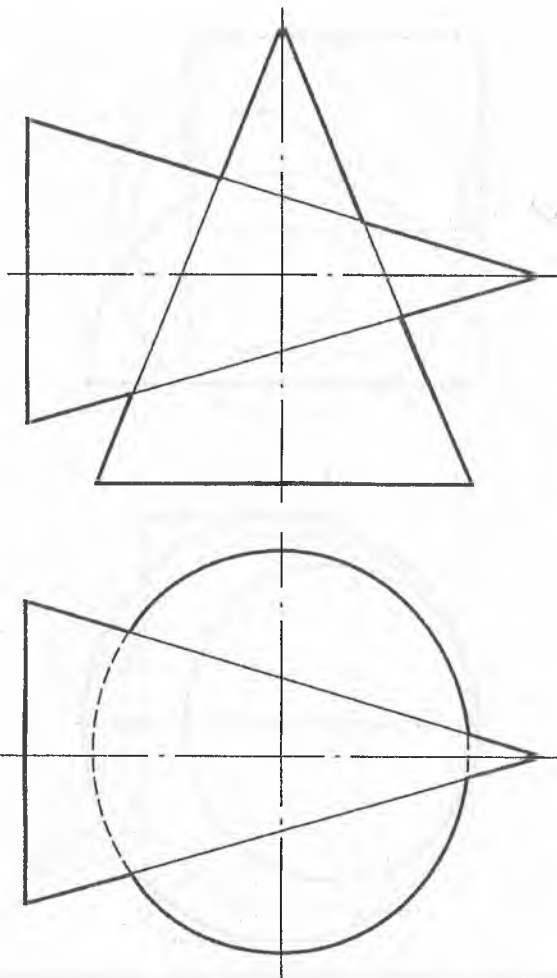
44-masala. Berilgan ikki sirtning o'zaro kesishish chizig'ining proyeksiyalari chizilsin.





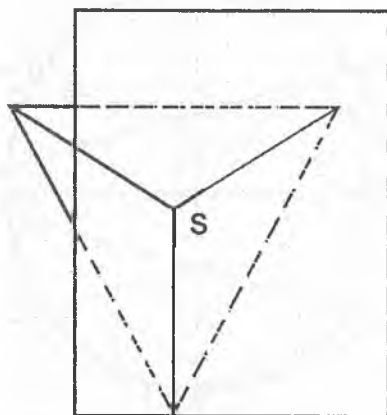
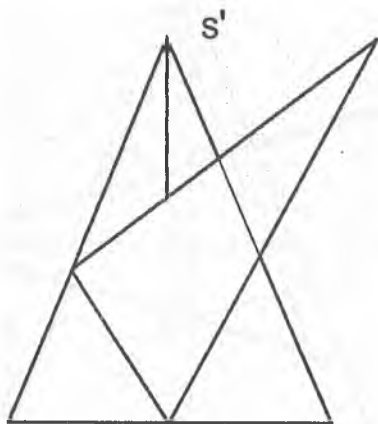
## Yakuniy yozma ishga doir masalalar

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



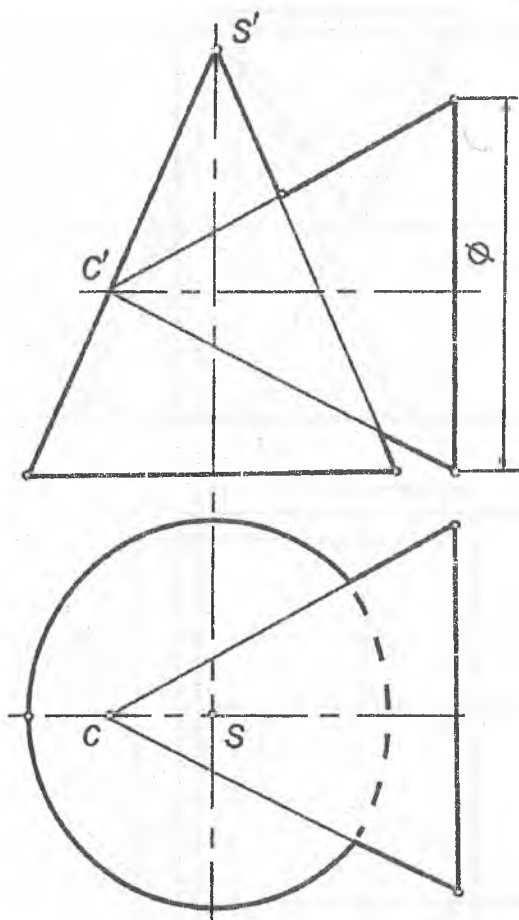
## Yakuniy yozma ishga doir masalalar

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



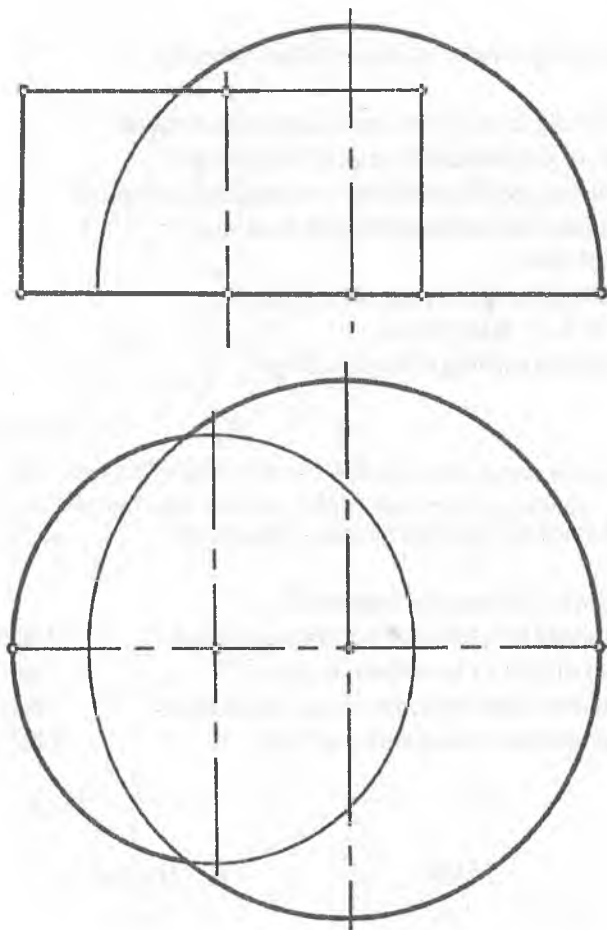
### Yakuniy yozma ishga doir masalalar

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. Chizma qalinligi Davlat standartlariga muvofiq qalinlashtirish     | - 2 ball  |
| 5. Masaladagi harfli va raqamli belgilarni shrift № 3, 5 bilan yozish | - 2 ball  |
| 6. Masalaning nechta yechimiga 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'iq va kesimlarni bajarish.   | - 5 ball  |
| 3. Chizma qalinligi standartga muvofiq qalinlashtirish                               | - 5 ball  |
| 4. Jismning zarur o'lchamlarini qo'yish.   | - 5 ball  |

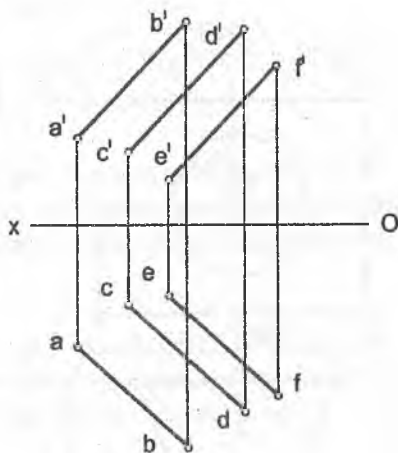
$30$  ball

JAMI:

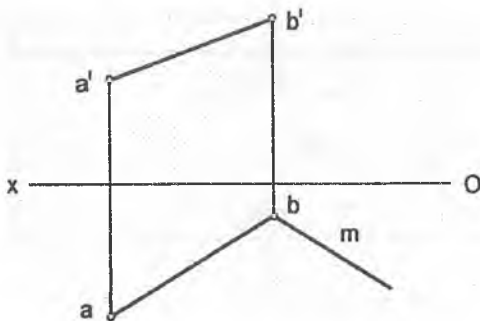
100 ball

## 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.

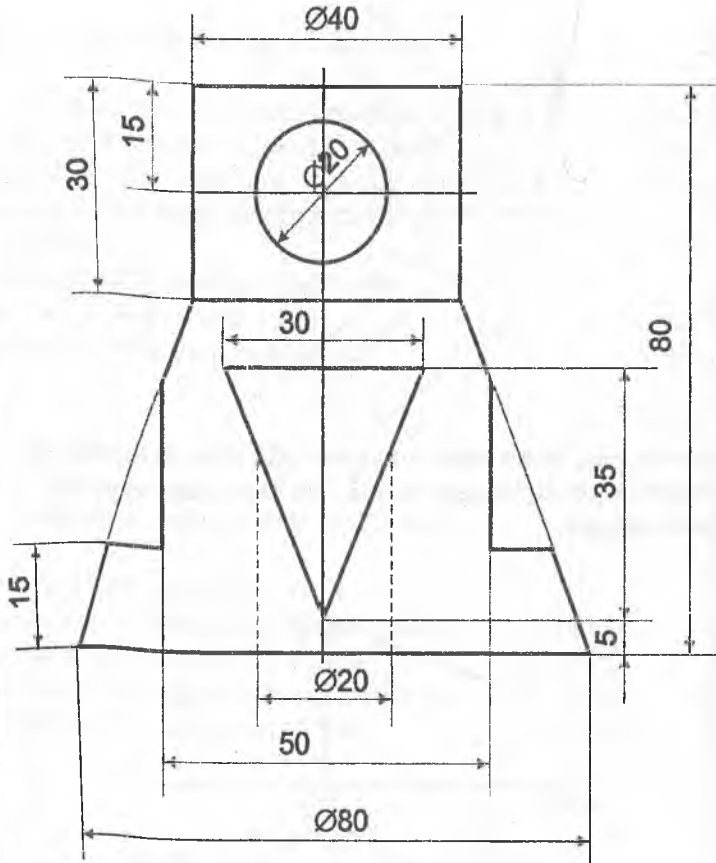


**2-masala.** Agar kvadratning bir tomoni AB, ikkinchi tomonining yo'nalishi m chiziq berilgan bo'lsa, ABCD kvadratning proyeksiyalari chizilsin.



### Olimpiada masalalari

3-masala. Berilgan geometrik jismning frontal proyeksiyasi bo'yicha gorizontal 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 fronta 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: fronta proyeksiyalar tekisligiga nisbatan A nuqtaga simmetrik bo'lgan B nuqtaning epyurini.

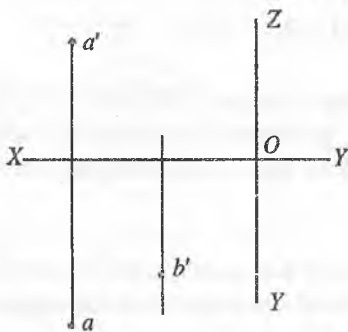
4-masala. Berilgan A nuqta ( $x=10$ ,  $y=-20$ ,  $z=-25$ )

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  $30\text{ mm}$  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:

- Umumiy vaziyatda bo'lsa;
- Gorizontal proyeksiyalar tekisligiga parallel bo'lsa;
- Frontal proyeksiyalar tekisligiga parallel bo'lsa;
- Gorizontal proyeksiyalar tekisligiga perpendikular bo'lsa;
- Frontal proyeksiyalar tekisligiga perpendikular bo'lsa;
- Profil proyeksiyalar tekisligiga perpendikular bo'lsa;

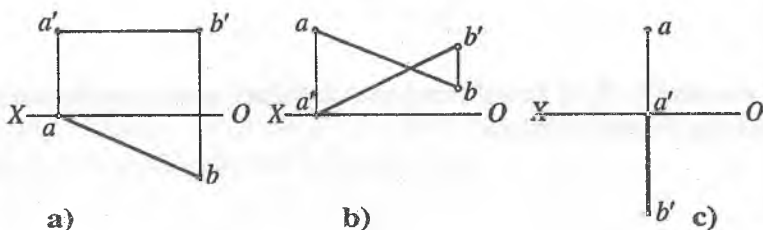
## Mustaqil ta'lim masalalari

**7-masala.**  $AB$  kesmalarining 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)

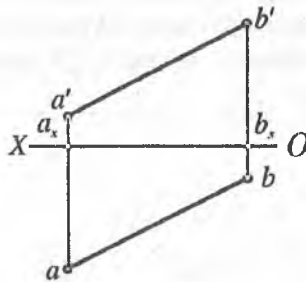
3)  $[AB]$  kesma fazoning (?) choragida joylashgan, u (?) proyeksiyalar tekisligiga perpendikular, A uchi (?) proyeksiyalar tekisligiga tegishli; (c) chizma)



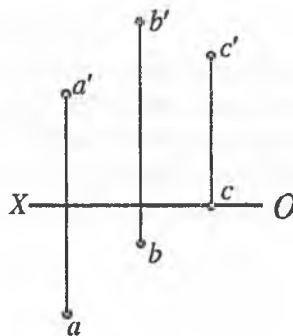
## Mustaqil ta'lim masalalari

### II. Ortogonal proyeksiyalarni qayta tuzish usullari

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

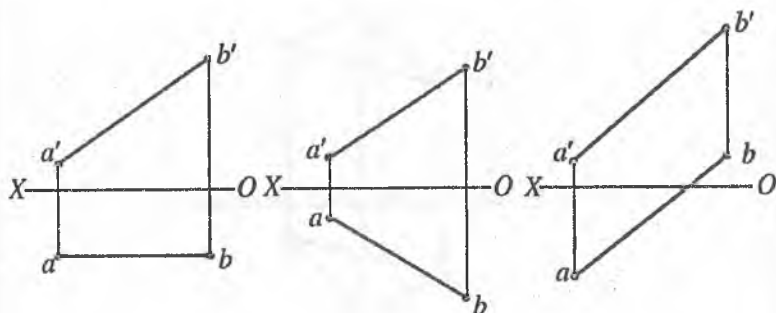


9-masala. A, B, C nuqtalarning proyeksiyalari yangi proyeksiyalar tekisligi tizimida chizilsin.

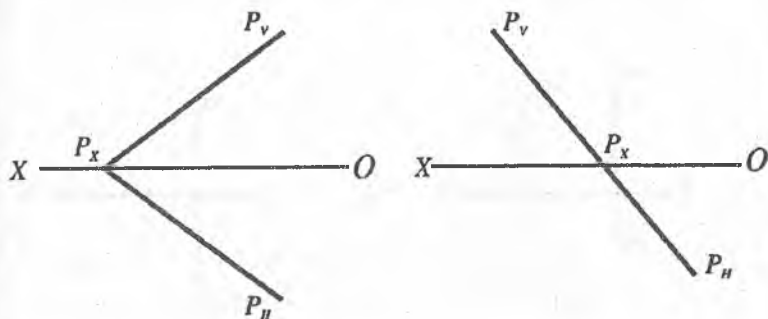


## Mustaqil ta'lim masalalari

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

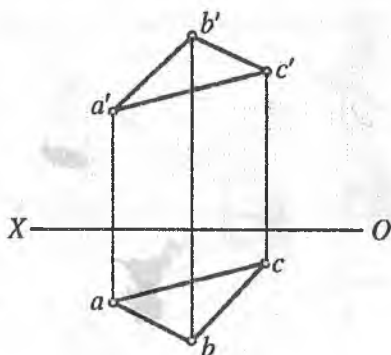


**11-masala.** Proyeksiyalar tekisligini almashtirib,  $P$  tekisligining yangi izi shunday chizilsinki, u yangi proyeksiyalar tizimida gorizontal proyeksiyalovchi vaziyatga kelsin.



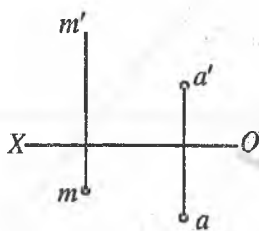
### Mustaqil ta'lim masalalari

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

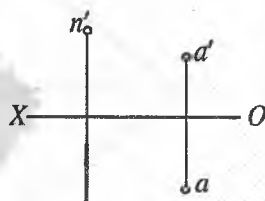


13-masala. Soat strelkasi yo'nalishida A nuqta  $90^\circ$  burchakka aylantirilsin.

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



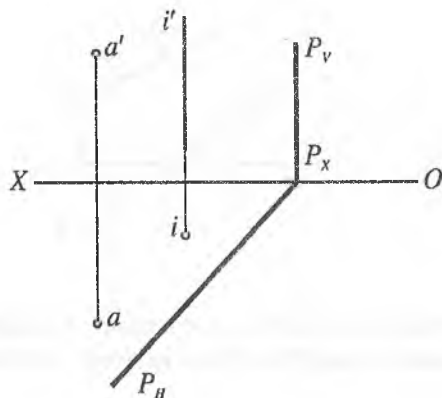
a)



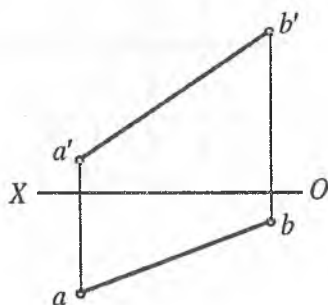
b) n

## Mustaqil ta'lim masalalari

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

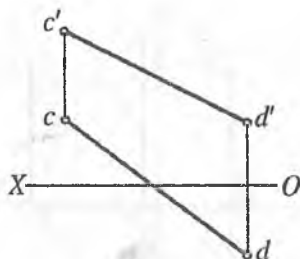


15-masala. V ga perpendikular o'q atrofida aylantirib, [AB] kesma gorizontal proyeksiyalar tekisligiga parallel vaziyatga keltirilsin.

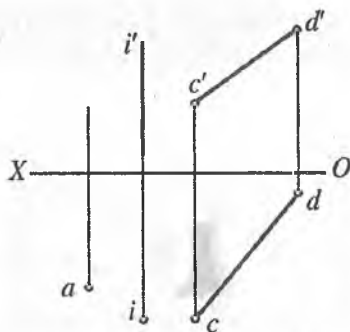


## Mustaqil ta'lim masalalari

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

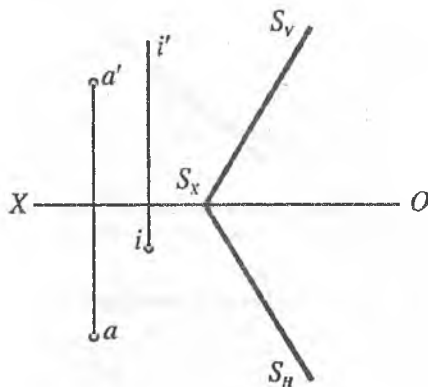


**17-masala.** Berilgan  $i$  o'q atrofida aylantirib, A nuqtaning  $CD$  to'g'ri chiziqqa tegishli vaziyatga keltirilsin va frontal proyeksiyasi aniqlansin.

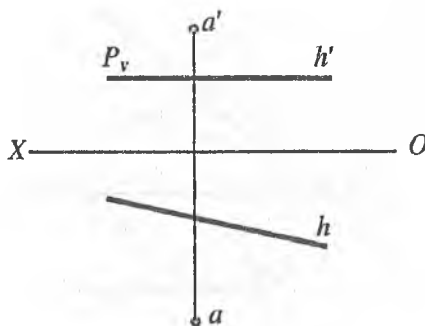


## Mustaqil ta'lim masalalari

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



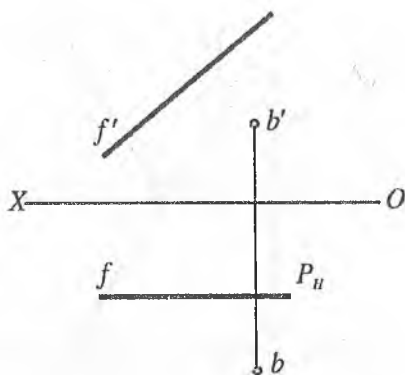
19-masala. A nuqta  $h_0(h, h')$  gorizontal atrofida aylantirib, P gorizontal tekislikka joylashtirilsin.



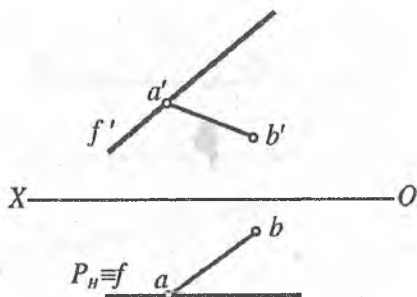


## Mustaqil ta'lim masalalari

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

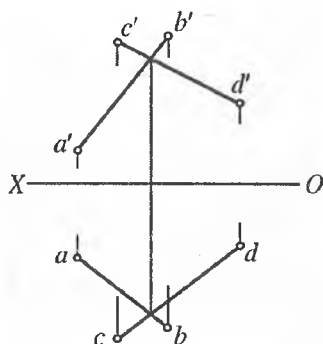


**21-masala.**  $[AB]$  kesma frontal o'q  $f$  atrofida aylantirilib, ( $A \in f_0$ ), frontal P tekislikka joylashtirilsin.

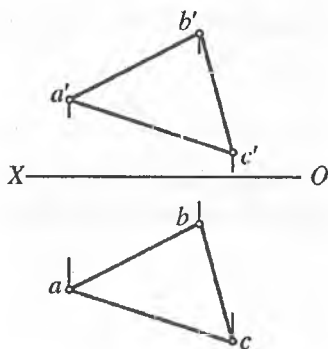


### Mustaqil ta'lim masalalari

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.

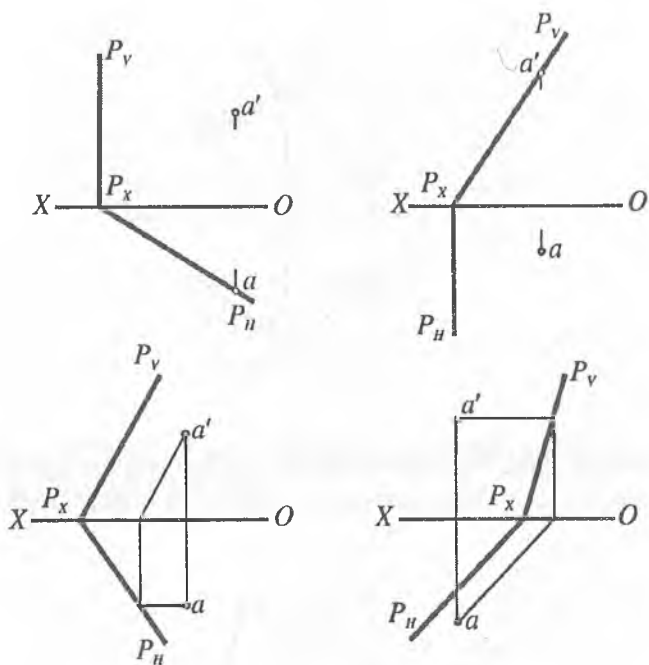


23-masala. ABC tekislikni gorizontal chizig'i atrofida aylantirib, uchburchak ichiga chizilgan urinma aylananing markazi topilsin.



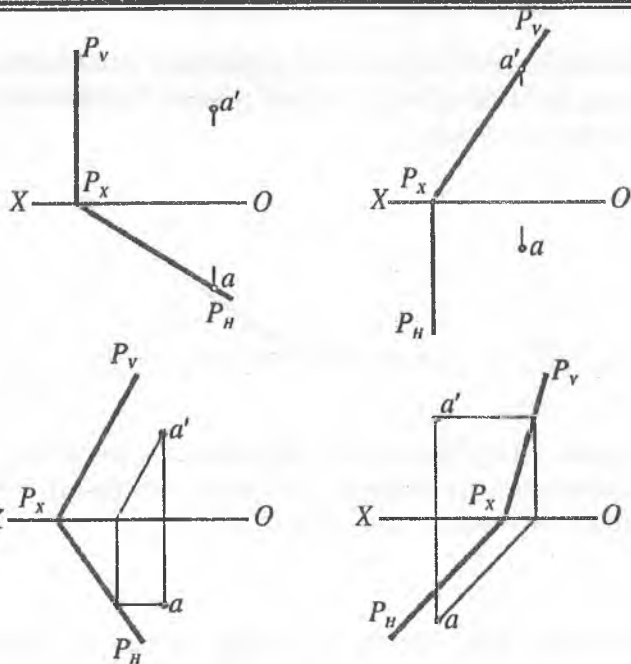
### Mustaqil ta'lim masalalari

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

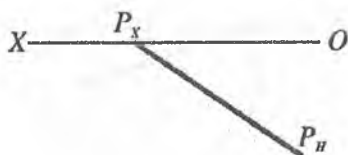


**25-masala.** P tekislik frontal proyeksiyalar tekisligiga joylashtirilsin va A nuqtaning joylashgan vaziyati aniqlansin.

## Mustaqil ta'lim masalalari

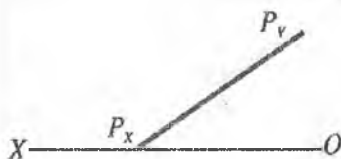


26-masala. Agar fazoda tekislik izlari  $P_H$  va  $P_V$  orasidagi burchak ma'lum bo'lib,  $45^\circ$  ga teng bo'lsa,  $P$  tekislikning frontal izi chizilsin.

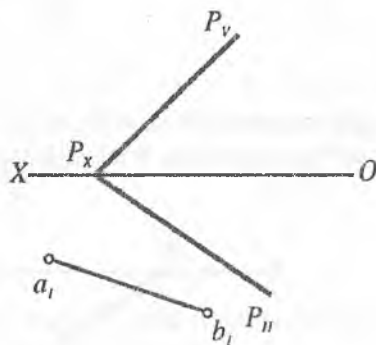


## Mustaqil ta'lim masalalari

27-masala. Agar fazoda tekislikning gorizontaal va frontal izlari orasidagi burchak ma'lum bo'lib,  $60^\circ$  ga teng bo'lsa, P tekislikning gorizontaal izi chizilsin.

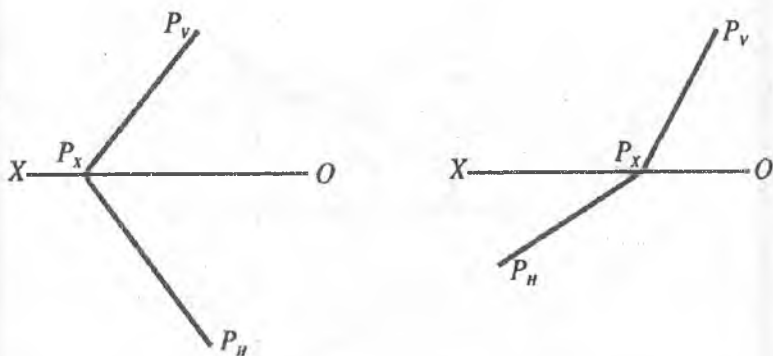


28-masala. P tekislikka tegishli [AB] kesmaning gorizontaal proyeksiyalari tekisligiga joylashgan vaziyati ma'lum  $[a_1, b_1]$ , kesmaning gorizontaal va frontal proyeksiyalari chizilsin.

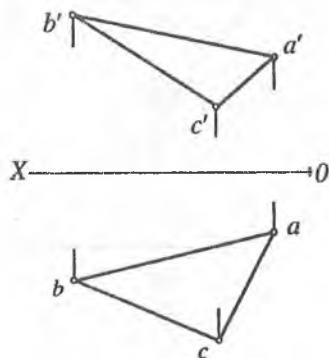


## Mustaqil ta'lim masalalari

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



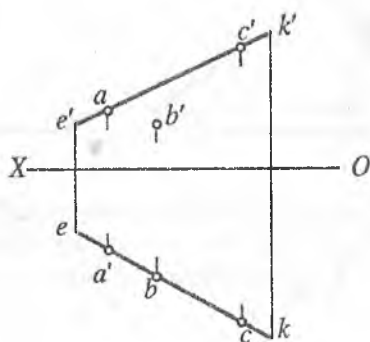
**30-masala.** Almashtirish usulidan foydalanib,  $ABC$  uchburchakning tashqarisiga urinma chizilgan aylananing markazi topilsin.



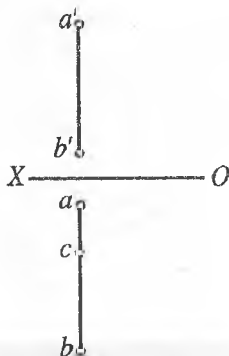
## Mustaqil ta'lim masalalari

### III. Vaziyatga oid masalalar

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

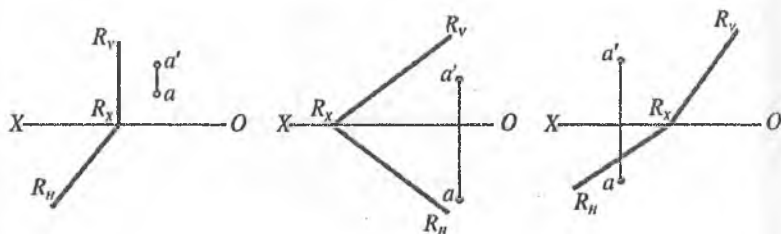


32-masala.  $[AB]$  kesma orqali berilgan to'g'ri chiziqda C nuqtaning proyeksiyasi aniqlansin. C nuqtaning gorizontal proyeksiyasi ma'lum va  $C \in [AB]$ .

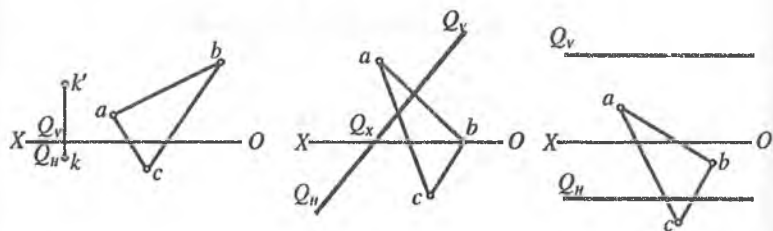


### Mustaqil ta'lim masalalari

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



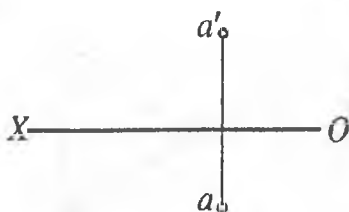
**34-masala.** Q tekislikka tegishli uchburchak  $ABC$  ni berilgan gorizontal proyeksiyasi orqali frontal proyeksiyasini chizing.  $\Delta ABC \in Q$



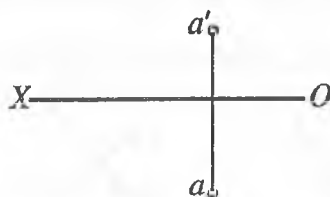


### Mustaqil ta'lim masalalari

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

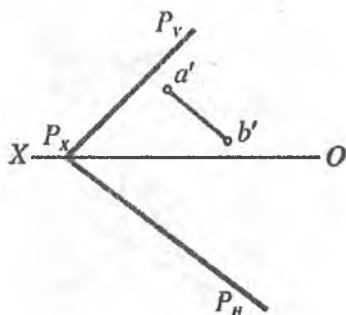


36-masala. A nuqta orqali  $x$  o'qiga parallel tekislikning izlari o'tkazilsin.

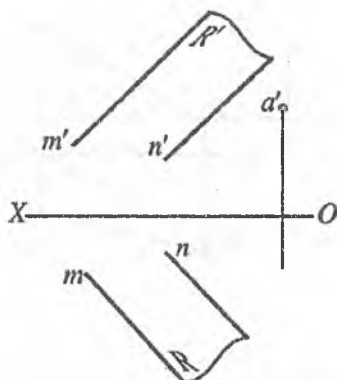


### Mustaqil ta'lim masalalari

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

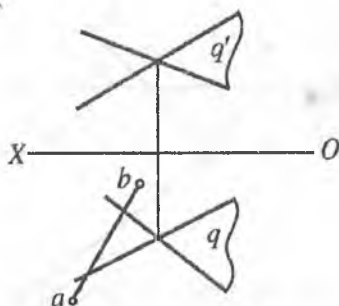


38-masala.  $R$  tekislikka tegishli  $A$  nuqta orqali tekislikning gorizontal o'tkazilsin.

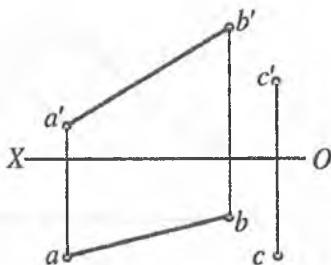


## Mustaqil ta'lim masalalari

**39-masala.**  $Q$  tekislikka tegishli  $(AB)$  to'g'ri chiziqning gorizontaal proyeksiyasi ma'lum, frontal proyeksiyasi aniqlansin.

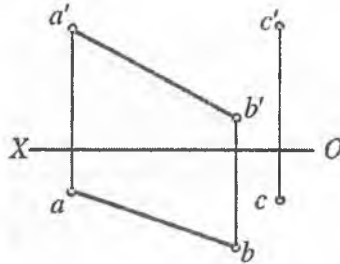


**40-masala.** Berilgan  $AB$  kesmani kesuvchi  $C$  nuqta orqali o'tuvchi gorizontaal proyeksiyalar tekisligiga parallel bo'lgan  $EK$  to'g'ri chiziq o'tkazilsin.

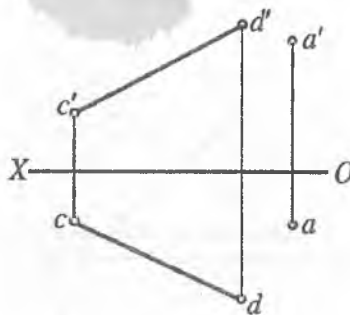


## Mustaqil ta'lim masalalari

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

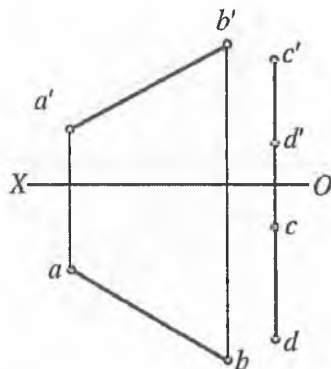


42-masala.  $A$  nuqta orqali frontal proyeksiyalar tekisligiga parallel va  $(CD)$  to'g'ri chiziqni kesib o'tuvchi to'g'ri chiziq o'tkazilsin.

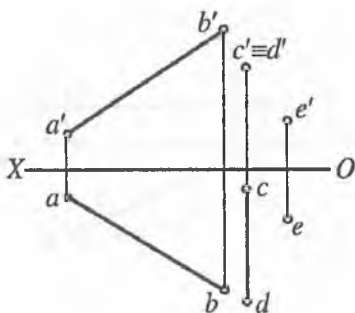


## Mustaqil ta'lim masalalari

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

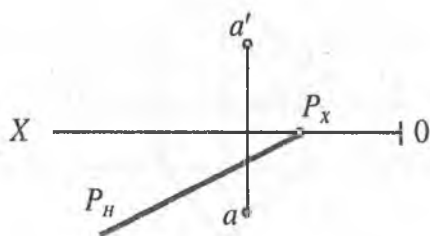


**44-masala.** Berilgan  $[AB]$  va  $[CD]$  kesmalarni kesib, E nuqta orqali o'tuvchi (EK) to'g'ri chiziq o'tkazilsin.

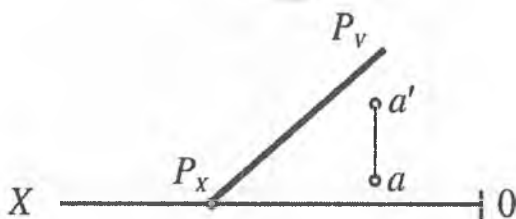


### Mustaqil ta'lim masalalari

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

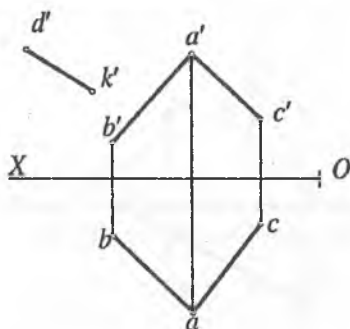


46-масала. A nuqta P tekislikka tegishli, P tekislikning gorizontaal izi chizilsin.

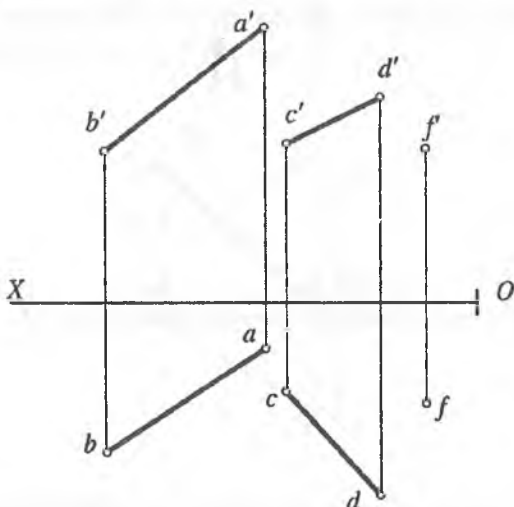


Mustaqil ta'lim masalalari

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

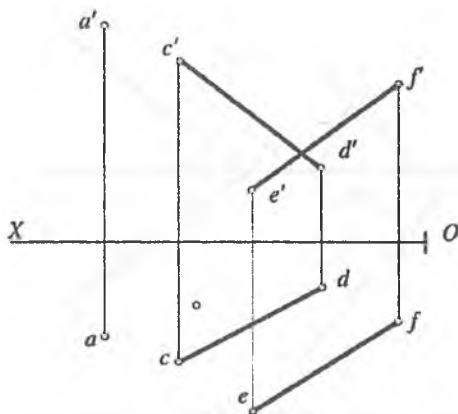


48-масала. CD to'g'ri chiziqning ABF tekislik bilan uchrashish nuqtasi aniqlansin.

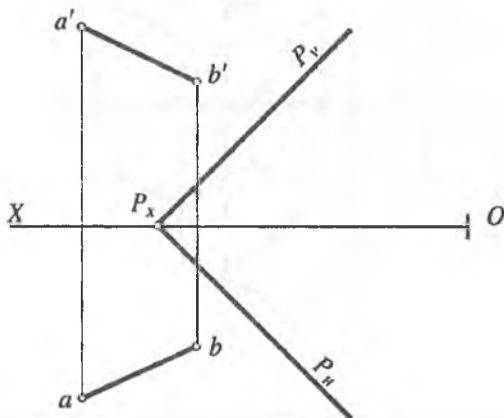


### Mustaqil ta'lim masalalari

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



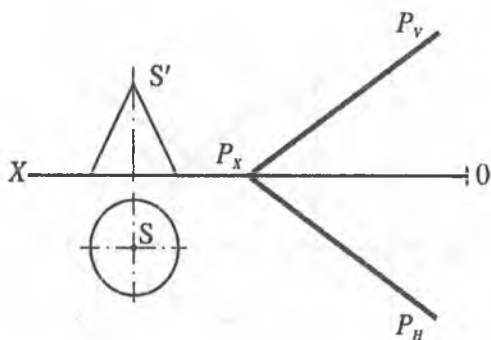
50-масала. AB to'g'ri chiziqning P tekislik bilan kesishish nuqtasining proyeksiyalari aniqlansin.



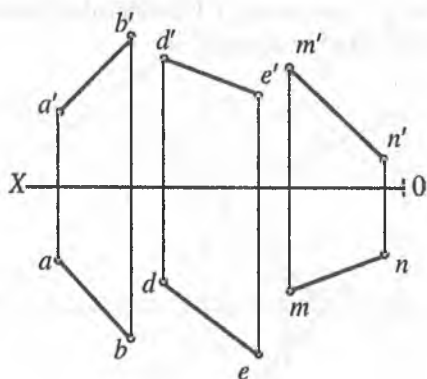


## Mustaqil ta'lim masalalari

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

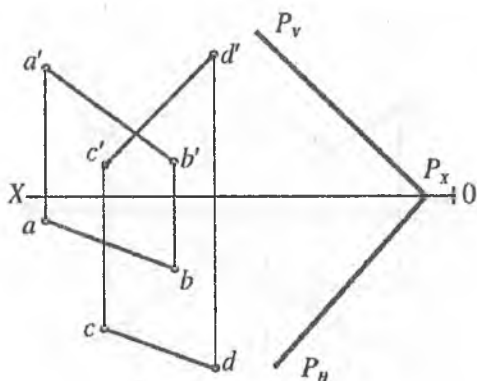


**52-масала.** Uchta ayqash  $AB$ ,  $DE$ ,  $MN$  chiziqlar berilgan, ularni kesib o'tuvchi to'g'ri chiziq o'tkazilsin.

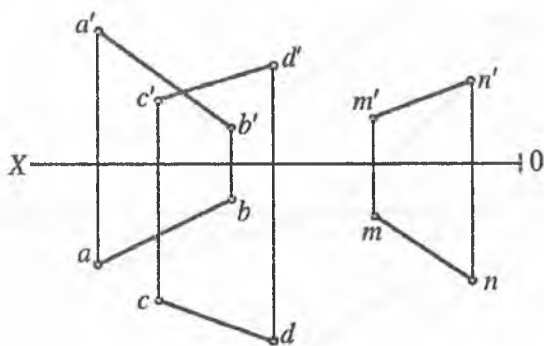


## Mustaqil ta'lim masalalari

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

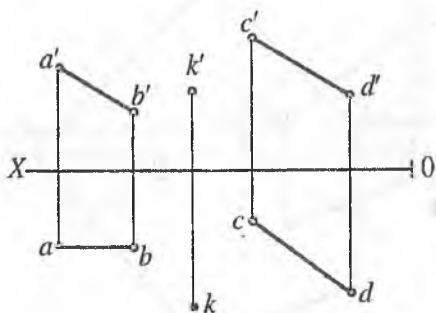


**54-масала.**  $AB$  va  $CD$  chiziqlarni kesib o'tuvchi va  $MN$  to'g'ri chiziqqa parallel bo'lgan to'g'ri chiziq o'tkazilsin.

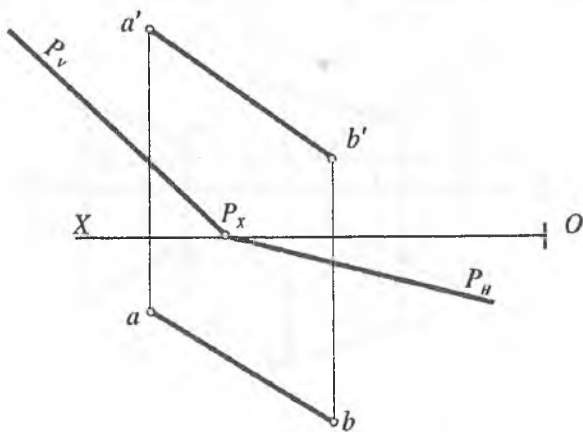


## Mustaqil ta'lim masalalari

**55-масала.** 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.

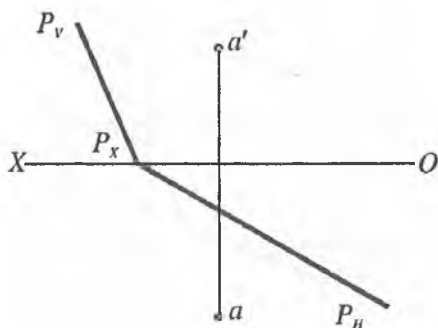


**56-масала.** AB to'g'ri chiziqning P tekislik bilan kesishish nuqtasining proyeksiyalari aniqlansin.

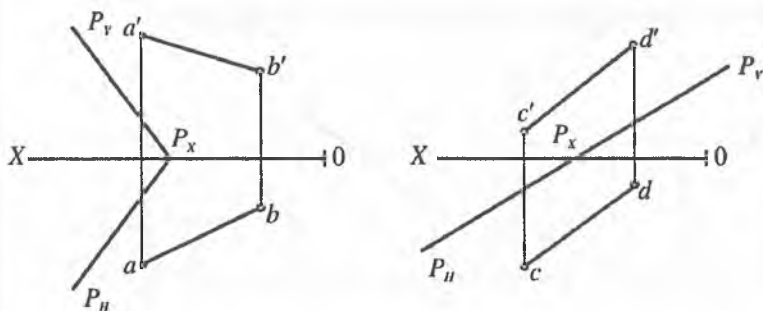


## Mustaqil ta'lim masalalari

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



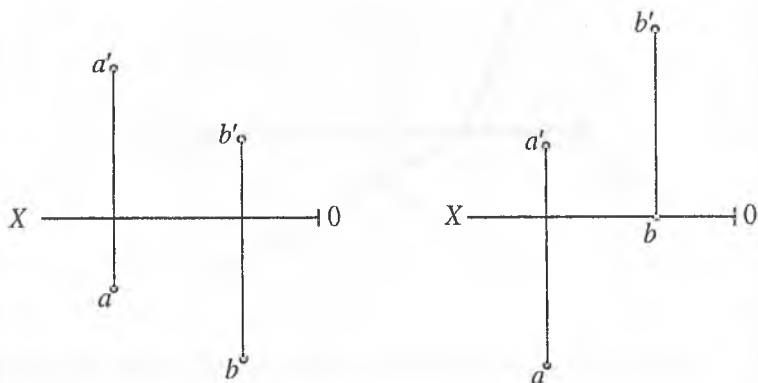
**58-масала.** AB to'g'ri chiziq orqali berilgan P tekislikka perpendikular bo'lgan Q tekislik o'tkazilsin.



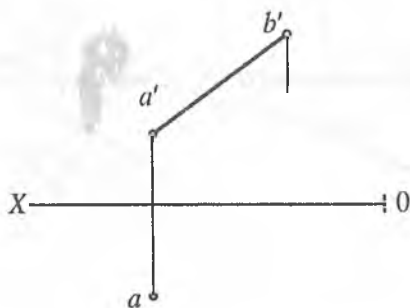
## Mustaqil ta'lim masalalari

### IV. O'lchovli masalalar

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

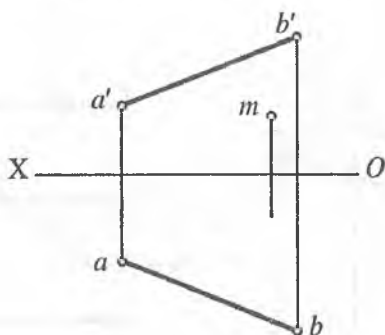


60- масала. Agar AB kesmaning uzunligi ma'lum bo'lib, 35 mm ga teng bo'lsa, uning gorizontal proyeksiyasi aniqlansin.

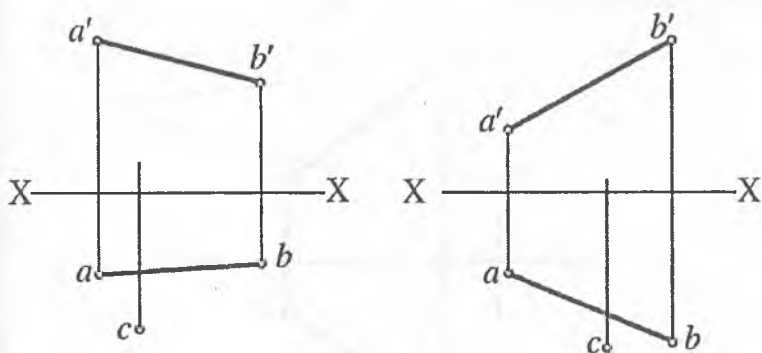


## Mustaqil ta'lim masalalari

**61-масала.** AB kesmaning uchlariidan baravar uzoqlikda joylashgan M nuqtaning gorizontali proyeksiyasi aniqlansin.

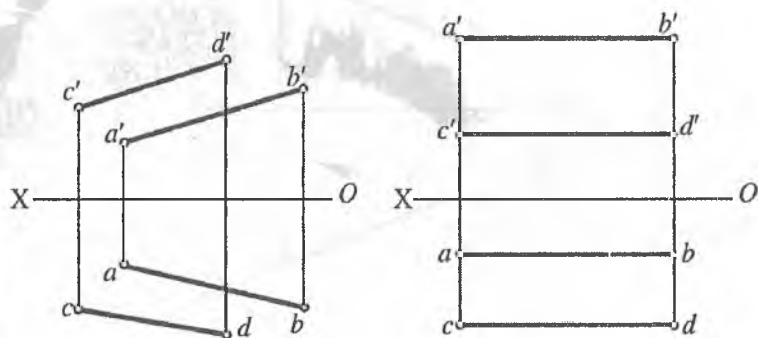


**62-масала.** Agar nuqta AB to'g'ri chiziqdan 20 mm uzoqlikda joylashgan bo'lsa, C nuqtaning frontal proyeksiyasi aniqlansin.

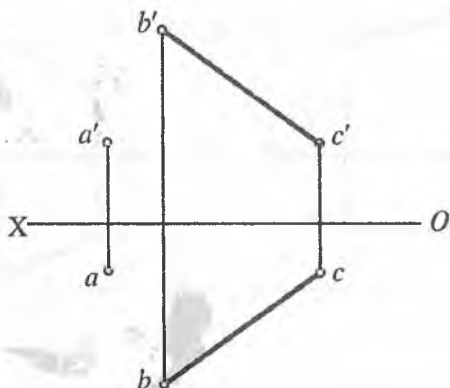


## Mustaqil ta'lim masalalari

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

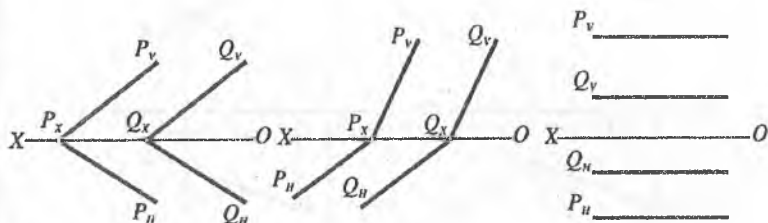


64-масала. A nuqtadan 20 mm masofada,  $BC$  to'g'ri chiziqdan 25 mm masofada va unga parallel bo'lgan  $DE$  to'g'ri chiziqning proyeksiyalari chizilsin.

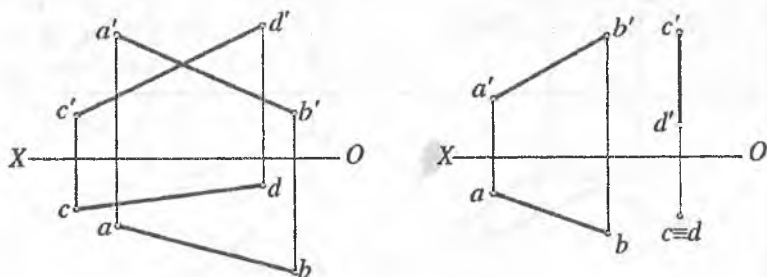


## Mustaqil ta'lim masalalari

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



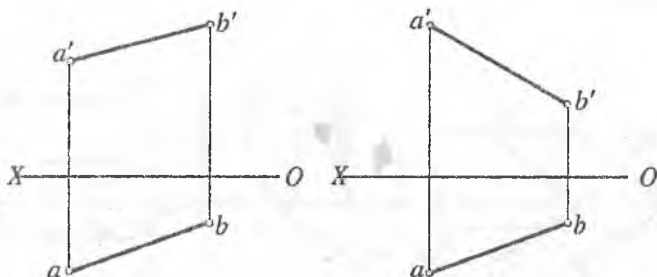
66-масала.  $AB$  va  $CD$  ayqash to'g'ri chiziqlar orasidagi masofa aniqlansin.



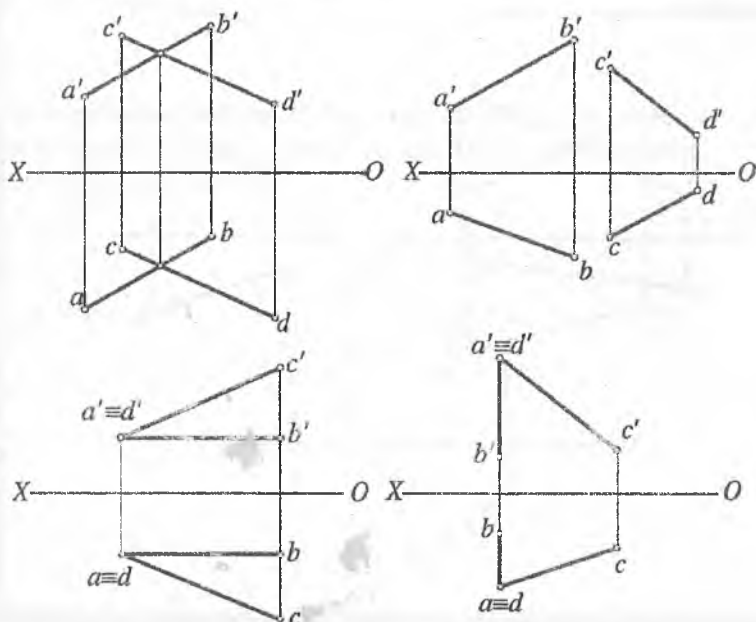


## Mustaqil ta'lim masalalari

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

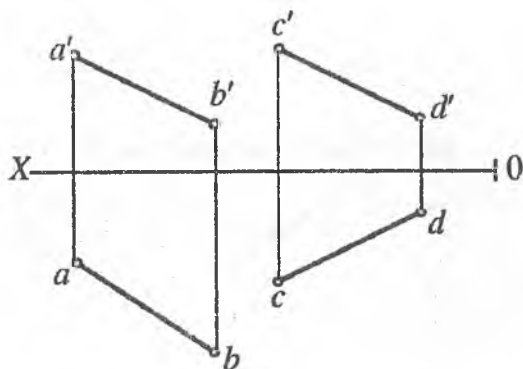


68-масала.  $AB$  va  $CD$  to'g'ri chiziqlar orasidagi burchak aniqlansin.

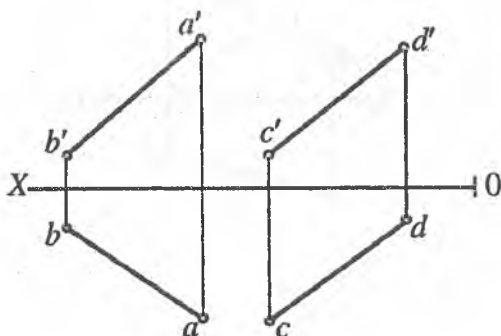


## Mustaqil ta'lim masalalari

69-masala. AB to'g'ri chiziqda CD to'g'ri chiziqdan  $40\text{ mm}$  uzoqlikda joylashgan nuqta topilsin.

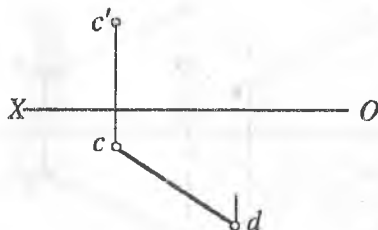


70-masala. AB va CD ayqash to'g'ri chiziqlarning AB to'g'ri chiziqni kesib o'tuvchi va CD to'g'ri chiziqdan  $20\text{ mm}$  uzoqlikda unga parallel to'g'ri chiziq o'tkazilsin.

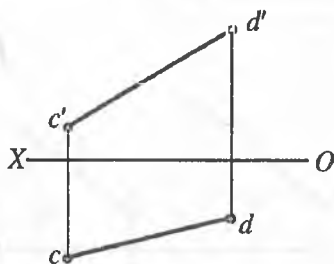


## Mustaqil ta'lim masalalari

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

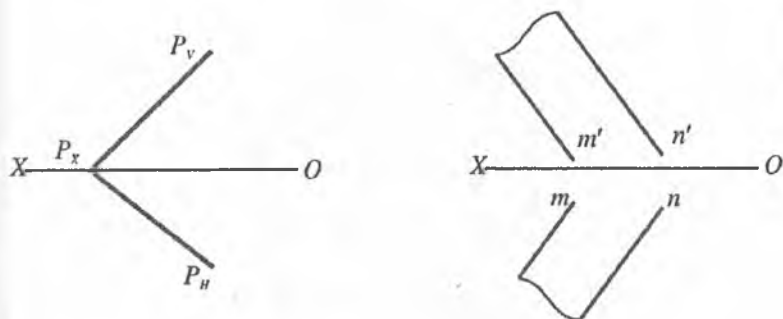


72-masala.  $CD$  to'g'ri chiziqda gorizontal proyeksiyalar tekisligidan  $20\text{ mm}$  masofada  $A$  nuqtani va frontal proyeksiyalar tekisligidan  $15\text{ mm}$  masofada  $B$  nuqtaning proyeksiyalarini aniqlang.

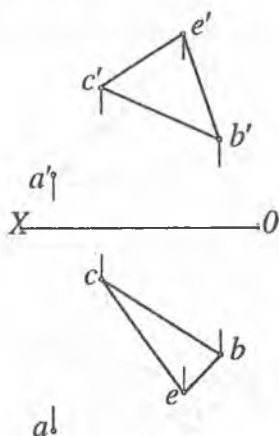


## Mustaqil ta'lim masalalari

**73-masala.** P tekislikda gorizontalar proyeksiyalar tekisligidan  $20\text{ mm}$  masofada bo'lgan A nuqta aniqlansin.

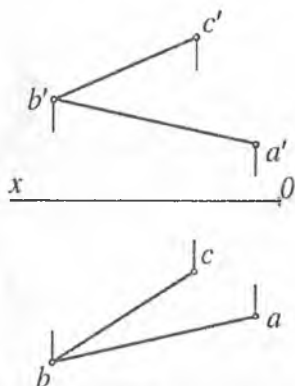


**74-masala.** A nuqtadan BCE tekislikkacha bo'lgan masofaning haqiqiy uzunligi aniqlansin.

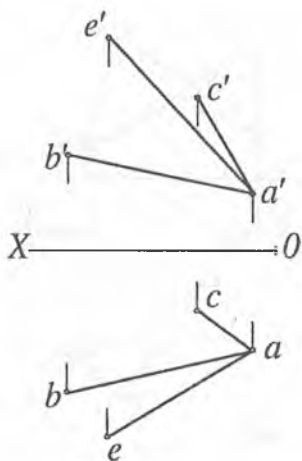


## Mustaqil ta'lim masalalari

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

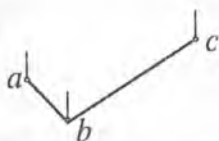
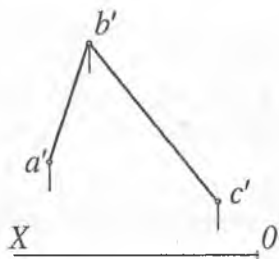


76-масала. AE to'g'ri chiziqda ABC tekislikdan 40 mm uzoqlikda bo'lgan nuqta topilsin.

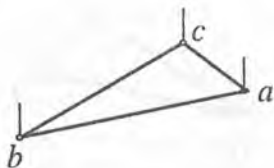
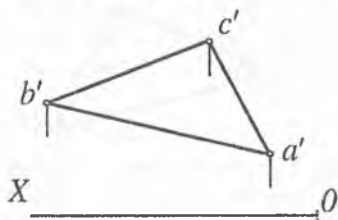


## Mustaqil ta'lim masalalari

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

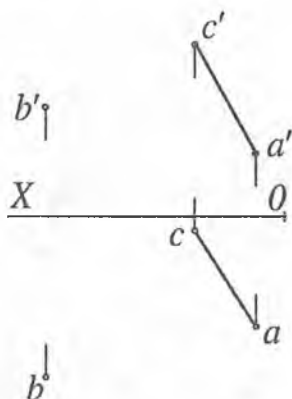


78-масала. Asosi ABC uchburchak bo'lgan, balandligi 40 mm ga teng to'g'ri prizma proyeksiyalari chizilsin.

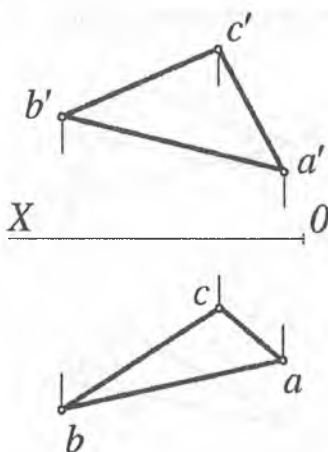


## Mustaqil ta'lim masalalari

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



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



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## 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

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