1-AMALIY MASHG'ULOT. To'plamlar va ular ustida amallar. Eyler-Venn diagrammalari. To'plamning kuvvatini topishga doir masalalar yechish.

Reja:

1. To'plamlarga oid asosiy tushunchalar.
2. Mustaqil bajarish uchun masala va topshiriqlar
2.1. Eyler-Venn diagrammalariga doir topshiriqlar
2.2. Murakkab to'plamlarni soddalashtirishga doir topshiriqlar
2.3. To'plam tartibini(quvvatini) topishga doir topshiriqlar

1. To'plamlarga oid asosiy tushunchalar

Eyler-Venn diagrammalari.

Ma'ruza darslarida kiritilgan birlashma, kesishma, ayirma, simmetrik ayirma, to'ldiruvchi amallari yordamida ayrim to'plamlarni boshqalari orqali ifodalash mumkin, buning uchun amallarni bajarish ketma-ketligi kelishib olingan:

1) to'ldiruvchi amali;

2) kesishma;

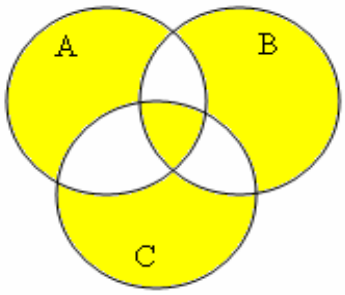
3) yig'indi va ayirma amallari bajariladi.

Bu tartibni ozgartirish uchun qavslardan foydalaniladi.

Shunday qilib, to'plamni boshqa to'plamlar orqali amallar va qavslardan foydalangan holda ifodalash **to'plamning analitik ifodasi** deyiladi.

Biz 1.1.4-paragrafda to'plamning analitik ifodasi berilgan bo'lsa, uni geometrik tasvirlagan edik, endi esa teskari masala, ya'ni berilgan diagrammaga ko'ra to'plamning analitik ifodasini aniqlaymiz:

1.1-Misol. Eyler-Venn diagrammasidagi shtrixlangan sohaning analitik ifodasini A, B, C to'plamlar orqali ifodalang. Bunda A, B, C to`plamlar bitta universumga tegishli.

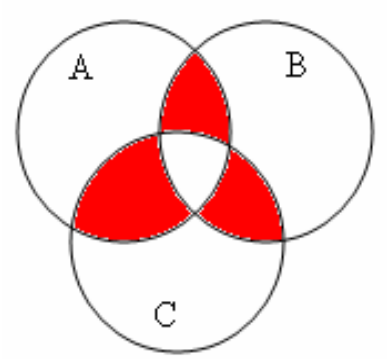


1-usul: $(A \cap B \cap C) \cup$ $(A \setminus (B \cup C)) \cup (B \setminus (A \cup C)) \cup (C \setminus A \setminus B)$

2-usul: $A\Delta B\Delta C$ =[(A\B)∪(B\A)] ΔC =[((A\B)∪(B\A))\C]∪[C\((A\B)∪(B\A))]

1.2-Misol. Strixlangan sohani A, B, C top`lamlar orqali tasvirlang. Bunda $A$, $B$, $C$ to`plamlar bitta universumga tegishli.

Bu masalani yechishning ham bir nechta usullari mavjud.



1-usul: $(A \cap B \setminus C) \cup (A \cap C \setminus B) \cup (B \cap C \setminus A)$

2-usul: $\overline{A\Delta B\Delta C}$

To‘plamlar ustida amallarning asosiy xossalari.

U universal to‘plamning A, B, C qism to‘plamlari uchun quyidagi xossalar o‘rinli (ba’zi xossalarning isbotini keltiramiz, qolganlari shunga o’xshash isbotlanadi. Isbotni Eyler-Venn diagrammasida bajarish ham mumkin):

Kommutativlik (o`rin almashtirish) xossasi: $1^0)$ $A \cup B = B \cup A$

$2^0)$ $A \cap B = B \cap A$

1^0 –xossaning isboti: $x \in A \cup B$ bo`lsa, u holda $x \in A$ va $x \in B$ bo`ladi. Shuningdek, $x \in B \cup x \in A$ bo`lsa, $x \in B \cup A$ kelib chiqadi. Bundan $x \in A \cup B \Leftrightarrow x \in B \cup A$ hosil bo`ladi. Bularni umumlashtirilsa, $A \cup B = B \cup A$ kommutativlik xossasi isbotlanadi.

Assotsiyativlik (guruhlash) xossasi: $3^0)$ $(A \cup B) \cup C = A \cup (B \cup C)$

$4^0)$ $(A \cap B) \cap C = A \cap (B \cap C)$

Distributivlik (taqsimot qonunlari) xossasi:

$5^0)$ $(A \cup B) \cap C = (A \cap C) \cup (B \cap C)$

$6^0)$ $(A \cap B) \cup C = (A \cup C) \cap (B \cup C)$

Yutilish qonunlari: $7^0)$ $A \cap (A \cup B) = A$

$$8^0) \quad A \cup (A \cap B) = A$$

De Morgan qonunlari (Ogastes de-Morgan (1806-1871yy) Shotlandiyalik matematik va mantiqchi, mantiqiy munosabatlar asoschisi):

$$9^0) \quad \overline{A \cap B} = \overline{A} \cup \overline{B}$$

$$10^0) \quad \overline{A \cup B} = \overline{A} \cap \overline{B}$$

9^0 – xossaning isboti:

$$\overline{A \cap B} = \{x : x \notin (A \cap B)\} = \{x : \overline{x \in (A \cap B)}\} = \{x : \overline{((x \in A) \cap (x \in B))}\};$$

$$\overline{A} \cup \overline{B} = \{x : (x \notin A) \cup (x \notin B)\} = \{x : \overline{x \in A} \cup \overline{x \in B}\} = \{x : \overline{((x \in A) \cup (x \in B))}\}.$$

0 va 1 (bo`sh va universal to`plam) qonunlari:

$11^0)$ $A \cap A = A$ $\quad$ $12^0)$ $A \cup U = U$

$13^0)$ $A \cup \overline{A} = \mathrm{U}$ $\quad$ $14^0)$ $A \cap Ø = Ø$

$15^0)$ $A \cap \overline{A} = Ø$ $\quad$ $16^0)$ $\overline{U} = Ø$

$17^0)$ $A \cup Ø = \mathrm{A}$ $\quad$ $18^0)$ $\overline{Ø} = \mathrm{U}$

$19^0)$ $A \cap U = A$ $\quad$ $20^0)$ $\mathrm{A} \setminus \mathrm{A} = Ø$

Ayirishdan qutilish qonuni: $21^0)$ $\mathrm{A} \setminus B = A \cap \overline{B}$

Ikkilangan rad etish qonuni: $22^0)$ $\overline{\overline{A}} = A$

To’plamlar ustida amallarning xossalariga e’tibor berib qaraydigan bo’lsak, ular juft – juft yozilgan va har ikkinchisi birinchi xossada amalni o’zgartirish bilan hosil qilingan deyish mumkin, masalan, $\cup$ amali $\cap$ ga, $\varnothing$ to’plam U ga almashtirib hosil qilingan. Xossalarning bunday mosligi **ikkiyoqlamalik qonunlari** deyiladi.

Murakkab ifodalarni soddalashtirish.

To‘plamlar ustida amallarning asosiy xossalariga asoslanib, to’plamlarning murakkab ifodalarini isbotlash yoki soddalashtirish mumkin.

1.3-Misol. $A \Delta B = (A \cup B) \cap \overline{A \cap B}$ (1) ifodani isbotlang.

Yechilishi: $A \Delta B = (A \setminus B) \cup (B \setminus A)$

yoki Eyler-Venn diagrammasidan

$$A \Delta B = (A \cap \overline{B}) \cup (B \cap \overline{A})$$

tenglikni hosil qilish mumkin.

$(A\cup B)\cap\overline{A\cap B}=$(9^0-xossadan foydalanamiz) $=(A\cup B)\cap(\overline{A}\cup\overline{B})=$(2^0-xossa)

$=(\overline{A}\cup\overline{B})\cap(A\cup B)=$(5^0-xossa)$=\big(\overline{A}\cap(A\cup B)\big)\cup\big(\overline{B}\cap(A\cup B)\big)=$(5^0-xossa)

$=\big((\overline{A}\cap A)\cup(\overline{A}\cap B)\big)\cup\big((\overline{B}\cap A)\cup(\overline{B}\cap B)\big)=$(15^0-xossa)$=\big(\varnothing\cup(B\cap\overline{A})\big)\cup\big((A\cap\overline{B})\cup\varnothing\big)=$

$=(A\cap\overline{B})\cup(B\cap\overline{A})$.

Bundan talab qilingan tenglikni hosil qilamiz. $A\Delta B=(A\cup B)\cap\overline{A\cap B}$.

1.4-Misol. $\overline{A\cup(A\setminus\overline{B})\cup(\overline{A}\setminus\overline{B})}$ ifodani soddalashtiring.

Yechilishi: $\overline{A\cup(A\setminus\overline{B})\cup(\overline{A}\setminus\overline{B})}=$(21^0-xossa)$=\overline{A\cup(A\cap\overline{\overline{B}})\cup(\overline{A}\cap\overline{\overline{B}})}=$

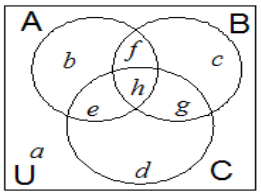
(22^0-xossa)$=\overline{A\cup(A\cap B)\cup(\overline{A}\cap B)}=$(10^0-xossa)$=\overline{A}\cap\overline{A\cap B}\cap\overline{\overline{A}\cap B}=$(9^0-xossa)=

$[\overline{A}\cap(\overline{A}\cup\overline{B})]\cap(\overline{\overline{A}}\cup\overline{B})=$(22^0-xossa)$=\big[(\overline{A}\cap A)\cup(\overline{A}\cap\overline{B})\big]\cap(A\cup\overline{B})=$(15^0-xossa).

$=\big(\overline{A}\cap\overline{B}\cap A\big)\cup(\overline{A}\cap\overline{B}\cap\overline{B})=\big(\overline{A}\cup\overline{B}\big)\cap\overline{B}$.

2. Mustaqil bajarish uchun masala va topshiriqlar

2.1. Eyler-Venn diagrammalariga doir topshiriqlar



Quyidagi misollarnig shartlarida Universal to‘plam U={ *a, b, c, d, e, f, g,h* } da X va Y to‘plamlar berilgan bo‘lib, $\overline{X\cup Y}$**,** $\overline{Y}$**,** $\overline{X}\Delta Y$**,** $X\cap\overline{Y}$**,** $\overline{X}\setminus\overline{Y}$ **to‘plamlarni A, B, C lar orqali ifodalang va Eyler-Venn diagrammalrida tasvirlang.**

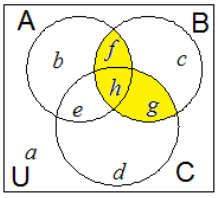
2.1.0	X={*a,b,c,d*}, Y={*b,c,d,e*}	2.1.10	X={*c,d,e,f*}, Y={*e,f,g,h*}	2.1.20	X={*e,f,g,h*}, Y={*h,a,b,c*}
2.1.1.	X={*b,c,d,e*}, Y={*c,d,e,,f*}	**2.1.11.**	X={*d,e,f,g*}, Y={*f,g,h,a*}	**2.1.21.**	X={*f,g,h,a*}, Y={*a,b,c,d*}
2.1.2.	X={*c,d,e,,f*}, Y={*d,e,f,g*}	2.1.12.	X={*e,f,g,h*}, Y={*g,h,a,b*}	2.1.22.	X={*g,h,a,b*}, Y={*b,c,d,e*}
2.1.3.	X={*d,e,f,g*}, Y={*e,f,g,h*}	2.1.13.	X={*f,g,h,a*}, Y={*h,a,b,c*}	2.1.23.	X={*h,a,b,c*}, Y={*c,d,e,,f*}
2.1.4.	X={*e,f,g,h*}, Y={*a,f,g,h*}	2.1.14.	X={*g,h,a,b*}, Y={*a,b,c,d*}	2.1.24.	X={*a,b,e,f*}, Y={*c,d,e,,f*}

2.1.5.	X={a,,f,g,h}, Y={a,b,g,h}	2.1.15.	X={h,a,b,c}, Y={b,c,d,e}	2.1.25.	X={b,c,f,g}, Y={d,e,,f,g}
2.1.6.	X={a,b,g,h}, Y={a,b,c,h}	2.1.16.	X={a,b,c,d}, Y={d,e,f,g}	2.1.26.	X={c,d,g,h}, Y={e,g,h,a}
2.1.7.	X={a,b,c,h}, Y={a,b,c,d}	**2.1.17.**	X={b,c,d,e}, Y={e,f,g,h}	**2.1.27.**	X={d,e,h,a}, Y={g,h,a,b}
2.1.8.	X={a,b,c,d}, Y={c,d,e,,f}	2.1.18.	X={c,d,e,f}, Y={f,g,h,a}	2.1.28.	X={e,f,a,b}, Y={h,a,b,c}
2.1.9.	X={b,c,d,e}, Y={d,e,f,g}	2.1.19.	X={d,e,f,g}, Y={g,h,a,b}	2.1.29.	X={f,g,b,c}, Y={a,b,c,d}

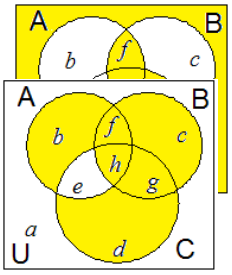
2.1.Eyler-Venn diagrammalri doir topshiriq(na'muna).

U={ *a, b, c, d, e, f, g,h* } da X={*a,b,c,d*} va Y={*b,c,d,e*} to'plamlar berilgan bo'lib, $\overline{X \cup Y}$, $\overline{Y}$, $\overline{X}\Delta Y$, $X \cap \overline{Y}$, $\overline{X} \setminus \overline{Y}$ to'plamlarni A, B, C lar orqali ifodalang va Eyler-Venn diagrammalrida tasvirlang.

2.1.Topshiriqning bajarilishi bo'yicha na'muna

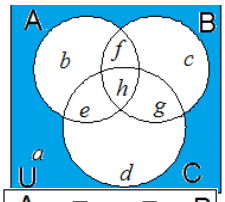


$$\overline{X \cup Y} = \overline{\{a,b,c,d\} \cup \{b,c,d,e\}} = \overline{\{a,b,c,d,e\}} = \{f,g,h\} = A \cap B \cup \overline{A} \cap B \cap C$$

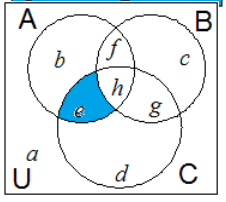


$$\overline{Y} = \overline{\{b,c,d,e\}} = \{a, f, g, h\} = \overline{A \cup B \cup C} \cup A \cap B \cup \overline{A} \cap B \cap C$$

$$\overline{X}\Delta Y = \overline{\{a,b,c,d\}}\Delta\{b,c,d,e\} = \{e, f, g, h\}\Delta\{b,c,d,e\} = \{b,c,d, f, g, h\} =$$
$$= B \cup A\Delta C$$



$$X \cap \overline{Y} = \{a,b,c,d\} \cap \overline{\{b,c,d,e\}} = \{a,b,c,d\} \cap \{a, f, g, h\} = \{a\} =$$
$$= \overline{A \cup B \cup C}$$



$$\overline{X} \setminus \overline{Y} = \overline{\{a,b,c,d\}} \setminus \overline{\{b,c,d,e\}} = \{e, f, g, h\} \setminus \{a, f, g, h\} = \{e\} = A \cap \overline{B} \cap C$$

2.2. Murakkab to'plamlarni soddalashtirishga doir topshiriqlar.

2.2.1	$\overline{X \cup Y} \cap \overline{\bar{X} \cup Y} \cup \overline{X \cap Y}$	2.2.15	$\overline{A/B \cup \overline{A/C}} \cup \overline{A/B/C} \cap A \cap B \cap C$
2.2.2	$\overline{\overline{A \cap B \cup \bar{A}} \cap \overline{B \cap \bar{A} \cup \bar{B}}}$	2.2.16	$(A \cup B \cup C) \cap (A \cup B \cup \bar{C})$
2.2.3	$(A \setminus B \cup A \cap B) \cap \overline{A}$	2.2.17	$(A \cup B \cup C) \cap (\bar{A} \cup B \cup C)$
2.2.4	$(B \setminus A) \cap (\bar{A} \cup B \setminus A)$	2.2.18	$(A \cup B \cup C) \cap (A \cup \bar{B} \cup C)$
2.2.5	$\overline{\overline{A \cup \bar{B}} \setminus \bar{C} \cup \overline{\overline{A} \cup \bar{B}} \setminus C}$	2.2.19	$\bar{A} \cap \bar{B} \cap \bar{C} \cup \bar{A} \cap \bar{B} \cap C \cup A \cap \bar{B} \cap \bar{C} \cup A \cap B \cap \bar{C}$
2.2.6	$\overline{\overline{A \cap \bar{B}} \setminus \bar{C} \cup \overline{\overline{A} \cap \cup \bar{B}} \setminus C}$	2.2.20	$\bar{A} \cap B \cup A \cap \bar{B} \cup A \cap B$
2.2.7	$A \cap \overline{B} \cup A \cap B$	2.2.21	$\bar{A} \cap B \cup \bar{A} \cap \bar{B} \cup A \cap B$
2.2.8	$\overline{\bar{A} \cup B \cup \bar{C} \cup \overline{\bar{A} \cup \bar{B} \cup \bar{C}}}$	2.2.22	$\bar{A} \cap \bar{B} \cup A \cap \bar{B} \cup A \cap B$
2.2.9	$A\Delta(A\Delta B)$	2.2.23	$\bar{A} \cap \bar{B} \cup A \cap \bar{B} \cup \bar{A} \cap B$
2.2.10	$A \setminus (B \cup C) \cup A \cap B \cap C \cup A \cap B \cap \bar{C}$	2.2.24	$\bar{A} \cap \bar{B} \cap C \cup \bar{A} \cap B \cap C \cup A \cap B \cap \bar{C} \cup A \cap \bar{B} \cap \bar{C}$
2.2.11	$A \cap (A \cup \overline{B} \cap \overline{C}) \cap B \cap C \cup A \cap B \cap \overline{C}$	2.2.25	$\bar{A} \cap \bar{B} \cap \bar{C} \cup \bar{A} \cap B \cap \bar{C} \cup A \cap B \cap C \cup A \cap \bar{B} \cap C$
2.2.12	$C \cap (C \cup \overline{B} \cap \overline{A}) \cap B \cap A \cup C \cap B \cap \overline{A}$	2.2.26	$\bar{A} \cap B \cap \bar{C} \cup \bar{A} \cap B \cap C \cup A \cap B \cap C \cup A \cap B \cap \bar{C}$
2.2.13	$A \cap B \cup \left(\bar{B} \cap (A \cap \bar{C} \cup \bar{A})\right) \cup (\bar{C} \cap \bar{B})$	2.2.27	$\bar{A} \cap \bar{B} \cap \bar{C} \cup A \cap \bar{B} \cap C \cup A \cap \bar{B} \cap \bar{C} \cup \bar{A} \cap \bar{B} \cap C$
2.2.14	$\bar{A} \cap \bar{B} \cap \bar{C} \cup \bar{A} \cap B \cap \bar{C} \cup A \cap \bar{B} \cap \bar{C} \cup A \cap B \cap \bar{C}$	2.2.28	$A \cap B \cap \bar{C} \cup A \cap \bar{B} \cap C \cup A \cap \bar{B} \cap \bar{C} \cup A \cap B \cap C$

Yuqorida keltirilgan soddalashtirishlarni amalga oshirish uchun quyida keltirilgan to‘plamlar ustida amallar xossalaridan foydalaning:

U-univyersal to‘plamning A, B, C to‘plam ostilari uchun quyidagi xossalar o‘rinli.

1. $A \cup B = B \cup A$ Kommutativlik
2. $A \cap B = B \cap A$
3. $(A \cup B) \cup C = A \cup (B \cup C)$ Assotsiativlik
4. $(A \cap B) \cap C = A \cap (B \cap C)$
11. $A \cap A = A$ 0 va 1
12. $A \cup \overline{A} = U$ qonunlari
13. $A \cap \overline{A} = Ø$
14. $A \cup Ø = A$

5.	$(A\cup B)\cap C=(A\cap C)\cup(B\cap C)$	distributivlik	15. $A\cap U=A$
6.	$(A\cap B)\cup C=(A\cup C)\cap(B\cup C)$		16. $A\cup U=U$
7.	$A\cap(A\cup B)=A$	Yutilish qonunlari	17. $A\cap$ Ø= Ø
8.	$A\cup(A\cap B)=A$		18. $\overline{U}=$ Ø
9.	$\overline{A\cap B}=\overline{A}\cup\overline{B}$	De Morgan qonunlari	19. $\overline{\varnothing}$ =U
10.	$\overline{A\cup B}=\overline{A}\cap\overline{B}$		20. $A\setminus B=A\cap\overline{B}$
21.	$\overline{\overline{A}}=A$	Ikkilangan rad etish qonuni	

2.2.Murakkab to‘plamlarni soddalashtirishga doir topshiriq

2.2. $(A\cup B\cap\overline{A})\cap(\overline{A}\cup A\cap B)$ soddalashtiring?.

2.2. Topshiriqning bajarilishi bo’yicha na’muna

$(A\cup B\cap\overline{A})\cap(\overline{A}\cup A\cap B)=6-xossaga\_ko'ra=(A\cup B)\cap(A\cup\overline{A})\cap(\overline{A}\cup A)\cap(\overline{A}\cup B)=$

=12-xossaga ko‘ra 2,3-qavslar U gat eng, 15-xossaga ko‘ra esa 1- va 4-qavslarning o‘zlari qoladi.=$(A\cup B)\cap(\overline{A}\cup B)$=6-xossaga ko‘ra=$A\cap\overline{A}\cup B$=13 va 14-xossalarga ko‘ra=B

Shunday qilib soddalashtirish natijasi quyidagicha: $(A\cup B\cap\overline{A})\cap(\overline{A}\cup A\cap B)=B$

2.3. To‘plam tartibini topishga doir topshiriqlar

2.3.1. Shahardagi 110 ta qandalotchilik sexlaridan 40 tasi A mahsulotni, 30 tasi B mahsulotni, 48 tasi C mahsulotni, 10 tasi A va B, 13 tasi B va C, 12 tasi A va C, 14 tasi faqat 2 xil mahsulot ishlab chiqarsa, ushbu mahsulotlarni ishlab chiqarmayatgan sexlar nechta?

2.3.2. 30 ta turistdan 19 tasi ingliz, 18 tasi nemis tilini biladi. Ulardan nechtasi faqat ingliz tilini biladi?

2.3.3. 42 turistdan 25 tasi ingliz, 28 tasi nemis tilini biladi. Ulardan nechtasi faqat nemis tilini, nechtasi faqat ingliz tilini, nechtasi ikkala tilni ham biladi?

2.3.4. Guruxda 40 talaba bolib, ulardan 25 tasi yigitlar, qolgani qizlar. Imtixonda ulardan 18 tasi “4”, 22 tasi “5” baho olgan. Agar qizlardan 9 tasi “5” olgan bolsa, “4” olgan yigitlar nechta?

2.3.5. Guruxdagi talabalardan 17 tasi volleybol, 16 tasi futbol, 18 tasi tennis boyicha togaraklarga qatnashadi. Ulardan 5 tasi futbol va voleybol 7 tasi voleybol, tennis, 6 tasi futbol va tennis, 2 tasi esa 3 ta togarakka ham qatnaydi. Guruhda nechta talaba bor?

2.3.6. Tumanda 32 ta fermer bolib, ular paxta, bugdoy va kartoshka yetishtirishadi. Ulardan 26 tasi paxta, bugdoy yetishtirishi ma’lum bolsa, faqat kartoshka yetishtiradigan fermer nechta?

2.3.7. Guruxdagi 28 talabadan 11 kishi futbol, 15 kishi kurash, 15 kishi basketbol to‘garaklariga qatnashadi. 5 kishi ham futbol ham kurash, 4 kishi ham futbol ham basketbol, 7 kishi ham kurash ham basketbol, 7 kishi esa faqat 2 tadan sport turiga qatnashadi. Necha kishi umuman bu to‘garaklarga qatnashmaydi? Necha kishi faqat bitta to‘garakka, necha kishi uchchala to‘garakka ham qatnashadi?

2.3.8. Potokda 100 talabadan 61 tasi ingliz tilini, 48 tasi fransuz tilini, 56 kishi kishi nemis tilini o‘rganishadi. 24 kishi ingliz va fransuz, 36 kishi ingliz va nemis, 30 kishi fransuz va nemis tilini o‘rganishadi. Faqat 2 tadan til o‘rganadiganlar 24 kishi bo‘lsa, umuman til o‘rganmayatganlar nechta? Faqat bittadan til o‘rganayatganlar nechta? Uchchala tilni ham necha kishi o‘rganayapti?

2.3.9. Oktyabr oyida 10 kun sovuq, 20 kun yomg‘rli, 16 kun shamolli kun bo‘ldi. Agar 2 kun faqat sovuq, 7 kun faqat yomg‘ir, 5 kun faqat shamol, 4 kun sovuq, yomg‘ir, shamolli kun bo‘lgan bo‘lsa, necha kun quyosh charaqlab turgan?

2.3.10. Sessiyada 100 ta talaba matematika, fizika, tarixdan imtixon topshirdi. Matematikani 54 kishi, fizikani 59 kishi, tarixni 50 kishi topshirdi. Matematika va fizikani 29 kishi, matematika va tarixni 22 kishi, fizika va tarixni 28 kishi, uchchala fanni ham 12 kishi topshirgan bo‘lsa, necha kishi birorta ham fanni toshira olmagan? Nechta kishi faqat bitta fanni, nechta kishi faqat ikkita fanni topshirgan?

2.3.11. 1 dan 100 gacha sonlar ichida 3 ga bo‘linadiganlari 33 ta, 4 ga bo‘linadiganlari 25 ta, 12 ga bo‘linadiganlari 8 ta bo‘lsa, faqat 3 ga, faqat 4 ga, 3 ga ham 4 ga ham bo‘linmaydiganlar sonlar nechta?

2.3.12. Potokdagi 85 talaba universitetga yetib kelish uchun metro, avtobus, tramvay kabi jamoat transportlaridan foydalanishadi va piyoda kelishadi. Agar 31 kishi metrodan, 33 kishi avtobus, 23 kishi tramvaydan, 10 kishi metro va avtobusdan, 13 kishi metro va tramvaydan, 12 kishi avtobus va tramvaydan, 21 kishi kamida 2 ta transportdan foydalansa, nechta kishi yotoqxonadan piyoda keladi? Nechta kishi faqat bitta, faqat ikkita, uchchala transportdan ham foydalanishadi?

2.3.13. Guruhdagi 17 ta talaba sportga, 22 tasi matematikaga qiziqadi. Komil, Baxodir, Nodir, Dilnoza va Shaxnoza sportga ham matematikaga ham qiziqishadi. Bitta talaba sportga ham matematikaga ham qiziqmaydi. Guruxda nechta talaba bor?

2.3.14. Guruxdagi 25 talabadan 8 tasi quvnoqlar va zukkolar o‘yinida raqs nomerlarida, 11 tasi turli xil sahna ko‘rinishlarida, 4 tasi ham raqs ham sahna ko‘rinishlarida qatnashishdi. Necha kishi quvnoqlar va zukkolar o‘yinida ishtirok etishmadi?

2.3.15. 1 dan 100 gacha sonlar ichida 2 ga bo‘linadiganlari 50 ta, 3 ga bo‘linadiganlari 33 ta, 17 toqlari 3 ga bo‘linadi. Nechta son 6 ga bo‘linadi? Nechta son 3 ga bo‘linmaydi? Nechta son 2 ga ham 3 ga ham bo‘linmaydi?

2.3.16. Guruxdagi 29 talabadan 18 tasi matematika, fizika, informatika bo‘yicha o‘tqazilgan olimpiadalardan birortasiga ham qatnashishni xoxlashmadi. Matematika

bo‘yicha olimpiadada 8 ta talaba, fizika bo‘yicha olimpiadada 4 ta talaba, ximiya bo‘yicha olimpiadada 4 ta, faqat matematikani o‘ziga 3, faqat fizikaga 1, faqat ximiyaga 2 kishi qatnashdi. Uchchala olimpiadaga ham biror kishi qatnashmadi. Matematika va fizika, fizika va informatika bo‘yicha o‘tqazilgan olimpiadalar bir vaqtda o‘tishi mumkinmi?

2.3.17. 1 dan 100 gacha sonlar ichida 3 ga bo‘linadiganlari 33 ta, 5 ga bo‘linadiganlari 20 ta, 15 ga bo‘linadiganlari 6 ta bo‘lsa, faqat 3 ga, faqat 5 ga bo‘linadigan, 3 ga ham 5 ga ham bo‘linmaydiganlar sonlar nechta?

2.3.18. Uch xonali sonlar ichida 3 ga bo‘linadiganlari 300 ta, 4 ga bo‘linadiganlari 225 ta bo‘lsa, u holda 12 ga bo‘linadigan sonlar nechta? 3 ga ham 4 ga ham bo‘linmaydigan sonlar nechta?

2.3.19. Ma‘lum vaqt kuzatish natijasida bozordan 16 kishi behi, 24 kishi olma, 15 kishi nok, 11 kishi behi va olma, 8 kishi behi va nok, 12 kishi olma va nok, 6 kishi behi, olma va nok, 5 kishi gilos olib chiqqan bo‘lsa, bozordan necha kishi chiqqan?

2.3.20. Qizil, sariq va ko‘k bo‘yoqlarning barchasi 28 kg. Ushbu bo‘yoqlarning bir qismi quyidagi bo‘yoqlarni olish uchun ishlatilgan: binafsha (qizil va ko‘k) – 2 kg, yashil (ko‘k va sariq) – 4 kg, zarg‘aldoq (qizil va sariq) – 3 kg, jigar (qizil, sariq, ko‘k) – 1 kg. Qizil, binafsha, zarg‘aldoq va jigar bo‘yoqlarning umumiy og‘irligi ko‘k, binafsha, yashil va jigar bo‘yoqning umumiy og‘irligiga, hamda sariq, zarg‘aldoq, yashil va jigar bo‘yoqlarning umumiy og‘irligiga teng. Faqat qizil, faqat ko‘k, faqat sariq bo‘yoqlardan necha kg. dan qoldi ?

2.3.21. Potokda talabalar yoki grant yoki shartnoma asosida o‘qishadi. Potokda 32 ta o‘g‘il bola, barcha shartnoma bo‘yicha o‘qiyatganlar 48 ta. Grant asosida o‘qiyatgan qizlar shartnoma asosida o‘qiyatgan o‘g‘il bolalar soniga teng bo‘lsa, potokda nechta talaba bor?

2.3.22. Qoplarga solingan qum, shag‘al, tsementni tashish uchun 120 ta mashina ajratilgan. Qum uchun 55 ta, shag‘al uchun 50 ta, tsement uchun 45 ta, qum va shag‘al uchun 15 ta, qum va tsement uchun 20 ta, shag‘al va tsement uchun 10 ta, ixtiyoriy ikki xil material tashish uchun 35 ta mashina ajratilgan bo‘lsa, nechta mashina ushbu yuklarni tashishda qatnashmagan?

2.3.23. Kutubxonaning o‘qish zalida A, B, C jurnallarni buyurtma berishadi. A va B ni 65%, A va C ni 70%, B va C ni 80%, A va C jurnallarni 10% o‘quvchi, A va B ni hech kim buyurtma bermasa, kamida ikkita jurnalni 15% o‘quvchi buyurtma bersa, necha foiz o‘quvchilar faqat bitta, faqat ikkita jurnalni buyurtma berishgan?

2.3.24. Uchta stanokda bir xil miqdordagi detallar qayta ishlanadi. Ulardan 30 ta detal 1 ta stanokda, 30 tasi faqat ikkita stanokda, 10 tasi qayta ishlanmagan bo‘lib, jami 80 ta detal ekanligi aniq bo‘lsa, uchchala stanokda ham nechta detal qayta ishlangan?

2.3.25. Sayohatda birinchi va iikinchi kurs talabalari bo‘lishdi. Ularning barchasi yoki a’lochi yoki yaxshi baholarda o‘qiydigan talabalar bo‘lib, ularning 16 tasi o‘g‘il bolalar, 24 tasi a’lochi, yaxhi bahoda o‘qiydigan qizlar a’lochi o‘g‘il bolalar soniga teng bo‘lsa, sayohatda nechta talaba bo‘lgan?

2.3.26. 120 ta detaldan 82 tasi 1-stanokda, 23 tasi 2-stanokda, 42 tasi 3-stanokda, 18 tasi 1- va 2-stanoklarda, 17 tasi 1- va 3-stanokda, 15 tasi 2- va 3-stanoklarda, 10 tasi uchchala stanokda qayta ishlov berildi. Nechta detal birorta ham stanokda qayta ishlanmagan?

2.3.27. Boshqarma 150 ta korxonadan iborat bo‘lib, ularning 80 tasi A mahsulotni, 60 tasi B mahsulotni, 50 tasi C mahsulotni, 20 tasi A va B mahsulotni, 30 tasi B va C mahsulotni, 10 tasi A va C mahsulotni, 50 tasi kamida ikkita mahsulotni ishlab chiqaradi. Nechta korxona A, B, C mahsulotlarni ishlab chiqarmaydi?

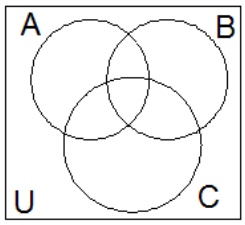
2.3.28. Qishki sessiyada 40 talabadan 18 tasi “3” baholar, 20 tasi “4” baholar, 23 tasi “5” baholar olgan. Ulardan 3 tasida 3, 4, 5 baholar, 6 tasida faqat 4, 5 baholar, 9 tasida esa faqat 5 baholar bolgan bolsa, sessiyada faqat 3 baho olgan, faqat 4 baho olgan talabalar nechta?

2.3.To‘plam tartibini topishga doir topshiriq(na’muna).

100 ta talaba sessiya topshirishdi. Tarixni 48 kishi, falsafani 42 kishi, matematikani 37 kishi topshirdi. Tarix va falsafani 76 kishi, tarix va matematikani ham 76 kishi, falsafa va matematikani 66 kishi topshirdi. Hamma imtihonlarni 5 kishi topshirdi. Necha kishi bittadan, ikkitadan imtixon topshirgan, necha kishi birorta ham imtixon topshira olmagan?

2.3.Topshiriqning bajarilishi bo’yicha na’muna:

Quyidagicha belgilashlar kiritamiz: A={Tarixni topshirganlar},



B={falsafani topshirganlar}, C={matyematikani topshirganlar}

$n(A)=48,\quad n(B)=42,\quad n(C)=37$, $n(A\cup B)=76$,

$n(A\cup C)=76,\quad n(B\cup C)=66,\quad n(A\cap B\cap C)=5$

$n(A\cap B)=n(A)+n(B)-n(A\cup B)=48+42-76=14$ kishi

$n(A\cap C)=n(A)+n(C)-n(A\cup C)=48+37-76=11$ kishi

$n(B\cap C)=n(B)+n(C)-n(B\cup C)=42+37-66=13$ kishi

Faqat ikkitadan fanni topshirganlar

$n(A\cap B\cap \overline{C})=n(A\cap B\setminus \mathrm{A}\cap \mathrm{B}\cap \mathrm{C})=n(A\cap B)-n(A\cap B\cap C)=14-5=9\ kishi$ faqat tarix va falsafani,

$n(A \cap \overline{B} \cap C) = n(A \cap C \setminus \mathrm{A} \cap \mathrm{B} \cap \mathrm{C}) = n(A \cap C) - n(A \cap B \cap C) = 11 - 5 = 6\ kishi$ faqat tarix va matematikani,

$n(\overline{A} \cap B \cap C) = n(B \cap C \setminus \mathrm{A} \cap \mathrm{B} \cap \mathrm{C}) = n(B \cap C) - n(A \cap B \cap C) = 13 - 5 = 8\ kishi$ faqat falsafa va matematikani topshirishgan.

Faqat bitta fanni topshirganlar:

$n(A \cap \overline{B} \cap \overline{C}) = n(A \setminus \mathrm{A} \cap \mathrm{B} \setminus \mathrm{A} \cap \overline{\mathrm{B}} \cap \mathrm{C}) = n(A) - n(A \cap B) - n(A \cap \overline{B} \cap C) = 48 - 14 - 6 = 28\ kishi$

faqat tarixni topshirishgan,

$n(\overline{A} \cap B \cap \overline{C}) = n(B \setminus \mathrm{A} \cap \mathrm{B} \setminus \overline{\mathrm{A}} \cap B \cap \mathrm{C}) = n(B) - n(A \cap B) - n(\overline{A} \cap B \cap C) = 42 - 14 - 8 = 20\ kishi$

faqat falsafani topshirishgan,

$n(\overline{A} \cap \overline{B} \cap C) = n(C \setminus \mathrm{A} \cap C \setminus \overline{\mathrm{A}} \cap B \cap \mathrm{C}) = n(C) - n(A \cap C) - n(\overline{A} \cap B \cap C) = 37 - 11 - 8 = 18\ kishi$

faqat matematikani topshirishgan.

Umuman topshirmaganlar:

$n(\overline{A \cup B \cup C}) = n(U \setminus (\mathrm{A} \cup \mathrm{B} \cup \mathrm{C})) = n(U) - n(A \cup B \cup C) =$

$= n(U) - (n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)) =$

=100-(48+42+37-14-11-13+5)=100-94=6 kishi umuman imtixon topshira olmagan.