Silindr mavzusini o‘qitishda geogebra 3d imkoniyatlaridan foydalanish

Sultonova Shahnoza Yusuf qizi
Osiyo texnologiyalar universiteti
Pedagogika kafedrasi o‘qituvchisi
Email: shahnozasultonova1111@gmail.com

Orcid: 0009-0005-7868-0151

Annotatsiya. Mazkur tezisda geometriya fanining stereometriya bo‘limida silindr mavzusini o‘qitishda GeoGebra dasturining 3D grafik muhiti imkoniyatlaridan foydalanish masalalari yoritilgan. Uch o‘lchamli modellashtirish asosida silindrning geometrik tuzilishi, asosiy elementlari, hajmi va sirt yuzasiga oid tushunchalarni o‘quvchilarga tushuntirishning metodik imkoniyatlari tahlil qilingan.

Kalit so‘zlar: GeoGebra, GeoGebra 3D, silindr, stereometriya, 3D modellashtirish, fazoviy tasavvur, vizuallashtirish, raqamli ta’lim.

Bugungi kunda ta’lim jarayoniga raqamli texnologiyalarni joriy etish ta’lim sifatini oshirishning muhim omillaridan biri hisoblanadi. Ayniqsa, geometriya fanini o‘qitishda axborot-kommunikatsiya texnologiyalaridan foydalanish murakkab geometrik tushunchalarni o‘quvchilarga tushunarli va ko‘rgazmali shaklda yetkazish imkonini beradi.

Stereometriya bo‘limidagi mavzular o‘quvchilardan fazoviy tasavvur va abstrakt fikrlashni talab qiladi. Xususan, silindr mavzusini o‘rganishda uning asoslari, o‘qi, balandligi, yasovchisi hamda sirtlari o‘rtasidagi bog‘lanishlarni tushunish uchun vizual vositalardan foydalanish muhim ahamiyatga ega. Shu nuqtai nazardan, GeoGebra dasturining 3D grafik muhiti silindr mavzusini o‘qitishda samarali didaktik vosita bo‘lib xizmat qiladi.

GeoGebra matematika va geometriyani dinamik hamda interfaol shaklda o‘rganish imkonini beruvchi zamonaviy dasturiy vositadir. Uning 3D grafik muhiti yordamida fazoviy geometrik jismlarni yaratish, ularni aylantirish, turli yo‘nalishlardan kuzatish hamda parametrlarini o‘zgartirish mumkin. Bu imkoniyatlar silindrning geometrik xususiyatlarini o‘quvchilarga aniqroq tushuntirishga yordam beradi.

Silindrning asosiy elementlari ikki teng va parallel asos, asos radiusi, balandlik, o‘q va yasovchidan iborat. GeoGebra 3D muhitida ushbu elementlarni alohida ko‘rsatish va belgilash orqali o‘quvchilar silindrning fazoviy tuzilishini yaxshiroq anglaydilar.

GEOGEBRA 3D ASOSIDA SILINDRNI MODELLASHTIRISH

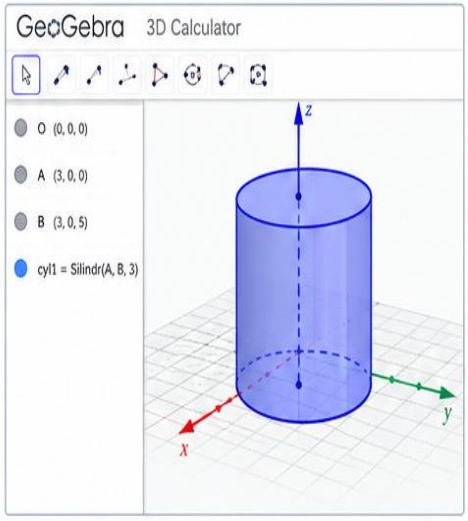
Dars jarayonida avvalo GeoGebra dasturining 3D Grafik muhiti ishga tushiriladi. Unda silindr modeli yaratiladi va o‘quvchilarga geometrik jismni turli rakurslardan kuzatish imkoniyati beriladi. Modelni aylantirish orqali silindrning asoslari, o‘qi va yon sirti fazoda qanday joylashganini ko‘rgazmali tarzda tushuntirish mumkin.

GeoGebra dasturining muhim afzalliklaridan biri parametrlarni dinamik ravishda o‘zgartirish imkoniyatidir. Masalan, radius r va balandlik h qiymatlari o‘zgartirilganda silindrning shakli va o‘lchamlari qanday o‘zgarishini kuzatish mumkin. Bu jarayon o‘quvchilarning kuzatish, tahlil qilish va mustaqil xulosa chiqarish ko‘nikmalarini rivojlantiradi.

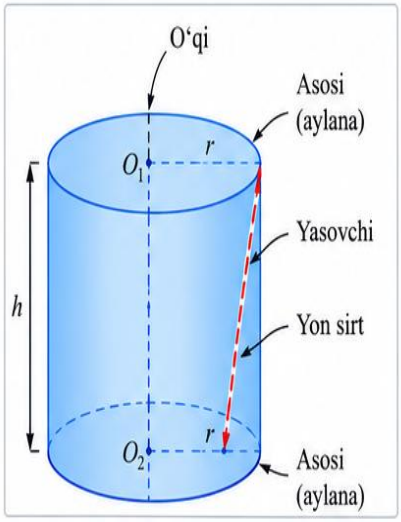
SILINDRNING HAJMI VA TO‘LA SIRT YUZASINI TUSHUNTIRISH

Silindr hajmi $V = \pi r^2 h$ formula orqali aniqlanadi. GeoGebra modeli yordamida radius va balandlik qiymatlarini o‘zgartirib, ushbu kattaliklarning hajmga ta’sirini amaliy ravishda kuzatish mumkin. Masalan, radius ikki marta oshirilganda hajmning to‘rt marta ortishi, balandlik ikki marta oshirilganda esa hajmning ikki marta ortishi aniqlanadi.

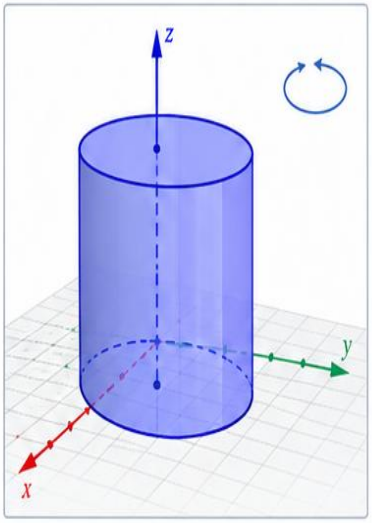
Silindrning to‘la sirt yuzasi $S = 2\pi r^2 + 2\pi rh$ formula bilan aniqlanadi. Ushbu formuladagi $2\pi r^2$ silindrning ikki asos yuzasini, $2\pi rh$ esa yon sirt yuzasini ifodalaydi. Uch o‘lchamli model orqali bu qismlarni alohida ko‘rsatish formulalarning geometrik mazmunini tushunishni osonlashtiradi.



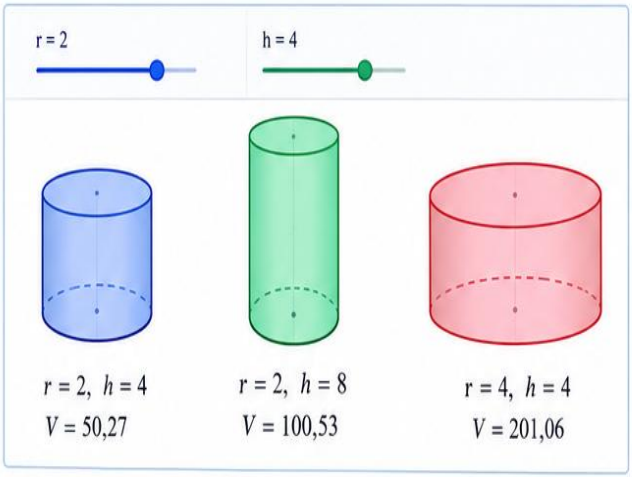
1-rasm. GeoGebra 3D muhitida silindr modeli.



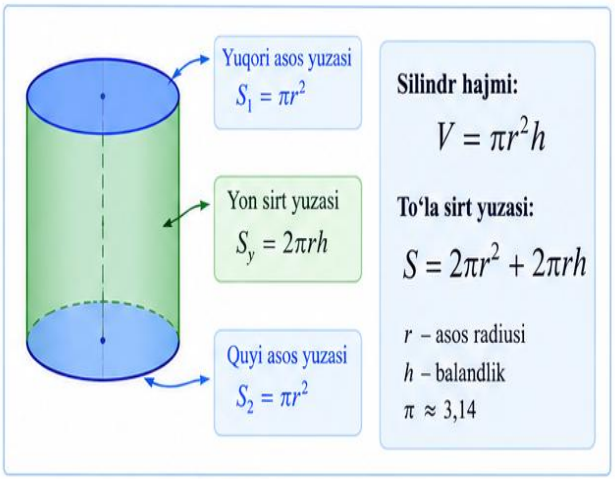
2-rasm. Silindrning asosiy elementlari.



3-rasm. Silindr modelini aylantirish orqali ko‘rish.



4-rasm. Radius va balandlik o‘zgarishida silindr modelining



5-rasm. Silindrning hajmi va to‘la sirt yuzasi.

1-rasm. Silindr mavzusini GeoGebra 3D imkoniyatlari asosida o‘qitishga oid vizual materiallar.

Silindr mavzusini o‘qitishda GeoGebra dasturining 3D imkoniyatlaridan foydalanish geometriya ta’limining samaradorligini oshirishga xizmat qiladi. Uch o‘lchamli modellashtirish orqali silindrning geometrik tuzilishi va asosiy elementlari aniq va tushunarli shaklda namoyish etiladi. GeoGebra 3D muhitida modellarni dinamik ravishda o‘zgartirish o‘quvchilarning fazoviy tasavvuri, kuzatish va tahlil qilish ko‘nikmalarini rivojlantiradi. Shuningdek, hajm va sirt yuzasi formulalarining geometrik mazmunini vizual tarzda tushuntirish bilimlarni chuqurroq o‘zlashtirishga yordam beradi.

FOYDALANILGAN ADABIYOTLAR

1. Hohenwarter M. Dynamic mathematics with GeoGebra // Journal of Online Mathematics and its Applications. — 2007. — Vol. 7. — Article 1448.

2. Hohenwarter M., Jones K. Ways of linking geometry and algebra: The case of GeoGebra // Proceedings of the British Society for Research into Learning Mathematics. — 2007. — Vol. 27, № 3. — P. 126–131.

3. Hohenwarter J., Hohenwarter M., Lavicza Z. Introducing dynamic mathematics software to secondary school teachers: The case of GeoGebra // Journal of Computers in Mathematics and Science Teaching. — 2008. — Vol. 28, № 2. — P. 135–146.

4. Hohenwarter M., Fuchs K. Combination of dynamic geometry, algebra and calculus in the software system GeoGebra // Proceedings of the Computer Algebra Systems and Dynamic Geometry Systems in Mathematics Teaching Conference. — 2004. — Pécs, Hungary.

5. Hollebrands K. F. The role of a dynamic software program for geometry in the strategies high school mathematics students employ // Journal for Research in Mathematics Education. — 2007. — Vol. 38, № 2. — P. 164–192.

6. Hohenwarter M., Lavicza Z. Mathematics teacher development with ICT: Towards an International GeoGebra Institute // Proceedings of the British Society for Research into Learning Mathematics. — 2007. — Vol. 27, № 3. — P. 49–54.

7. Hohenwarter M. GeoGebra – Ein Softwaresystem für dynamische Geometrie und Algebra der Ebene: Master thesis. — Salzburg: University of Salzburg, 2002.