Mirzakarimov Ergashboy Mirzaboyevich, dotsent

Farg‘ona davlat texnika universiteti, Farg‘ona, Uzbekiston

Tel: 90 634-65-46, e-mail: ergashboy.mir@mail.ru

Fayzullayev Jamshid Ismoiljonovich, p.f.f.d (PhD), dotsent,

Farg‘ona davlat texnika universiteti, Farg‘ona, Uzbekiston,

Tel: +998936467980, fayzullayev4748@gmail.com

Мирзакаримов Эргашбой Мирзабоевич, доцент

Ферганский государственный технический университет,

Фергана, Узбекистан

Tel: 90 634-65-46, e-mail: ergashboy.mir@mail.ru

Файзуллаев Джамшид Исмаилжонович, PhD, доцент,

Ферганский государственный технический университет,

Фергана, Узбекистан,

Тел: +998936467980, fayzullayev4748@gmail.com

Mirzakarimov Ergashboy Mirzaboyevich , Associate Professor

Fergana State Technical University, Fergana, Uzbekistan

Tel: 90 634-65-46, e-mail: ergashboy.mir@mail.ru

Fayzullaev Jamshid Ismailjonovich, PhD, Associate Professor,

Ferghana State Technical University, Ferghana, Uzbekistan,

Phone: +998936467980, fayzullayev4748@gmail.com

Farg‘ona davlat universiteti “Matematik analiz va differensial tenglamalar” kafedrasi, dotsent, fizika-matematika fanlari nomzodi Abdurasul Rafikov taqrizi ostida

O'RTA MAKTABLARDA STEREOMETRIK JISIMLARDAN MUNTAZAM PIRAMIDANI QURISHDA MAPLE KOMPYUTER MATEMATIK PAKETIDAN FOYDALANNISH

Аннотация. Maqola Maple kompyuter matematik paketining analitik imkoniyatlaridan va dasturlash natijalarini grafik talqin qilishdan foydalangan holda o'quvchilarning tizimli fikrlashini

va shu bilan ularning ijodiy va tadqiqot qobiliyatlarini rivojlantirishga qaratilgan. Muntazam piramidani qurish imkoniyatlari ko'rsatilgan.

Kalit so'zlarlar: Maple, kompyuter, algoritm, modellashtirish, stereometriya, geometrik jismlarni, 3D vizual format, polygonplot3d, plots, display

ИСПОЛЬЗОВАНИЕ ПАКЕТА КОМПЬЮТЕРНЫХ МАТЕМАТИЧЕСКИХ ВЫЧИСЛЕНИЙ MAPLE ДЛЯ ПОСТРОЕНИЯ ПРАВИЛЬНОЙ ПИРАМИДЫ ИЗ СТЕРЕОМЕТРИЧЕСКИХ ТЕЛ В СРЕДНИХ ШКОЛАХ

Аннотация. Цель статьи — развитие у студентов системного мышления, а следовательно, и творческих и исследовательских навыков, с использованием аналитических возможностей компьютерного математического пакета Maple и графической интерпретации результатов программирования. Показаны возможности построения правильной пирамиды.

Ключевые слова: Maple, компьютер, алгоритм, моделирование, стереометрия, геометрические тела, 3D-визуализация, **polygonplot3d, plots, display**

USING THE MAPLE COMPUTER MATHEMATICAL PACKAGE TO CONSTRUCT A REGULAR PYRAMID FROM STEREOMETRIC SOLIDS IN SECONDARY SCHOOLS

Abstract. The purpose of this article is to develop students' systems thinking, and consequently, creative and research skills, using the analytical capabilities of the Maple computer mathematical package and the graphical interpretation of programming results. The possibilities of constructing a regular pyramid are shown.

Keywords: Maple, computer, algorithm, modeling, stereometry, geometric solids, 3D visualization, **polygonplot3d, plots, display**

ASOSIY QISM. O'rta maktabda ixtisoslashtirilgan informatika kursida Maple kompyuter matematik paketidan foydalangan holda dasturlashni o'qitishning maqsadlari quyidagilardan iborat:

Informatika o'rganish jarayonini yanada tasviriy, interfaol va qiziqarli, shuning uchun samaraliroq qilish;

O'rta maktabda algoritmik fikrlashni rivojlantirish va dasturlash asoslarini yuqori sifatli o'zlashtirish uchun strukturaviy dasturlash tamoyillari va matematik fikrlash mantig'i o'rtasida yaqinroq moslikka erishish;

Maple kompyuter matematik paketining analitik imkoniyatlaridan va dasturlash natijalarini grafik talqin qilishdan foydalangan holda o'quvchilarning tizimli fikrlashini va shu bilan ularning ijodiy va tadqiqot qobiliyatlarini rivojlantirish;

Maktab o'quvchilariga Maple kompyuter matematik paketi, modellashtirish texnologiyalari va loyiha usuli asosida ijodiy va kognitiv faoliyatni faollashtirish orqali original dasturiy mahsulotlar yaratishni o'rgatish;

Tabiiy fanlar va texnologiyalar bo'yicha o'quvchilarning kasbiy yo'nalishini yaxshilash, darsda va darsdan tashqari mashg'ulotlarda axborot texnologiyalarini qo'llashda professional kompetentsiyalar va amaliy ko'nikmalarni rivojlantirish. O'quv maqsadlariga erishish uchun o'quv jarayonining mazmunini aniqlash kerak. O'qitish vositasi sifatida ma'lum bir dasturiy ta'minotni, masalan, Maple kompyuter matematik paketini tanlash dasturlash kursining mazmunini qayta ko'rib chiqish zaruratiga olib keladi.

Maple kompyuter matematik paketi dasturlari yordamida stereometriya masalalaridagi geometrik jismlarni 2D va 3D vizual formatlarda qurish va animatsiyami namoyish qilish qulay ekanligini quyidagi muntazam piramidani qurish misolda ko'rsatamiz.

1)Asosi muntazam uchburchakdan iborat bo'lga muntazam piramidani aniqlash va qurish:

M a p l e d a s t u r i:

> restart; with(plots):with(plottools):

> _EnvXName := x: _EnvYName := y: _EnvZName := z:

Muntazam piramidaning katta asosi uchburchakni aniqlash:

> KB3Kats:=[seq([2*cos(2*Pi*i/3),2*sin(2*Pi*i/3),0], i=0..2)];

$$KB3Kats := [[2, 0, 0], [-1, \sqrt{3}, 0], [-1, -\sqrt{3}, 0]]$$

> BUTP:=display(line([0,0,3],KB3Kats[1]), line([0,0,3],KB3Kats[2]),line([0,0,3],KB3Kats[3]), color=red, linestyle=solid,thickness=2);

$$BUTP := PLOT3D(\ldots)$$

Piramida asosini qurish:

> BPasos:=polygonplot3d([KB3Kats],axes=normal, orientation=[54,67]);

$$BPasos := PLOT3D(\ldots)$$

Butun piramidani qurish:

> plots[display]({BUTP,BPasos},thickness=1, orientation=[-14,65]); (1-rasm).

Kesik piramidaning katta asosdan H=1 masofadagi kichik asosini aniqlash:

> KB3Kias:=[seq([cos(2*Pi*i/3),sin(2*Pi*i/3),1], i=0..2)];

$$KB3Kias := \left[[1, 0, 1], \left[-\frac{1}{2}, \frac{1}{2}\sqrt{3}, 1\right], \left[-\frac{1}{2}, -\frac{1}{2}\sqrt{3}, 1\right]\right]$$

Kesik piramidaning qirralarini aniqlash:

> QKKP:=display(line(KB3Kias[1],KB3Kats[1]), line(KB3Kias[2],KB3Kats[2]),line(KB3Kias[3],KB3Kats[3]), color=red, linestyle=solid,thickness=2);

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QKKP := PLOT3D(...)

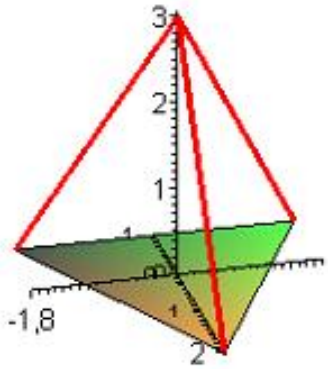
Kesik piramidaning asoslarini qurish:

> KPasos:=polygonplot3d([KB3Kias,KB3Kats],axes=normal, orientation=[54,67]);

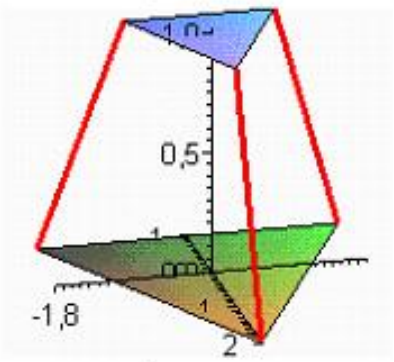
KPasos := PLOT3D(...)

Kesik piramidani qurish:

> plots[display]({QKKP,KPasos},thickness=1, orientation=[-14,65]); (1a-rasm)



1-rasm.



1a-rasm.

2)Asosi muntazam to‘rtburchakdan iborat bo‘lga piramidani aniqlash va qurish:

M a p l e d a s t u r i:

> restart; with(plots):with(plottools):

> _EnvXName:=x: _EnvYName:=y: _EnvZName:=z:

Muntazam piramidaning katta asosi to‘rtburchakni aniqlash:

> KB4Katas:=[seq([2*cos(Pi*i/2),2*sin(Pi*i/2),0], i=0..4)];

KB4Katas := [[2, 0, 0], [0, 2, 0], [−2, 0, 0], [0, −2, 0], [2, 0, 0]]

Uchi (0;0;3) *nuqtada bo‘lgan piramidaning qirralarini aniqlash:*

> BUTP:=display(line([0,0,3],KB4Katas[1]), line([0,0,3],KB4Katas[2]),line([0,0,3],KB4Katas[3]), line([0,0,3],KB4Katas[4]),line([0,0,3], KB4Katas[5]), color=red, linestyle=solid,thickness=2);

BUTP := PLOT3D(...)

Piramida asosini qurish:

> BPasos:=polygonplot3d([KB4Katas],axes=normal, orientation=[54,67]);

BPasos := *PLOT3D*(…)

Butun piramidani qurish:

> plots[display]({BUTP,BPasos},thickness=1, orientation=[-14,65]); (2-rasm)

Kesik piramidaning katta asosdan H=1 masofadagi kichik asosini aniqlash:

> KB4Kias:=[seq([cos(Pi*i/2),sin(Pi*i/2),1],i=0..4)];

KB4Kias := [[1, 0, 1], [0, 1, 1], [−1, 0, 1], [0, −1, 1], [1, 0, 1]]

Kesik piramidaning qirralarini aniqlash:

> QKKP:=display(

line(KB4Kias[1],KB4Katas[1]), line(KB4Kias[2],KB4Katas[2]), line(KB4Kias[3],KB4Katas[3]), line(KB4Kias[4],KB4Katas[4]), line(KB4Kias[5],KB4Katas[5]),

color=red, linestyle=solid,thickness=2); *QKKP* := *PLOT3D*(…)

Kesik piramidaning asoslarini qurish:

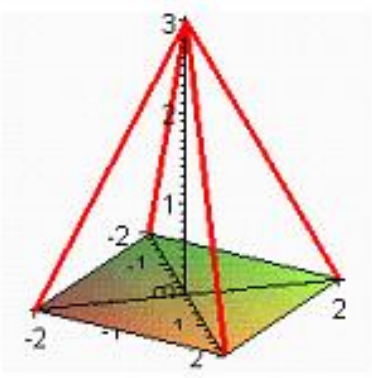
> KPasos:=polygonplot3d([KB4Kias,KB4Katas],axes=normal, orientation=[54,67]);

KPasos := *PLOT3D*(…)

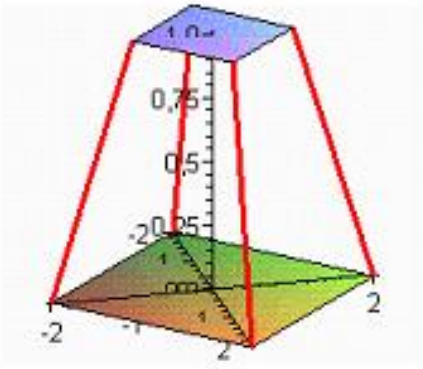
Kesik piramidani qurish:

> plots[display]({QKKP,KPasos},thickness=1,

orientation=[-14,65]); (2a-rasm)



2-rasm.



2a-rasm.

OLINGAN NATIJALARNI TAHLIL QILISH. O'rta maktabda ixtisoslashtirilgan informatika kursida Maple kompyuter matematik paketidan foydalangan holda dasturlashni o'qitishning maqsadlari matematika fani masalalarni tez, aniq va sifatli yechish uchun ishlatilishi

mumkin, shuningdek, 2D va 3D formatlarida animatsion grafikalarini qilish imkonini beradi [1,2,3].

XULLOSA. Bugungi kunda kompyuter yordamida ko‘plab masalalarni, matematik modulini tuzishda va bu masalalarni katta tezlikda hal qilishga xizmat qiluvchi Maple matematik paketi mavjud bo‘lib, murakkab geometri shaki va grafiklarni 2D va 3D farmatlarida tez, aniq va sifatli tasvirlashda Maple tizimi dasturlaridan foydalanish qulay va samarali ekanligi ko‘ramiz[7,8].

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Muallif haqida ma’lumot.

1.**Mirzakarimov Ergashboy Mirzaboyevich.**

2.Dotsent.

3.Farg‘ona davlat texnika universiteti, Farg‘ona, Uzbekiston.

4. Maple tizimi yordamida egri chiziqni qutb koordinatalar sistemasida aniqlash va qurish.
5. Tel: +998 90 634 65 46.
6.ergashboy.mir@mail.ru
7. +998 94 133 96 69, @rafiqovrasulbek

1.**Fayzullayev Jamshid Ismoiljonovich.**

2. p.f.f.d (PhD), dotsent.

3.Farg‘ona davlat texnika universiteti, Farg‘ona, Uzbekiston

4. Vektorlarni animatsiya asosida qo’shishda maple tizimidan foydalanish.

5.Tel: +998936467980.

6.fayzullayev4748@gmail.com.

7. +998 94 133 96 69, @rafiqovrasulbek