

Interfaol usullarni qo‘llab funksiyaning differensial va uning taqribiy hisoblashga doir misollar yechish

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Annotatsiya: Maqolada Funksiyaning differensial va uning taqribiy hisoblashga doir misollar yechish usullari bayon qilingan. Interfaol «Kichik guruhlarda ishlash» usulini qo‘llagan holda darsni samarali o‘tish yo‘llari keltirilgan. «Kichik guruhlarda ishlash» metodini qo‘llashda foydalanish mumkin bo‘lgan bir nechta misollar tavsiya qilingan.

Kalit so‘zlar: Funksiyaning differensial, taqribiy hisoblash, «Kichik guruhlarda ishlash» usuli, baholash, iqtidor, interfaol metodlar

Solving examples of differential functions and its approximate calculations using interactive methods

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Abstract: The article describes the methods of solving the differential of a function and examples of its approximate calculation. Here are some suggestions on how to look or get an appointment for appointments in small groups. Here are some examples of how to work in small groups.

Keywords: Differential function, approximate calculation, "Working in small groups" method, assessment, ability, interactive methods

Hozirgi vaqtda ilg‘or pedagogik texnologiyalar (interfaol usullar) mashg‘ulot turlari ko‘p bo‘lib, ularni dars mavzusining xususiyatlari hamda ko‘zda tutilgan maqsadlarga muvofiq tanlanadi va tegishlicha tayyorgarlik ko‘riladi. Bu matematika fani darslarini o‘tishda juda muhim hisoblanadi. Bunda o‘quvchilarning tayyorgarliklariga o‘ziga xos talablar qo‘yiladi. Xususan: mashg‘ulotda faol ishtirok etish uchun zarur bilimlarni o‘zlashtirganlik, muloqotga tayyorlik, o‘zaro hamkorlikda ishlash, mustaqil fikrlash, o‘z fikrini erkin bayon qilish va himoya qila olish ko‘nikmalari va boshqalar...

Mashg‘ulotda vaqtdan unumli foydalanish zarur. Buning uchun zarur vositalarni to‘g‘ri tanlash, tayyorlash hamda mashg‘ulot o‘tkazuvchilar va ularning vazifalari aniq belgilangan bo‘lishi kerak.

Bilimlarni takrorlash, ko'nikmalarni shakllantirish, rivojlantirish, mustahkamlash, yangi bilimlarni berish, amalda qo'llash mashg'ulotlarida hamda o'quv fanining xususiyatlarini hisobga olgan holda har bir mavzu bo'yicha eng maqsadga muvofiq bo'lgan ilg'or pedagogik texnologiyalarni to'g'ri tanlash nazarda tutiladi.

Interfaol metodlar konstruktivizm nazariyasi bilan bog'liq bo'lib, konstruktivizmning quyidagi asosiy xulosalarini hisobga olish kerak:

- o'quvchi o'zi o'rganishi kerak, aks holda unga hech kim hech narsani o'rgata olmaydi;

- o'qituvchi o'quvchilarga bilimlarni «kashf qilishga» yordam beradigan jarayonni tashkil qiladi;

- bilim borliqdan ko'chirilgan nusxa emas, uni odam shakllantiradi.

Interfaol metodlarning pedagogik-psixologik asosi konstruktivizm nazariyasi (Dj. Dyui), eng yaqin rivojlanish sohasi (L.S.Vigoskiy), bola intellektining rivojlanishi (J.Piaje), intellektning ko'p turliligi (G.Gardner) hamda yuqorida bayon etilgan o'quv maqsadlari taksonomiyasi (B.Blum) haqidagi ma'lumotlardan iborat. Buning uchun har bir o'qituvchi o'z ustida tinmay ishlashi zarur.

Maqolada keltirilgan mavzu: ayrim ratsional tenglamalarni yechishda kichik guruhlarda ishlash interfaol usulini qo'llash tavsiya qilinadi.

Kichik guruhlarda ishlash o'quvchilarning darsda faolligini ta'minlaydi, har biri uchun munozarada qatnashish huquqini beradi, bir-biridan auditoriyada o'rganishga imkoni tug'ildi, boshqalar fikrini qadrlashga o'rgatadi.

Qo'llanish usuli

1. Faoliyatni tanlash. Mavzuga oid muammo shunday tanlanadiki, natijada talabalar uni o'rganish (bajarish) uchun ijodiy faoliyat ko'rsatishlari zarur bo'ladi va vazifalar belgilab olinadi.

2. Zaruriy asos yaratish. Talabalar kichik guruh ishida qatnashishlari uchun tanlangan faoliyat bo'yicha ba'zi bilim, ko'nikma va malakalarni oldindan egallagan bo'lishlari kerak.

3. Guruhni shakllantirish. Odatda xar bir guruhda 3-5 o'quvchi bo'ladi (ehtimol, kam yoki ko'p bo'lishi mumkin). Agar guruhda ishlash u yoki bu yozma hujjat tayyorlashni talab etsa, yaxshisi 2-3 kishili guruh tuzilgani ma'qul.

Guruh o'lchovi masalaning muhimligi, auditoriyadagi talabalar soni, o'quvchilarning bir-biri bilan konstruktiv holatda o'zaro harakatiga bog'liq holda o'zgaradi. Eng yaxshisi, "getrogen" guruh tashkil etishidir (jinsi, o'zlashtirish darajasi va boshqa belgilar asosida). Guruhda ishlash o'quvchilar o'rtasida vazifalarni aniq taqsimlashga tayanadi (misol uchun, bir talaba munozarani boshqaradi, ikkinchisi yozib boradi, uchinchisi spiker (sardor) rolini o'taydi va hokazo).

Auditoriyani guruhlarga ajratish, xoxish bo'yicha yoki hisob bo'yicha amalga oshiriladi.

4. Aniq yo'l-yo'riqlar ko'rsatish. o'quvchilarga faoliyatni bajarish bo'yicha aniq va xajm jixatdan ko'p bo'lmagan tushuntirish beriladi. o'qituvchi guruhlarining ishlash tezligi turlicha bo'lishini inobatga olgan holda vaqt chegarasini aytadi. Guruhlar kerakli materiallar va axborotlar bilan ta'minlanadi. Talabalar guruhda ishni boshlashlari uchun vazifalarini aniq tushunib etganligi tekshirib ko'riladi

5. Qo'llab quvvatlash va yo'naltirish. o'qituvchi zarurat tug'lsa guruhlar yoniga navbatma - navbat kelib to'g'ri yo'nalishda ishlayotganligini qayd etadi yoki ularga yordam beradi, guruhlarga ta'zviq o'tkazilmaydi.

6. Muhokama qilish va baholash. Guruhlarda ish yakunlangach, ular natijalari bo'yicha axborot beradilar. Buning uchun xar bir guruh o'z sardorini belgilaydi.

Zarurat tug'lsa, faoliyat natijalari bo'yicha bildirilgan fikrlar o'qituvchi tomonidan yozilib boriladi. Muhimi, guruhning yechimining asoslanishini aniqlashtirib olishdi. Agar vaqt etarlicha bo'lsa, u yoki bu fikrni argumentlashda guruhlar

bir-biriga savol ham berishlari mumkin.

Kichik guruhlarda ishlash natijalari o'qituvchi tomonidan baholanadi.

Bunda faoliyatni to'g'ri va aniq bajarish, vaqt sarfi asosiy mezon hisoblanadi.

Ushbu metod qo'llanilganda talaba kichik guruhlarda ishlab, darsda faol ishtirok etish huquqiga, boshlovchi rolida bo'lishga, bir-biridan o'rganishga va turli nuqtai nazarlarni qadrlash imkoniga ega bo'ladi.

Kichik guruhlarda ishlash metodi qo'llanilganda o'qituvchi boshqa noan'anaviy metodlarga qaraganda vaqtni tejash imkoniyatiga ega bo'ladi. Chunki o'qituvchi bir vaqtning o'zida barcha talabalarni mavzuga jalb eta oladi va baholay oladi.

Kichik guruhlarda ishlash» metodining afzalligi:

- o'qitish mazmunini yaxshi o'zlashtirishga olib keladi;
- muloqotga kirishish ko'nikmasining takomillashishiga olib keladi;
- vaqtni tejash imkoniyati mavjud;
- barcha talabalar jalb etiladi;
- o'z-o'zini va guruhlararo baholash imkoniyati mavjud bo'ladi.

«Kichik guruhlarda ishlash» metodining kamchiliklari:

- kuchsiz talabalar bo'lganligi sababli kuchli talabalarning ham past baho olish ehtimoli bor;
- barcha talabalarni nazorat qilish imkoniyati past bo'ladi;
- guruhlararo o'zaro salbiy raqobatlar paydo bo'lib qolishi mumkin.

Shu sababli, talabalarga Funksiyaning differensial va uning taqribiy hisoblashga doir misollar yechishni o'rgatish bilan bilan bir qatorda, ular o'tilgan nazariy mashg'ulotlarni qanday tushunganliklarini bilib olish ham o'qituvchi uchun muhim

hisoblanadi. Ushbuni inobatga olib, har bir guruhga har xil turdagi misollarni yechishni tavsiya qilish ijobiy samara beradi. Har bir guruhga misollar tavsiya qilinib, yechimlari tekshiriladi.

(1-guruh uchun): $y = \sqrt{1+x^2}$ funksiyaning birinchi va ikkinchi tartibli differensiallarini toping.

Yechish. Oldin birinchi va ikkinchi tartibli hosilalarni topamiz:

$$y' = (\sqrt{1+x^2})' = \frac{(1+x^2)'}{2\sqrt{1+x^2}} = \frac{2x}{2\sqrt{1+x^2}} = \frac{x}{\sqrt{1+x^2}};$$

$$y'' = \left(\frac{x}{\sqrt{1+x^2}} \right)' = \frac{x'\sqrt{1+x^2} - x(\sqrt{1+x^2})'}{(\sqrt{1+x^2})^2} =$$

$$= \frac{\sqrt{1+x^2} - x \cdot x/\sqrt{1+x^2}}{1+x^2} = \frac{1+x^2 - x^2}{(1+x^2)\sqrt{1+x^2}} = \frac{1}{\sqrt{(1+x^2)^3}}.$$

Shunday qilib,

$$dy = \frac{x}{\sqrt{1+x^2}} dx \quad \text{va} \quad d^2y = \frac{1}{\sqrt{(1+x^2)^3}} dx^2$$

bo`ladi.

(2-guruh uchun): $f(x) = 3x^2 - 7$ funksiyaning, argument 2 dan 2,001 gacha o'zgarandagi orttirmasini taqriban toping.

Yechish. (3) formuladan foydalanamiz. $x_0 = 2$, $\Delta x = 0.001$.
 $f'(x) = 6x$, $f'(x_0) = 6 \cdot 2 = 12$, $\Delta f(x_0) \approx df(x_0) = f'(x_0) \Delta x = 12 \cdot 0.001 = 0.012$.

Funksiya orttirmasi o'rniga uning differensialini olib qancha xatoga yo'l qo'yilganini baholaymiz: buning uchun haqiqiy orttirmani topamiz,

$$\begin{aligned} \Delta f(x_0) &= f(x_0 + \Delta x) - f(x_0) = 3(x_0 + \Delta x)^2 - 7 - (3x_0^2 - 7) = \\ &= 3x_0^2 + 6x_0\Delta x + 3(\Delta x)^2 - 7 - 3x_0^2 + 7 = \\ &= 6x_0\Delta x + 3(\Delta x)^2 = 6 \cdot 2 \cdot 0.001 + 3 \cdot 0.000001 = 0.012003. \end{aligned}$$

Demak, absolyut xato

$$|\Delta y - dy| = |0.012003 - 0.012| = 0.000003.$$

Nisbiy xato

$$\frac{|\Delta y - dy|}{dy} = \frac{0.000003}{0.012} = 0.00025 \quad \text{yoki } 0,025\%.$$

Taqribiy hisoblash xatosi ancha kichik, bu esa yuqoridagi taqribiy tenglikdan taqribiy hisoblashlarda foydalanish mumkinligini ko'rsatadi.

(3-guruh uchun): Ushbu $f(x) = \sqrt[3]{x^2} - 1$ funksiya $(-1; 1)$ intervalning ichki $x = 0$ nuqtasida o'zining eng kichik qiymatiga erishsa ham, bu funksiya uchun Ferma teoremasining xulosasi o'rinli emas. Shuni ko'rsating.

Yechish. Berilgan funksiya $x = 0$ nuqtada o'zining eng kichik qiymatiga erishadi. Biroq funksiya shu $x = 0$ nuqtada chekli hosilaga ega emas. Bu ushbu

$$\frac{\Delta f(0)}{\Delta x} = \frac{f(\Delta x) - f(0)}{\Delta x} = \frac{\sqrt[3]{\Delta x^2}}{\Delta x} = \frac{1}{\sqrt[3]{\Delta x}}$$

nisbatning $\Delta x \rightarrow 0$ da chekli limitga ega emasligidan kelib chikadi.

Demak, Ferma teoremasining sharti bajarilmaydi. Binobarin, teoremaning xulosasi o'rinli emas.

(4-guruh uchun): Ushbu $f(x) = x^2 + 3$ funksiya $[-1; 2]$ segmentda Lagranj teoremasining shartlarini qanoatlantiradimi?

Yechish. Ravshanki, berilgan funksiya $[-1; 2]$ segmentda uzluksiz va $(-1; 2)$ intervalda $f'(x) = 2x$ hosilaga ega.

Demak, $f(x) = x^2 + 3$ funksiya $[-1; 2]$ segmentda Lagranj teoremasiga ko'ra shunday s nuqta ($-1 < c < 2$) topiladiki,

$$\frac{f(2) - f(-1)}{2 - (-1)} = f'(c) = 2c$$

$$c = \frac{1}{2}$$

bo'ladi. Keyingi tenglikdan $\frac{1}{2}$ ekanini topamiz.

Kelgusida «Kichik guruhlarda ishlash» metodini qo'llashda foydalanish mumkin bo'lgan bir nechta misollar mustaqil yechish uchun tavsiya qilinadi:

Funksiyalarning differensiallari toping.

1) $y = \sqrt{1+x^2}$; 2) $s = \frac{gt^2}{2}$.

1) $y = x^n$; 2) $y = x^3 - 3x^2 + 3x$.

1) $d\left(\frac{a}{x} + \operatorname{arctg} \frac{x}{a}\right)$; 2) $d(\alpha + \ln \alpha)$;

1) $d(\sin^2 t)$; 2) $d(1 - \cos u)$.

5) Ushbu $f(x) = \sin x$ funksiya uchun $[0; 2\pi]$ segmentda Roll teoremasining shartlari bajariladimi?

6) Ushbu $f(x) = e^x$, $g(x) = \frac{x^2}{1+x^2}$ funksiyalar $[0; 2\pi]$ segmentda Koshi teoremasining shartlarini kanoatlantiradimi?

7). $f(x) = \begin{cases} x \sin \frac{1}{x}, & \text{agar } x \neq 0 \text{ булса} \\ 0, & \text{agar } x = 0 \text{ булса} \end{cases}$ funksiya uchun $[-1; 1]$ oralikda Lagranj teoremasi o'rinlimi?

8) $f(x) = x^2 - 4x + 3$ funksiya ildizlari orasida uning xosilasining xam ildizi bor ekani tekshirilsin.

9) $y = x^2$ parabolaning qaysi nuqtasida o'tkazilgan urinma $A(-1; 1)$ va $B(3; 9)$ nuqtalarni birlashtiruvchi vatarga parallel bo'ladi?

10) $[a, b]$ segmentda $f(x) = x^2$ funksiya uchun Lagranj formulasi yozilsin va s topilsin. Grafik usul bilan tushuntirilsin.

11) $[1; 4]$ segmentda $f(x) = \sqrt{x}$ funksiya uchun Lagranj formulasi yozilsin va s topilsin.

12) $f(x) = x^3$ va $g(x) = x^2$ funksiyalar uchun Koshining $\frac{f(b) - f(a)}{g(b) - g(a)} = \frac{f'(c)}{g'(c)}$ formula yozilsin hamda s topilsin.

Shu o'rinda aytish joizki, matematika fanini samarali o'qitish hamda uni amaliyotga tadbiiq qilinishida bir qator ilg'or pedegogik texnologiyalardan foydalanish va boshqa fanlar bilan integratsiyasi haqida ma'lumotlar berish muhim ahamiyat kasb etadi[1-30].

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