

**Son tushunchasini o'qitish metodikasi. Manfiy va irratsional sonlarni kiritish metodikasi**

**Maktabda ayniy shakl almashtirishlarni o'rganish**

**Umumiy o'rta ta'lim maktab va o'rta maxsus ta'lim muassasalari matematikasi kursida funktsiya tushunchasini o'qitish metodikasi.**

**Umumiy o'rta ta'lim maktab va o'rta maxsus ta'lim muassasalari matematikasi kursida tenglama tushunchasini o'qitish metodikasi.**

**Umumiy o'rta ta'lim maktab va o'rta maxsus ta'lim muassasalari matematikasi kursida tengsizliklar tushunchasini o'qitish metodikasi.**

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11.001. Piramidaning asosida gipotenuzasining uzunligi  $c$  ga va o'tkir burchagi  $30^\circ$  ga teng bo'lgan to'g'ri burchakli uchburchak yotibdi. Piramidaning yon qirralari asos tekisligiga  $45^\circ$  li burchak ostida og'gan. Piramidaning hajmini toping.

11.002. Agar muntazam tetraedring yog'iga tashqi chizilgan aylananing radiusi  $R$  ga teng bo'lsa, uning hajmini toping.

11.003. Muntazam uchburchakli piramida asosining tomoni  $a$  ga, asosidagi ikki yoqli burchagi esa  $45^\circ$  ga teng. Piramidaning hajmini va to'la sirtining yuzini aniqlang.

11.004. Uchburchakli og'ma prizmaning yon yoqlaridan birining yuzi  $S$  ga, bu yoq tekisligidan unga qarshi qirrachagacha bo'lgan masofa esa  $d$  ga teng. Prizmaning hajmini aniqlang.

11.005. Uchburchakli muntazam piramidaning uchidagi tekis burchagi  $90^\circ$  ga teng. Bu piramida yon sirtining asos yuziga nisbatini toping.

11.006. Tog'ri burchakli diagonalni 13 sm ga, yon yoqlarining diagonalari esa  $4\sqrt{10}$  sm va  $3\sqrt{17}$  sm ga teng. Parallelepipedning hajmini toping.

11.007. Qirradi kub yog'ining diagonaliga teng bo'lgan muntazam tetraedr hajmining shu kub hajmiga nisbatini toping.

11.008. Tog'ri parallelepiped asosining tomonlari  $a$  va  $b$  ga teng, bu tomonlar orasidagi o'tkir burchak esa  $60^\circ$  ga teng. Asosning katta diagonalni parallelepipedning kichik diagonaliga teng. Parallelepipedning hajmini toping.

11.009. To'rtburchakli muntazam prizma ustki asosining markazi va ostki asosi tomonlarining o'rtalari prizмага ichki chizilgan piramidaning uchlari bo'lib xizmat qiladi. Piramidaning hajmi  $V$  ga teng. Prizmaning hajmini toping.

11.010. Qirradi  $a$  ga teng bo'lgan kub ustki yog'ining markazi kub asosining uchlari bilan tutashtirilgan. Hosil bo'lgan piramidaning to'la sirtini toping.

11.011. Muntazam piramidaning asosi bo'lib ichki burchaklarining yig'indisi  $720^\circ$  ga teng bo'lgan ko'pburchak xizmat qiladi. Agar piramidaning  $l$  ga teng bo'lgan yon qirradi uning balandligi bilan  $30^\circ$  li burchak tashkil etsa, bu piramidaning hajmini aniqlang.

11.012. To'rtburchakli muntazam piramidaning asosida yotgan kvadratning diagonalini uning yon qirrasiga teng bo'lib, u ham  $a$  ga teng. Bu piramidaning to'la sirtini va hajmini toping.

11.013. Qirradi  $a$  ga teng bo'lgan kub ustki asosining markazi uning ostki asosi tomonlarining o'rtalari bilan ketma-ket tutashtirilgan. Shuningdek, ostki asos tomonlarining o'rtalari ham tutashtirilgan. Hosil bo'lgan piramidaning to'la sirtini hisoblang.

11.014. Oltuburchakli muntazam piramidaning apofemasi  $h$  ga teng. Asosdagi ikki yoqli burchak  $60^\circ$  ga teng. Piramidaning to'la sirtini toping.

11.015. Asosining tomoni  $a$  ga, asosidagi ikki yoqli burchagi esa  $60^\circ$  ga teng bo'lgan uchburchakli muntazam piramidaning to'la sirtini toping.

11.016. To'rtburchakli piramidaning asosi to'g'ri to'rtburchak bo'lib, uning diagonalini  $b$  ga, bu diagonallar orasidagi burchak  $60^\circ$  ga teng. Yon qirralarining har biri asos tekisligi bilan  $45^\circ$  li burchak tashkil etadi. Piramidaning hajmini toping.

11.017. Uchburchakli muntazam piramida asosining tomoni 1 sm ga teng, yon sirti esa  $3 \text{ sm}^2$  ni tashkil etadi. Piramidaning hajmini toping.

11.018. Piramidaning asosi tomonlari  $a$ ,  $a$  va  $b$  ga teng bo'lgan uchburchakdan iborat. Barcha yon qirralar asos tekisligiga  $60^\circ$  li burchak ostida og'gan. Piramidaning hajmini aniqlang.

11.019. Uchburchakli muntazam piramidaning yon qirradi  $l$  ga, balandligi esa  $h$  ga teng. Piramidaning hajmini aniqlang.

11.020. Og'ma prizmani asosida tomonlari 3 dm va 6 dm, o'tkir burchagi esa  $45^\circ$  bo'lgan parallelogramm yotadi. Prizmaning yon qirradi 4 dm ga teng bo'lib, asos tekisligiga  $30^\circ$  li burchak ostida og'ma. Prizmaning hajmini toping.

11.021. Piramida yon qirralarining har biri  $\frac{269}{32}$  sm ga teng.

Piramidaning asosi tomonlari 13, 14 va 15 sm bo'lgan uchburchakdan iborat. Piramidaning hajmini toping.

11.022. Agar to'rtburchakli muntazam prizmaning diagonalini yon yoq tekisligi bilan  $30^\circ$  li burchak tashkil etsa, asosning tomoni esa  $a$  ga teng bo'lsa, uning hajmini aniqlang.

11.023. To'rtburchakli muntazam piramida asosining tomoni 6 dm, balandligi esa 4 dm. Berilgan piramidadan uning asosidan 1 dm masofa naridan unga parallel qilib o'tkazilgan tekislik bilan kesishdan hosil bo'lgan kesik piramidaning yon sirtini toping.

11.024. Muntazam kesik piramidaning asoslari tomonlari  $a$  va  $b$  ( $a > b$ ) bo'lgan kvadratlardan iborat. Yon qirralar asos tekisligiga  $45^\circ$  li burchak ostida og'ma. Kesik piramidaning hajmini toping.

11.025. Uchburchakli muntazam kesik piramidaning yon qirralari asos tekisligiga  $60^\circ$  li burchak ostida og'ma. Ostki va ustki asoslarning tomonlari, mos ravishda,  $a$  va  $b$  ( $a > b$ ) ga teng. Kesik piramidaning hajmini toping.

11.026. To'g'ri parallelepipedning asosi rombdan iborat. ostki asosning bir tomoni hamda ustki asosning bu tomonga garshi tomoni orqali o'tkazilgan tekislik asos tekisligi bilan  $45^\circ$  li burchak tashkil qiladi. Hosil qilingan kesimning yuzi  $Q$  ga teng. Parallelepipedning yon sirtini aniqlang.

11.027. Agar to'rtburchakli muntazam piramidaning yon qirrasi asos tekisligi bilan  $45^\circ$  li burchak tashkil etsa, diagonal kesimining yuzi esa  $S$  ga teng bo'lsa, uning hajmini aniqlang.

11.028. Piramidaning asosi o'tkir burchagi  $30^\circ$  bo'lgan rombdan iborat. Yon yoqlari asos tekisligiga  $60^\circ$  li burchak ostida og'ma. Agar rombga ichki chizilgan doiraning radiusi  $r$  ga teng bo'lsa, piramidaning hajmini va to'la sirtini aniqlang.

11.029. Yon yog'i asos tekisligiga  $45^\circ$  burchak ostiga og'gan uchburchakli muntazam piramidaning hajmi  $9 \text{ sm}^3$  ga teng. Piramida to'la sirtining yuzini toping.

11.030. To'g'ri parallelepipedning asosida tomonlari 1 va 4 sm, o'tkir burchagi esa  $60^\circ$  bo'lgan parallelogramm yotadi. Parallelepipedning katta diagonali 5 sm ga teng. Uning hajmini aniqlang.

11.031. Qirrasi  $a$  ga teng bo'lgan kubning markazi uning barcha uchlari bilan tutashtirilgan. Hosil bo'lgan har bir piramidaning hajmini va to'la sirtini aniqlang.

11.032. Piramidaning asosi teng yonli uchburchak bo'lib, bu uchburchakning asosi 6 sm ga, balandligi esa 9 sm ga teng. Har bir yon qirrasi 13 sm ga teng. Piramidaning hajmini hisoblang.

11.033. Uchburchakli piramidaning yon qirralari o'zaro perpendikular bo'lib, ulaming uzunliklari  $\sqrt{70}$ ,  $\sqrt{99}$  va  $\sqrt{126}$  sm ga teng. Piramidaning hajmini va asosining yuzini toping.

11.034. Eng katta diagonal  $d$  ga teng, yon qirralari esa kvadratlardan iborat bo'lgan oltiburchakli muntazam prizmaning hajmini aniqlang.

11.035. Agar kubning diagonalidan  $u$  bilan kesishmaydigan qirragacha bo'lgan masofa  $d$  ga teng bo'lsa, uning hajminj toping.

11.036. Qirrasi  $a$  ga teng bo'lgan oktaedr (muntazam sakkizyoq)ning hajmini aniqlang.

11.037. Prizmaning asosi tomoni  $a$  ga teng bo'lgan kvadratdan iborat. Yon yoqlaridan biri ham kvadrat, ikkinchisi esa burchagi  $60^\circ$  bo'lgan rombdan iborat, Prizmaning to'la sirtini aniqlang.

11.038. Parallelepipedning asosi kvadratdan iborat. Ustki asosning uchlaridan biri ostki asosning barcha uchlaridan baravar uzoqlikda bo'lib, shu ostki asos tekisligidan  $b$  masofada joylashgan. Asosning tomoni  $a$  ga teng. Bu parallelepipedning to'la sirtini aniqlang.

11.039. Kub asoslarintrig markazlari yon yoqlarining markazlari bilan tutashtirilgan. Agar kubning qirrasi  $a$  ga teng bo'lsa, hosil bo'lgan oktaedrning sirtini hisoblang.

11.040. Piramidaning asosi tomonlarining uzunliklari 6, 5 va 5 sm bo'lgan uchburchakdan iborat. Piramidaning yon yoqlari uning asos bilan teng ikki yoqli burchaklar tashkil qilib, bu burchaklar  $45^\circ$  ga teng. Bu piramidaning hajmini aniqlang.

11.941. To'g'ri burchakli parallelepipedning diagonal  $l$  ga teng bo'lib,  $u$  yon yoqning biri bilan  $30^\circ$ , ikkinchisi bilan esa  $45^\circ$  li burchak tashkil etadi. Uning hajimini toping.

11.042. Agar tortburchakli muntazam kesik piramidaning diagonal  $18$  sm ga, asoslarining tomonlari esa  $14$  va  $10$  sm ga teng bolsa, uning hajmini aniqlang.

11.043. To'g'ri parallelepipedning asosi rombdan iborat bo'lib, uning yuzi  $Q$  ga teng. Diagonal kesimlarning yuzlari  $S_1$ , va  $S_2$  ga teng. Parallelepipedning hajmini toping.

11.044. To'rtburchakli muntazam piramidaning yon qirrasi  $l$  ga teng bo'lib,  $u$  asos tekisligiga  $60^\circ$  li burchak ostida og'ma. Piramidaning hajmini toping.

11.045. Oltiburchakli muntazam prizmaning eng katta diagonalini  $d$  ga teng bo'lib, u prizmaning yon qirrasini bilan  $30^\circ$  li burchak tashkil qiladi. Prizmaning hajmini toping.

11.046. To'g'ri burchakli parallelepiped asosining tomonlari  $a$  va  $b$  ga teng. Parallelepipedning diagonalini asosining  $h$  ga teng qirrasini o'z ichiga olgan yon yoqqa  $30^\circ$  li burchak ostida og'ma. Parallelepipedning hajmini toping.

11.047. To'g'ri burchakli parallelepiped asosining tomonlari  $a$  va  $b$  ga teng. Parallelepipedning diagonalini asos tekisligiga  $60^\circ$  li burchak ostida og'ma. Parallelepipedning yon sirtini aniqlang.

11.048. Uchburchakli og'ma prizmaning asosi tomoni  $a$  ga teng bo'lgan muntazam uchburchakdan iborat. Agar prizmaning yon qirrasini asos tomoniga teng bo'lib, asos tekisligi bilan  $60^\circ$  li burchak hosil qilsa, uning hajmini toping.

11.049. Agar uchburchakli muntazam prizma asosining tomoni  $a$  ga teng bo'lib, yon sirti esa asoslari yuzlarining yig'indisiga tengdosh bo'lsa, uning hajmini toping.

11.050. Balandligi  $h$  ga, yon qirrasini esa  $l$  ga teng bo'lgan oltiburchakli muntazam piramidaning yon sirtini toping.

$$6\operatorname{ctg}^2 x - 2\cos^2 x = 3$$

$$\operatorname{tg}^2 3x - 2\sin^2 3x = 0$$

$$\cos 2x + 3\sin x = 2$$

$$\cos 2x + \sin^2 x + \sin x = 0,25$$

$$2\operatorname{tg} x - 2\operatorname{ctg} x = 3$$

$$2(1 - \cos 2x) = \sqrt{3}\operatorname{tg} x$$

$$\sin^2 2x + \sin^2 x = \frac{9}{16}$$

$$2\cos^2 \frac{x}{2} - 1 = \sin 3x$$

$$\sin 6x + \sin 2x = 0,5\operatorname{tg} 2x$$

$$\sin 3x + \sin x = 4\sin^3 x$$

$$\sqrt{2}(1 + \cos x) = \operatorname{ctg} \frac{x}{2}$$

$$\cos x - \cos 3x = \sin 2x$$

$$\operatorname{tg} 2x * \sin 2x - 3\sqrt{3}\operatorname{ctg} 2x * \cos 2x = 0$$

$$\cos x - \sin x = 4\cos x * \sin^2 x$$

$$\cos x - \cos 2x = \sin 3x$$

$$\cos 4x + 2\cos^2 x = 1$$

$$\cos(4x + 2) + 3\sin(2x + 1) = 2$$

$$\cos(x + 1)\sin 2(x + 1) = \cos 3(x + 1)\sin 4(x + 1)$$

$$3 + 2\sin 2x = \operatorname{tg} x + \operatorname{ctg} x$$

$$\sin^4 x + \cos^4 x = \cos^2 2x + 0,25$$

$$\sin 3x - \sin 7x = \sqrt{3}\sin 2x$$

$$\sin x - \sin 3x - \sin 5x + \sin 7x = 0$$

$$\operatorname{tg} x + \operatorname{ctg} x = 2\cos^{-1} 4x$$

$$1 + \sin 2x = \sin x + \cos x$$

$$1 + \sin x - \cos 5x - \sin 7x = 2\cos^2 \frac{3x}{2}$$

$$\cos 3x * \cos 6x = \cos 4x * \cos x 7x$$

$$\cos 2x + \cos 6x + 2 \sin^2 x = 1$$

$$4 \sin x + \cos x = 4.$$

$$\sin 2x * \sin 6x = \cos x * \cos 3x$$

$$1 - \cos 6x = \operatorname{tg} 3x$$

$$\sin 3x + \sin 5x = \sin 4x$$

$$\frac{1 - \cos x}{\sin \frac{x}{2}} = 2$$

$$\cos 6x = 2 \sin \left( \frac{3\pi}{2} + 2x \right)$$

$$\cos 5x + \cos 7x = \cos(\pi + 6x)$$

$$\cos 7x + \sin 8x = \cos 3x - \sin 2x$$

$$\sin x - \sin 2x + \sin 5x + \sin 8x = 0$$

$$(\cos 6x - 1) \operatorname{ctg} 3x = \sin 3x$$

$$\sin 9x = 2 \sin 3x$$

$$\cos 4x + 2 \sin^2 x = 0$$

$$\sqrt{3} \sin 2x + \cos 5x - \cos 9x = 0$$

$$\cos 2x - 5 \sin x - 3 = 0$$

$$3 \sin^2 2x + 7 \cos 2x - 3 = 0$$

$$\sin x * \sin 3x + \sin 4x * \sin 8x = 0$$

$$\log_2 (25^{x+3} - 1) = 2 - \log_2 (5^{x+3} + 1)$$

$$\log_6 \sqrt[7]{3^{x(15-x)}} + 8 \log_6 2 = 8$$

$$\log_3 \left( 3^{x^2-13x+28} + \frac{2}{9} \right) = \log_5 0,2.$$

$$5^{\log_2 (x^3-21)} \cdot 0,2^2 \cdot 25^{-0,5 \log_2 x} = 1$$

$$4^{\log_5 x^2} - 4^{\log_5 x+1} + 4^{\log_5 x-1} - 1 = 0$$

$$27^{\lg x} - 7 \cdot 9^{\lg x} - 21 \cdot 3^{\lg x} + 27 = 0.$$

$$4^{\log_9 x^2} + \log_{\sqrt{3}} 3 = 0,2 (4^{2+\log_9 x} - 4^{\log_9 x}).$$

$$\log_{\sqrt{5}} (4^x - 6) - \log_{\sqrt{5}} (2^x - 2) = 2$$

$$\log_3 (3^x - 8) = 2 - x.$$

$$x (\lg 5 - 1) = \lg (2^x + 1) - \lg 6.$$

$$\log_6 (3^{x^2} + 1) - \log_6 (3^{2-x^2} + 9) = \log_6 2 - 1.$$

$$\log_3 (81^x + 3^{2x}) = 3 \log_{27} 90.$$

$$3^{2+\log_9 25} = 5 \cdot 9^{2/x}.$$

$$\frac{1}{x^{\lg x}} = 10$$

$$4^{\log_2 x} + x^2 = 8.$$

$$5^{2(\log_5 2 + x)} - 2 = 5^{x + \log_5 2}.$$

$$\log_2 (9 - 2^x) = 10^{\lg (3-x)}$$

$$9^{\log_{1/3} (x+1)} = 5^{\log_{1/5} (2x^2+1)}$$

$$3 \log_5 2 + 2 - x = \log_5 (3^x - 5^{2-x}).$$

$$\left(1 + \frac{1}{2x}\right) \lg 3 + \lg 2 = \lg \left(27 - 3^{\frac{1}{x}}\right)$$

$$1 + 2 \log_x 2 \cdot \log_4 (10 - x) = \frac{2}{\log_4 x}.$$

$$\log_{1-x} 3 - \log_{1-x} 2 - 0,5 = 0.$$

$$\sqrt{\log_a x} + \sqrt{\log_x a} = 10/3.$$

$$\log_3 x \cdot \log_9 x \cdot \log_{27} x \cdot \log_{81} x = 2/3.$$

$$\log_y x + \log_x y = 2.$$

$$2\log_x 27 - 3\log_{27} x = 1.$$

$$\log_2 x + \log_4 x + \log_8 x = 11$$

$$\log_x 9 + \log_{x^2} 729 = 10.$$

$$\log_{1/2}^2 4x + \log_2 \frac{x^2}{8} = 8.$$

$$\log_x 9x^2 \cdot \log_3^2 x = 4.$$

$$\lg^2 (100x) + \lg^2 (10x) = 14 + \lg \frac{1}{x}.$$

$$\lg (x(x+9)) + \lg \frac{x+9}{x} = 0.$$

$$\lg (x^2 + 1) = 2\lg^{-1} (x^2 + 1) - 1.$$

$$(\log_2 x - 3) \log_2 x + 2 (\log_2 x + 1) \log_2 \sqrt[3]{2} = 0.$$

$$\frac{\lg (2x-19) - \lg (3x-20)}{\lg x} = -1$$

$$2\lg \sqrt{4-x} + \lg (6-x) = 1$$

$$\lg 8 - \lg \sqrt{x+6} = \lg 16 - \lg (x-2)$$

$$2\lg x - \lg 4 = -\lg (5-x^2).$$

$$\log_3 (x-3)^2 + \log_3 |x-3| = 3.$$

$$\lg (3x^2 + 12x + 19) - \lg (3x + 4) = 1.$$

$$2\log_3 (x - 2) + \log_3 (x - 4)^2 = 0.$$

$$0,5 (\lg (x^2 - 55x + 90) - \lg (x - 36)) = \lg \sqrt{2}.$$

$$\lg (5 - x) + 2\lg \sqrt{3 - x} = 1.$$