Тема: «Преобразование алгебраических выражений»

1. Основные формулы

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| $$\left(a\pm b\right)^{2}=a^{2}\pm 2ab+b^{2}$$ | $ax^{2}+bx+c=a\left(x-x\_{1}\right)\left(x-x\_{1}\right)$, где $x\_{1} и x\_{2}- корни кв.трёхчл.$ |
| $$\left(a-b\right)\left(a+b\right)=a^{2}-b^{2}$$ | $$\frac{a}{b}=\frac{ac}{bc}$$ | $$\frac{a}{b}\pm \frac{c}{d}=\frac{ad\pm bc}{bd}$$ |
| $$\left(a\pm b\right)\left(a^{2}\mp ab+b^{2}\right)=a^{3}\pm b^{2}$$ |

2. Пример решения.

Упростите выражение: $\frac{x-4}{x^{3}-x}:\left(\frac{x-1}{2x^{2}+3x+1}-\frac{1}{x^{2}-1}\right)$.

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

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

$$D=b^{2}-4ac=9-8=1, x\_{1}=\frac{-b+\sqrt{D}}{2a}=\frac{-3+1}{4}=\frac{1}{2}, x\_{2}=\frac{-b-\sqrt{D}}{2a}=\frac{-3-1}{4}=-1.$$

2) $\frac{x-1}{\left(2x-1\right)\left(x+1\right)}-\frac{1}{\left(x-1\right)\left(x+1\right)}=\frac{\left(x-1\right)^{2}}{\left(2x-1\right)\left(x+1\right)\left(x-1\right)}-\frac{2x-1}{\left(2x-1\right)\left(x+1\right)\left(x-1\right)}=\frac{x^{2}-2x+1-2x+1}{\left(2x-1\right)\left(x+1\right)\left(x-1\right)}=\frac{x^{2}-4x+2}{\left(2x-1\right)\left(x+1\right)\left(x-1\right)}= \frac{x^{2}-4x+2}{\left(2x-1\right)\left(x^{2}-1\right)}$;

3) $\frac{x-4}{x\left(x^{2}-1\right)}:\frac{x^{2}-4x+2}{\left(2x-1\right)\left(x^{2}-1\right)}= \frac{\left(x-4\right)\left(2x-1\right)\left(x^{2}-1\right)}{x\left(x^{2}-1\right)\left(x^{2}-4x+2\right)}=\frac{\left(x-4\right)\left(2x-1\right)}{x\left(x^{2}-4x+2\right)}=\frac{2x^{2}-8x-x+4}{x^{3}-4x^{2}+2x}=\frac{2x^{2}-9x+4}{x^{3}-4x^{2}+2x}$ .

Ответ: $\frac{2x^{2}-9x+4}{x^{3}-4x^{2}+2x}$.

3. Задания.

Задания №№7-12 для самостоятельной проработки.

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| 1) . Ответ: $\frac{3x}{2xy-4y^{2}}$. | 7)$ \frac{x+40}{x^{3}-16x}:\left(\frac{x-4}{3x^{2}+11x-4}-\frac{16}{16-x^{2}}\right)$; |
| 2) $\frac{x-5}{x^{2}-9}:\left(\frac{a+2}{a^{2}-3a+9}-\frac{2\left(a+8\right)}{a^{3}+27}\right).$ Ответ: $\frac{a^{2}-3a+9}{a^{2}-a-6}$.  | 8)$ \frac{4x^{2}-9}{2x^{2}-7x+3}:\frac{3+2x}{1-2x}+\frac{9-4x}{3-x}$; |
| 3) . Ответ: $\frac{1}{3m+1}$. | 9)$ \frac{9x^{2}-4}{2x^{2}-5x+2}∙\frac{2-x}{3x+2}+\frac{x}{1-2x}$; |
| 4)$ \left(\frac{x}{x^{2}-25}+\frac{5}{5-x}+\frac{1}{x+5}\right):\left(x-5+\frac{28-x^{2}}{x+5}\right)$. Ответ: $\frac{x+10}{5-x}$. | 10)$ \left(\frac{a}{a^{2}-2a+1}-\frac{a+2}{a^{2}+a-2}\right):\frac{1}{\left(2a-2\right)^{2}}$; |
| 5)$ \left(\frac{a-b}{a^{2}+ab}-\frac{1}{a^{2}-b^{2}}∙\frac{\left(b-a\right)^{2}}{a+b}\right):\frac{a-b}{a^{2}+ab}$. Ответ: $\frac{b}{a+b}$. | 11)$ \frac{a+4}{5\left(a-1\right)}:\left(\frac{9\left(a-1\right)}{3a+4}-\frac{\left(2a-7\right)^{2}}{3a^{2}+a-4}\right)$; |
| 6)$ \left(\frac{a+2}{2-a}-\frac{2-a}{2+a}-\frac{4a^{2}}{a^{2}-4}\right):\left(\frac{1}{a^{3}+a^{2}}-\frac{1-a}{a^{2}}-1\right)$. Ответ: $\frac{4a^{2}}{a-2}$. | 12)$ \left(\frac{2}{x+1}+\frac{10}{x^{2}-3x-4}+\frac{3x}{x-4}\right):\frac{3x+2}{3}$. |