6.2 Pre-Calculus Math11

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1. a) $\frac{{}^{3}\cancel{12}\, m^{\cancel{2}}\cancel{f}}{\cancel{5}\cancel{c}\cancel{f}} \cdot \frac{{}^{3}\cancel{15}\cancel{c}}{\cancel{4}\cancel{m}}$, $c \neq 0$, $f \neq 0$, $m \neq 0$

$9m$

reduce common factors from numerator and denominator

b) $\frac{{}^{1}\cancel{3}\cancel{(a-b)}}{(a-1)\cancel{(a+5)}} \cdot \frac{(a-5)\cancel{(a+5)}}{\cancel{5\ 15}\cancel{(a-b)}}$

$\frac{a-5}{5(a-1)}$

$a-1 \neq 0$, $a+5 \neq 0$, $a-b \neq 0$

$a \neq 1$ $a \neq -5$ $a \neq b$

c) $\frac{(y-7)\cancel{(y+3)}}{(2y-3)\cancel{(2y+3)}} \cdot \frac{4\cancel{(2y+3)}}{\cancel{(y+3)}(y-1)}$

$\frac{4(y-7)}{(2y-3)(y-1)}$

$2y-3 \neq 0$, $2y+3 \neq 0$, $y+3 \neq 0$, $y-1 \neq 0$

$2y \neq 3$ $2y \neq -3$ $y \neq -3$ $y \neq 1$

$y \neq \frac{3}{2}$ $y \neq -\frac{3}{2}$

2. a) $\frac{d^2-100}{144} \cdot \frac{36}{d+10}$

factor first!

$d+10 \neq 0$

$d \neq -10$

$\frac{\cancel{(d-10)}\cancel{(d+10)}}{\cancel{144}\ 4} \cdot \frac{\cancel{36}}{\cancel{d+10}}$

$\frac{d-10}{4}$

b) $\frac{a+3}{a+1} \cdot \frac{a^2-1}{a^2-9}$

$\frac{\cancel{a+3}}{\cancel{a+1}} \cdot \frac{\cancel{(a+1)}(a-1)}{\cancel{(a+3)}(a-3)}$

$\frac{a-1}{a-3}$

$a+1 \neq 0$, $a+3 \neq 0$, $a-3 \neq 0$

$a \neq -1$ $a \neq -3$ $a \neq 3$

c) $\frac{4z^2-25}{2z^2-13z+20} \cdot \frac{z-4}{4z+10}$

$\frac{\cancel{(2z-5)}\cancel{(2z+5)}}{\cancel{(z-4)}\cancel{(2z-5)}} \cdot \frac{\cancel{z-4}}{2\cancel{(2z+5)}}$

$\frac{1}{2}$

factor

$2z^2-13z+20$

$2z^2-8z-5z+20$

$2z(z-4)-5(z-4)$

$(z-4)(2z-5)$

$z-4 \neq 0$, $2z-5 \neq 0$

$z \neq 4$ $2z \neq 5$

$z \neq \frac{5}{2}$

and

$2z+5 \neq 0$

$2z \neq -5$

$z \neq -\frac{5}{2}$

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2. d) $\frac{2p^2+5p-3}{2p-3} \cdot \frac{p^2-1}{6p-3} \cdot \frac{2p-3}{p^2+2p-3}$

factor $2p^2+5p-3 =$
$2p^2+6p-p-3 =$
$2p(p+3)-1(p+3) =$
$(p+3)(2p-1)$

$\frac{\cancel{(p+3)}(2p-1)}{\cancel{2p-3}} \cdot \frac{(p+1)\cancel{(p-1)}}{3(2p-1)} \cdot \frac{\cancel{2p-3}}{\cancel{(p+3)}\cancel{(p-1)}}$

$\frac{p+1}{3}$

$2p-3 \neq 0$, $2p-1 \neq 0$, $p+3 \neq 0$, $p-1 \neq 0$
$2p \neq 3$ $\quad 2p \neq 1$ $\quad p \neq -3$ $\quad p \neq 1$
$p \neq \frac{3}{2}$ $\quad p \neq \frac{1}{2}$

8. a) $\frac{2w^2-w-6}{3w+6} \div \frac{2w+3}{w+2}$

factor $2w^2-w-6 =$
$2w^2-4w+3w-6 =$
$2w(w-2)+3(w-2) =$
$(w-2)(2w+3)$

$\frac{(w-2)\cancel{(2w+3)}}{3\cancel{(w+2)}} \cdot \frac{\cancel{w+2}}{\cancel{2w+3}}$

change to multiplication and write the reciprocal

$\frac{w-2}{3}$

$w+2 \neq 0$, $2w+3 \neq 0$ $\quad w+2 \neq 0$
$w \neq -2$ $\quad 2w \neq -3$ $\quad w \neq 2$
$w \neq \frac{-3}{2}$

b) $\frac{v-5}{v} \div \frac{v^2-2v-15}{v^3}$

$v \neq 0$, $(v-5)(v+3) \neq 0$
$v-5 \neq 0$ and $v+3 \neq 0$
$v \neq 5$ $\quad v \neq -3$

$\frac{\cancel{v-5}}{\cancel{v}} \cdot \frac{v^{\cancel{3}\,2}}{\cancel{(v-5)}(v+3)}$

$\frac{v^2}{v+3}$

remember: in division, your denominator changes when you change from division to multiplication – you must check the non-permissable values for <u>all</u> denominators

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8. c) $\frac{9x^2-1}{x+5} \div \frac{3x^2-5x-2}{2-x}$

$\frac{(3x-1)\cancel{(3x+1)}}{x+5} \cdot \frac{\cancel{2-x}(-1)}{\cancel{(x-2)}\cancel{(3x+1)}}$

$\frac{-1(3x-1)}{x+5}$ $\left(\text{or } \frac{1-3x}{x+5}\right)$

factor $3x^2-5x-2$

$3x^2-6x+x-2$

$3x(x-2)+1(x-2)$

$(x-2)(3x+1)$

$x+5 \neq 0$, $2-x \neq 0$, $x-2 \neq 0$, $3x+1 \neq 0$

$x \neq -5$ $\quad 2 \neq x$ $\quad x \neq 2$ $\quad 3x \neq -1$

$x \neq -\frac{1}{3}$

d) $\frac{8y^2-2y-3}{y^2-1} \div \frac{2y^2-3y-2}{2y-2} \div \frac{3-4y}{y+1}$

$(-1)\frac{\cancel{(4y-3)}\cancel{(2y+1)}}{\cancel{(y-1)}\cancel{(y+1)}} \cdot \frac{2\cancel{(y-1)}}{(y-2)\cancel{(2y+1)}} \cdot \frac{\cancel{y+1}}{\cancel{3-4y}}$

$\frac{-2}{y-2}$

factor $8y^2-2y-3$

$8y^2-6y+4y-3$

$2y(4y-3)+1(4y-3)$

$(4y-3)(2y+1)$

factor $2y^2-3y-2$

$2y^2-4y+y-2$

$2y(y-2)+1(y-2)$

$(y-2)(2y+1)$

$y-1 \neq 0$, $y+1 \neq 0$, $y-2 \neq 0$, $2y+1 \neq 0$, $3-4y \neq 0$

$y \neq 1$ $\quad y \neq -1$ $\quad y \neq 2$ $\quad 2y \neq -1$ $\quad 3 \neq 4y$

$y \neq -\frac{1}{2}$ $\quad \frac{3}{4} \neq y$