

b.1

## Pre-Calculus Math 11

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4. Non-permissible values are not allowed because they will allow the denominator to be zero and the denominator cannot be zero!

a)  $\frac{3a}{4-a}$ ,  $4-a \neq 0$   
 $4 \neq a$

b)  $\frac{2e+8}{e}$ ,  $e \neq 0$

c)  $\frac{3(y+7)}{(y-4)(y+2)}$ ,  $(y-4)(y+2) \neq 0$   
 $y-4 \neq 0$  and  $y+2 \neq 0$   
 $y \neq 4$                             $y \neq -2$

d)  $\frac{-7(r-1)}{(r-1)(r+3)}$ ,  $(r-1)(r+3) \neq 0$   
 $r-1 \neq 0$  and  $r+3 \neq 0$   
 $r \neq 1$                             $r \neq -3$

e)  $\frac{2k+8}{k^2}$ ,  $k^2 \neq 0$   
 $k \neq 0$

f)  $\frac{6x-8}{(3x-4)(2x+5)}$ ,  $(3x-4)(2x+5) \neq 0$   
 $3x-4 \neq 0$  and  $2x+5 \neq 0$   
 $x \neq \frac{4}{3}$                             $x \neq -\frac{5}{2}$

b. a)  $\frac{2c(c-5)}{3c(c-5)}$   
 $\frac{2}{3}$

$3c(c-5) \neq 0$   
 $c(c-5) \neq 0$   
 $c \neq 0$  and  $c-5 \neq 0$   
 $c \neq 5$

b)  $\frac{3w(2w+3)}{2w(3w+2)}$   
 $\frac{3(2w+3)}{2(3w+2)}$

$2w(3w+2) \neq 0$   
 $w(3w+2) \neq 0$   
 $w \neq 0$  and  $3w+2 \neq 0$   
 $3w \neq -2$   
 $w \neq -\frac{2}{3}$

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6. c)  $\frac{(x-7)(x+7)}{(2x-1)(x-7)}$

$$\frac{x+7}{2x-1}$$

d)  $\frac{15(a-3)(a+2)}{210(3-a)(a+2)}$

$$\frac{-1}{2}$$

$$(2x-1)(x-7) \neq 0$$

$$2x-1 \neq 0 \text{ and } x-7 \neq 0$$

$$2x \neq 1$$

$$x \neq \frac{1}{2}$$

$$x \neq 7$$

remember:  $\frac{a-3}{3-a}$  reduce to be -1

$$10(3-a)(a+2) \neq 0$$

$$(3-a)(a+2) \neq 0$$

$$3-a \neq 0 \text{ and } a+2 \neq 0$$

$$3 \neq a$$

$$a \neq -2$$

7.  $\frac{x^2-1}{x^2+2x-3}$

a) The  $x^2$  in both the numerator are part of a polynomial. You need to reduce the whole polynomial or none of it.

b) Find the non-permissible by setting the denominator as "not equal" to zero and solve.

$$x^2 + 2x - 3 \neq 0$$

$$(x+3)(x-1) \neq 0$$

*factor*  
 $x+3 \neq 0 \text{ and } x-1 \neq 0$  each bracket cannot

$$x \neq -3$$

$$x \neq 1$$

*equal zero*

c) Simplify a rational expression by factoring then reducing common factors

$$\frac{x^2-1}{x^2+2x-3}$$

$$\frac{(x-1)(x+1)}{(x+3)(x-1)}$$

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

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8. a)  $\frac{6r^2p^3}{4rp^4} = \frac{2 \cdot 3 \cdot r \cdot p \cdot p \cdot p}{2 \cdot 2 \cdot r \cdot p \cdot p \cdot p} = \frac{3r}{2p}$   $\frac{4rp^4 \neq 0}{r \neq 0, p \neq 0}$

Method 1 - Write each expression as multiples of prime factors, then reduce like factors in the numerator and denominator

b)  $\frac{3x-6}{10-5x}$

$\frac{3(x-2)}{5(2-x)}$  } prime factors  
 $\frac{-3}{5}$

remember:  $\frac{x-2}{2-x} = -1$

non-perm. val:  $10-5x \neq 0$   
 $10 \neq 5x$   
 $2 \neq x$

c)  $\frac{b^2+2b-24}{2b^2-72}$

$\frac{(b+6)(b-4)}{2(b^2-36)}$   
 $\frac{(b+6)(b-4)}{2(b-6)(b+6)}$   
 $\frac{b-4}{2(b-6)}$

Used factored state of denominator

$2(b-6)(b+6) \neq 0$   
 $(b-6)(b+6) \neq 0$   
 $b-6 \neq 0$  and  $b+6 \neq 0$   
 $b \neq 6$   $b \neq -6$

d)  $\frac{10k^2+55k+75}{20k^2-10k-150}$

$\frac{5(2k^2+11k+15)}{2(2k^2-k-15)}$   
 $\frac{2k^2+6k+5k+15}{2[2k^2-6k+5k-15]}$   
 $\frac{2k(k+3)+5(k+3)}{2[2k(k-3)+5(k-3)]}$   
 $\frac{(k+3)(2k+5)}{2(k-3)(2k+5)}$

$2(k-3)(2k+5) \neq 0$

$k-3 \neq 0$  and  $2k+5 \neq 0$   
 $k \neq 3$   $2k \neq -5$   
 $k \neq -\frac{5}{2}$

use decomposition to factor

$\frac{k+3}{2(k-3)}$

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8. e)  $\frac{x-4}{4-x} = -1$  (because  $x-4 = -1(-x+4)$ )  $\rightarrow \frac{-1(4-x)}{4-x} = -1$

$4-x \neq 0$   
 $4 \neq x$

f)  $\frac{5(x^2-y^2)}{x^2-2xy+y^2}$   $\rightarrow x-y \neq 0$   
 $\frac{5(x-y)(x+y)}{(x-y)(x-y)}$   $\rightarrow x \neq y$   
 $\frac{5(x+y)}{x-y}$

9. This statement is sometimes true because it is true except when  $x = 3$ .

13. Shali:  $\frac{g^2-4}{2g-4} = \frac{(g-2)(g+2)}{2(g-2)}$   
 $= \frac{g+2}{2}$   
 $= g+1$

$\leftarrow$  this is the correct answer -  
the 2's cannot be reduced  
because the one on top  
is part of a polynomial