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Domain: acceptable values for X

$$\frac{3x+7}{x-5}$$

1. No value is allowed in the domain that causes the denominator to be zero.

consider $\frac{3x}{2x-8}$ $\rightarrow 2x-8=0$
 $\Rightarrow 2x=8$
 $\therefore x=4$

Domain: all real no. except 4

2. No value is allowed in the domain that results in a negative number under a radical with an even index

consider $\sqrt{3x-15}$

$$3x-15 \geq 0$$

$$\Rightarrow \frac{3x}{3} \geq \frac{15}{3}$$

$$\Rightarrow x \geq 5$$

Domain: all real no. ≥ 5

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web assign prob. 3.

$$\frac{x+9}{5x+3}$$

$$5x+3 \geq 0$$
$$\quad -3 \quad -3$$

$$\Rightarrow \frac{5x}{5} \geq -\frac{3}{5}$$

$$\therefore x \geq \boxed{-\frac{3}{5}}$$

Domain: all real no. except $-\frac{3}{5}$.

4. $\sqrt{x+7}$

$$x+7 \geq 0$$
$$\quad -7 \quad -7$$

$$\Rightarrow x \geq \boxed{-7}$$

Domain: all real no. ≥ -7

$$5. \sqrt{3x+7}$$

$$3x+7 \geq 0$$

-7 -7

$$\Rightarrow \frac{3x}{3} \geq -\frac{7}{3}$$

$$\therefore x \geq \boxed{-\frac{7}{3}}$$

Domain: all real no. $\geq -\frac{7}{3}$

$$\# \frac{3x+6}{7} ; \text{ Domain?}$$

all real no.

$$\# \sqrt{x^2+1} ; \text{ Domain?}$$

Domain is all real no.

$$\# \sqrt[3]{5x+17} ; \text{ Domain?}$$

Domain: all real no.

$$\begin{aligned}
 6. \quad & \frac{30y^4}{25y^5} \\
 &= \frac{2 \cdot 3 \cdot \cancel{5} \cdot \cancel{y} \cdot \cancel{y}}{5 \cdot 5 \cdot \cancel{y} \cdot \cancel{y} \cdot \cancel{y} \cdot y} \\
 &= \boxed{\frac{6}{5y}}
 \end{aligned}$$

$$\begin{aligned}
 7. \quad & \frac{36 - 4x}{x - 9} \\
 &= \frac{2y(1 - \cancel{3y})}{7(2y - 1)} \\
 &= \boxed{-\frac{2y}{7}}
 \end{aligned}$$

$$\begin{aligned}
 9. \quad & \frac{x^3 + 5x^2 + 6x}{x^2 - 4} \\
 &= \frac{x(x^2 + 5x + 6)}{(x+2)(x-2)} \\
 &= \frac{x(x^2 + 3x + 2x + 6)}{(x+2)(x-2)} \\
 &= \frac{x\{x(x+3) + 2(x+3)\}}{(x+2)(x-2)}
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{(x+3)(\cancel{x+2})x}{(\cancel{x+2})(x-2)} \\
 &= \boxed{\frac{x(x+3)}{x-2}}
 \end{aligned}$$

Domain:
 all real no.
 except 2

Multiplying Fractions:

$$\frac{2}{3} \cdot \frac{5}{6} = \frac{10}{18} \text{ or } \boxed{\frac{5}{9}}$$

$$\begin{aligned} \frac{12x^2}{20x^3} \cdot \frac{15x}{18x} &= \frac{12x^2 \cdot 15x}{20x^3 \cdot 18x} \\ &= \frac{\cancel{2} \cdot \cancel{2} \cdot 3 \cdot 3 \cdot 5 \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x}}{\cancel{2} \cdot \cancel{2} \cdot \cancel{5} \cdot \textcircled{2} \cdot 3 \cdot 3 \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \textcircled{2} \cdot x} \\ &= \boxed{\frac{1}{2x}} \end{aligned}$$

$$\# \frac{x}{x-1} \cdot \frac{x^2-1}{x^2}$$

$$= \frac{\cancel{x} (x+1) (\cancel{x-1})}{(\cancel{x-1}) \cdot \cancel{x} \cdot x}$$

$$= \boxed{\frac{x+1}{x}}$$

Domain: all real no. except 0.

$$\begin{aligned}
 \# \frac{x^2 - x - 6}{x^2 + 6x + 9} \cdot \frac{x+3}{4-x^2} \\
 = \frac{(x-3)(\cancel{x+2})(\cancel{x+3})}{(\cancel{x+3})(x+3)(2-x)(\cancel{2+x})} \\
 = \boxed{\frac{x-3}{(x+3)(2-x)}}
 \end{aligned}$$

Domain: all real no. except $-3, 2$.

Dividing Fractions:

$$\frac{2}{5} \div \frac{2}{3} = \frac{2}{5} \times \frac{3}{\cancel{2}} = \boxed{\frac{3}{5}}$$

$$\begin{aligned}
 \# \frac{3x^2 + 9x}{2x+6} \div \frac{6x-6}{2x-2} \\
 = \frac{3x^2 + 9x}{2x+6} \times \frac{2x-2}{6x-6} \\
 = \frac{\cancel{3}x(\cancel{x+3})}{\cancel{2}(x+3)} \times \frac{\cancel{2}(x-1)}{\frac{6}{2}(x-1)} \\
 = \boxed{\frac{x}{2}}
 \end{aligned}$$

Domain: all real no.

$$\# \frac{4y-16}{5y+15} \div \frac{4-y}{2y+6}$$

$$= \frac{4y-16}{5y+15} \times \frac{\cancel{2y+6}}{4-y}$$

$$= \frac{4(\cancel{y-4})}{5(\cancel{y+3})} \times \frac{2(\cancel{y+3})}{(4-\cancel{y})}$$

$$= \boxed{\frac{-8}{5}}$$