Chapter 12. Rational Expressions and Equations

Ex. 12.3

Answer 1CU.

Let $\frac{3x^2}{4}$ and $\frac{16}{6x^3}$ are two rational expressions. Multiply its expressions.

$$\frac{3x^2}{4}\cdot\frac{16}{6x^3}=\frac{48x^2}{24x^3} \quad \text{Multiply the numerators and denominators}$$

$$=\frac{\overset{1}{\cancel{24x^2}}(2)}{\underset{1}{\cancel{24x^2}}(x)} \quad \text{The GCF is } 24x^2.$$

$$=\frac{2}{x} \quad \text{Simplify.}$$

Thus, two rational expressions are $\frac{3x^2}{4}$ and $\frac{16}{6x^3}$, whose product is $\frac{2}{x}$.

Answer 1PQ.

Graph an inverse variation in which *y* varies inversely as *x* and $y=28$ when $x=7$.

First solve for *k*:

$$xy=k \quad \text{Inverse variation equation}$$

$$(7)(28)=k \quad \text{Substitue } x=7, \text{and } y=28$$

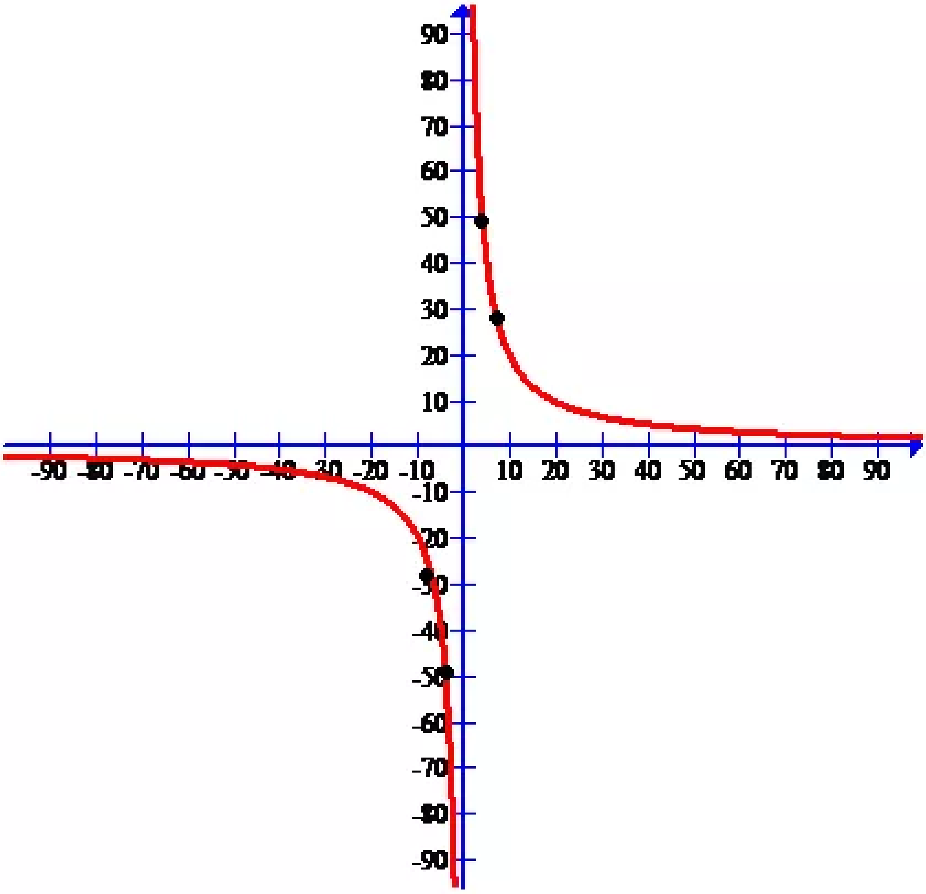
$$196=k \quad \text{Multiply}$$

Thus, the constant of variation is 196.

Choose value for *x* and *y* whose product is 196.

x	*y*
–7	– 28
– 4	– 49
– 2	– 98
0	undefined
2	98
4	49
7	28

Now plot the graph:



Answer 2CU.

The expression $-\frac{x+6}{x-5}$ is not equivalent to $\frac{-x+6}{x-5}$ because the opposite of the numerator is wrong.

The correct simplification is:

$$-\frac{x+6}{x-5}=\frac{-x-6}{x-5}$$

Answer 2PQ.

Graph an inverse variation in which *y* varies inversely as *x* and $y = -6$ when $x = 9$.

First solve for *k*:

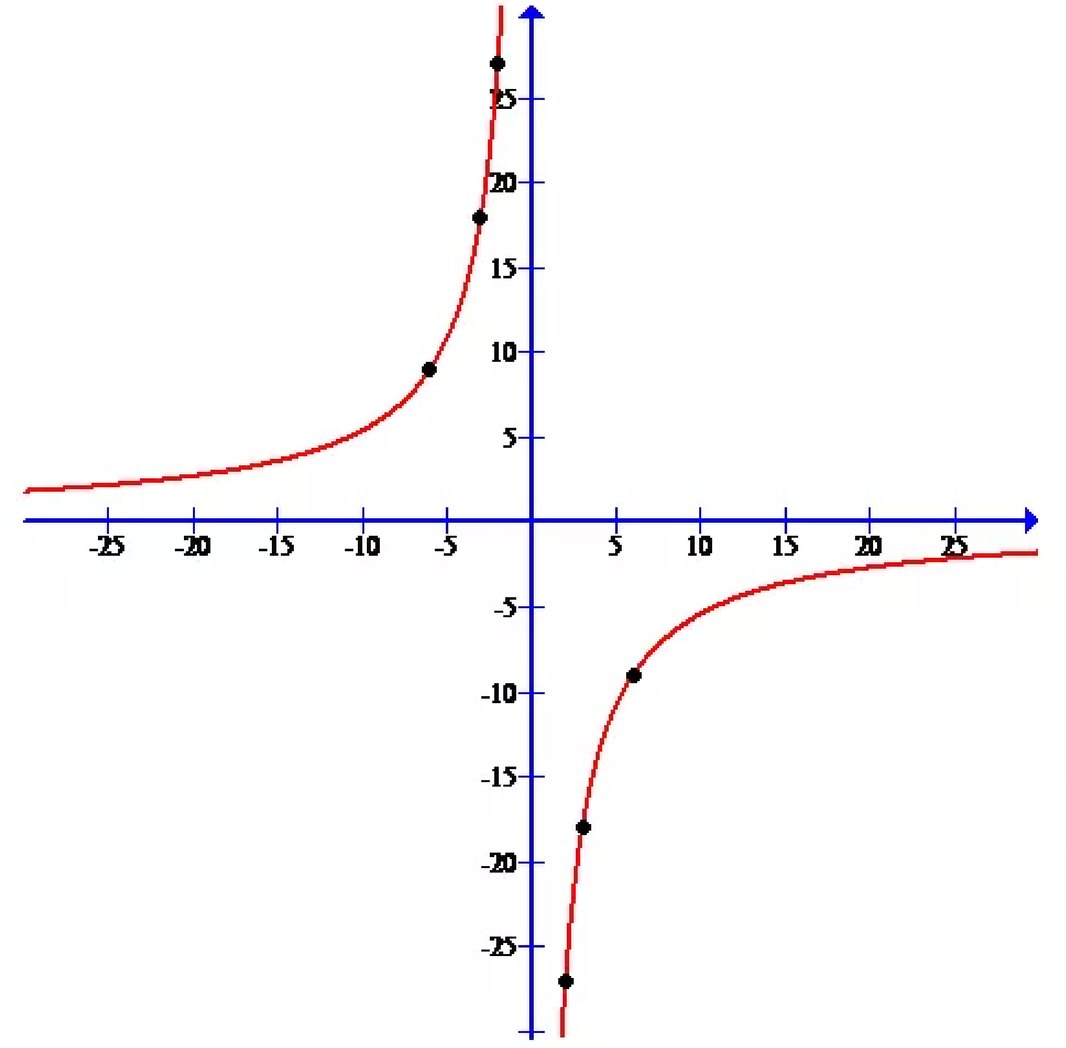
$xy = k$	Inverse variation equation
$(9)(-6) = k$	Substitue $x = 9$, and $y = -6$
$-54 = k$	Multiply

Thus, the constant of variation is -54.

Choose value for *x* and *y* whose product is -54.

x	*y*
−6	9
−3	18
−2	27
0	undefined
6	−9
3	−18
2	−27

Now plot the graph:



Answer 3CU.

The solution of Amiri is correct.

$$\frac{x-3}{x+3}\cdot\frac{4x}{x^2-4x+3}$$

$$=\frac{\cancel{(x-3)}4x}{(x+3)\cancel{(x-3)}(x-1)}$$

$$=\frac{4x}{(x+3)(x-1)}$$

Amiri correctly divided by the GCF.

Answer 3PQ.

Consider the following rational expression.

$$\frac{28a^2}{49ab}$$

$$= \frac{7a \cdot (4a)}{7a(7b)} \quad \text{Factor the numerators and denominators}$$

$$= \frac{\cancel{7a}^{1} \cdot (4a)}{\cancel{7a}_{1}(7b)} \quad \text{The GCF is } 7a.$$

$$= \frac{4a}{7b} \quad \text{Simplify.}$$

Thus, the answer is $\boxed{\frac{4a}{7b}}$.

Answer 4CU.

Consider the following rational expression.

$$\frac{64y^2}{5y} \cdot \frac{5y}{8y} = \frac{320y^3}{40y^2} \quad \text{Multiply the numerators and denominators}$$

$$= \frac{\cancel{40y^2}^{1}(8y)}{\cancel{40y^2}_{1}} \quad \text{The GCF is } 40y^2.$$

$$= 8y \quad \text{Simplify.}$$

Thus, the product is $\boxed{8y}$.

Answer 4PQ.

Consider the following rational expression.

$$\frac{y+3y^2}{3y+1}$$

$$= \frac{y(1+3y)}{3y+1} \quad \text{Factor the numerators.}$$

$$= \frac{y(3y+1)}{3y+1} \quad \text{Write } (1+3y) \text{ as } (3y+1).$$

$$= \frac{y\,\cancel{(3y+1)}^{1}}{\cancel{3y+1}_{1}} \quad \text{The GCF is } (3y+1).$$

$$= y \quad \text{Simplify.}$$

Thus, the answer is $\boxed{y}$.

Answer 5CU.

Consider the following rational expression.

$$\frac{15s^2t^3}{12st}\cdot\frac{16st^2}{10s^3t^3}=\frac{240s^3t^5}{120s^4t^4}$$ Multiply the numerators and denominators

$$=\frac{\cancel{120s^3t^4}(2t)}{\cancel{120s^3t^4}(s)}$$ The GCF is $120s^3t^4$.

$$=\frac{2t}{s}$$ Simplify.

Thus, the product is $\boxed{\frac{2t}{s}}$.

Answer 5PQ.

Consider the following rational expression.

$$\frac{b^2-3b-4}{b^2-13b+36}$$

$$=\frac{(b-4)(b+1)}{(b-9)(b-4)}$$ Factor the numerators and denominators.

$$=\frac{\cancel{(b-4)}(b+1)}{(b-9)\cancel{(b-4)}}$$ The GCF is $(b-4)$.

$$=\frac{b+1}{b-9}$$ Simplify.

Thus, the answer is $\boxed{\frac{b+1}{b-9}}$.

Answer 6CU.

Consider the following rational expression.

$$\frac{m+4}{3m}\cdot\frac{4m^2}{(m+4)(m+5)}$$

$$=\frac{4m^2(m+4)}{3m(m+4)(m+5)}$$ Multiply the numerators and denominators

$$=\frac{\cancel{m(m+4)}(4m)}{\cancel{m(m+4)}(3(m+5))}$$ The GCF is $m(m+4)$.

$$=\frac{4m}{3(m+5)}$$ Simplify.

Thus, the product is $\boxed{\frac{4m}{3(m+5)}}$.

Answer 6PQ.

Consider the following rational expression.

$$\frac{3n^2+5n-2}{3n^2-13n+4}$$

$$=\frac{(n+2)(3n-1)}{(n-4)(3n-1)}$$ Factor the numerators and denominators.

$$=\frac{(n+2)\cancel{(3n-1)}^{1}}{(n-4)\cancel{(3n-1)}_{1}}$$ The GCF is $(3n-1)$.

$$=\frac{n+2}{n-4}$$ Simplify.

Thus, the answer is $\boxed{\frac{n+2}{n-4}}$.

Answer 7CU.

Consider the following rational expression.

$$\frac{x^2-4}{2}\cdot\frac{4}{x-2}$$

$$=\frac{4(x^2-4)}{2(x-2)}$$ Multiply the numerators and denominators.

$$=\frac{4(x-2)(x+2)}{2(x-2)}$$ Factor the numerators.

$$=\frac{\cancel{2(x-2)}^{1}[2(x+2)]}{\cancel{2(x-2)}_{1}}$$ The GCF is $2(x-2)$.

$$=2(x+2)$$ Simplify.

Thus, the product is $\boxed{2(x+2)}$.

Answer 7PQ.

Consider the following rational expression.

$$\frac{3m^2}{2m}\cdot\frac{18m^2}{9m}$$

$$=\frac{54m^4}{18m^2}$$ Multiply the numerators and denominators

$$=\frac{\cancel{18m^2}^{1}(3m^2)}{\cancel{18m^2}_{1}}$$ The GCF is $18m^2$.

$$=3m^2$$ Simplify.

Thus, the answer is $\boxed{3m^2}$.

Answer 8CU.

Consider the following rational expression.

$$\frac{n^2-16}{n+4}\cdot\frac{n+2}{n^2-8n+16}$$

$$=\frac{(n-4)(n+4)}{n+4}\cdot\frac{n+2}{(n-4)(n-4)} \quad \text{Factor the numerators and denominators.}$$

$$=\frac{(n-4)(n+4)(n+2)}{(n+4)(n-4)(n-4)} \quad \text{Multiply the numerators and denominators.}$$

$$=\frac{\overset{1}{\cancel{(n+4)}}\ \overset{1}{\cancel{(n-4)}}\ (n+2)}{\underset{1}{\cancel{(n+4)}}\ \underset{1}{\cancel{(n-4)}}\ (n-4)} \quad \text{The GCF is } (n+4)(n-4).$$

$$=\frac{n+2}{n-4} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\frac{n+2}{n-4}}$.

Answer 8PQ.

Consider the following rational expression.

$$\frac{5a+10}{10x^2}\cdot\frac{4x^3}{a^2+11a+18}$$

$$=\frac{5(a+2)}{10x^2}\cdot\frac{4x^3}{(a+9)(a+2)} \quad \text{Factor the numerators and denominators.}$$

$$=\frac{20x^3(a+2)}{10x^2(a+9)(a+2)} \quad \text{Multiply the numerators and denominators.}$$

$$=\frac{\overset{1}{\cancel{\left[10x^2(a+2)\right]}}(2x)}{\underset{1}{\cancel{\left[10x^2(a+2)\right]}}(a+9)} \quad \text{The GCF is } 10x^2(a+2).$$

$$=\frac{2x}{a+9} \quad \text{Simplify.}$$

Thus, the answer is $\boxed{\frac{2x}{a+9}}$.

Answer 9CU.

Consider the following rational expression.

$$\frac{x-5}{x^2-7x+10}\cdot\frac{x^2+x-6}{5}$$

$$=\frac{x-5}{(x-2)(x-5)}\cdot\frac{(x-2)(x+3)}{5} \quad \text{Factor the numerators and denominators.}$$

$$=\frac{(x-5)(x-2)(x+3)}{5(x-2)(x-5)} \quad \text{Multiply the numerators and denominators.}$$

$$=\frac{\overset{1}{\cancel{(x-2)}}\ \overset{1}{\cancel{(x-5)}}\ (x+3)}{5\ \underset{1}{\cancel{(x-2)}}\ \underset{1}{\cancel{(x-5)}}} \quad \text{The GCF is } (x-2)(x-5).$$

$$=\frac{x+3}{5} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\frac{x+3}{5}}$.

Answer 9PQ.

Consider the following rational expression.

$$\frac{4n+8}{n^2-25}\cdot\frac{n-5}{5n+10}$$

$$=\frac{4(n+2)}{(n-5)(n+5)}\cdot\frac{(n-5)}{5(a+2)} \quad \text{Factor the numerators and denominators.}$$

$$=\frac{4(n+2)(n-5)}{5(n-5)(n+5)(a+2)} \quad \text{Multiply the numerators and denominators.}$$

$$=\frac{4\ \overset{1}{\cancel{(n+2)}}\ \overset{1}{\cancel{(n-5)}}}{5\ \underset{1}{\cancel{(n-5)}}\ (n+5)\ \underset{1}{\cancel{(a+2)}}} \quad \text{The GCF is } (n+2)(n-5).$$

$$=\frac{4}{5(n+5)} \quad \text{Simplify.}$$

Thus, the answer is $\boxed{\frac{4}{5(n+5)}}$.

Answer 10CU.

Consider the following rational expression.

$$\frac{24\text{ feet}}{1\text{ second}}\cdot\frac{60\text{ seconds}}{1\text{ minute}}\cdot\frac{60\text{ minutes}}{1\text{ hour}}\cdot\frac{1\text{ mile}}{5280\text{ feet}}$$

$$=\frac{24\ \cancel{\text{feet}}}{1\ \cancel{\text{second}}}\cdot\frac{60\ \cancel{\text{seconds}}}{1\ \cancel{\text{minute}}}\cdot\frac{60\ \cancel{\text{minutes}}}{1\text{ hour}}\cdot\frac{1\text{ mile}}{5280\ \cancel{\text{feet}}}$$

$$=\frac{24\cdot 60\cdot \cancel{60}\cdot 1\text{ mile}}{1\cdot 1\cdot 1\cdot \underset{88}{\cancel{5280}}\text{ hour}} \quad \text{Simplify.}$$

$$=\frac{1{,}440\text{ mile}}{88\text{ hour}} \quad \text{Multiply.}$$

$$=\frac{16.37\text{ mile}}{1\text{ hour}} \quad \text{Divide numerator and denominator by 88.}$$

Thus, the product is $\boxed{\frac{16.37\text{ mile}}{1\text{ hour}}\ \text{or}\ 16.37\text{ mile per hour}}$.

Answer 10PQ.

Consider the following rational expression.

$$\frac{x^2-x-6}{x^2-9}\cdot\frac{x^2+7x+12}{x^2+4x+4}$$

$$=\frac{(x-3)(x+2)}{(x-3)(x+3)}\cdot\frac{(x+3)(x+4)}{(x+2)(x+2)} \quad \text{Factor the numerators and denominators.}$$

$$=\frac{(x-3)(x+2)(x+3)(x+4)}{(x-3)(x+3)(x+2)(x+2)} \quad \text{Multiply the numerators and denominators.}$$

$$=\frac{\overset{1}{\cancel{(x-3)}}\,\overset{1}{\cancel{(x+2)}}\,\overset{1}{\cancel{(x+3)}}\,(x+4)}{\underset{1}{\cancel{(x-3)}}\,\underset{1}{\cancel{(x+3)}}\,\underset{1}{\cancel{(x+2)}}\,(x+2)} \quad \text{The GCF is } (x-3)(x+3)(x+2).$$

$$=\frac{x+4}{x+2} \quad \text{Simplify.}$$

Thus, the answer is $\boxed{\frac{x+4}{x+2}}$.

Answer 11CU.

The moon is about 240,000 miles from earth. A spacecraft travel at an average of 100 miles per minute.

Use the formula; $\text{Time }(t)=\dfrac{\text{Distance }(d)}{\text{Speed}(s)}$.

Now, substitute 240,000 miles for *d* and 100 miles per minute for *s* in the formula $t=\dfrac{d}{s}$.

$$\begin{aligned}
t&=\frac{d}{s}\\
&=\frac{240,000\text{ mile}}{100\text{ mile/minute}} && \text{Substitute.}\\
&=\frac{240,000\text{ mile}}{100\text{ mile/minute}}\cdot\frac{1\text{ hour}\cdot 1\text{ day}}{60\text{ minute}\cdot 24\text{ hour}}\\
&=\frac{240,000\ \cancel{\text{mile}}\cdot 1\ \cancel{\text{minute}}}{100\ \cancel{\text{mile}}}\cdot\frac{1\ \cancel{\text{hour}}\cdot 1\text{ day}}{60\ \cancel{\text{minute}}\cdot 24\ \cancel{\text{hour}}}\\
&=\frac{240,000}{144,000}\text{days}\\
&=\frac{5\cdot \cancel{48,000}}{3\cdot \cancel{48,000}}\text{days} && \text{The GCF is 48,000.}\\
&=\frac{5}{3}\text{days} && \text{Simplify.}\\
&=1\frac{2}{3}\text{days}
\end{aligned}$$

The spacecraft reach on the moon in $\boxed{1\frac{2}{3}\text{days}}$.

Answer 11CU.

The moon is about 240,000 miles from earth. A spacecraft travel at an average of 100 miles per minute.

Use the formula; $\text{Time } (t) = \dfrac{\text{Distance } (d)}{\text{Speed}(s)}$.

Now, substitute 240,000 miles for *d* and 100 miles per minute for *s* in the formula $t = \dfrac{d}{s}$.

$$t = \frac{d}{s}$$

$$= \frac{240,000 \text{ mile}}{100 \text{ mile/minute}} \quad \text{Substitute.}$$

$$= \frac{240,000 \text{ mile}}{100 \text{ mile/minute}} \cdot \frac{1 \text{ hour} \cdot 1 \text{ day}}{60 \text{ minute} \cdot 24 \text{ hour}}$$

$$= \frac{240,000 \ \cancel{\text{mile}} \cdot 1 \ \cancel{\text{minute}}}{100 \ \cancel{\text{mile}}} \cdot \frac{1 \ \cancel{\text{hour}} \cdot 1 \text{ day}}{60 \ \cancel{\text{minute}} \cdot 24 \ \cancel{\text{hour}}}$$

$$= \frac{240,000}{144,000} \text{days}$$

$$= \frac{5 \cdot \cancel{48,000}^{1}}{3 \cdot \cancel{48,000}_{1}} \text{days} \quad \text{The GCF is 48,000.}$$

$$= \frac{5}{3} \text{days} \quad \text{Simplify.}$$

$$= 1\frac{2}{3} \text{days}$$

The spacecraft reach on the moon in $\boxed{1\frac{2}{3} \text{days}}$.

Answer 13PA.

Consider the following rational expression.

$$\frac{10r^3}{6n^3} \cdot \frac{42n^2}{35r^3} = \frac{420n^2r^3}{210n^3r^3} \quad \text{Multiply the numerators and denominators}$$

$$= \frac{\cancel{210n^2r^3}^{1}(2)}{\cancel{210n^2r^3}_{1}(n)} \quad \text{The GCF is } 210n^2r^3.$$

$$= \frac{2}{n} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\frac{2}{n}}$.

Answer 14PA.

Consider the following rational expression.

$$\frac{10y^3z^2}{6wx^3}\cdot\frac{12w^2x^2}{25y^2z^4}$$

$$=\frac{120w^2x^2y^3z^2}{150wx^3y^2z^4} \quad \text{Multiply the numerators and denominators}$$

$$=\frac{\cancel{30wx^2y^2z^2}(4wy)}{\cancel{30wx^2y^2z^2}(5xz^2)} \quad \text{The GCF is } 30wx^2y^2z^2.$$

$$=\frac{4wy}{5xz^2} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\frac{4wy}{5xz^2}}$.

Answer 15PA.

Consider the following rational expression.

$$\frac{3a^2b}{2gh}\cdot\frac{24g^2h}{15ab^2}$$

$$=\frac{72a^2bg^2h}{30ab^2gh} \quad \text{Multiply the numerators and denominators}$$

$$=\frac{\cancel{6abgh}(12ag)}{\cancel{6abgh}(5b)} \quad \text{The GCF is } 6abgh.$$

$$=\frac{12ag}{5b} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\frac{12ag}{5b}}$.

Answer 16PA.

Consider the following rational expression.

$$\frac{(x-8)}{(x+8)(x-3)}\cdot\frac{(x+4)(x-3)}{(x-8)}$$

$$=\frac{(x-8)(x+4)(x-3)}{(x+8)(x-3)(x-8)} \quad \text{Multiply the numerators and denominators}$$

$$=\frac{\cancel{(x-8)}(x+4)\cancel{(x-3)}}{(x+8)\cancel{(x-3)}\cancel{(x-8)}} \quad \text{The GCF is } (x-8)(x-3).$$

$$=\frac{x+4}{x+8} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\frac{x+4}{x+8}}$.

Answer 17PA.

Consider the following rational expression.

$$\frac{(n-1)(n+1)}{(n+1)}\cdot\frac{(n-4)}{(n-1)(n+4)}$$

$$=\frac{(n-1)(n+1)(n-4)}{(n+1)(n-1)(n+4)} \quad \text{Multiply the numerators and denominators}$$

$$=\frac{\overset{1}{\cancel{(n-1)}}\,\overset{1}{\cancel{(n+1)}}\,(x-4)}{\underset{1}{\cancel{(n-1)}}\,\underset{1}{\cancel{(n+1)}}\,(n+4)} \quad \text{The GCF is } (n-1)(n+1).$$

$$=\frac{x-4}{n+4} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\dfrac{x-4}{n+4}}$.

Answer 18PA.

Consider the following rational expression.

$$\frac{(z+4)(z+6)}{(z-6)(z+1)}\cdot\frac{(z+1)(z-5)}{(z+3)(z+4)}$$

$$=\frac{(z+4)(z+6)(z+1)(z-5)}{(z-6)(z+1)(z+3)(z+4)} \quad \text{Multiply the numerators and denominators}$$

$$=\frac{\overset{1}{\cancel{(z+4)}}\,(z+6)\,\overset{1}{\cancel{(z+1)}}\,(z-5)}{(z-6)\,\underset{1}{\cancel{(z+1)}}\,(z+3)\,\underset{1}{\cancel{(z+4)}}} \quad \text{The GCF is } (z+4)(z+1).$$

$$=\frac{(z+6)(z-5)}{(z-6)(z+3)} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\dfrac{(z+6)(z-5)}{(z-6)(z+3)}}$.

Answer 19PA.

Consider the following rational expression.

$$\frac{(x-1)(x+7)}{(x-7)(x-4)}\cdot\frac{(x-4)(x+10)}{(x+1)(x+10)}$$

$$=\frac{(x-1)(x+7)(x-4)(x+10)}{(x-7)(x-4)(x+1)(x+10)}$$ Multiply the numerators and denominators

$$=\frac{(x-1)(x+7)\cancel{(x-4)}^{1}\cancel{(x+10)}^{1}}{(x-7)\cancel{(x-4)}_{1}(x+1)\cancel{(x+10)}}$$ The GCF is $(x-4)(x+10)$.

$$=\frac{(x-1)(x+7)}{(x-7)(x+1)}$$ Simplify.

Thus, the product is $\boxed{\frac{(x-1)(x+7)}{(x-7)(x+1)}}$.

Answer 20PA.

Consider the following rational expression.

$$\frac{x^2-25}{9}\cdot\frac{x+5}{x-5}$$

$$=\frac{(x-5)(x+5)}{9}\cdot\frac{x+5}{x-5}$$ Factor the numerators.

$$=\frac{(x-5)(x+5)(x+5)}{9(x-5)}$$ Multiply the numerators and denominators.

$$=\frac{\cancel{(x-5)}^{1}(x+5)(x+5)}{9\cancel{(x-5)}_{1}}$$ The GCF is $(x-5)$.

$$=\frac{(x+5)(x+5)}{9}$$ Simplify.

$$=\frac{(x+5)^2}{9}$$

Thus, the product is $\boxed{\frac{(x+5)^2}{9}}$.

Answer 21PA.

Consider the following rational expression.

$$\frac{y^2-4}{y^2-1}\cdot\frac{y+1}{y+2}$$

$$=\frac{(y-2)(y+2)}{(y-1)(y+1)}\cdot\frac{y+1}{y+2} \quad \text{Factor the numerators and denominators.}$$

$$=\frac{(y-2)(y+2)(y+1)}{(y-1)(y+1)(y+2)} \quad \text{Multiply the numerators and denominators.}$$

$$=\frac{(y-2)\cancel{(y+2)}^{1}\cancel{(y+1)}^{1}}{(y-1)\cancel{(y+1)}_{1}\cancel{(y+2)}_{1}} \quad \text{The GCF is } (y+1)(y+2).$$

$$=\frac{y-2}{y-1} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\frac{y-2}{y-1}}$.

Answer 22PA.

Consider the following rational expression.

$$\frac{1}{x^2+x-12}\cdot\frac{x-3}{x+5}$$

$$=\frac{1}{(x+4)(x-3)}\cdot\frac{x-3}{x+5} \quad \text{Factor the denominators.}$$

$$=\frac{(x-3)}{(x+4)(x-3)(x+5)} \quad \text{Multiply the numerators and denominators.}$$

$$=\frac{\cancel{(x-3)}^{1}}{(x+4)\cancel{(x-3)}_{1}(x+5)} \quad \text{The GCF is } (x-3).$$

$$=\frac{1}{(x+4)(x+5)} \quad \text{Simplify.}$$

Thus, the product is $\boxed{\frac{1}{(x+4)(x+5)}}$.

Answer 23PA.

Consider the following rational expression.

$$\frac{x-6}{x^2+4x-32}\cdot\frac{x-4}{x+2}$$

$$=\frac{(x-6)}{(x+8)(x-4)}\cdot\frac{x-4}{x+2}$$ Factor the denominators.

$$=\frac{(x-6)(x-4)}{(x+8)(x-4)(x+2)}$$ Multiply the numerators and denominators.

$$=\frac{(x-6)\,\overset{1}{\cancel{(x-4)}}}{(x+8)\,\underset{1}{\cancel{(x-4)}}\,(x+2)}$$ The GCF is $(x-4)$.

$$=\frac{x-6}{(x+8)(x+2)}$$ Simplify.

Thus, the product is $\boxed{\frac{x-6}{(x+8)(x+2)}}$.

Answer 24PA.

Consider the following rational expression.

$$\frac{x+3}{x+4}\cdot\frac{x}{x^2+7x+12}$$

$$=\frac{x+3}{x+4}\cdot\frac{x}{(x+3)(x+4)}$$ Factor the denominators.

$$=\frac{x(x+3)}{(x+4)(x+3)(x+4)}$$ Multiply the numerators and denominators.

$$=\frac{x\,\overset{1}{\cancel{(x+3)}}}{(x+4)\,\underset{1}{\cancel{(x+3)}}\,(x+4)}$$ The GCF is $(x+3)$.

$$=\frac{x}{(x+4)(x+4)}$$ Simplify.

$$=\frac{x}{(x+4)^2}$$

Thus, the product is $\boxed{\frac{x}{(x+4)^2}}$.

Answer 25PA.

Consider the following rational expression.

$$\frac{n}{n^2+8n+15}\cdot\frac{2n+10}{n^2}$$

$$=\frac{n}{(n+3)(n+5)}\cdot\frac{2(n+5)}{n^2}$$ Factor the numerators and denominators.

$$=\frac{2n(n+5)}{n^2(n+3)(n+5)}$$ Multiply the numerators and denominators.

$$=\frac{2\cancel{n}\,\cancel{(n+5)}}{\cancel{n^2}\,(n+3)\,\cancel{(n+5)}}$$ The GCF is $n(n+5)$.

$$=\frac{2}{n(n+3)}$$ Simplify.

Thus, the product is $\boxed{\frac{2}{n(n+3)}}$.

Answer 26PA.

Consider the following rational expression.

$$\frac{b^2+12b+11}{b^2-9}\cdot\frac{b+9}{b^2+20b+99}$$

$$=\frac{(b+1)(b+11)}{(b-3)(b+3)}\cdot\frac{b+9}{(b+9)(b+11)}$$ Factor the numerators and denominators.

$$=\frac{(b+1)(b+11)(b+9)}{(b-3)(b+3)(b+9)(b+11)}$$ Multiply the numerators and denominators.

$$=\frac{(b+1)\,\cancel{(b+11)}\,\cancel{(b+9)}}{(b-3)(b+3)\,\cancel{(b+9)}\,\cancel{(b+11)}}$$ The GCF is $(b+9)(b+11)$.

$$=\frac{b+1}{(b-3)(b+3)}$$ Simplify.

Thus, the product is $\boxed{\frac{b+1}{(b-3)(b+3)}}$.

Answer 27PA.

Consider the following rational expression.

$$\frac{a^2-a-6}{a^2-16}\cdot\frac{a^2+7a+12}{a^2+4a+4}$$

$$=\frac{(a-3)(a+2)}{(a-4)(a+4)}\cdot\frac{(a+3)(a+4)}{(a+2)(a+2)}$$ Factor the numerators and denominators.

$$=\frac{(a-3)(a+2)(a+3)(a+4)}{(a-4)(a+4)(a+2)(a+2)}$$ Multiply the numerators and denominators.

$$=\frac{(a-3)\cancel{(a+2)}^{1}(a+3)\cancel{(a+4)}^{1}}{(a-4)\cancel{(a+4)}_{1}(a+2)\cancel{(a+2)}_{1}}$$ The GCF is $(a+2)(a+4)$.

$$=\frac{(a-3)(a+3)}{(a-4)(a+2)}$$ Simplify.

Thus, the product is $\boxed{\frac{(a-3)(a+3)}{(a-4)(a+2)}}$.

Answer 28PA.

Consider the following rational expression.

$$\frac{2.54\text{ centimeters}}{1\text{ inch}}\cdot\frac{12\text{ inches}}{1\text{ foot}}\cdot\frac{3\text{ foot}}{1\text{ yard}}$$

$$=\frac{2.54\text{ centimeters}}{1\ \cancel{\text{inch}}}\cdot\frac{12\ \cancel{\text{inches}}}{1\ \cancel{\text{foot}}}\cdot\frac{3\ \cancel{\text{foot}}}{1\text{ yard}}$$

$$=\frac{2.54\cdot 12\cdot 3\text{ centimeters}}{1\cdot 1\cdot 1\text{ yard}}$$ Simplify.

$$=\frac{91.44\text{ centimeters}}{1\text{ yard}}$$ Multiply.

Thus, the product is $\boxed{91.44\text{ centimeters/yard}}$.

Answer 29PA.

Consider the following rational expression.

$$\frac{60 \text{ kilometers}}{1 \text{ hour}} \cdot \frac{1000 \text{ meters}}{1 \text{ kilometer}} \cdot \frac{1 \text{ hour}}{60 \text{ minutes}} \cdot \frac{1 \text{ minutes}}{60 \text{ seconds}}$$

$$= \frac{60 \cancel{\text{kilometers}}}{1 \cancel{\text{hour}}} \cdot \frac{1000 \text{ meters}}{1 \cancel{\text{kilometer}}} \cdot \frac{1 \cancel{\text{hour}}}{60 \cancel{\text{minutes}}} \cdot \frac{1 \cancel{\text{minutes}}}{60 \text{ seconds}}$$

$$= \frac{60 \cdot 1000 \cdot 1 \cdot 1 \text{ meters}}{1 \cdot 1 \cdot 60 \cdot 60 \text{seconds}}$$

$$= \frac{60{,}000 \text{ meters}}{3{,}600 \text{seconds}} \quad \text{Multiply.}$$

$$\approx \frac{16.67 \text{ meters}}{1 \text{seconds}} \quad \text{Simplify.}$$

$$\approx 16.67 \text{ meters/seconds}$$

Thus, the answer is $\boxed{16.67 \text{ m/s}}$.

Answer 30PA.

Consider the following rational expression.

$$\frac{32 \text{ feet}}{1 \text{ second}} \cdot \frac{60 \text{ seconds}}{1 \text{ minute}} \cdot \frac{60 \text{ minutes}}{1 \text{ hour}} \cdot \frac{1 \text{ mile}}{5280 \text{ feet}}$$

$$= \frac{32 \cancel{\text{feet}}}{1 \cancel{\text{second}}} \cdot \frac{60 \cancel{\text{seconds}}}{1 \cancel{\text{minute}}} \cdot \frac{60 \cancel{\text{minutes}}}{1 \text{ hour}} \cdot \frac{1 \text{ mile}}{5280 \cancel{\text{feet}}}$$

$$= \frac{32 \cdot 60 \cdot \cancel{60} \cdot 1 \text{ mile}}{1 \cdot 1 \cdot 1 \cdot \underset{88}{\cancel{5280}} \text{ hour}} \quad \text{Simplify.}$$

$$= \frac{1{,}920 \text{ mile}}{88 \text{ hour}} \quad \text{Multiply.}$$

$$\approx \frac{21{,}82 \text{ mile}}{1 \text{ hour}} \quad \text{Divide numerator and denominator by 88.}$$

$$\approx 21{,}82 \text{ m/h}$$

Thus, the answer is $\boxed{21{,}82 \text{ m/h}}$.

Answer 31PA.

Consider the following rational expression.

$$10 \text{ feet} \cdot 18 \text{ feet} \cdot 3 \text{ feet} \cdot \frac{1 \text{ yard}^3}{27 \text{ feet}^3}$$

$$= \frac{10 \cdot 18 \cdot 3 \ \cancel{\text{feet}^3}}{1} \cdot \frac{1 \text{ yard}^3}{27 \ \cancel{\text{feet}^3}}$$

$$= \frac{\overset{20}{\cancel{540}} \text{ yard}^3}{\underset{1}{\cancel{27}}} \qquad \text{The GCF is 27.}$$

$$= 20 \text{ yard}^3 \qquad \text{Simplify.}$$

Thus, the answer is $\boxed{20 \text{ yd}^3}$.

Answer 32PA.

Alani's bedroom is 12 feet wide and 14 feet long. Then find the cast to carpet her room if the carpet costs $18 per square yard.

The area (A) of bedroom is equal to product of length (l) and width(b).

Substitute 14 feet for l and 12 feet for b in the formula; $A = l \times b$.

$$A = l \times b$$

$$= 14 \text{ feet} \times 12 \text{ feet} \qquad \text{Sustitute.}$$

$$= 168 \text{ feet}^2$$

$$= 168 \text{ feet}^2 \cdot \frac{1 \text{ yard}^2}{9 \text{ feet}^2}$$

$$= 168 \ \cancel{\text{feet}^2} \cdot \frac{1 \cdot \text{yard}^2}{9 \cdot \cancel{\text{feet}^2}}$$

$$= \frac{3 \cdot 56}{3 \cdot 3} \text{ yard}^2$$

$$= \frac{\overset{1}{\cancel{3}} \cdot 56}{\underset{1}{\cancel{3}} \cdot 3} \text{ yard}^2 \qquad \text{The GCF is 3.}$$

$$= \frac{56}{3} \text{ yard}^2$$

Thus, area of bedroom or carpet is $\frac{56}{3} \text{ yard}^2$.

Since, the carpet costs \$18 per square yard.

Thus, the costs of carpet is

$$\frac{56}{3}\text{yard}^2 \times \$18 \text{ per yard}^2$$
$$= \frac{56}{3}\cancel{\text{yard}^2} \times \frac{\$18}{\cancel{\text{yard}^2}}$$
$$= \boxed{\$336}$$

Answer 33PA.

Johanna bought 2 T-shirt that cost \$21.95 (Canadian).

The exchange rate was 1 U.S. dollar for 1.37 Canadian dollars.

$$21.95(\text{Canadian dollar}) \cdot \frac{1(\text{U.S. dollar})}{1.37(\text{Canadian dollar})}$$
$$= 21.95(\cancel{\text{Canadian dollar}}) \cdot \frac{1(\text{U.S. dollar})}{1.37(\cancel{\text{Canadian dollar}})}$$
$$= \frac{21.95 \text{ U.S. dollar}}{1.37} \quad \text{Simplify.}$$
$$\approx 16.02 \quad \text{Multiply.}$$

Thus, Johanna spend about $\boxed{16.02 \text{ U.S. dollars}}$.

Answer 34PA.

Find how many miles of streets can be cleaned in 18 hours on the road.

$$2 \text{ sweepers} \cdot \frac{3 \text{ hours}}{1 \text{ sweeper}} \cdot \frac{3 \text{ miles}}{1 \text{ hour}} \cdot 18 \text{ hours}$$
$$= 2\ \cancel{\text{sweepers}} \cdot \frac{3\ \cancel{\text{hours}}}{1\ \cancel{\text{sweeper}}} \cdot \frac{3 \text{ miles}}{1\ \cancel{\text{hours}}} \cdot 18\ \cancel{\text{hours}}$$
$$= 2 \cdot 3 \cdot 3 \cdot 18 \text{ miles} \quad \text{Simplify.}$$
$$\approx 324 \quad \text{Multiply.}$$

Thus, $\boxed{324 \text{ miles}}$ of streets can be cleaned in 18 hours on the road.

Answer 35PA.

One evening, traffic was backed up for 13 miles. Assume that each vehicle occupied 30 feet. The freeway has three lanes.

An expression that could be used to determine the number of vehicles involved in the backup:

$$\boxed{3 \text{ lanes} \cdot \frac{13 \text{ miles}}{1 \text{ lane}} \cdot \frac{5280 \text{ feet}}{1 \text{ mile}} \cdot \frac{1 \text{ vehicle}}{30 \text{ feet}}}$$

Answer 36PA.

One evening, traffic was backed up for 13 miles. Assume that each vehicle occupied 30 feet. The freeway has three lanes.

An expression that could be used to determine the number of vehicles involved in the backup:

$$3 \text{ lanes} \cdot \frac{13 \text{ miles}}{1 \text{ lane}} \cdot \frac{5280 \text{ feet}}{1 \text{ mile}} \cdot \frac{1 \text{ vehicle}}{30 \text{ feet}}$$

$$= 3 \cancel{\text{ lanes}} \cdot \frac{13 \cancel{\text{ miles}}}{1 \cancel{\text{ lane}}} \cdot \frac{5280 \cancel{\text{ feet}}}{1 \cancel{\text{ mile}}} \cdot \frac{1 \text{ vehicle}}{30 \cancel{\text{ feet}}}$$

$$= \frac{3 \cdot 13 \cdot 5280 \text{ vehicle}}{30}$$

$$= 6864$$

Thus, the number of vehicle is $\boxed{6864}$.

Answer 37PA.

One evening, traffic was backed up for 13 miles. Assume that each vehicle occupied 30 feet. The freeway has three lanes.

An expression that could be used to determine the number of vehicles involved in the backup:

$$3 \text{ lanes} \cdot \frac{13 \text{ miles}}{1 \text{ lane}} \cdot \frac{5280 \text{ feet}}{1 \text{ mile}} \cdot \frac{1 \text{ vehicle}}{30 \text{ feet}}$$

$$= 3 \cancel{\text{ lanes}} \cdot \frac{13 \cancel{\text{ miles}}}{1 \cancel{\text{ lane}}} \cdot \frac{5280 \cancel{\text{ feet}}}{1 \cancel{\text{ mile}}} \cdot \frac{1 \text{ vehicle}}{30 \cancel{\text{ feet}}}$$

$$= \frac{3 \cdot 13 \cdot 5280 \text{ vehicle}}{30}$$

$$= 6864$$

Thus, the number of vehicle is 6864.

Suppose that there are 8 exits, it takes each vehicle an average of 24 seconds to exits.

$$6864 \text{ vehicles} \cdot \frac{24 \text{ seconds}}{8 \text{ vehicles}} \cdot \frac{1 \text{ minute}}{60 \text{ seconds}} \cdot \frac{1 \text{ hours}}{60 \text{ menutes}}$$
$$= 6864 \ \cancel{\text{vehicles}} \cdot \frac{24 \ \cancel{\text{seconds}}}{8 \ \cancel{\text{vehicles}}} \cdot \frac{1 \ \cancel{\text{minute}}}{60 \ \cancel{\text{seconds}}} \cdot \frac{1 \text{ hours}}{60 \ \cancel{\text{menutes}}}$$
$$= \frac{6864 \cdot 24 \text{ hours}}{8 \cdot 60 \cdot 60}$$
$$= 5.72 \text{ hours}$$

Thus, it will take $\boxed{5.72 \text{ hours}}$ for all the vehicles.

Answer 38PA.

The options c. $\frac{3x}{3y}$ and e. $\frac{n^3 x}{n^3 y}$ are equivalent to $\frac{x}{y}$.

In the expression $\frac{3x}{3y}$, 3 is common factor of numerator and denominator.

In the expression $\frac{n^3 x}{n^3 y}$, n^3 is common factor of numerator and denominator.

Answer 39PA.

Multiply rational expression to perform dimensional analysis.

Answer should include the following.

- $25 \text{ lights} \cdot h \text{ hours} \cdot \frac{60 \text{ watts}}{\text{light}} \cdot \frac{1 \text{ kilowatt}}{1000 \text{ watts}} \cdot \frac{15 \text{ cents}}{1 \text{ kilowatt hours}} \cdot \frac{1 \text{ dollar}}{100 \text{ cents}}$
- An example of a real-world situation in which you must multiply rational expression.

Converting units of measure

$$\frac{2.54 \text{ centimeters}}{1 \text{ inch}} \cdot \frac{12 \text{ inches}}{1 \text{ foot}} \cdot 3 \text{ feet}$$
$$= \frac{2.54 \text{ centimeters}}{1 \ \cancel{\text{inch}}} \cdot \frac{12 \ \cancel{\text{inches}}}{1 \ \cancel{\text{foot}}} \cdot 3 \ \cancel{\text{feet}}$$
$$= 2.54 \cdot 12 \cdot 3 \text{ centimeters}$$
$$= 91.44 \text{ centimeters}$$

Answer 40PA.

Consider the following rational expression.

$$\frac{13xyz}{4x^2y}\cdot\frac{8x^2z^2}{2y^3}$$

$$=\frac{104x^3yz^3}{8x^2y^4} \quad \text{Multiply the numerators and denominators}$$

$$=\frac{8x^2y\left(13xz^3\right)}{8x^2y\left(y^3\right)} \quad \text{The GCF is } 8x^2y.$$

$$=\frac{13xz^3}{y^3} \quad \text{Simplify.}$$

Thus, the correct product is option $\boxed{D.\ \frac{13xz^3}{y^3}}$.

Answer 41PA.

Consider the following rational expression.

$$\frac{4a+4}{a^2+a}\cdot\frac{a^2}{3a-3}$$

$$=\frac{a^2(4a+4)}{(a^2+a)(3a-3)} \quad \text{Multiply the numerators and denominators.}$$

$$=\frac{4a^2(a+1)}{3a(a+1)(a-1)} \quad \text{Factor the numerators.}$$

$$=\frac{4a^2(a+1)}{3a(a+1)(a-1)} \quad \text{The GCF is } a(a+1).$$

$$=\frac{4a}{3(a-1)} \quad \text{Simplify.}$$

Thus, the correct product is option $\boxed{A.\ \frac{4a}{3(a-1)}}$.

Answer 42MYS.

Consider the following rational expression.

$$\frac{s+6}{s^2-36}$$

Excluded the values for which $s^2-36=0$.

$$\begin{aligned} s^2-36&=0 && \text{The denominator cannot equal 0.} \\ (s-6)(s+6)&=0 && \text{Factor.} \end{aligned}$$

Use the zero product property to solve for *s*.

$$\begin{aligned} s-6&=0 \quad \text{or} \quad & s+6&=0 \\ s&=6 & s&=-6 \end{aligned}$$

Therefore, *s* cannot equal $\boxed{6 \text{ or} -6}$.

Answer 43MYS.

Consider the following rational expression.

$$\frac{a^2-25}{a^2+3a-10}$$

Excluded the values for which $a^2+3a-10=0$.

$$\begin{aligned} a^2+3a-10&=0 && \text{The denominator cannot equal 0.} \\ (a+5)(a-2)&=0 && \text{Factor.} \end{aligned}$$

Use the zero product property to solve for *a*.

$$\begin{aligned} a+5&=0 \quad \text{or} \quad & a-2&=0 \\ a&=-5 & a&=2 \end{aligned}$$

Therefore, *a* cannot equal $\boxed{-5 \text{ or } 2}$.

Answer 44MYS.

Consider the following rational expression.

$$\frac{x+3}{x^2+6x+9}$$

Excluded the values for which $x^2+6x+9=0$.

$$\begin{aligned} x^2+6x+9&=0 && \text{The denominator cannot equal 0.} \\ (x+3)(x+3)&=0 && \text{Factor.} \end{aligned}$$

Use the zero product property to solve for *x*.

$$\begin{aligned} x+3&=0 \\ x&=-3 \end{aligned}$$

Therefore, *x* cannot equal $\boxed{-3}$.

Answer 45MYS.

Let $x_1 = 8,\ y_1 = 9$ and $y_2 = 6$. Solve for x_2.

Use the product rule.

$$x_1 y_1 = x_2 y_2 \qquad \text{Product rule for inverse variations.}$$
$$8 \cdot 9 = x_2 \cdot 6 \qquad x_1 = 8,\ y_1 = 9,\ \text{and } y_2 = 6.$$
$$72 = x_2 \cdot 6 \qquad \text{Multiply.}$$

$$\frac{72}{6} = x_2 \qquad \text{Divide each side by 6.}$$
$$12 = x_2 \qquad \text{Simplify.}$$

Thus $x = 12$ when $y = 6$, and $xy = 12 \cdot 6 = 72$.

Therefore, the value of xy and x are $\boxed{72;\ 12}$.

Answer 46MYS.

Let $x_1 = 8.1,\ y_1 = 2.4$ and $x_2 = 3.6$. Solve for y_2.

Use the product rule.

$$x_1 y_1 = x_2 y_2 \qquad \text{Product rule for inverse variations.}$$
$$(8.1)\times(2.4) = (3.6)\times y_2 \qquad x_1 = 8.1,\ y_1 = 2.4,\ \text{and } x_2 = 3.6.$$
$$19.44 = (3.6)\times y_2 \qquad \text{Multiply.}$$

$$\frac{19.44}{3.6} = y_2 \qquad \text{Divide each side by 3.6.}$$
$$5.4 = y_2 \qquad \text{Simplify.}$$

Thus $y = 5.4$ when $x = 3.6$, and $xy = 5.4 \times 3.6 = 19.44$.

Therefore, the value of xy and y are $\boxed{19.44;\ 5.4}$.

Answer 47MYS.

Let $x_1 = -8,\ y_1 = 24$ and $x_2 = 4$. Solve for y_2.

Use the product rule.

$$x_1 y_1 = x_2 y_2 \qquad \text{Product rule for inverse variations.}$$
$$(-8)\times(24) = (4)\times y_2 \qquad x_1 = -8,\ y_1 = 24,\ \text{and } x_2 = 4.$$
$$-192 = (4)\times y_2 \qquad \text{Multiply.}$$

$$-\frac{192}{4} = y_2 \qquad \text{Divide each side by 4.}$$
$$-48 = y_2 \qquad \text{Simplify.}$$

Thus $y = -48$ when $x = 4$, and $xy = 48 \times 4 = 192$.

Therefore, the value of xy and y are $\boxed{-192;\ -48}$.

Answer 48MYS.

Let $x_1 = 4.4,\ y_1 = 6.4$ and $y_2 = 3.2$. Solve for x_2.

Use the product rule.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variations.}$$
$$(4.4)\times(6\cdot 4) = x_2 \times (3.2) \quad x_1 = 4.4,\ y_1 = 6.4,\ \text{and } y_2 = 3.2.$$
$$28.16 = x_2 \times (3.2) \quad \text{Multiply.}$$

$$\frac{28.16}{3.2} = x_2 \quad \text{Divide each side by 3.2.}$$
$$8.8 = x_2 \quad \text{Simplify.}$$

Thus $x = 8.8$ when $y = 3.2$, and $xy = 8\cdot 8 \times 3.2 = 28.16$.

Therefore, the value of xy and x are $\boxed{28.16;\ 3.2}$.

Answer 49MYS.

Consider the following rational expression.

$$\frac{-7^{12}}{7^9}$$
$$= \frac{7^9 \cdot (-7^3)}{7^9}$$
$$= \frac{\cancel{7^9}^{1} \cdot (-7^3)}{\cancel{7^9}_{1}} \quad \text{The CGF is } 7^9.$$
$$= -7^3 \quad \text{Simplify.}$$
$$= -7^3 \text{ or } -343 \quad \text{Use the exponents.}$$

Thus, the answer is $\boxed{-7^3 \text{ or } -343}$.

Answer 50MYS.

Consider the following rational expression.

$$\frac{20p^6}{8p^8}$$

$$= \frac{4p^6 \cdot (5)}{4p^6 (2p^2)}$$

$$= \frac{\cancel{4p^6} \cdot (5)}{\cancel{4p^6} (2p^2)} \qquad \text{The CGF is } 4p^6.$$

$$= \frac{5}{2p^2} \qquad \text{Simplify.}$$

Thus, the answer is $\boxed{\frac{5}{2p^2}}$.

Answer 51MYS.

Consider the following rational expression.

$$\frac{24a^3b^4c^7}{6a^6c^2}$$

$$= \frac{\overset{1}{\cancel{6a^3c^2}} (4b^4c^5)}{\underset{1}{\cancel{6a^3c^2}} (a^3)} \qquad \text{The GCF is } 6a^3c^2.$$

$$= \frac{4b^4c^5}{a^3} \qquad \text{Simplify.}$$

Thus, the answer is $\boxed{\frac{4b^4c^5}{a^3}}$.

Answer 52MYS.

Consider the following inequality.

$$\frac{g}{8} < \frac{7}{2}$$

$$\frac{g}{8} \cdot 8 < \frac{7}{2} \cdot 8 \qquad \text{Multiply each side by 8.}$$

$$g < 7 \cdot 4 \qquad \text{Simplify.}$$

$$g < 28 \qquad \text{Multiply.}$$

Check

Substitute 28 for *g* in the inequality $\frac{g}{8} < \frac{7}{2}$.

$$\frac{g}{8} < \frac{7}{2}$$

$$\frac{28}{8} \stackrel{?}{<} \frac{7}{2} \quad \text{Substitute.}$$

$$\frac{7}{2} < \frac{7}{2} \quad \text{False}$$

At $g = 32 > 28$

$$\frac{g}{8} < \frac{7}{2}$$

$$\frac{32}{8} \stackrel{?}{<} \frac{7}{2} \quad \text{Substitute.}$$

$$4 < 3.5 \quad \text{False.}$$

At $g = 24 < 28$

$$\frac{g}{8} < \frac{7}{2}$$

$$\frac{24}{8} \stackrel{?}{<} \frac{7}{2} \quad \text{Substitute.}$$

$$3 < 3.5 \quad \text{True.}$$

Thus, the solution is $\boxed{\{g \mid g < 28\}}$.

Answer 53MYS.

Consider the following equation.

$$3.5r \geq 7.35$$

$$\frac{3.5r}{3.5} \geq \frac{7.35}{3.5} \quad \text{Divide each sides by 3.5.}$$

$$r \geq 2.1 \quad \text{Simplify.}$$

Check

Substitute 2.1 for *r* in the inequality $3.5r \geq 7.35$.

$$3.5r \geq 7.35$$

$$3.5(2.1) \stackrel{?}{\geq} 7.35 \quad \text{Substitute.}$$

$$7.35 \geq 7.35 \quad \text{True.}$$

Thus, the solution is $\boxed{r \mid r \geq 2.1}$.

Answer 54MYS.

Consider the following equation.

$$\frac{9k}{4} > \frac{3}{5}$$

$$\frac{9k}{4} \cdot 4 > \frac{3}{5} \cdot 4 \quad \text{Multiply each sides by 4.}$$

$$9k > \frac{12}{5} \quad \text{Simplify.}$$

$$\frac{9k}{9} > \frac{12}{5 \cdot 9} \quad \text{Divide each sides by 9.}$$

$$k > \frac{4}{15} \quad \text{Simplify.}$$

Check

Substitute $\frac{4}{15}$ for k in the inequality $\frac{9k}{4} > \frac{3}{5}$.

$$\frac{9k}{4} > \frac{3}{5}$$

$$\frac{9\left(\frac{4}{15}\right)}{4} \overset{?}{>} \frac{3}{5} \quad \text{Substitute.}$$

$$\frac{3}{5} > \frac{3}{5} \quad \text{True.}$$

Thus, the solution is $\boxed{k \mid k > \frac{4}{15}}$.

Answer 55MYS.

Since, the total amount of money varies directly with the number of days.

Let $x_1 = 4, y_1 = 340$, and $y_1 = 935$. solve for x_2.

$$\frac{x_1}{y_1} = \frac{x_2}{y_2} \quad \text{Proportion for direct variation.}$$

$$\frac{4}{340} = \frac{x_2}{935} \quad \text{Substitute.}$$

$$\frac{4}{340} \cdot 935 = x_2 \quad \text{Multiply both sides by 935.}$$

$$11 = x_2 \quad \text{Simplify.}$$

Thus, it will take $\boxed{\text{11 days}}$ to earn \$935.

Answer 56MYS.

Consider the following polynomial:

$$x^2 - 3x - 40$$

$= x^2 - 8x + 5x - 40$ Write $-3x = -8x + 5x$.

$= x(x-8) + 5(x-8)$ Distributive property.

$= (x-8)(x+5)$ Factor out $(x-8)$.

Thus, the factor of the polynomial is $\boxed{(x-8)(x+5)}$.

Answer 57MYS.

Consider the following polynomial:

$$n^2 - 64$$

$= n^2 - 8^2$ Write as $a^2 - b^2$.

$= (n-8)(n+8)$ Difference of two squares pattern.

Thus, the factor of the polynomial is $\boxed{(n-8)(n+8)}$.

Answer 58MYS.

Consider the following polynomial:

$$x^2 - 12x + 36$$

$= x^2 - 6x - 6x + 36$ Write $-12x = -6x - 6x$.

$= x(x-6) - 6(x-6)$ Distributive property.

$= (x-6)(x-6)$ Factor out $(x-6)$.

Thus, the factor of the polynomial is $\boxed{(x-6)(x-6) \text{ or } (x-6)^2}$.

Answer 59MYS.

Consider the following polynomial:

$$a^2 + 2a - 35$$

$= a^2 + 7a - 5a - 35$ Write $2a = 7a - 5a$.

$= a(a+7) - 5(a+7)$ Distributive property.

$= (a+7)(a-5)$ Factor out $(a+7)$.

Thus, the factor of the polynomial is $\boxed{(a+7)(a-5)}$.

Answer 60MYS.

Consider the following polynomial:

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

$$= 2x^2 - 6x + x - 3 \qquad \text{Write } -5x = -6x + x.$$

$$= 2x(x-3) + 1(x-3) \qquad \text{Distributive property.}$$

$$= (x-3)(2x+1) \qquad \text{Factor out } (x-3).$$

Thus, the factor of the polynomial is $\boxed{(x-3)(2x+1)}$.

Answer 61MYS.

Consider the following polynomial:

$$3x^3 - 24x^2 + 36x$$

$$= 3x(x^2 - 8x + 12) \qquad \text{Factor out } 3x.$$

$$= 3x(x^2 - 6x - 2x + 12) \qquad \text{Write } -5x = -6x + x.$$

$$= 3x[x(x-6) - 2(x-6)] \qquad \text{Distributive property.}$$

$$= 3x(x-6)(x-2) \qquad \text{Factor out } (x-6).$$

Thus, the factor of the polynomial is $\boxed{3x(x-6)(x-2)}$.