Chapter 12. Rational Expressions and Equations

Ex. 12.8

Answer 1CU.

Both mixed numbers and mixed expressions are made up by the sum of an integer or monomial and a fraction or rational expression.

Mixed number: $2\frac{1}{2}, 3\frac{1}{3}, \ldots$

Mixed expression: $3+\frac{x-y}{a+b}, 2+\frac{x^2-y^2}{a^2-b^2}, \ldots$

Answer 2CU.

Consider the following fraction as an example of a complex fraction. Simplify:

$$\frac{3\frac{1}{2}}{4\frac{3}{4}} = \frac{\frac{7}{2}}{\frac{19}{4}} \qquad \text{Express each term as in improper fraction.}$$

$$= \frac{7}{2} \cdot \frac{4}{19} \qquad \frac{\frac{a}{b}}{\frac{c}{d}} = \frac{ad}{bc}$$

$$= \frac{7}{2} \cdot \frac{2 \cdot 2}{19} \qquad \text{Factor.}$$

$$= \frac{7}{\cancel{2}_1} \cdot \frac{\cancel{2}^1 \cdot 2}{19} \qquad \text{Simplify.}$$

$$= \frac{14}{19}$$

Therefore, the answer is $\boxed{\frac{14}{19}}$.

Answer 3CU.

Consider the following expression:

$$\frac{4}{2x+1}-\frac{5}{x+1}+\frac{2}{x-1}$$

LCD found by

Bolton: $(2x+1)(x+1)(x-1)$

Lian: $2(x+1)(x-1)$

Bolton is correct; Lian omitted the factor $(x+1)$.

Answer 4CU.

Consider the following mixed expression as a rational expression.

$$3+\frac{4}{x}=3\cdot\frac{x}{x}+\frac{4}{x} \quad \text{The LCD is } x.$$

$$=\frac{3x}{x}+\frac{4}{x} \quad \text{Multiply}$$

$$=\frac{3x+4}{x} \quad \text{Add the numerators.}$$

Therefore, the answer is $\boxed{\frac{3x+4}{x}}$.

Answer 5CU.

Consider the following mixed expression as a rational expression.

$$7+\frac{5}{6y}=7\cdot\frac{6y}{6y}+\frac{5}{6y} \quad \text{The LCD is } 6y.$$

$$=\frac{42y}{6y}+\frac{5}{6y} \quad \text{Multiply}$$

$$=\frac{42y+5}{6y} \quad \text{Add the numerators.}$$

Therefore, the answer is $\boxed{\frac{42y+5}{6y}}$.

Answer 6CU.

Consider the following mixed expression as a rational expression.

$$\frac{a-1}{3a}+2a=\frac{a-1}{3a}+2a\cdot\frac{3a}{3a} \qquad \text{The LCD is } 3a.$$

$$=\frac{a-1}{3a}+\frac{6a^2}{3a} \qquad \text{Multiply}$$

$$=\frac{(a-1)+6a^2}{3a} \qquad \text{Add the numerators.}$$

$$=\frac{6a^2+a-1}{3a}$$

Therefore, the answer is $\boxed{\frac{6a^2+a-1}{3a}}$.

Answer 7CU.

Consider the following expression.

$$\frac{3\frac{1}{2}}{4\frac{3}{4}}=\frac{\frac{7}{2}}{\frac{19}{4}} \qquad \text{Express each term as in improper fraction.}$$

$$=\frac{7}{2}\cdot\frac{4}{19} \qquad \frac{\frac{a}{b}}{\frac{c}{d}}=\frac{ad}{bc}$$

$$=\frac{7}{2}\cdot\frac{2\cdot 2}{19} \qquad \text{Factor.}$$

$$=\frac{7}{\cancel{2}_1}\cdot\frac{\cancel{2}^1\cdot 2}{19} \qquad \text{Smplify.}$$

$$=\frac{14}{19}$$

Therefore, the answer is $\boxed{\frac{14}{19}}$.

Answer 8CU.

Consider the following expression.

$$\frac{\frac{x^3}{y^2}}{\frac{y^3}{x}} = \frac{x^3}{y^2} \div \frac{y^3}{x} \qquad \text{Rewrite as a division sentence.}$$

$$= \frac{x^3}{y^2} \cdot \frac{x}{y^3} \qquad \text{Rewrite as multiplication by the reciprocal.}$$

$$= \frac{x^{3+1}}{y^{2+3}} \qquad a^m \cdot a^n = a^{m+n}.$$

$$= \frac{x^4}{y^5} \qquad \text{Simplify}$$

Therefore, the answer is $\boxed{\frac{x^4}{y^5}}$.

Answer 9CU.

Consider the following expression.

$$\frac{\frac{x-y}{a+b}}{\frac{x^2-y^2}{a^2-b^2}}$$

$$= \frac{x-y}{a+b} \div \frac{x^2-y^2}{a^2-b^2} \qquad \text{Rewrite as a division sentence.}$$

$$= \frac{x-y}{a+b} \cdot \frac{a^2-b^2}{x^2-y^2} \qquad \text{Rewrite as multiplication by the reciprocal.}$$

$$= \frac{x-y}{a+b} \cdot \frac{(a-b)(a+b)}{(x-y)(x+y)} \qquad \text{Factor.}$$

$$= \frac{\overset{1}{\cancel{x-y}}}{\underset{1}{\cancel{a+b}}} \cdot \frac{(a-b)\overset{1}{\cancel{(a+b)}}}{\underset{1}{\cancel{(x-y)}}(x+y)} \qquad \text{Divide the common factor, } (x-y)(a+b).$$

$$= \frac{a-b}{x+y} \qquad \text{Simplify.}$$

Therefore, the answer is $\boxed{\frac{a-b}{x+y}}$.

Answer 10CU.

To find the average length of the performances divide the sum of lengths by the number of performances.

$$\frac{7+4\frac{1}{2}+6\frac{1}{2}+8\frac{1}{4}+10\frac{1}{5}}{5}$$

$$=\frac{7+\frac{9}{2}+\frac{13}{2}+\frac{33}{4}+\frac{51}{5}}{5}$$

$$=\frac{\frac{140}{20}+\frac{90}{20}+\frac{130}{20}+\frac{165}{20}+\frac{204}{20}}{5}$$

$$=\frac{\frac{729}{20}}{5}$$

$$=\frac{729}{100} \text{ or } 7\frac{29}{100}$$

Thus, the average length of the performances is $\boxed{7\frac{29}{100}\text{ min}}$.

Answer 11PA.

Consider the following mixed expression as a rational expression.

$8+\frac{3}{n}=8\cdot\frac{n}{n}+\frac{3}{n}$	The LCD is n.
$=\frac{8n}{n}+\frac{3}{n}$	Multiply.
$=\frac{8n+3}{n}$	Add the numerators.

Therefore, the answer is $\boxed{\frac{8n+3}{n}}$.

Answer 12PA.

Consider the following mixed expression as a rational expression.

$4+\frac{5}{a}=4\cdot\frac{a}{a}+\frac{5}{a}$	The LCD is a.
$=\frac{4a}{a}+\frac{5}{a}$	Multiply.
$=\frac{4a+5}{a}$	Add the numerators.

Therefore, the answer is $\boxed{\frac{4a+5}{a}}$.

Answer 13PA.

Consider the following mixed expression as a rational expression.

$$2x+\frac{x}{y}=2x\cdot\frac{y}{y}+\frac{x}{y} \qquad \text{The LCD is } y.$$

$$=\frac{2xy}{y}+\frac{x}{y} \qquad \text{Multiply.}$$

$$=\frac{2xy+x}{y} \qquad \text{Add the numerators.}$$

Therefore, the answer is $\boxed{\frac{2xy+x}{y}}$.

Answer 14PA.

Consider the following mixed expression as a rational expression.

$$6z+\frac{2z}{w}=6z\cdot\frac{w}{w}+\frac{2z}{w} \qquad \text{The LCD is } w.$$

$$=\frac{6wz}{w}+\frac{2z}{w} \qquad \text{Multiply.}$$

$$=\frac{6wz+2z}{w} \qquad \text{Add the numerators.}$$

Therefore, the answer is $\boxed{\frac{6wz+2z}{w}}$.

Answer 15PA.

Consider the following mixed expression as a rational expression.

$$2m-\frac{4+m}{m}=2m\cdot\frac{m}{m}-\frac{4+m}{m} \qquad \text{The LCD is } m.$$

$$=\frac{2m^2}{m}-\frac{4+m}{m} \qquad \text{Multiply.}$$

$$=\frac{2m^2-(4+m)}{m} \qquad \text{Subtract the numerators.}$$

$$=\frac{2m^2+[-(4+m)]}{m} \qquad \text{The additive inverse of } (4+m) \text{ is } -(4+m).$$

$$=\frac{2m^2-4-m}{m} \qquad \text{Distributive property.}$$

$$=\frac{2m^2-m-4}{m}$$

Therefore, the answer is $\boxed{\frac{2m^2-m-4}{m}}$.

Answer 16PA.

Consider the following mixed expression as a rational expression.

$$\begin{aligned} 3a-\frac{a+1}{2a} &= 3a\cdot\frac{2a}{2a}-\frac{a+1}{2a} && \text{The LCD is } 2a. \\ &= \frac{6a^2}{2a}-\frac{a+1}{2a} && \text{Multiply.} \\ &= \frac{6a^2-(a+1)}{2a} && \text{Subtract the numerators.} \\ &= \frac{6a^2+[-(a+1)]}{2a} && \text{The additive inverse of } (a+1) \text{ is } -(a+1). \\ &= \frac{6a^2-a-1}{2a} && \text{Distributive property.} \end{aligned}$$

Therefore, the answer is $\boxed{\frac{6a^2-a-1}{2a}}$.

Answer 17PA.

Consider the following mixed expression as a rational expression.

$$\begin{aligned} b^2+\frac{a-b}{a+b} &= b^2\cdot\frac{a+b}{a+b}+\frac{a-b}{a+b} && \text{The LCD is } (a+b). \\ &= \frac{ab^2+b^3}{a+b}+\frac{a-b}{a+b} && \text{Distributive property.} \\ &= \frac{ab^2+b^3+a-b}{a+b} && \text{Add the numerators.} \\ &= \frac{b^3+ab^2+a-b}{a+b} \end{aligned}$$

Therefore, the answer is $\boxed{\frac{b^3+ab^2+a-b}{a+b}}$.

Answer 18PA.

Consider the following mixed expression as a rational expression.

$$\begin{aligned} r^2+\frac{r-4}{r+3} &= r^2\cdot\frac{r+3}{r+3}+\frac{r-4}{r+3} && \text{The LCD is } (r+3). \\ &= \frac{r^3+3r^2}{r+3}+\frac{r-4}{r+3} && \text{Distributive property.} \\ &= \frac{r^3+3r^2+r-4}{r+3} && \text{Add the numerators.} \end{aligned}$$

Therefore, the answer is $\boxed{\frac{r^3+3r^2+r-4}{r+3}}$.

Answer 19PA.

Consider the following mixed expression as a rational expression.

$$5n^2 - \frac{n+3}{n^2-9}$$

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

$$= 5n^2 - \frac{1}{n-3}$$ Divide by the common factor, $n+3$.

$$= 5n^2 \cdot \frac{n-3}{n-3} - \frac{1}{n-3}$$ The LCD is $(n-3)$.

$$= \frac{5n^3-15n^2}{n-3} - \frac{1}{n-3}$$ Distributive property.

$$= \frac{(5n^3-15n^2)-1}{n-3}$$ Subtract the numerators.

$$= \frac{5n^3-15n^2-1}{n-3}$$ Distributive property.

Therefore, the answer is $\boxed{\frac{5n^3-15n^2-1}{n-3}}$.

Answer 20PA.

Consider the following mixed expression as a rational expression.

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

$$= 3s^2 - \frac{s+1}{(s+1)(s-1)}$$ Factor the denominators.

$$= 3s^2 - \frac{1}{s-1}$$ Divide by the common factor, $s+1$.

$$= 3s^2 \cdot \frac{s-1}{s-1} - \frac{1}{s-1}$$ The LCD is $(s-1)$.

$$= \frac{3s^3-3s^2}{s-1} - \frac{1}{s-1}$$ Distributive property.

$$= \frac{(3s^3-3s^2)-1}{s-1}$$ Subtract the numerators.

$$= \frac{3s^3-3s^2-1}{s-1}$$ Distributive property.

Therefore, the answer is $\boxed{\frac{3s^3-3s^2-1}{s-1}}$.

Answer 21PA.

Consider the following mixed expression as a rational expression.

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

$$=(x-5)\cdot\frac{x-3}{x-3}+\frac{x+2}{x-3} \qquad \text{The LCD is } (x-3).$$

$$=\frac{x^2-8x+15}{x-3}+\frac{x+2}{x-3} \qquad (x-5)(x-3)=x^2-8x+15.$$

$$=\frac{(x^2-8x+15)+(x+2)}{x-3} \qquad \text{Add the numerators.}$$

$$=\frac{x^2-8x+15+x+2}{x-3}$$

$$=\frac{x^2-7x+17}{x-3} \qquad \text{Simplify.}$$

Therefore, the answer is $\boxed{\frac{x^2-7x+17}{x-3}}$.

Answer 22PA.

Consider the following mixed expression as a rational expression.

$$(p+4)+\frac{p+1}{p-4}$$

$$=(p+4)\cdot\frac{p-4}{p-4}+\frac{p+1}{p-4} \qquad \text{The LCD is } (p-4).$$

$$=\frac{p^2-16}{p-4}+\frac{p+1}{p-4} \qquad (p+4)(p-4)=p^2-16.$$

$$=\frac{(p^2-16)+(p+1)}{p-4} \qquad \text{Add the numerators.}$$

$$=\frac{p^2-16+p+1}{p-4}$$

$$=\frac{p^2+p-15}{p-4} \qquad \text{Distributive property.}$$

Therefore, the answer is $\boxed{\frac{p^2+p-15}{p-4}}$.

Answer 23PA.

Consider the following expression.

$$\frac{5\frac{3}{4}}{7\frac{2}{3}} = \frac{\frac{23}{4}}{\frac{23}{3}}$$ Express each term as in improper fraction.

$$= \frac{23 \cdot 3}{4 \cdot 23}$$ $\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{ad}{bc}$

$$= \frac{\overset{1}{\cancel{23}} \cdot 3}{4 \cdot \underset{1}{\cancel{23}}}$$ Divide by common factor, 23.

$$= \frac{3}{4}$$ Simplify.

Therefore, the answer is $\boxed{\frac{3}{4}}$.

Answer 24PA.

Consider the following expression.

$$\frac{8\frac{2}{7}}{4\frac{4}{5}} = \frac{\frac{58}{7}}{\frac{24}{5}}$$ Express each term as in improper fraction.

$$= \frac{58 \cdot 5}{7 \cdot 24}$$ $\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{ad}{bc}$.

$$= \frac{2 \cdot 29 \cdot 5}{7 \cdot 2 \cdot 12}$$ Factor.

$$= \frac{\overset{1}{\cancel{2}} \cdot 29 \cdot 5}{7 \cdot \underset{1}{\cancel{2}} \cdot 12}$$ Divide by common factor, 2.

$$= \frac{145}{84} \text{ or } 1\frac{61}{84}$$ Simplify.

Therefore, the answer is $\boxed{\frac{145}{84} \text{ or } 1\frac{61}{84}}$.

Answer 25PA.

Consider the following expression.

$$\frac{\frac{a}{b^3}}{\frac{a^2}{b}} = \frac{a}{b^3} \div \frac{a^2}{b} \qquad \text{Rewrite as a division sentence.}$$

$$= \frac{a}{b^3} \cdot \frac{b}{a^2} \qquad \text{Rewrite as multiplication by the reciprocal.}$$

$$= \frac{a}{b \cdot b^2} \cdot \frac{b}{a \cdot a} \qquad \text{Factor.}$$

$$= \frac{\overset{1}{\cancel{a}}}{\underset{1}{\cancel{b}} \cdot b^2} \cdot \frac{\overset{1}{\cancel{b}}}{\underset{1}{\cancel{a}} \cdot a} \qquad \text{Divide by common factors, } a \text{ and } b.$$

$$= \frac{1}{ab^2} \qquad \text{Simplify.}$$

Therefore, the answer is $\boxed{\frac{1}{ab^2}}$.

Answer 26PA.

Consider the following expression.

$$\frac{\frac{n^3}{m^2}}{\frac{n^2}{m^2}} = \frac{n^3}{m^2} \div \frac{n^2}{m^2} \qquad \text{Rewrite as a division sentence.}$$

$$= \frac{n^3}{m^2} \cdot \frac{m^2}{n^2} \qquad \text{Rewrite as multiplication by the reciprocal.}$$

$$= \frac{n^2 \cdot n}{m^2} \cdot \frac{m^2}{n^2} \qquad \text{Factor.}$$

$$= \frac{\overset{1}{\cancel{n^2}} \cdot n}{\underset{1}{\cancel{m^2}}} \cdot \frac{\overset{1}{\cancel{m^2}}}{\underset{1}{\cancel{n^2}}} \qquad \text{Divide by common factors, } m^2 \text{ and } n^2.$$

$$= n \qquad \text{Simplify.}$$

Therefore, the answer is $\boxed{n}$.

Answer 27PA.

Consider the following expression.

$$\frac{\frac{x+4}{y-2}}{\frac{x^2}{y^2}} = \frac{x+4}{y-2} \div \frac{x^2}{y^2} \qquad \text{Rewrite as a division sentence.}$$

$$= \frac{x+4}{y-2} \cdot \frac{y^2}{x^2} \qquad \text{Rewrite as multiplication by the reciprocal.}$$

$$= \frac{y^2(x+4)}{x^2(y-2)} \qquad \text{Simplify.}$$

Therefore, the answer is $\boxed{\frac{y^2(x+4)}{x^2(y-2)}}$.

Answer 28PA.

Consider the following expression.

$$\frac{\frac{s^3}{t^2}}{\frac{s+t}{s-t}} = \frac{s^3}{t^2} \div \frac{s+t}{s-t} \qquad \text{Rewrite as a division sentence.}$$

$$= \frac{s^3}{t^2} \cdot \frac{s-t}{s+t} \qquad \text{Rewrite as multiplication by the reciprocal.}$$

$$= \frac{s^3(s-t)}{t^2(s+t)} \qquad \text{Simplify.}$$

Therefore, the answer is $\boxed{\frac{s^3(s-t)}{t^2(s+t)}}$.

Answer 29PA.

Consider the following expression.

$$\frac{\frac{y^2-1}{y^2+3y-4}}{y+1}$$

$$=\frac{\frac{y^2-1}{y^2+3y-4}}{\frac{y+1}{1}}$$ Rewrite $y+1$ as $\frac{y+1}{1}$.

$$=\frac{y^2-1}{y^2+3y-4}\div\frac{y+1}{1}$$ Rewrite as a division sentence.

$$=\frac{y^2-1}{y^2+3y-4}\cdot\frac{1}{y+1}$$ Rewrite as multiplication by the reciprocal.

$$=\frac{(y-1)(y+1)}{(y+4)(y-1)}\cdot\frac{1}{y+1}$$ Factor numerator and denominator.

$$=\frac{\overset{1}{\cancel{(y-1)}}\,\overset{1}{\cancel{(y+1)}}}{(y+4)\,\underset{1}{\cancel{(y-1)}}}\cdot\frac{1}{\underset{1}{\cancel{y+1}}}$$ Divide by the common factors, $(y+1)$ and $(y-1)$.

$$=\frac{1}{y+4}$$ Divide by the common factors, $(y+1)$ and $(y-1)$.

Therefore, the answer is $\boxed{\frac{1}{y+4}}$.

Answer 30PA.

Consider the following expression.

$$\frac{\frac{a^2-2a-3}{a^2-1}}{a-3}$$

$$=\frac{\frac{a^2-2a-3}{a^2-1}}{\frac{a-3}{1}} \quad \text{Rewrite } a-3 \text{ as } \frac{a-3}{1}.$$

$$=\frac{a^2-2a-3}{a^2-1}\div\frac{a-3}{1} \quad \text{Rewrite as a division sentence.}$$

$$=\frac{a^2-2a-3}{a^2-1}\cdot\frac{1}{a-3} \quad \text{Rewrite as multiplication by the reciprocal.}$$

$$=\frac{(a-3)(a+1)}{(a+1)(a-1)}\cdot\frac{1}{a-3} \quad \text{Factor numerator and denominator.}$$

$$=\frac{\cancel{(a-3)}\,\cancel{(a+1)}}{\cancel{(a+1)}\,(a-1)}\cdot\frac{1}{\cancel{a-3}} \quad \text{Divide by the common factors, } (a+1) \text{ and } (a-3).$$

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

Therefore, the answer is $\boxed{\frac{1}{a-1}}$.

Answer 31PA.

Consider the following expression.

$$\frac{\frac{n^2+2n}{n^2+9n+18}}{\frac{n^2-5n}{n^2+n-30}}$$

$$=\frac{n^2+2n}{n^2+9n+18}\div\frac{n^2-5n}{n^2+n-30} \quad \text{Rewrite as a division sentence.}$$

$$=\frac{n^2+2n}{n^2+9n+18}\cdot\frac{n^2+n-30}{n^2-5n} \quad \text{Rewrite as multiplication by the reciprocal.}$$

$$=\frac{n(n+2)}{(n+6)(n+3)}\cdot\frac{(n+6)(n-5)}{n(n-5)} \quad \text{Factor numerator and denominator.}$$

$$=\frac{\cancel{n}(n+2)}{\cancel{(n+6)}(n+3)}\cdot\frac{\cancel{(n+6)}\,\cancel{(n-5)}}{\cancel{n}\,\cancel{(n-5)}} \quad \text{Divide by the common factor, } n(n+2)(n-5).$$

$$=\frac{n+2}{n+3} \quad \text{Simplify.}$$

Therefore, the answer is $\boxed{\frac{n+2}{n+3}}$.

Answer 32PA.

Consider the following expression.

$$\frac{\frac{x^2+4x-21}{x^2-9x+18}}{\frac{x^2+3x-28}{x^2-10x+24}}$$

$$=\frac{x^2+4x-21}{x^2-9x+18}\div\frac{x^2+3x-28}{x^2-10x+24} \quad \text{Rewrite as a division sentence.}$$

$$=\frac{x^2+4x-21}{x^2-9x+18}\cdot\frac{x^2-10x+24}{x^2+3x-28} \quad \text{Rewrite as multiplication by the reciprocal.}$$

$$=\frac{(x+7)(x-3)}{(x-6)(x-3)}\cdot\frac{(x-6)(x-4)}{(x+7)(x-4)} \quad \text{Factor numerator and denominator.}$$

$$=\frac{\overset{1}{\cancel{(x+7)}}\,\overset{1}{\cancel{(x-3)}}}{\underset{1}{\cancel{(x-6)}}\,\underset{1}{\cancel{(x-3)}}}\cdot\frac{\overset{1}{\cancel{(x-6)}}\,\overset{1}{\cancel{(x-4)}}}{\underset{1}{\cancel{(x+7)}}\,\underset{1}{\cancel{(x-4)}}} \quad \left[\begin{array}{l}\text{Divide by the common factor,}\\(x-6)(x-4)(x-3)(x+7).\end{array}\right]$$

$$=1 \quad \text{Simplify.}$$

Therefore, the answer is $\boxed{1}$.

Answer 33PA.

Consider the following expression.

$$\frac{x-\frac{15}{x-2}}{x-\frac{20}{x-1}}$$

The numerator and denominator contain mixed expression. Rewrite it as rational expression first.

$$\frac{x-\frac{15}{x-2}}{x-\frac{20}{x-1}}$$

$$=\frac{\frac{x(x-2)}{x-2}-\frac{15}{x-2}}{\frac{x(x-1)}{x-1}-\frac{20}{x-1}} \quad \left[\begin{array}{l}\text{The LCD of the fractions in the numerator}\\\text{is } x-2 \text{ and denominator is } x-1.\end{array}\right]$$

$$=\frac{\frac{x^2-2x}{x-2}-\frac{15}{x-2}}{\frac{x^2-x}{x-1}-\frac{20}{x-1}} \quad \text{Distributive property.}$$

$$=\frac{\frac{x^2-2x-15}{x-2}}{\frac{x^2-x-20}{x-1}} \quad \text{Simplify.}$$

$$= \frac{x^2-2x-15}{x-2} \div \frac{x^2-x-20}{x-1}$$ Rewrite as a division sentence.

$$= \frac{x^2-2x-15}{x-2} \cdot \frac{x-1}{x^2-x-20}$$ Rewrite as multiplication by the reciprocal.

$$= \frac{(x-5)(x+3)}{x-2} \cdot \frac{x-1}{(x-5)(x+4)}$$ Factor numerator and denominator.

$$= \frac{\overset{1}{\cancel{(x-5)}}(x+3)}{x-2} \cdot \frac{x-1}{\underset{1}{\cancel{(x-5)}}(x+4)}$$ Divide by the common factor, $x-5$.

$$= \frac{(x+3)(x-1)}{(x-2)(x+4)}$$ Simplify.

Therefore, the answer is $\boxed{\frac{(x+3)(x-1)}{(x-2)(x+4)}}$.

Answer 34PA.

Consider the following expression.

$$\frac{n+\frac{35}{n+12}}{n-\frac{63}{n-2}}$$

The numerator and denominator contain mixed expression. Rewrite it as rational expression first.

$$\frac{n+\frac{35}{n+12}}{n-\frac{63}{n-2}}$$

$$= \frac{\frac{n(n+12)}{n+12}+\frac{35}{n+12}}{\frac{n(n-2)}{n-2}-\frac{63}{n-2}}$$ $\left[\begin{array}{l}\text{The LCD of the fractions in the numerator} \\ \text{is } n+12 \text{ and denominator is } n-2.\end{array}\right]$

$$= \frac{\frac{n^2+12n}{n+12}+\frac{35}{n+12}}{\frac{n^2-2n}{n-2}-\frac{63}{n-2}}$$ Distributive property.

$$= \frac{\frac{n^2+12n+35}{n+12}}{\frac{n^2-2n-63}{n-2}}$$ Simplify.

$$=\frac{n^2+12n+35}{n+12}\div\frac{n^2-2n-63}{n-2}$$ Rewrite as a division sentence.

$$=\frac{n^2+12n+35}{n+12}\cdot\frac{n-2}{n^2-2n-63}$$ Rewrite as multiplication by the reciprocal.

$$=\frac{(n+7)(n+5)}{n+12}\cdot\frac{n-2}{(n-9)(n+7)}$$ Factor numerator and denominator.

$$=\frac{\overset{1}{\cancel{(n+7)}}(n+5)}{n+12}\cdot\frac{n-2}{(n-9)\underset{1}{\cancel{(n+7)}}}$$ Divide by the common factor, $n+7$.

$$=\frac{(n+5)(n-2)}{(n+12)(n-9)}$$ Simplify.

Therefore, the answer is $\boxed{\frac{(n+5)(n-2)}{(n+12)(n-9)}}$.

Answer 35PA.

Consider the following division:

$$\frac{b+\frac{1}{b}}{a+\frac{1}{a}}$$

$$=\frac{\frac{b^2}{b}+\frac{1}{b}}{\frac{a^2}{a}+\frac{1}{a}}$$ [The LCD of the fractions in the numerator is b and denominator is a.]

$$=\frac{\frac{b^2+1}{b}}{\frac{a^2+1}{a}}$$ Simplify.

$$=\frac{b^2+1}{b}\div\frac{a^2+1}{a}$$ Rewrite as a division sentence.

$$=\frac{b^2+1}{b}\cdot\frac{a}{a^2+1}$$ Rewrite as multiplication by the reciprocal.

$$=\frac{a(b^2+1)}{b(a^2+1)}$$ Simplify.

Therefore, the quotient is $\boxed{\frac{a(b^2+1)}{b(a^2+1)}}$.

Answer 36PA.

Find the product of $\frac{2b^2}{5c}$ and the quotient of $\frac{4b^3}{2c}$ and $\frac{7b^3}{8c^2}$:

$$\frac{2b^2}{5c}\cdot\left(\frac{4b^3}{2c}\div\frac{7b^3}{8c^2}\right)$$

$$=\frac{2b^2}{5c}\cdot\frac{4b^3}{2c}\cdot\frac{8c^2}{7b^3}$$ Rewrite as multiplication by the reciprocal.

$$=\frac{\overset{32}{\cancel{64}}\,\overset{b^2}{\cancel{b^5}}\,\overset{1}{\cancel{c^2}}}{\underset{35}{\cancel{70}}\,\underset{1}{\cancel{b^3}}\,\underset{1}{\cancel{c^2}}}$$ Divide by common factors.

$$=\frac{32b^2}{35}$$ Simplify.

Thus, the answer is $\boxed{\frac{32b^2}{35}}$.

Answer 37PA.

To find the number of serving of soda can divide soda in bottle by soda fills a cup.

$$5\cdot 66\div 5\frac{1}{2}$$

$$=5\cdot 66\div\frac{11}{2}$$ Write to a proper fraction.

$$=5\cdot 66\cdot\frac{2}{11}$$ Multiply by the reciprocal of $\frac{11}{2}$.

$$=60$$ Simplify.

Thus, the number of serve is $\boxed{60}$.

Answer 38PA.

Simplify the complex fraction in the formula.

$$h = \frac{f}{1 - \frac{v}{s}}$$

$$= \frac{f}{\frac{s-v}{s}} \qquad \text{Subtrsct the denominator.}$$

$$= f \div \frac{s-v}{s} \qquad \text{Rewrite as a division sentence.}$$

$$= f \cdot \frac{s}{s-v} \qquad \text{Multiply by the reciprocal } \frac{s-v}{s}.$$

$$= \frac{fs}{s-v} \qquad \text{Simplify.}$$

Thus, the formula is $\boxed{h = \frac{fs}{s-v}}$.

Simplify the complex fraction in the formula.

$$h = \frac{f}{1 - \frac{v}{s}}$$

$$= \frac{f}{\frac{s-v}{s}} \qquad \text{Subtrsct the denominator.}$$

$$= f \div \frac{s-v}{s} \qquad \text{Rewrite as a division sentence.}$$

$$= f \cdot \frac{s}{s-v} \qquad \text{Multiply by the reciprocal } \frac{s-v}{s}.$$

$$= \frac{fs}{s-v} \qquad \text{Simplify.}$$

Thus, the formula is $\boxed{h = \frac{fs}{s-v}}$.

Answer 39PA.

Simplify the complex fraction in the formula.

$$h = \frac{f}{1 - \frac{v}{s}}$$

$$= \frac{f}{\frac{s - v}{s}} \qquad \text{Subtrsct the denominator.}$$

$$= f \div \frac{s - v}{s} \qquad \text{Rewrite as a division sentence.}$$

$$= f \cdot \frac{s}{s - v} \qquad \text{Multiply by the reciprocal } \frac{s - v}{s}.$$

$$= \frac{fs}{s - v} \qquad \text{Simplify.}$$

Thus, the formula is $h = \frac{fs}{s - v}$.

Substitute $f = 370, s = 760, \text{ and } v = 65$ in the formula, to find the frequency of the horn as you hear it.

$$h = \frac{fs}{s - v} \qquad \text{Formula.}$$

$$= \frac{370 \cdot 760}{760 - 65} \qquad \text{Substitute.}$$

$$= \frac{281,200}{695} \qquad \text{Simplify}$$

$$\approx 404.60$$

Thus, the frequency of the horn as you hear it is $\boxed{404.60 \text{ cycles/s}}$.

Answer 43PA.

Most measurements used in banking are fractions or mixed numbers, which are examples of rational expressions.

Answer should include the following.

• You want to find the number of batches of cookies you can make using the 7 cups of flour you have on hand when a batch requires $1\frac{1}{2}$ cups of flour.

• Divide the expression in the numerator of a complex fraction by the expression in the denominator.

Answer 45PA.

Consider the following expression.

$$\frac{\frac{6mn}{5p}}{\frac{24n^2}{20mp}} = \frac{6mn}{5p} \div \frac{24n^2}{20mp} \qquad \text{Rewrite as a division sentence.}$$

$$= \frac{6mn}{5p} \cdot \frac{20mp}{24n^2} \qquad \text{Rewrite as multiplication by the reciprocal.}$$

$$= \frac{120m^2np}{120n^2p} \qquad \text{Multiply.}$$

$$= \frac{\overset{1}{\cancel{120}}\, m^2\, \overset{1}{\cancel{n}}\, \overset{1}{\cancel{p}}}{\underset{1}{\cancel{120}}\, \underset{n}{\cancel{n^2}}\, \underset{1}{\cancel{p}}} \qquad \text{Divide by common factors.}$$

$$= \frac{m^2}{n} \qquad \text{Simplify.}$$

Therefore, the answer is option $\boxed{C.\ \frac{m^2}{n}}$.

Answer 46PA.

Consider the following addition.

$$\frac{12x}{4y^2}+\frac{8}{6y}$$

Factor each denominator and find the LCD.

$$4y^2 = 2\cdot 2\cdot y\cdot y$$
$$6y = 2\cdot 3\cdot y$$
$$\text{LCD} = 2\cdot 2\cdot 3\cdot y\cdot y = 12y^2.$$

Change each rational expression into an equivalent expression with the LCD. Then add.

$$\frac{12x}{4y^2}+\frac{8}{6y} = \frac{12x}{4y^2}\cdot\frac{3}{3}+\frac{8}{6y}\cdot\frac{2y}{2y} \quad \text{The LCD is } 12y^2.$$

$$= \frac{36x}{12y^2}+\frac{16y}{12y^2} \quad \text{Multiply.}$$

$$= \frac{36x+16y}{12y^2} \quad \text{Add the numerators.}$$

$$= \frac{4(9x+4y)}{4\cdot 3y^2} \quad \text{Factor.}$$

$$= \frac{\overset{1}{\cancel{4}}(9x+4y)}{\underset{1}{\cancel{4}}\cdot 3y^2} \quad \text{Divide by the common factor, 4.}$$

$$= \frac{9x+4y}{3y^2} \quad \text{Simplify.}$$

Therefore, the sum is $\boxed{\frac{9x+4y}{3y^2}}$.

Answer 47PA.

Consider the following addition.

$$\frac{a}{a-b}+\frac{b}{2b+3a}$$

The denominators $a-b$ and $2b+3a$ are already completely factor. Thus, LCD is $(a-b)(2b+3a)$.

$$\frac{a}{a-b}+\frac{b}{2b+3a}$$

$$=\frac{a(2b+3a)}{(a-b)(2b+3a)}+\frac{b(a-b)}{(2b+3a)(a-b)} \quad \text{The LCD is } (a-b)(2b+3a).$$

$$=\frac{2ab+3a^2}{(a-b)(2b+3a)}+\frac{ab-b^2}{(a-b)(2b+3a)} \quad \text{Distributive property.}$$

$$=\frac{(2ab+3a^2)+(ab-b^2)}{(a-b)(2b+3a)} \quad \text{Add the numerators.}$$

$$=\frac{3a^2+3ab-b^2}{(a-b)(2b+3a)} \quad \text{Combine like terms.}$$

Therefore, the sum is $\boxed{\dfrac{3a^2+3ab-b^2}{(a-b)(2b+3a)}}$.

Answer 48PA.

Consider the following addition.

$$\frac{a+3}{3a^2-10a-8}+\frac{2a}{a^2-8a+16}$$

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

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

$$=\frac{a^2-a-12}{(3a+2)(a-4)^2}+\frac{6a^2+4a}{(3a+2)(a-4)^2} \quad \text{Simplify.}$$

$$=\frac{(a^2-a-12)+(6a^2+4a)}{(3a+2)(a-4)^2} \quad \text{Add the numerators.}$$

$$=\frac{7a^2+3a-12}{(3a-2)(a-4)^2} \quad \text{Combine like terms.}$$

Therefore, the sum is $\boxed{\dfrac{7a^2+3a-12}{(3a-2)(a-4)^2}}$.

Answer 49PA.

Consider the following addition.

$$\frac{n-4}{(n-2)^2}+\frac{n-5}{n^2+n-6}$$

$$=\frac{n-4}{(n-2)^2}+\frac{n-5}{(n+3)(n-2)}$$ Factor the denominators.

$$=\frac{n-4}{(n-2)^2}\cdot\frac{n+3}{n+3}+\frac{n-5}{(n+3)(n-2)}\cdot\frac{n-2}{n-2}$$ The LCD is $(n+3)(n-2)^2$.

$$=\frac{n^2-n-12}{(n+3)(n-2)^2}+\frac{n^2-7n+10}{(n+3)(n-2)^2}$$ Simplify.

$$=\frac{(n^2-n-12)+(n^2-7n+10)}{(n+3)(n-2)^2}$$ Add the numerators.

$$=\frac{2n^2-8n-2}{(n+3)(n-2)^2}$$ Combine like terms.

Therefore, the sum is $\boxed{\frac{2n^2-8n-2}{(n-2)^2(n+3)}}$.

Answer 50MYS.

Consider the following subtraction.

$$\frac{7}{x^2}-\frac{3}{x^2}=\frac{7-3}{x^2}$$ The common denominator is x^2.

$$=\frac{4}{x^2}$$ Subtract the numerator.

Thus, difference is $\boxed{\frac{4}{x^2}}$.

Answer 51MYS.

Consider the following subtraction.

$$\frac{x}{(x-3)^2}-\frac{3}{(x-3)^2}=\frac{x-3}{(x-3)^2}$$ The common denominator is $(x-3)^2$.

$$=\frac{x-3}{(x-3)(x-3)}$$ Rewrite $(x-3)^2$ as $(x-3)(x-3)$.

$$=\frac{\cancel{x-3}^{\,1}}{\cancel{(x-3)}_{\,1}(x-3)}$$ Divide by the common factor, $x-3$.

$$=\frac{1}{x-3}$$ Simplify.

Thus, difference is $\boxed{\frac{1}{x-3}}$.

Answer 52MYS.

Consider the following subtraction.

$$\frac{2}{t^2-t-2}-\frac{t}{t^2-t-2}=\frac{2-t}{t^2-t-2} \quad \text{The common denominator is } t^2-t-2.$$

$$=\frac{2-t}{(t-2)(t+1)} \quad \text{Factor the denominators.}$$

$$=\frac{-(t-2)}{(t-2)(t+1)} \quad \text{Rewrite } (2-t) \text{ as } -(t-2).$$

$$=\frac{-\overset{1}{\cancel{(t-2)}}}{\underset{1}{\cancel{(t-2)}}(t+1)} \quad \text{Divide by the common factor, } t-2.$$

$$=-\frac{1}{t+1} \quad \text{Simplify.}$$

Thus, difference is $\boxed{-\frac{1}{t+1}}$.

Answer 53MYS.

Consider the following subtraction.

$$\frac{2n}{n^2+2n-24}-\frac{8}{n^2+2n-24}$$

$$=\frac{2n-8}{n^2+2n-24} \quad \text{The common denominator is } n^2+2n-24.$$

$$=\frac{2(n-4)}{(n+6)(n-4)} \quad \text{Factor the numerators and denominators.}$$

$$=\frac{2\overset{1}{\cancel{(n-4)}}}{(n+6)\underset{1}{\cancel{(n-4)}}} \quad \text{Divide by common factor, } n-4.$$

$$=\frac{2}{n+6} \quad \text{Simplify.}$$

Thus, difference is $\boxed{\frac{2}{n+6}}$.

Answer 55MYS.

Consider the following equation.

$$s^2=16$$

$$s^2-16=0 \quad \text{Subtract 16 from each side.}$$

$$s^2-4^2=0 \quad \text{Rewrite 16 a } 4^2$$

$$(s-4)(s+4)=0 \quad \text{Factor.}$$

$$s-4=0 \quad \text{or} \quad s+4=0$$

$$s=4 \quad \text{or} \quad s=-4 \quad \text{Solve for } s.$$

Check

Substitute 4 for *s* in the original equation.

$$s^2 = 16 \quad \text{Original equation.}$$
$$(4)^2 \stackrel{?}{=} 16 \quad \text{Substitute.}$$
$$16 = 16 \quad \text{True.}$$

Now, substitute -4 for *s* in the original equation.

$$s^2 = 16 \quad \text{Original equation.}$$
$$(-4)^2 \stackrel{?}{=} 16 \quad \text{Substitute.}$$
$$16 = 16 \quad \text{True.}$$

Thus, the solution are $\boxed{-4,\ 4}$.

Answer 56MYS.

Consider the following equation.

$$9p^2 = 64$$
$$9p^2 - 64 = 0 \quad \text{Subtract 64 from each side.}$$
$$(3p)^2 - 8^2 = 0 \quad \text{Rewrite 64 a } 8^2 \text{ and } 9p^2 \text{ as } (3p)^2.$$
$$(3p-8)(3p+8) = 0 \quad \text{Factor.}$$
$$3p - 8 = 0 \quad \text{or} \quad 3p + 8 = 0$$
$$p = \frac{8}{3} \quad \text{or} \quad p = -\frac{8}{3} \quad \text{Solve for } p.$$

Check

Substitute $\frac{8}{3}$ for *p* in the original equation.

$$9p^2 = 64 \quad \text{Original equation.}$$
$$9\left(\frac{8}{3}\right)^2 \stackrel{?}{=} 64 \quad \text{Substitute.}$$
$$9 \cdot \frac{64}{9} \stackrel{?}{=} 64 \quad \text{Use the exponents.}$$
$$64 = 64 \quad \text{True.}$$

Now, substitute $-\frac{8}{3}$ for *p* in the original equation.

$$9p^2 = 64 \quad \text{Original equation.}$$
$$9\left(-\frac{8}{3}\right)^2 \stackrel{?}{=} 64 \quad \text{Substitute.}$$
$$9 \cdot \frac{64}{9} \stackrel{?}{=} 64 \quad \text{Use the exponents.}$$
$$64 = 64 \quad \text{True.}$$

Thus, the solution are $\boxed{\pm\frac{8}{3}}$.

Answer 57MYS.

Consider the following equation:

$$z^3 - 9z = 45 - 5z^2$$

$$z^3 + 5z^2 - 9z = 45 \qquad \text{Add } 5z^2 \text{ to both sides.}$$

$$z^3 + 5z^2 - 9z - 45 = 0 \qquad \text{Subtract 45 from both sides.}$$

$$z^2(z+5) - 9(z+5) = 0 \qquad \text{Distributive property.}$$

$$(z+5)(z^2-9) = 0 \qquad \text{Factor out } (z+5).$$

$$(z+5)(z-3)(z+3) = 0 \qquad \text{Factor } (z^2-9).$$

Use zero factor property and solve for *z*.

$z+5=0$, $z=-5$ or $z-3=0$, $z=3$ or $z+3=0$, $z=-3$

Thus, the solutions are $\boxed{-5,-3,3}$.

Check

Substitute -5 for *z* in the original equation:

$$(-5)^3 - 9(-5) \stackrel{?}{=} 45 - 5(-5)^2$$

$$-125 + 45 \stackrel{?}{=} 45 - 125$$

$$-80 = -80 \qquad \text{True}$$

Substitute -3 for *z* in the original equation:

$$(-3)^3 - 9(-3) \stackrel{?}{=} 45 - 5(-3)^2$$

$$-27 + 27 \stackrel{?}{=} 45 - 45$$

$$0 = 0 \qquad \text{True}$$

Substitute 3 for *z* in the original equation:

$$(3)^3 - 9(3) \stackrel{?}{=} 45 - 5(3)^2$$

$$27 - 27 \stackrel{?}{=} 45 - 45$$

$$0 = 0 \qquad \text{True}$$

Answer 58MYS.

By using exponents, we can reformat numbers. For very large or very small numbers, it is sometimes simpler to use scientific notation.

The first number is called the coefficient. It must be greater than or equal to 1 and less than 10. The second number is called the base. It must always be 10 in scientific notation. The base number 10 is always written in exponent form.

Write the numbers in scientific notation:

Housing:

$53,310 = \boxed{5.331 \times 10^4}$ Shift decimal 4 point left.
Use 4 as an exponent of 10.

Food:

$27,990 = \boxed{2.799 \times 10^4}$ Shift decimal 4 point left.
Use 4 as an exponent of 10.

Transportation:

$22,980 = \boxed{2.298 \times 10^4}$ Shift decimal 4 point left.
Use 4 as an exponent of 10.

Miscellaneous:

$18,120 = \boxed{1.812 \times 10^4}$ Shift decimal 4 point left.
Use 4 as an exponent of 10.

Child care and education:

$15,750 = \boxed{1.575 \times 10^4}$ Shift decimal 4 point left.
Use 4 as an exponent of 10.

Healthcare:

$11,190 = \boxed{1.119 \times 10^4}$ Shift decimal 4 point left.
Use 4 as an exponent of 10.

Clothing:

$10,800 = \boxed{1.08 \times 10^4}$ Shift decimal 4 point left.
Use 4 as an exponent of 10.

Answer 59MYS.

By using exponents, we can reformat numbers. For very large or very small numbers, it is sometimes simpler to use scientific notation.

The first number is called the coefficient. It must be greater than or equal to 1 and less than 10. The second number is called the base. It must always be 10 in scientific notation. The base number 10 is always written in exponent form.

To find how many times as great is the amount spent on food as the amount spent on clothing divide amount spent on food by clothing.

$$\frac{27,990}{10,800}$$

$$=\frac{2.799\times10^4}{1.08\times10^4} \qquad \text{Write in scientific notation.}$$

$$=\frac{2.799}{1.08}\times\frac{10^4}{10^4} \qquad \text{Simplify.}$$

$$=2.59\times10^0 \qquad \text{Divide.}$$

Thus, the amount spent on food is $\boxed{2.59\times10^0}$ times greater than clothing.

Answer 60MYS.

An average middle-income family will spend $160,140 to raise a child born in 1999.

Amount spent on housing $53,310

The percent of total amount is spent on housing:

$$\frac{53,310}{160,140}$$

$$=0.3329 \text{ or } 33.29\%$$

Thus, the percent of total amount is spent on housing $\boxed{33.29\%}$.

Answer 61MYS.

A 15-minute call to Mexico costs \$3.39. A 24-minute call costs \$4.83.

The points for consideration are:

$(15, 3.39)$ and $(24, 4.83)$

Let *C* represents the cost of call and *m* represents the duration of the call.

Then, mathematically, the slope of equation is

$$= \frac{4.83 - 3.39}{24 - 15}$$
$$= \frac{1.44}{9}$$
$$= 0.16$$

Now, the equation would be

$$0.16 = \frac{C - 3.39}{m - 15}$$

$0.16m - 2.4 = C - 3.39$ Multiply both sides by $(m - 15)$.

$0.16m + 0.99 = C$ Add 3.39 to both sides.

Thus, a linear equation to find the total cost *C* of an *m*-minute call is $\boxed{C = 0.16m + 0.99}$.

Answer 62MYS.

Linear equation to find the total cost *C* of an *m*-minute call is $C = 0.16m + 0.99$.

Substitute 9 for *m* in the formula to find the total cost of a 9-minute call:

$C = 0.16m + 0.99$ Formula.

$= 0.16(9) + 0.99$ Substitute.

$= 1.44 + 0.99$ Multiply.

$= 2.43$ Add.

Thus, the total cost of a 9-minute call is $\boxed{\$2.43}$.

Answer 63MYS.

Consider the following equation:

$-12 = \frac{x}{4}$ Original equation.

$-12 \cdot 4 = \frac{x}{4} \cdot 4$ Multiply both sides by 4.

$-48 = x$ Simplify.

Thus, the solution is $\boxed{-48}$.

Answer 64MYS.

Consider the following equation:

$$\begin{aligned} 1.8 &= g - 0.6 && \text{Original equation.} \\ 1.8 + 0.6 &= g - 0.6 + 0.6 && \text{Add 0.6 to both sides.} \\ 2.4 &= g && \text{Simplify.} \end{aligned}$$

Thus, the solution is $\boxed{2.4}$.

Answer 65MYS.

Consider the following equation:

$$\begin{aligned} \frac{3}{4}n - 3 &= 9 && \text{Original equation.} \\ \frac{3}{4}n - 3 + 3 &= 9 + 3 && \text{Add 3 to both sides.} \\ \frac{3}{4}n &= 12 && \text{Simplify} \\ \frac{4}{3}\cdot\frac{3}{4}n &= \frac{4}{3}\cdot 12 && \text{Multiply both sides by } \frac{4}{3}. \\ n &= 16 && \text{Simplify.} \end{aligned}$$

Thus, the solution is $\boxed{16}$.

Answer 66MYS.

Consider the following equation:

$$\begin{aligned} 7x^2 &= 28 && \text{Original equation.} \\ \frac{7x^2}{7} &= \frac{28}{7} && \text{Divide both sides by 7.} \\ x^2 &= 4 && \text{Simplify.} \\ x^2 - 4 &= 4 - 4 && \text{Subtract 4 from both sides.} \\ x^2 - 4 &= 0 && \text{Simplify.} \\ (x-2)(x+2) &= 0 && \text{Factor.} \end{aligned}$$

Use zero factor property; solve for *x*.

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

Thus, the solutions are $\boxed{\pm 2}$.

Answer 67MYS.

Consider the following equation:

$$3.2 = \frac{-8+n}{-7} \quad \text{Original equation.}$$

$$3.2(-7) = \frac{-8+n}{-7}(-7) \quad \text{Multiply both sides by } -7.$$

$$-22.4 = -8+n \quad \text{Simplify.}$$

$$-22.4+8 = -8+8+n \quad \text{Add 8 to both sides.}$$

$$-14.4 = n \quad \text{Simplify.}$$

Thus, the solution is $\boxed{-14.4}$.

Answer 68MYS.

Consider the following equation:

$$\frac{-3n-(-4)}{-6} = -9 \quad \text{Original equation.}$$

$$\frac{-3n-(-4)}{-6}(-6) = -9(-6) \quad \text{Multiply both sides by } -6.$$

$$-3n-(-4) = 54 \quad \text{Simplify.}$$

$$-3n-(-4)+(-4) = 54+(-4) \quad \text{Add } (-4) \text{ to both sides.}$$

$$-3n = 50 \quad \text{Simplify.}$$

$$\frac{-3n}{-3} = \frac{50}{-3} \quad \text{Divide both sides by } -3.$$

$$n = -\frac{50}{3} \quad \text{Simplify.}$$

Thus, the solution is $\boxed{-\frac{50}{3}}$.