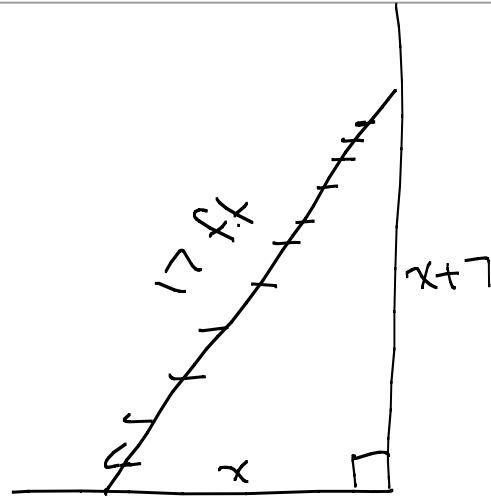


Homework Qs

Note Title

4/5/2017

G.8 # 39



x : dist. from base of ladder to house

$x+7$: dist. from top of ladder to the ground (measured vertical)

Pythagorean Theorem:

$$a^2 + b^2 = c^2, \quad c = \text{hypotenuse}$$

$$(x)^2 + (x+7)^2 = (17)^2$$

$$x^2 + x^2 + 14x + 49 = 289$$

$$2x^2 + 14x - 240 = 0$$

$$2(x^2 + 7x - 120) = 0$$

$$2(x+15)(x-8) = 0$$

$2=0$	$x+15=0$	$x-8=0$
never true	$x=-15$	$x=8$
	Discard (can't have a negative dimension)	

dist. base of ladder to house: $x = 8$ ft

dist. top of ladder to ground: $x+7$
 $= 8+7 = 15$

The top of ladder is 15 ft from ground. Base is 8 ft from house.

$$\begin{aligned} &(x+7)^2 \\ &(x+7)(x+7) \\ &x^2 + 7x + 7x + 49 \\ &x^2 + 14x + 49 \end{aligned}$$

$$\begin{array}{r} 289 \\ -49 \\ \hline 240 \end{array}$$

$$\begin{array}{r} 120 \\ \wedge \\ 1 \cdot 120 \\ 2 \cdot 60 \\ 3 \cdot 40 \\ 4 \cdot 30 \\ 5 \cdot 24 \\ 6 \cdot 20 \\ \textcircled{8 \cdot 15} \\ 10 \cdot 12 \end{array}$$

6.8 #42

longer leg $\xrightarrow{\text{compare to}}$ shorter leg
hypotenuse $\xrightarrow{\text{compare to}}$ $\times$

shorter leg: x

longer leg: $2x-1$

hypotenuse: $2x+1$

$$a^2 + b^2 = c^2$$

$$(x)^2 + (2x-1)^2 = (2x+1)^2$$

$$x^2 + 4x^2 - 4x + 1 = 4x^2 + 4x + 1$$

$$\begin{aligned} (2x-1)(2x-1) \\ 4x^2 - 2x - 2x + 1 \\ 4x^2 - 4x + 1 \end{aligned}$$

7.1: Simplifying Rational Expressions (cont'd)

Example:

Simplify.

$$\frac{x^2 - x - 12}{x^2 - 16}$$
$$= \frac{(x-4)(x+3)}{(x+4)(x-4)}$$

$$= \boxed{\frac{x+3}{x+4}}$$

Restrictions:

$$\begin{aligned} x &\neq -4 \\ x &\neq 4 \end{aligned}$$

Scratchwork

$$\begin{aligned} x^2 - x - 12 \\ (x-4)(x+3) \\ x^2 - 4x + 3x - 12 \\ \quad \quad \quad -x \end{aligned}$$

Can only "cancel" the $x-4$ if $x-4 \neq 0$

where is $\frac{(x-4)(x+3)}{(x+4)(x-4)}$ undefined?

$$\text{At } x = -4, x = 4$$

Ex.

Simplify.

$$\frac{x-3}{x^2-9x+18}$$

$$= \frac{\cancel{x-3}}{(x-6)(\cancel{x-3})}$$

$$= \boxed{\frac{1}{x-6}}$$

Restrictions:

$$x \neq 6, x \neq 3$$

Ex.

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

$$= \frac{x-2}{-x^2+4}$$

$$= \frac{x-2}{-1(x^2-4)}$$

$$= \frac{\cancel{x-2}}{-1(\cancel{x+2})(\cancel{x-2})}$$

$$= \frac{1}{-1(x+2)} = \boxed{-\frac{1}{x+2}}$$

$-1 \neq 0$
never
true

$$x+2 \neq 0$$

$$x \neq -2$$

$$x-2 \neq 0$$

$$x \neq 2$$

Restrictions:

$$\boxed{x \neq -2, x \neq 2}$$

or, $\boxed{x \neq \pm 2}$

Note:

$$a-b = -(b-a)$$

OR
(not recommended)

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

$$= \frac{x-2}{(2+x)(2-x)}$$

$$= \frac{x-2}{(2+x)(-1)(-2+x)}$$

$$= \frac{\cancel{x-2}}{-1(2+x)(\cancel{x-2})}$$

Factor out -1 from $2-x$

$$\rightarrow = -\frac{1}{x+2}$$

$$= \frac{1}{-1(2+x)}$$

$$= \boxed{-\frac{1}{2+x}}$$

Ex.:

Simplify.

$$\frac{5x^4y^2 - 15x^3y^3}{10x^6y^3 + 40x^5y^4} = \frac{\cancel{5}^1 x^3 y^2 (x - 3y)}{\cancel{10}_2 x^5 y^3 (x + 4y)}$$

$$= \frac{1 (x - 3y)}{2x^2y (x + 4y)}$$

$$= \boxed{\frac{x - 3y}{2x^2y (x + 4y)}}$$

Restrictions:

$$\begin{aligned} x &\neq 0 \\ y &\neq 0 \\ x + 4y &\neq 0 \end{aligned}$$

Ex.:

$$\frac{x^2 - 25}{x + 5} = \frac{\cancel{(x + 5)}^1 (x - 5)}{\cancel{x + 5}_1} = \frac{x - 5}{1}$$

Restrictions:

$$\boxed{x \neq -5}$$

$$= \boxed{x - 5}$$

7.2: Multiplying and Dividing Rational Expressions

Example: $\frac{2}{3} \cdot \frac{4}{5} = \frac{2 \cdot 4}{3 \cdot 5} = \boxed{\frac{8}{15}}$

Ex: $\frac{\cancel{16}^1}{\cancel{15}_5} \cdot \frac{\cancel{21}^7}{\cancel{32}_2} = \frac{1 \cdot 7}{5 \cdot 2} = \boxed{\frac{7}{10}}$

Ex: $\frac{3x^2y}{4z} \cdot \frac{\cancel{16}^4 z^5}{y^3 x} = \frac{12x^2 y z^5}{x y^3 z} = \boxed{\frac{12x z^4}{y^2}}$

Ex: Simplify.

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

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

$$= \boxed{\frac{x-2}{x-1}}$$

[Factor all numerators
and all denominators.]

Restrictions:

$$\begin{aligned} x &\neq -2 \\ x &\neq 2 \\ x &\neq 0 \\ x &\neq 1 \end{aligned}$$

Ex: $(x+2) \cdot \frac{5}{4x^2 - 16}$

$$= \frac{x+2}{1} \cdot \frac{5}{4(x^2 - 4)} = \frac{\cancel{x+2}^1}{1} \cdot \frac{5}{4(\cancel{x+2})(x-2)}$$

$$= \boxed{\frac{5}{4(x-2)}}$$

$$= \boxed{\frac{5}{4x-8}}$$

(Either answer
is OK)

Division of Rational Expressions

Example: $\frac{3}{4} \div \frac{5}{7}$

$$= \frac{3}{4} \cdot \frac{7}{5}$$
$$= \boxed{\frac{21}{20}}$$

[Dividing by a number
is equivalent to
multiplying by its reciprocal]

Ex.: $\frac{x^2 + 2x}{x + 5} \div \frac{4 - x^2}{3x - 6}$

$$= \frac{x^2 + 2x}{x + 5} \cdot \frac{3x - 6}{-x^2 + 4}$$

[change to
multiplication]

$$= \frac{x(x+2)}{x+5} \cdot \frac{3(x-2)}{-1(x^2-4)}$$

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

Ex.: $\frac{x^2 + 7x + 12}{x^2 - 4x} \div (x^2 - 9)$

$$= \frac{(x+3)(x+4)}{x(x-4)} \div \frac{x^2-9}{1}$$

$$= \frac{(x+3)(x+4)}{x(x-4)} \cdot \frac{1}{x^2-9}$$

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

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

$$\text{Ex: } \frac{8x^2 - 16x + 32}{2x^4 + 16x} \div \frac{4x^2 - 4x - 8}{x^3 - 4x}$$

$$= \frac{8x^2 - 16x + 32}{2x^4 + 16x} \cdot \frac{x^3 - 4x}{4x^2 - 4x - 8}$$

$$= \frac{8(x^2 - 2x + 4)}{2x(x^3 + 8)} \cdot \frac{x(x^2 - 4)}{4(x^2 - x - 2)}$$

$$= \frac{8(x^2 - 2x + 4)}{2x(x+2)(x^2 - 2x + 4)} \cdot \frac{x(x+2)(x-2)}{4(x-2)(x+1)}$$

$$= \frac{8x}{8x(x+1)} = \boxed{\frac{1}{x+1}}$$

$$\begin{aligned} x^3 + 8 &= x^3 + 2^3 \\ &= (x+2) \cdot (x^2 - 2x + 4) \end{aligned}$$