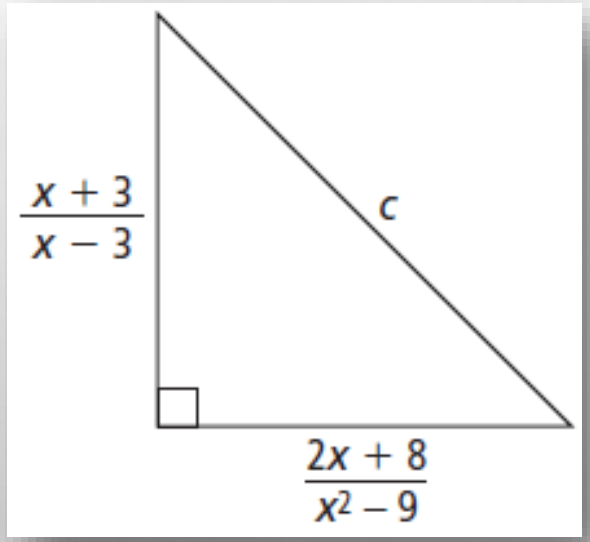
Wednesday, October 8, 2014

1. What is the area of the triangle shown below?



2. Express the quotient below in simplest form.

$$\frac{y+2}{2y^2-3y-2} \div \frac{y^2-4}{y^2+y-6}$$

3. State any restrictions on the variable for the quotient above.

10
9
8
7
6
5
4
3
2
1

Objectives Solve rational equations

Solve problems involving varying rates of work.

Homework Workbook page 231: 6, 8, 10, 11, 19 20, 24, 27, 28, 29, 30

Homework…

Simplify each sum or difference. State any restrictions on the variables.

5. $\frac{x^2}{5} + \frac{x^2}{5}$ $\frac{2x^2}{5}$

6. $\frac{6y - 4}{y^2 - 5} + \frac{3y + 1}{y^2 - 5}$ $\frac{3(3y - 1)}{y^2 - 5}$; $y \neq \pm\sqrt{5}$

7. $\frac{2y + 1}{3y} + \frac{5y + 4}{3y}$ $\frac{7y + 5}{3y}$; $y \neq 0$

8. $\frac{12}{xy^3} - \frac{9}{xy^3}$ $\frac{3}{xy^3}$; $x, y \neq 0$

9. $-\frac{2}{n + 4} - \frac{n^2}{n^2 - 16}$ $\frac{2 - n}{n - 4}$; $n \neq \pm 4$

10. $\frac{3}{8x^3y^3} - \frac{1}{4xy}$ $\frac{3 - 2x^2y^2}{8x^3y^3}$; $x, y \neq 0$

11. $\frac{6}{5x^2y} + \frac{5}{10xy^2}$ $\frac{12y + 5x}{10x^2y^2}$; $x, y \neq 0$

12. $\frac{x + 2}{x^2 + 4x + 4} + \frac{2}{x + 2}$ $\frac{3}{x + 2}$; $x \neq -2$

13. $\frac{4}{x^2 - 25} + \frac{6}{x^2 + 6x + 5}$

$\frac{10x - 26}{(x + 5)(x - 5)(x + 1)}$; $x \neq -1, \pm 5$

14. $\frac{y}{4y + 8} - \frac{1}{y^2 + 2y}$

$\frac{y - 2}{4y}$; $y \neq -2, 0$

Homework…

Add or subtract. Simplify where possible. State any restrictions on the variables.

25. $\frac{3}{7x^2y} + \frac{4}{21xy^2}$

$\frac{9y + 4x}{21x^2y^2}$; $x, y \neq 0$

26. $\frac{xy - y}{x - 2} - \frac{y}{x + 2}$

$\frac{x^2y}{x^2 - 4}$; $x \neq \pm 2$

27. $\frac{3}{x^2 - x - 6} + \frac{2}{x^2 + 6x + 5}$

$\frac{(5x + 1)(x + 3)}{(x - 3)(x + 2)(x + 5)(x + 1)}$; $x \neq -5, -2, -1, 3$

28. $\frac{6}{y^2 + 5y} + \frac{3y}{4y + 20} - \frac{1}{4}$

$\frac{2y^2 - 5y + 24}{4y(y + 5)}$; $y \neq -5, 0$

Solving rational functions…

Solve for x.

$$\frac{1}{x} = \frac{x}{9}$$

Simplest case:
One fraction equal to another

$$9 = x^2$$

Cross Multiply

$$\sqrt{9} = \sqrt{x^2}$$

Take the square root of both sides.

$$x = \pm 3$$

This is the only case where you can Cross Multiply.

Solving rational functions…

Solve for x.

$$\frac{35}{45}+\frac{x}{45}=\frac{55}{45}$$

Because they all have the same denominator you just have to solve the equation $35+x=55$.

How can this be?

$$\cancel{45}\left(\frac{35}{\cancel{45}}+\frac{x}{\cancel{45}}\right)=\cancel{45}\left(\frac{55}{\cancel{45}}\right)$$

To get rid of the fractions, multiply both sides by 45.

$$35+x=55$$

Solving rational functions…

Solve for x.

$$\frac{x}{3}+\frac{x}{2}=10$$

What do I need?

Common denominator.

$$\frac{x}{3}\left(\frac{2}{2}\right)+\frac{x}{2}\left(\frac{3}{3}\right)=10\left(\frac{6}{6}\right)$$

Common denominator is **6**. Think "What do I need to make each denominator 6?".

$$\frac{2x}{6}+\frac{3x}{6}=\frac{60}{6}$$

Now just look at the numerators.

$$2x+3x=60$$

$$5x=60$$

$$x=12$$

Solving rational functions…

Solve for x.

$$\frac{1}{r-2}+\frac{1}{r^2-7r+10}=\frac{6}{r-2}$$

Factor

$$\frac{1}{r-2}+\frac{1}{(r-2)(r-5)}=\frac{6}{r-2}$$

What's missing in denominators?

$$\frac{1}{r-2}\left(\frac{r-5}{r-5}\right)+\frac{1}{(r-2)(r-5)}=\frac{6}{r-2}\left(\frac{r-5}{r-5}\right)$$

$$\frac{r-5}{(r-2)(r-5)}+\frac{1}{(r-2)(r-5)}=\frac{6(r-5)}{(r-2)(r-5)}$$

$$r-5+1=6r-30$$

$$r=\frac{26}{5}$$

Solving rational functions…

Solve for x.

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

Factor

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

What's missing in denominators?

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

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

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

$$x=-1$$

Solving rational functions…

You try

Solve for x.

10. $\frac{1}{2x+2}+\frac{5}{x^2-1}=\frac{1}{x-1}$

$$\frac{1}{2(x+1)}\left(\frac{x-1}{x-1}\right)+\frac{5}{(x+1)(x-1)}\left(\frac{2}{2}\right)=\frac{1}{x-1}\left(\frac{2(x+1)}{2(x+1)}\right)$$

$$(x-1)+10=2(x+1)$$

$$x+9=2x+2$$

$$x=7$$

Work Problems

These type of problems involve two or more people working at different rates. We're usually asked to determine how long it would take them to complete the same task if they were working together.

For example

It takes ***somebody*** 3 hours to mow the lawn behind the mobile classrooms. It takes ***somebody else*** 4 hours to mow the same lawn. How long would it take to get the lawn mowed if they worked together?

We use the following formula

$$\frac{1}{\substack{first\ person's\ time \\ alone}} + \frac{1}{\substack{2nd\ person's\ time \\ alone}} = \frac{1}{total\ time}$$

Work Problems

It takes ***Mr. Schmutz*** 3 hours to mow the lawn behind the mobile classrooms. It takes ***Mr. Mealey*** 4 hours to mow the same lawn. How long would it take to get the lawn mowed if they worked together?

$$\frac{1}{\substack{first\ person's\ time \\ alone}} + \frac{1}{\substack{2nd\ person's\ time \\ alone}} = \frac{1}{total\ time}$$

Step 1: Put in what we know

$$\frac{1}{3} + \frac{1}{4} = \frac{1}{total\ time}$$

Step 2: Simplify the fractions. (Common denominator etc.)

$$\frac{1}{3} + \frac{1}{4} = \frac{1}{3}\left(\frac{4}{4}\right) + \frac{1}{4}\left(\frac{3}{3}\right) = \frac{4}{12} + \frac{3}{12} = \mathbf{\frac{7}{12}}$$

Step 3: Solve for total time.

$$\frac{7}{12} = \frac{1}{total\ time} \qquad total\ time = \frac{12}{7} = 1.7\ hours$$

Mad Lib Work Problems

It takes _____ _____ hours to _____.

It takes _____ _____ hours to _____

How long would it take to _____ if they work together?

$$\frac{1}{\substack{first\ person's\ time \\ alone}} + \frac{1}{\substack{2nd\ person's\ time \\ alone}} = \frac{1}{total\ time}$$

Step 1: Put in what we know

Step 2: Simplify the fractions. (Common denominator etc.)

Step 3: Solve for total time.

Mad Lib Work Problems

It takes [ ] [ ] hours to [ ].

It takes [ ] [ ] hours to [ ]

How long would it take to [ ] if they work together?

$$\frac{1}{\frac{first\ person's\ time}{alone}} + \frac{1}{\frac{2nd\ person's\ time}{alone}} = \frac{1}{total\ time}$$

Step 1: Put in what we know

Step 2: Simplify the fractions. (Common denominator etc.)

Step 3: Solve for total time.

Work Problems

Travis can paint a barn in 4 hours. Haley has never painted a barn but when they worked together they finished painting an identical barn in 2.4 hours. How long would it take Haley to paint a barn alone?

Step 1: Set up the rates you know.

$$\frac{1}{\substack{first\ person's\ time \\ alone}} + \frac{1}{\substack{2nd\ person's\ time \\ alone}} = \frac{1}{total\ time}$$

$$\frac{1}{4} + \frac{1}{h} = \frac{1}{2.4}$$

Step 2: Solve for the unknown rate

$$\frac{1}{4}\left(\frac{\mathbf{2.4}}{\mathbf{2.4}}\right) + \frac{1}{h} = \frac{1}{2.4}\left(\frac{4}{4}\right) \qquad \frac{2.4}{9.6} + \frac{1}{h} = \frac{4}{9.6} \qquad \frac{1}{h} = \frac{4}{9.6} - \frac{2.4}{9.6} = \frac{1.6}{9.6} \qquad h = \frac{9.6}{1.6} = 6\ hours$$