

شكراً لتحميلك هذا الملف من موقع المناهج الإماراتية



## شرح الدرس السادس Solving rational inequalities and equations من الوحدة السابعة

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تاريخ نشر الملف على موقع المناهج: 10-12-2023 10:07:10 | اسم المدرس: محمد زياد

## التواصل الاجتماعي بحسب الصف الحادي عشر المتقدم



## روابط مواد الصف الحادي عشر المتقدم على تلغرام

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## المزيد من الملفات بحسب الصف الحادي عشر المتقدم والمادة رياضيات في الفصل الأول

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المزيد من الملفات بحسب الصف الحادي عشر المتقدم والمادة رياضيات في الفصل الأول

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## 1) Rational equations:

**Ex1:** Solve each equation.

$$1) \frac{13}{y+3} - \frac{12}{y+4} = \frac{18}{y^2+7y+12}$$

$$y+3 = (y+3)$$

$$y+4 = (y+4)$$

$$y^2+7y+12 = (y+3)(y+4)$$

$$\text{LCD} = (y+3)(y+4)$$

multiply all terms  
by LCD

$$\frac{13(y+3)(y+4)}{(y+3)} - \frac{12(y+3)(y+4)}{(y+4)} = \frac{18(y+3)(y+4)}{y^2+7y+12}$$

$$13(y+4) - 12(y+3) = 18$$

$$13y + 52 - 12y - 36 = 18$$

$$y + 16 = 18$$

$$\boxed{y = 2}$$

Check that  $y=2$  is not a Zero for  
any denominator

$\Rightarrow$  Solution :  $\boxed{y = 2}$

$$2) \frac{8}{t^2-9} + \frac{4}{t+3} = 1$$

$$t^2-9 = (t-3)(t+3)$$

$$t+3 = (t+3)$$

$$\text{LCD} = (t+3)(t-3)$$

$$\frac{8(t-3)\cancel{(t+3)}}{\cancel{(t^2-9)}} + \frac{4\cancel{(t-3)}(t+3)}{\cancel{(t+3)}} = 1 \cdot \cancel{(t+3)}(t-3)$$

$$8 + 4t - 12 = t^2 + 3t - 3t - 9$$

$$4t - 4 = t^2 - 9$$

$$t^2 - 4t - 5 = 0$$

$$t = 5, \quad t = -1$$

↓

↓

both are acceptable

(not zeros for denominators)

$$3) \frac{2f}{f^2-4} + \frac{1}{f-2} = \frac{2}{f+2}$$

$$f^2-4 = (f-2)(f+2)$$

$$f-2 = (f-2)$$

$$f+2 = (f+2)$$

$$\text{LCD} = (f-2)(f+2)$$

$$\frac{2f\cancel{(f-2)}\cancel{(f+2)}}{\cancel{(f^2-4)}} + \frac{1\cancel{(f-2)}(f+2)}{\cancel{(f-2)}} = \frac{2\cancel{(f-2)}\cancel{(f+2)}}{\cancel{(f+2)}}$$

$$2f + f + 2 = 2f - 4$$

$$3f + 2 = 2f - 4$$

$$\boxed{f = -6}$$

Check denominators  $\neq 0$

## 2) Rational inequalities:

Ex2: Solve each inequality

$$1) \frac{5}{3a} - \frac{3}{4a} > \frac{5}{6}$$

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The equation is  $\frac{5}{3a} - \frac{3}{4a} = \frac{5}{6}$

Find zeros of deno:  $3a=0 \rightarrow \boxed{a=0}$   $4a=0 \rightarrow \boxed{a=0}$

$$\frac{5 \cdot 4}{3 \cdot 4a} - \frac{3 \cdot 3}{4a} = \frac{5 \cdot 2a}{6}$$

$$3a = 3 \cdot a$$

$$4a = 2 \cdot 2 \cdot a$$

$$6 = 2 \cdot 3$$

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$$20 - 9 = 10a$$

$$\text{LCD} = 3 \cdot 2 \cdot a \cdot 2$$

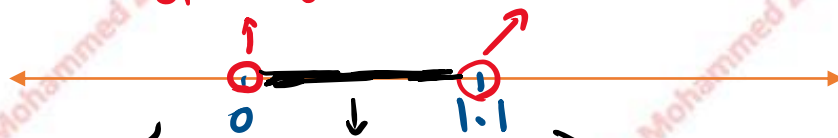
$$= 12a$$

multiply

$$\frac{10a}{10} = \frac{11}{10} \Rightarrow a = \frac{11}{10} = 1.1$$

open (zero of deno)

(no equal in the inequality)



test  $a = -1$

test  $a = 1$

test  $a = 2$

$$\frac{5}{3(-1)} - \frac{3}{4(-1)} > \frac{5}{6}$$

$$-0.91 > 0.88$$

✗

$$\frac{5}{3(1)} - \frac{3}{4(1)} > \frac{5}{6}$$

$$0.91 > 0.88$$

✓

$$\frac{5}{3(2)} - \frac{3}{4(2)} > \frac{5}{6}$$

$$0.45 > 0.88$$

✗

Solution set =  $\{ a \mid 0 < a < 1.1 \}$

$$2) \frac{3}{4} - \frac{1}{x-3} > \frac{x}{x+4}$$

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

$$4 = 2 \cdot 2$$

$$(x-3) = (x-3)$$

$$(x+4) = (x+4)$$

$$\text{LCD} = 2 \cdot 2 \cdot (x-3)(x+4)$$

$$= 4(x-3)(x+4)$$

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

$$3(x^2+4x-3x-12) - 4(x+4) = 4x(x-3)$$

$$3(x^2+x-12) - 4x-16 = 4x^2-12x$$

$$3x^2+3x-36-4x-16 = 4x^2-12x$$

$$3x^2-x-52 = 4x^2-12x$$

$$x^2-11x+52 = 0$$

No solution

but zeros of deno

$$x-3=0 \\ x=3$$

$$x+4=0 \\ x=-4$$



test  $x = -5$

test  $x = 0$

test  $x = 4$

$$\frac{3}{4} - \frac{1}{x-3} > \frac{x}{x+4}$$

$$\frac{3}{4} - \frac{1}{-5-3} > \frac{-5}{-5+4}$$

$$0.87 > 5$$

✗

$$\frac{3}{4} - \frac{1}{0-3} > \frac{0}{0+4}$$

$$1.08 > 0$$

✓

$$\frac{3}{4} - \frac{1}{4-3} > \frac{4}{4+4}$$

$$-0.25 > 0.5$$

✗

$$\{x \mid -4 < x < 3\} \quad \text{or} \quad (-4, 3)$$

**SOLUTION** Evita adds a 75% acid solution to 8 milliliters of solution that is 15% acid.

- a. Write a function that represents the percent of acid in the resulting solution, where  $x$  is the amount of 75% acid solution added.  $f(x)$

	Original	New	Resulting
Amount of Solution	8	$x$	$8 + x$
Percent of Acid	15% } times	75%	$f(x)$
Amount of Acid	$0.15(8) = 1.2$	$0.75x$	$1.2 + 0.75x$

(Percentage of Acid)

$$f(x) = \frac{\text{Amount of acid}}{\text{Amount of Solution}}$$

$$f(x) = \frac{1.2 + 0.75x}{8 + x}$$

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- b. How much 75% acid solution should be added to create a solution that is 50% acid?

$$f(x) = 50\% = \frac{50}{100} = \frac{1}{2}$$

$$\Rightarrow \frac{1.2 + 0.75x}{8 + x} = \frac{1}{2}$$

$$2(1.2 + 0.75x) = 1(8 + x)$$

$$2.4 + 1.5x = 8 + x$$

$$\frac{0.5x}{0.5} = \frac{5.6}{0.5}$$

$$x = 11.2 \text{ ml}$$

**CONSTRUCTION** It takes Rosita 32 hours to drywall a basement by herself and 18 hours if Paola helps her. How long would it take Paola to drywall the basement by herself? Round your answer to the nearest hour.

	Rosita	Paola	Both
Time needed to finish	32	$x$	18
Achivement per hour	$\frac{1}{32}$	$\frac{1}{x}$	$\frac{1}{18}$

$$\frac{1}{32} + \frac{1}{x} = \frac{1}{18}$$

$$\frac{1}{x} = \frac{1}{18} - \frac{1}{32}$$

$$\left( \frac{1}{x} = \frac{7}{288} \right)$$

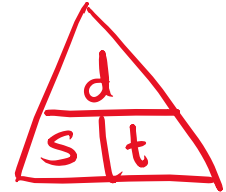
$$x = \frac{288}{7} = 41.14 \text{ hour}$$



**CURRENT** The distance for the Valleyview River Cruise trip is 14 miles round trip. The boat travels 10 miles per hour in still water. Because of the current, it takes longer to cruise upstream than downstream.

- a. Define a variable and write an equation to represent the situation if it takes 30 minutes longer to cruise upstream versus downstream.
- b. What is the speed of the current?  $\rightarrow x$

$$\begin{aligned} \text{upstream speed} &= 10 - x \\ \text{downstream speed} &= 10 + x \end{aligned}$$



$$\text{time} = \frac{\text{distance}}{\text{speed}}$$

$$\text{time needed upstream} - \text{time needed downstream} = 30 \text{ min (0.5 hours)}$$

$$\frac{14}{10 - x} - \frac{14}{10 + x} = \frac{1}{2}$$

by solving for  $x$

$$x = 1.73 \text{ mile/hour}$$