

NAME Student
Adv Geo - 7

AMDG

9.1 Review of Radicals and Quadratic Equations

Ms. Kresovic
Monday 24 February 2014

Objectives

- ☒ Simplify radicals
- ☒ Solve Quadratic Equations
 - ☐ Method 1: Solve for x
 - ☐ Method 2: Factoring
 - ☐ Method 3: Factoring by grouping
 - ☐ Method 4: Area model
- Review of Pythagorean Theorem and radicals (below)

Class Examples

Problem 1 Simplify $\sqrt{48}$.

Solution

$$\begin{aligned}\sqrt{48} &= \sqrt{16 \cdot 3} \quad (16 \text{ is a perfect square.}) \\ &= \sqrt{16} \cdot \sqrt{3} \\ &= 4\sqrt{3}\end{aligned}$$

Problem 2 Simplify $\sqrt{18} + \sqrt{32} + \sqrt{75}$.

Solution

$$\begin{aligned}\sqrt{18} + \sqrt{32} + \sqrt{75} &= \sqrt{9 \cdot 2} + \sqrt{16 \cdot 2} + \sqrt{25 \cdot 3} \\ &= 3\sqrt{2} + 4\sqrt{2} + 5\sqrt{3} \\ &= 5\sqrt{2} + 5\sqrt{3}\end{aligned}$$

Problem 3 Simplify $\sqrt{\frac{5}{3}}$.

Solution

$$\begin{aligned}\sqrt{\frac{5}{3}} &= \frac{\sqrt{5}}{\sqrt{3}} \\ &= \frac{\sqrt{5}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \\ &= \frac{\sqrt{15}}{3} \text{ or } \frac{1}{3}\sqrt{15} \quad (\text{The two answers are equivalent simplifications.})\end{aligned}$$

Problem 4. Simplify $\sqrt{98} = \sqrt{49 \cdot 2} = \pm 7\sqrt{2}$ MK

Problem 5. Simplify $\sqrt{200} = \sqrt{100 \cdot 2} = \pm 10\sqrt{2}$ TH

Problem 6. Simplify $\sqrt{4+9} = \pm\sqrt{13}$ HW

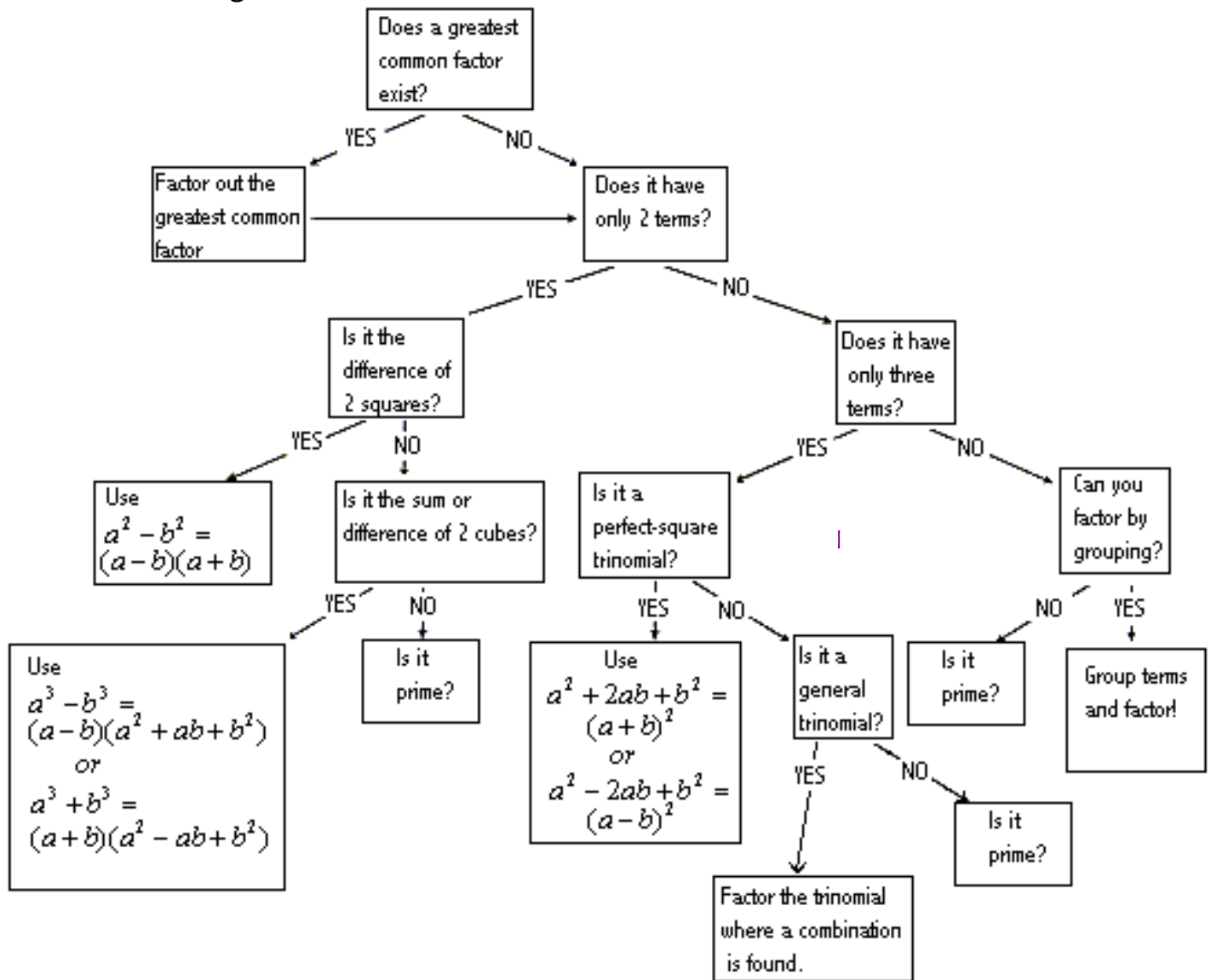
Problem 7. Simplify $\sqrt{4 \cdot 9} = \sqrt{4} \cdot \sqrt{9} = 2 \cdot 3 = \pm 6$ VR

Problem 8. Simplify $\sqrt{9+16} = \sqrt{25} = \pm 5$

Problem 9. Simplify $\frac{9 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \frac{9\sqrt{3}}{3} = 3\sqrt{3}$ WA
rationalize the denominator JA

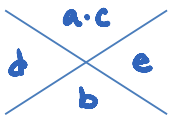
Problem 10. Simplify $\underline{7\sqrt{5}} + \underline{\sqrt{7}} + \underline{6\sqrt{5}} + \underline{\sqrt{7}} = 13\sqrt{5} + 2\sqrt{7}$ SD

Method 1: Factoring Flowchart



Method 4: An area model

$$0 = ax^2 + bx + c$$



ax^2	d
e	c

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Solving Quadratics:

- ✓ You may use any method that you are comfortable with, and that allows you to be successful. You are in a unique position as I will survey you at the end of this class and after your homework about these methods. This information will be shared with the department at our meeting this Thursday.



Problem 11. Solve $x^2 + 9 = 25$

$$\begin{aligned} & \quad \quad -9 \quad -9 \\ x^2 &= 16 \\ x &= \pm 4 \end{aligned}$$

Problem 12. $x^2 + 13x + 42$

Method 2: Flowchart

$$x^2 + 13x + 42$$

$\uparrow$ mult $\uparrow$ add
 $\swarrow$

$$(x+7)(x+6)$$

Method 3: $x^2 + 13x + 42$

$$\underbrace{x^2 + 7x}_x + \underbrace{6x + 42}_6$$

$$x(x+7) + 6(x+7)$$

$$(x+7)(x+6)$$

Method 4: $x^2 + 13x + 42 = (x+7)(x+6)$

$$\begin{array}{c} 42x^2 \\ 7x \quad 6x \\ 13x \end{array}$$

	x	7
x	x^2	$7x$
6	$6x$	42

Problem 13. $y^2 - 15y + 54$

$$\boxed{2} \quad y^2 - 15y + 54$$

$$(y - 9)(y - 6)$$

$$\boxed{3} \quad y^2 - 15y + 54$$

$$\frac{(y^2 - 9y) + (-6y + 54)}{y \quad -6}$$

$$y(y - 9) + -6(y - 9)$$

$$(y - 9)(y - 6)$$

④ By request (2 maj vote) skip area

Problem 14. $z^2 - 3z - 28$

$$2: \quad (z - 7)(z + 4)$$

Problem 15. $-20n^2 + 9n + 20$

Flowchart $\rightarrow$ Traditional

2: $-1(20n^2 - 9n - 20)$

$-1(4n - 5)(5n + 4)$

3: Grouping

$-1(20n^2 - 9n - 20)$

Mult: $(20n^2)(-20)$
 $-400n^2$

add to $-9n$

$\frac{20n^2 - 25n}{5n} + \frac{16n - 20}{4}$

$5n(4n - 5) + 4(4n - 5)$

$(4n - 5)(5n + 4)$

4 Area

$-20n^2 + 9n + 20$

$-1(20n^2 - 9n - 20)$

$\begin{array}{r} -400n^2 \\ -25n \quad 16n \\ -9n \end{array}$

$\begin{array}{cc} 5n & 4 \\ 4n & \begin{array}{|c|c|} \hline 20n^2 & 16n \\ \hline -25n & -20 \\ \hline \end{array} \\ -5 & \end{array} \rightarrow (5n + 4)(4n - 5)$

Problem 16. Solve $(3\sqrt{5})^2 + (3\sqrt{2})^2 = x^2$ for x .

$$(3 \cdot \sqrt{5} \cdot 3 \cdot \sqrt{5}) + (3 \cdot \sqrt{2} \cdot 3 \cdot \sqrt{2}) = x^2$$

$$9 \cdot 5 + 9 \cdot 2 = x^2$$

$$45 + 18 = x^2$$

$$63 = x^2$$

$$9 \cdot 7 = x^2$$

$$\pm 3\sqrt{7} = x$$

alt ↓

$$9(5+2) = x^2$$

$$9 \cdot 7 = x^2$$

$$\pm 3\sqrt{7} = x$$

Problem 17. Solve for x . **a** $x^2 - 10x = -16$

PB

$$x^2 - 10x + 16 = 0$$

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

$$x = 8 \text{ or } 2$$

b $x^2 + 5x = 0$ NS

$$x(x + 5) = 0$$

$$\downarrow$$

$$x = 0$$

$$\rightarrow$$

$$x + 5 = 0$$

$$x = 0$$

$$\text{or } x = -5$$

Homework

1 Simplify.

a $\sqrt{4}$

c $\sqrt{72}$

e $\sqrt{98}$

g $\sqrt{20}$

b $\sqrt{27}$

d $\sqrt{32}$

f $\sqrt{200}$

h $\sqrt{24}$

2 Simplify.

a $5\sqrt{18}$

c $\sqrt{3^2 + 4^2}$

e $\frac{1}{6}\sqrt{48}$

b $\sqrt{4 + 9}$

d $\sqrt{5^2 + 12^2}$

f $\sqrt{49 \cdot 3}$

3 Simplify.

a $\frac{1}{\sqrt{2}}$

b $\frac{1}{\sqrt{5}}$

c $\frac{4}{\sqrt{2}}$

d $\frac{6}{\sqrt{3}}$

4 Simplify.

a $4\sqrt{3} + 7\sqrt{3}$

c $\sqrt{12} + \sqrt{27}$

b $7\sqrt{2} + \sqrt{3} + 6\sqrt{3} + \sqrt{2}$

d $\sqrt{72} + \sqrt{75} - \sqrt{48}$

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5 Solve for x .

a $x^2 = 25$

b $x^2 = 144$

c $x^2 = 169$

d $x^2 = \frac{1}{4}$

e $x^2 = 12$

f $x^2 = 18$

6 Solve for x .

a $x^2 + 16 = 25$

b $x^2 + 6^2 = 100$

c $12^2 + x^2 = 13^2$

d $x^2 + (3\sqrt{3})^2 = 36$

e $(\sqrt{5})^2 + (\sqrt{11})^2 = x^2$

f $x^2 = (5\sqrt{3})^2 + (\sqrt{5})^2$

7 Solve for x .

a $x^2 - 5x - 6 = 0$

b $x^2 + 4x - 12 = 0$

c $x^2 - 8x + 15 = 0$

d $x^2 - 18 - 3x = 0$

e $x^2 - 36 = 9x$

f $-x^2 + 5x + 36 = 0$

8 Solve for x .

a $x^2 - 4x = 0$

b $x^2 = 10x$

c $x^2 - 2x = 11x$

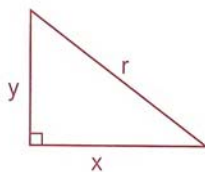
d $5x = x^2 - 3x$

9 If, in the given figure, $x^2 + y^2 = r^2$,

a Find x if $y = 21$ and $r = 29$

b Find y , in simplified radical form, if $x = 2$ and $r = 4$

c Find r to the nearest tenth if $x = 4.1$



10 Solve for x .

a $3x^2 + 5x - 7 = x^2 + 8x + 28$

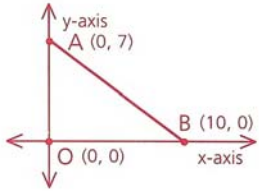
b $12x^2 - 15 = -11x$

c $8x^2 - 7x + 9 = 2x^2 + 6x + 7$

22.3

11 Solve $\frac{7}{x+1} = \frac{2x+4}{3x-3}$ for x .

12 Find AB



13 Simplify.

a $\sqrt{h^2}$, if h represents a negative number

b $\sqrt{(x-3)^2}$, if $x < 3$

c $\sqrt{p^2q^2}$, if p and q both represent negative numbers

d $\sqrt{x^3y^2}$, if $x > 0$ and $y < 0$