N: D: P: 1 2 3 4 5 6

Algebra 2: Topic 9 // **Review Worksheet A** *Mission Hills Math 2013*

Find the least common denominator (LCD) of the following rational expressions.

1) $\frac{1}{x^2-81}$, $\frac{5}{x^2-18x+81}$, and $\frac{4}{x^3+9x^2}$

$(x+9)(x-9)$ $(x-9)(x-9)$ $x^2(x+9)$

$(x-9)(x-9)$

2

$x^2(x-9)^2(x+9)$

2) $\frac{3}{x^2-9}$, $\frac{7}{x^2+3x}$, and $\frac{2}{x^3}$

$x(x+3)$ $(x+3)(x-3)$

$x^3(x+3)(x-3)$

Simplify each expression.

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

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

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

4) $\frac{x^3-x}{x^2+5x-6} = \frac{x(x^2-1)}{(x+6)(x-1)}$

$= \frac{x(x+1)(x-1)}{(x+6)(x-1)}$

$\boxed{\frac{x(x+1)}{x+6}}$

5) $\frac{x^2+5x-14}{x^2-49}$

$= \frac{(x+7)(x-2)}{(x+7)(x-7)}$

$\boxed{\frac{x-2}{x-7}}$

6) $\frac{8x^2-8}{1-x} = \frac{8(x^2-1)}{-1(x-1)}$

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

$\boxed{-8(x+1)}$ or $\boxed{-8x-8}$

7) $\frac{3x^2-3x-60}{5-x} = \frac{3(x^2-x-20)}{-1(x-5)}$

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

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

8) $\frac{2x^3y+20x^2y+50xy}{2xy}$

$= \frac{2xy(x^2+10x+25)}{2xy}$

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

$\boxed{(x+5)^2}$

9) $\frac{3x^3y^2+24x^2y^3+48xy^4}{3xy^2}$

$= \frac{3xy^2(x^2+8xy+16y^2)}{3xy^2}$

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

$\boxed{(x+4y)^2}$

Perform the indicated operation and simplify.

10) $\frac{(x+3)^2}{x^2-2x-15} \cdot \frac{x^2-5x}{x^2-9}$

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

$\boxed{\frac{x}{x-3}}$

11) $\frac{x^2+6x+9}{x^2-3x-10} \cdot \frac{3x-15}{x^2-9}$

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

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

12) $\frac{x^2+3x-40}{2x^2+8x} \div \frac{x^2-64}{4x+16}$ ← flip

$\frac{x^2+3x-40}{2x^2+8x} \cdot \frac{4x+16}{x^2-64}$

$\frac{(x+8)(x-5)}{2x(x+4)} \cdot \frac{2 \cdot 4(x+4)}{(x+8)(x-8)}$

$\boxed{\frac{2(x-5)}{x(x-8)}}$

13) $\frac{2x^2-72}{4x^2-24x} \div \frac{(x^2+3x-18)}{1}$ flip

$\frac{2x^2-72}{4x^2-24x} \cdot \frac{1}{x^2+3x-18}$

$\frac{2(x^2-36)}{4x(x-6)} \cdot \frac{1}{(x+6)(x-3)}$

$\frac{2(x+6)(x-6)}{2 \cdot 2x(x-6)} \cdot \frac{1}{(x+6)(x-3)}$

$\boxed{\frac{1}{2x(x-3)}}$

14) $\frac{(3x-30)}{1} \div \frac{4x^2-400}{x^2+15x+50}$ flip

$\frac{3x-30}{1} \cdot \frac{x^2+15x+50}{4(x^2-100)}$

$\frac{3(x-10)}{1} \cdot \frac{(x+10)(x+5)}{4(x+10)(x-10)}$

$\boxed{\frac{3(x+5)}{4}}$

15) $\frac{3x+1}{x^2-5x} + \frac{7}{x-5}$ $\cdot x$ $\cdot x(x-5)$

$\frac{3x+1}{x(x-5)} + \frac{7x}{x(x-5)}$

$\frac{3x+1+7x}{x(x-5)}$

$\boxed{\frac{10x+1}{x(x-5)}}$

16) $\frac{2x}{x^2-6x-16} + \frac{5}{x+2}$ $(x-8)$ $(x-8)$ $(x+2)$

$\frac{2x}{(x-8)(x+2)} + \frac{5x-40}{(x+2)(x-8)}$

$\boxed{\frac{7x-40}{(x+2)(x-8)}}$

17) $\frac{4}{x^2-5x-24} + \frac{x-2}{x+3}$ $(x-8)$ $(x-8)$ $(x-8)(x+3)$

$\frac{4}{(x-8)(x+3)} + \frac{(x-2)(x-8)}{(x-8)(x+3)}$ FOIL

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

$\frac{4+x^2-8x-2x+16}{(x-8)(x+3)}$

$\boxed{\frac{x^2-10x+20}{(x-8)(x+3)}}$

18) $\frac{6}{x+3} - \frac{2}{x-5}$ $(x-5)$ $(x+3)$ $(x+3)$ $(x-5)$

$\frac{6(x-5)}{(x-5)(x+3)} - \frac{2(x+3)}{(x+3)(x-5)}$

$\frac{6x-30-2x-6}{(x-5)(x+3)}$

$\boxed{\frac{4x-36}{(x-5)(x+3)}}$

or $\frac{4(x-9)}{(x-5)(x+3)}$

19) $\frac{3x}{x^2-1} - \frac{1}{x+1}$ $(x-1)$ $(x-1)$

$(x+1)(x-1)$

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

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

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

20) $\frac{7}{x^2+8x+12} - \frac{3}{x+6}$ $(x+2)$ $(x+2)$

$(x+6)(x+2)$

$\frac{7-3x-6}{(x+6)(x+2)}$

$\boxed{\frac{-3x+1}{(x+6)(x+2)}}$

Solve the equation:

21) $\frac{x-3}{8} = \frac{2x}{3x+7}$ $\cdot 8$ $\cdot (3x+7)$

FOIL

$\frac{(3x+7)(x-3)}{8(3x+7)} = \frac{2x \cdot 8}{8(3x+7)}$ top

$3x^2-9x+7x-21 = 16x$

$3x^2-2x-21 = 16x$

$-16x \quad -16x$

$3x^2-18x-21=0$

$3(x^2-6x-7)=0$

$1 \quad -7$

$1 \quad +1$

$(x-7)(x+1)=0$

$x-7=0 \quad x+1=0$

$+7 \quad +7 \quad -1 \quad -1$

$\boxed{x=7} \quad \boxed{x=-1}$

22) $\frac{5}{6} - \frac{4}{5x} = \frac{1}{10} \cdot 3x$ $\cdot 6$ $5x$ $\cdot 6$

$\hookrightarrow 30x$

$25x-24 = 3x$ top

$-25x \quad -25x$

$\frac{-24}{-22} = \frac{-22x}{-22}$

$\boxed{x = 12/11}$

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

$3(x+2) + 2(x-4) = x^2+4x-8$

$3x+6+2x-8 = x^2+4x-8$

$5x-2 = x^2+4x-8$

$-5x \quad +2 \quad -5x \quad +2$

$0 = x^2-x-6$

$1 \quad -3$

$1 \quad +2$

$(x-3)(x+2)=0$

$x-3=0 \quad x+2=0$

$+3 \quad +3 \quad -2 \quad -2$

$\boxed{x=3} \quad \boxed{x=-2}$

24) $x^2 1+\frac{1}{x^2}=\frac{3}{x}\cdot x$ → top

$\hookrightarrow x^2$ $x^2+1=3x$

$-3x \quad -3x$

$x^2-3x+1=0$

$a \quad b \quad c$

$x=\frac{--3\pm\sqrt{(-3)^2-4(1)(1)}}{2(1)}$

$=\frac{3\pm\sqrt{9-4}}{2}=\frac{3\pm\sqrt{5}}{2}$

$\boxed{\frac{3}{2}\pm\frac{\sqrt{5}}{2}}$

25) $x^2 2+\frac{1}{x^2}=\frac{7}{x}\cdot x$

$\hookrightarrow x^2$ $2x^2+1=7x$

$-7x \quad -7x$

$2x^2-7x+1=0$

$a \quad b \quad c$

$x=\frac{--7\pm\sqrt{(-7)^2-4(2)(1)}}{2(2)}$

$=\frac{7\pm\sqrt{49-8}}{4}=\frac{7\pm\sqrt{41}}{4}$

$=\boxed{\frac{7}{4}\pm\frac{\sqrt{41}}{4}}$

26) $x^2 1+\frac{2}{x^2}=\frac{5}{x}\cdot x$

$\hookrightarrow x^2$ $x^2+2=5x$

$-5x \quad -5x$

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

$a \quad b \quad c$

$x=\frac{--5\pm\sqrt{(-5)^2-4(1)(2)}}{2(1)}$

$=\frac{5\pm\sqrt{25-8}}{2}=\frac{5}{2}\pm\frac{\sqrt{17}}{2}$

$\boxed{\frac{5}{2}\pm\frac{\sqrt{17}}{2}}$

Problems 27-29: If x is a real number, for what values of x is each equation true? Choose from the following statements.

A) All values of x
B) No values of x
C) Some values of x
D) Impossible to determine

27) $\frac{3x+18}{3}=x+6$

$\frac{3(x+6)}{3}=x+6$

A All

28) $\frac{6x-2}{2}=3x-2$

$\frac{2(3x-1)}{2}=3x-2$

B None

29) $\frac{x^2-36}{x+6}=x-6$

$\frac{(x+6)(x-6)}{x+6}=x-6$

$x+6=0$

$-6 \quad -6$

$x=-6$

C because it doesn't work for -6!

Problems 30-32: Which of the following statements is correct about each equation.

A) The equation is always true.
B) The equation is always true, except when x = -7.
C) The equation is never true.
D) The equation is sometimes true when x = -7.

30) $\frac{4x-28}{4}=x-28$

$\frac{4(x-7)}{4}=x-28$

C

31) $\frac{2x+14}{2}=x+7$

$\frac{2(x+7)}{2}=x+7$

A

32) $\frac{x^2-49}{x+7}=x-7$ → $x\neq -7$

$\frac{(x+7)(x-7)}{x+7}=x-7$

B