LESSON 172

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

$for\ x\neq -1,-2$

2. $\frac{x^2+4x-5}{x^2+5x}\cdot\frac{x^2}{x^2-1}$

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

$=\frac{x}{x+1}\ for\ x\neq 0,-5,-1,1$

3. $\frac{x^2+6x+8}{x^2+2x}\div(x+4)$

$=\frac{x^2+6x+8}{x^2+2x}\cdot\frac{1}{x+4}=\frac{(x+2)(x+4)}{x(x+2)}\cdot\frac{1}{x+4}$

$=\frac{1}{x}\ for\ x\neq 0,-2,-4$

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

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

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

$=\frac{x-3}{x-1}\ for\ x\neq 1,-3$

5. $\frac{\frac{2}{3}+\frac{1}{6}}{\frac{5}{9}+\frac{1}{3}}=\frac{18\left(\frac{2}{3}+\frac{1}{6}\right)}{18\left(\frac{5}{9}+\frac{1}{3}\right)}=\frac{12+3}{10+6}=\frac{15}{16}$

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

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

$=x(x+2)\ for\ x\neq 0,-2$

7. $\frac{1}{x-5}=\frac{3}{x-3}$ Restrictions: $x\neq 5,3$; LCD $=(x-5)(x-3)$

$x-3=3(x-5)$ Multiply both sides by the LCD, then solve for x.

$x=6$

8. $\frac{5}{x}+\frac{x}{x-8}=\frac{1}{x}$ Restrictions: $x\neq 0,8$; LCD $=x(x-8)$

$5(x-8)+x^2=x-8$ Multiply both sides by the LCD, then solve for x.

$x^2+4x-32=0$

$(x-4)(x+8)=0$

$x=4,x=-8$

9. $\frac{x+1}{x}+\frac{x}{2}=\frac{1}{x}$ Restrictions: $x\neq 0$; LCD $=2x$

$2(x+1)+x^2=2$ Multiply both sides by the LCD, then solve for x.

$x^2+2x=0$

$x(x+2)=0$

$x=0,x=-2$

$x\neq 0$, so $x=-2$. $x=0$ is extraneous.

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

$\frac{1}{x}-\frac{1}{x+1}=\frac{2}{x(x+1)}$ Restrictions: $x\neq 0,-1$; LCD $=x(x+1)$

$x+1-x=2$ Multiply both sides by the LCD, then solve for x.

$1=2$

No solutions

11. The answer is D.

$\frac{x-2}{x}-\frac{x-4}{2x}=\frac{1}{2}$ Restrictions: $x\neq 0$; LCD $=2x$

$2(x-2)-(x-4)=x$ Multiply both sides by the LCD, then solve for x.

$0=0$

All x except 0

12. The vertical asymptote is $x=3$ because it is the value of x that makes the denominator zero.

The horizontal asymptote is $y=4/1=4$ because it is the ratio of the leading coefficients of the numerator and denominator when their degrees are equal.

13. The answer is D.

$(1,0)$ is on the graph, so eliminate A and C.

The vertical asymptote is $x=2$, so choose D.

14. The answer is B.

$(2,0)$ is on the graph, so eliminate A and D.

The horizontal asymptote is $y=1$, so choose B.

15. The answer is C.

$y = \frac{1}{x}$ Parent function

$y = -\frac{1}{x}$ Reflect over the x-axis.

$y = -\frac{1}{x+4}$ Shift left 4 units.

$f(x) = -\frac{1}{x+4} - 5$ Shift down 5 units.

16. $x =$ time to drain the pool together

Pipe A's rate + Pipe B's rate = combined rate, so

$$\frac{1}{3} + \frac{1}{6} = \frac{1}{x}$$

Sove for x, and you get $x = 2$.

It will take 2 hours.

17. $x =$ speed of the wind

$150 + x =$ speed of the plane with the wind

$150 - x =$ speed of the plane against the wind

Time with the wind = time against the wind, so

$$\frac{800}{150+x} = \frac{700}{150-x}$$

Sove for x, and you get $x = 10$.

The speed of the wind is 10 mph.

18. $x =$ shadow length, $y =$ object height

Plug $x = 12$ and $y = 8$ into $y = kx$.

$8 = 12k$; $k = 2/3$

The equation is $y = (2/3)x$.

When $x = 30$, $y = 20$.

The tree is 20 feet tall.