

Secondary Math III
Unit 5 Practice Test

Name Key
Period _____

1. Which function has a graph with a hole? *must cross something off.*

a. $f(x) = \frac{x-5}{x^2+25}$

Doesn't factor

No hole

b. $g(x) = \frac{x^2-3x-28}{x+4}$

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

Hole

c. $h(x) = \frac{x^2+3x-28}{x+4}$

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

No hole

d. $k(x) = \frac{x}{x^2-25}$

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

No hole

2. Which function has a vertical asymptote at $x=2$ and a horizontal asymptote at $y=\frac{3}{4}$?

a. $f(x) = \frac{3x}{4x-8}$
 $= \frac{3x}{4(x-2)}$

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

c. $h(x) = \frac{3x}{x-2}$

d. $k(x) = \frac{x}{x-2}$

*VA: $x=2$
HA: $y=\frac{3}{4}$*

*VA: $x=2, x=-2$
HA: $y=0$*

*VA: $x=2$
HA: $y=3$*

*VA: $x=2$
HA: $y=1$*

3. What is the least common denominator (LCD) of the rational expressions: $\frac{7}{x+4}$, $\frac{5+x}{4}$ and $\frac{x}{x^2-16}$?

LCD: $4(x+4)(x-4)$

$(x+4)(x-4)$

4. Perform the operation $\frac{12x^2+24x}{x^2-9x+18} \cdot \frac{x^2-3x-18}{5x+10}$?

$x \neq 6, 3, -2$

$= \frac{12x(x+2)}{(x-6)(x-3)} \cdot \frac{(x-6)(x+3)}{5(x+2)}$
 $= \frac{12x(x+3)}{5(x-3)}$

5. Perform the operation $\frac{7x}{7x^2} - \frac{1 \cdot x}{7x \cdot x}$?

$= \frac{7x - x}{7x^2}$

$= \frac{6x}{7x^2} = \frac{6}{7x}$

*LCD: $7x^2$
 $x \neq 0$*

6. What is the domain of the function $f(x) = \frac{9x+4}{x-3}$?

$x \neq 3$

Simplify, multiply, divide, add or subtract as indicated. List any restrictions on the variable and simplify answers where possible.

$$7. \frac{5x^3 + 45x^2}{x^2 + 5x - 36} = \frac{5x^2(x+9)}{(x+9)(x-4)}$$

$$x \neq -9, 4$$

$$= \frac{5x^2}{x-4}$$

$$8. \frac{3x-4}{x^2-25} + \frac{5(x+5)}{x-5(x+5)}$$

LCD: $(x+5)(x-5)$
 $x \neq -5, 5$

$$= \frac{3x-4 + 5x+25}{(x+5)(x-5)} = \frac{8x+21}{(x+5)(x-5)}$$

$$9. \frac{x^2-36}{x} = \frac{(x+6)(x-6)}{x}$$

or $\frac{(x+6)(x-6)}{x}$
 $x \neq 0, -6$

Rewrite: $\frac{(x+6)(x-6)}{x} \cdot \frac{x}{x+6}$

$$= \frac{x-6}{1} = x-6$$

$$10. \frac{x^2+9x}{x+8} \div \frac{x^2+12x+27}{x^2-64}$$

$$x \neq -8, -9, -3, 8$$

$$\frac{x(x+9)}{x+8} \cdot \frac{(x+8)(x-8)}{(x+9)(x+3)}$$

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

Solve each equation. List any restrictions on the variable.

$$11. \left(x + \frac{35}{x} = -2\right) \quad \text{LCD: } x \quad x \neq 0$$

$$x^2 - 35 = -2x$$

$$x^2 - 35 + 2x = 0$$

$$x^2 + 2x - 35 = 0$$

$$(x+7)(x-5) = 0$$

$$x = -7 \quad x = 5$$

$$12. \frac{x+6}{x-4} = \frac{8}{9} \quad x \neq 4$$

$$9(x+6) = 8(x-4)$$

$$9x + 54 = 8x - 32$$

$$-8x - 54 \quad -8x - 54$$

$$x = -86$$

Find the following and draw the graph of the function. Be sure to draw asymptotes as dashed lines and holes as open circles. (Hint: there is a hole):

$$13. f(x) = \frac{3x+24}{x^2+3x-40} = \frac{3(x+8)}{(x+8)(x-5)}$$

Simplified form $y = \frac{3}{x-5}$ $d=0$
 $d=1$

Vertical asymptote(s): $x = 5$

Horizontal asymptote: $y = 0$

Hole: $(-8, -3/5)$

Intercepts: $(0, -3/5)$

additional points: $(6, 3)$ $(7, 3/2)$

$$\frac{3}{6-5} = \frac{3}{1} \quad \frac{3}{7-5} = \frac{3}{2}$$

$$\frac{3}{-8-5} = \frac{3}{-13}$$

