

## SM3 HW #3-9 (modeling with rational functions)

Period \_\_\_\_\_

**Find the zeroes (nice pattern?)**

1)  $f(x) = 2x^3 + x^2 - 2x - 1$

**Simplify each expression.**

2)  $\frac{2n}{12m^2} - \frac{6m + 4n}{12m^2}$

3)  $\frac{4}{2} - \frac{3n - 2}{2n - 5}$

4)  $\frac{a^2 + 9a + 20}{a - 4} \cdot \frac{a - 4}{6a^2 + 30a}$

5)  $\frac{(n + 4)(n - 1)}{8n^2} \div \frac{(n + 4)(n - 1)}{8n^2(n + 4)}$

**Identify the domain and range of each.**

6)  $y = -\frac{3}{4}\sqrt{x + 3} + 5$

7) (a) write the intercept form equation (Nice 3rd degree?)

(b) find the zeroes of the function.

(c) How do the zeroes you found "satisfy" the fundamental theorem of Algebra?

$y = 5x^3 - 50x^2 + 125x$

- 8) a) Factor the following  
b) Convert the quadratic factor to vertex form then find its zeroes.  
 $y = x^3 - 64$

**Find all zeros of the "quadratic form" equation below**

9)  $f(x) = x^4 - 5x^2 - 14$

- a) Simplify the equations.
- b) Identify the "excluded values of x" (which are x-values NOT in the domain)
- c) what is the domain of the function?
- d) Identify the x-values of holes in the graph of the function
- e) Identify the vertical asymptotes of the graph.
- f) Identify the x-intercepts.
- g) identify the horizontal asymptote OR find the oblique asymptote.

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

11) How many lbs. of mixed nuts that contain 60% peanuts must Kayla add to 12 lbs. of mixed nuts that contain 75% peanuts to make a mixture with 66% peanuts?

12) Mofor wants to make a 72% alcohol solution. He has already poured 12 L of a 90% alcohol solution into a beaker. How many L of a 45% alcohol solution must he add to this to create the desired mixture?

13) Julio and his brother mixed together two types of soil to make  $10 \text{ m}^3$  of soil with a 42% silt content. They used  $2 \text{ m}^3$  of a soil with 50% silt content and  $8 \text{ m}^3$  of another type of soil. What was the silt content of the second type of soil?

14) 11 gal. of an acid solution was mixed with 4 gal. of a 50% acid solution to make a 28% acid solution. Find the percent concentration of the first solution.

**Solve each question. Round your answer to the nearest hundredth.**

15) It takes Sumalee 12 minutes to sweep a porch. Jack can sweep the same porch in 14 minutes. If they worked together how long would it take them?

16) Working alone, Mofor can mop a warehouse in 11 hours. One day his friend Heather helped him and it only took 4.63 hours. Find how long it would take Heather to do it alone.

17) Working together, Mike and Daniel can pick forty bushels of apples in 7.24 hours. Had he done it alone it would have taken Daniel 15 hours. How long would it take Mike to do it alone?

**Solve each equation. Remember to check for extraneous solutions.**

18)  $\frac{1}{a^2} - \frac{3}{a} = \frac{4}{a^2}$

19)  $\frac{a^2 + 4a - 12}{a^2 - a} = \frac{4}{a - 1} + 1$