Math 2 Final Exam Study Guide Name: ______________________________

Unit 3 – Rational & Radical Functions

Exponent Rules

1. $x^4 * x^6 =$
2. $(y^7)^2 =$
3. What is the perimeter of a square with a side length of $2x^3$?
4. $\frac{z^2}{z^4} =$
5. $\frac{x^{(y+2)}}{x^{(y+1)}} =$
6. $(\frac{2d}{d^2})^3 =$

Radical & Rational Exponents If the expression is written in radical form, rewrite it in fractional exponent form. If the expression is in fractional exponent form, rewrite it in radical form.

7. $d^{\frac{1}{3}} =$
8. $(4x^3y^4)^{\frac{3}{4}} =$
9. $(6x^2y)^{\frac{2}{3}} =$
10. $\sqrt[3]{2y} =$
11. $-\sqrt[4]{(3x)^6} =$
12. $\sqrt[2]{(3x^2y)^4} =$

Simplify Radicals

13. $\sqrt{16} =$
14. $\sqrt{\frac{175}{7}} =$
15. $5\sqrt{180} =$
16. $-2\sqrt{72} =$
17. $\sqrt{6300} =$
18. $7\sqrt{96} =$

Add & Subtract Radicals Remember: You can only combine like radicals, just like when you combine like terms!!!!

19. $\sqrt{x} + 2\sqrt{x} + 3\sqrt{x} =$
20. $3\sqrt{7} - 5\sqrt{7} =$
21. $\sqrt{6} + \sqrt{6} =$
22. $\sqrt{x} + 4\sqrt{y} - 4\sqrt{x} - 2\sqrt{y} =$
23. $4\sqrt{32} + 3\sqrt{18} - \sqrt{8} =$
24. $6\sqrt[3]{4} - 6\sqrt{2} + 3\sqrt[3]{4} - 3\sqrt{2} =$

Multiply Radicals Remember: multiply what is in front of the radicals, multiply what's inside the radicals (they turn in to one radical), then simplify the radical.

25. $\sqrt{2} * \sqrt{6} =$
26. $2\sqrt{3} * 4\sqrt{12} =$
27. $4z^3\sqrt{8x^5y} * 2x\sqrt{3z^4} =$
28. $\sqrt{3}\left(\sqrt{x} - \sqrt{y}\right) =$
29. $5\sqrt{5}\left(\sqrt{3} + 4\right) + \sqrt{3}\left(6 - \sqrt{5}\right) =$
30. $\left(6 + \sqrt{x}\right)\left(2 - \sqrt{x}\right) =$
31. $4\left(4 + 2\sqrt{x}\right)\left(\sqrt{x} - 4\right) =$

Rationalize the Denominator

32. $\frac{\sqrt{5}}{\sqrt{3y}} =$
33. $\frac{x-3}{\sqrt{x-4}} =$

Divide Radicals

34. $\frac{\sqrt{90}}{3\sqrt{26}} =$
35. $\frac{\sqrt{5}}{5\sqrt{7}} =$
36. $\frac{\sqrt{20xy}}{3\sqrt{5xy^5}} =$
37. $\frac{\sqrt{7x^5y^3}}{4\sqrt{3xy^5}} =$

Solving Radical Equations

38. $\sqrt{x + 3} = 4$
39. $\sqrt{4x - 2} - 3 = 4x$
40. $\sqrt{a^2 - 4} = 4a + 1$
41. $\sqrt{x - 2} = 3x$
42. $\sqrt[3]{(x - 2)^3} + 4 = 20$

Direct Variation

$y = kx$

Y varies directly with x.

Example: Y varies directly with x. If $y = 4$ and $x = 2$, find *x* when $y = 6$.

$y = kx$ $y = kx$

$4 = k(2)$ $6 = (2)x$

$2 = k$ $3 = x$

*You try these:

43. Is this an example of direct variation? If so, write the equation to represent this data.

x	y
-2	-6
-1	-3
0	0
1	3
2	6

44. Y varies directly with x. If $y = 16$ and $x = 8$, find *x* when $y = 4$.
45. Y varies directly with x. If $y = 10$ and $x = 2$, find *y* when $x = 3$.

Inverse Variation

$y = \frac{k}{x}$

Y varies inversely with x.

Example: Y varies inversely with x. If $y = 4$ and $x = 2$, find *x* when $y = 6$.

$y = \frac{k}{x}$ $y = \frac{k}{x}$

$4 = \frac{k}{2}$ $6 = \frac{8}{x}$

$8 = k$ $6x = 8$

$x = \frac{8}{6} = \frac{4}{3}$

*You try these:

46. Is this an example of inverse variation? If so, write the equation to represent this data.

x	y
-2	-6
-1	-12
1	12
2	6
3	4

REMEMBER: If the problem says directly or jointly, you are going to multiply the variable by k. If the problem says inversely, you are going to divide by the variable!!!!!

47. Y varies inversely with x. If $y = 16$ and $x = 8$, find *x* when $y = 4$.
48. Y varies inversely with x. If $y = 10$ and $x = 2$, find *y* when $x = 3$.
49. The number of hours needed to paint a house varies inversely with the number of painters working. A 2400 square foot house can be painted in 27 hours by 6 painters. How many painters would it take to paint the house in 18 hours?

Joint Variation

$y = kxz$

Y varies jointly with x and z.

Example: y varies jointly with x and z. If $y = 18$, $x = 2$, and $z = 3$, find y when $x = 4$ and $z = 2$

$18 = k(2)(3)$ $\quad\quad$ $y = (3)(4)(2)$

$18 = k(6)$ $\quad\quad$ $y = 24$

$3 = k$

*You try these:

50. y varies jointly with x^2 and a^2. If $y = 8$, $x = 3$, and $a = 4$, find y when $x = 4$ and $a = 2$
51. y varies jointly with x and z. If $y = 8$, $x = 2$, and $z = 3$, find y when $x = 3$ and $z = 4$

Combined Variation

$y = \frac{kxz}{w}$

Y varies jointly with x and z and inversely with w.

Example: Y varies jointly with x and z and inversely with w. If $y = 3$, $x = 2$, $z = 3$ and $w = 4$, find y when $x = 4$, $z = 3$ and $w = 5$

$y = \frac{kxz}{w}$ $\quad\quad$ $y = \frac{kxz}{w}$

$3 = \frac{k(2)(3)}{4}$ $\quad\quad$ $y = \frac{(2)(4)(3)}{5}$

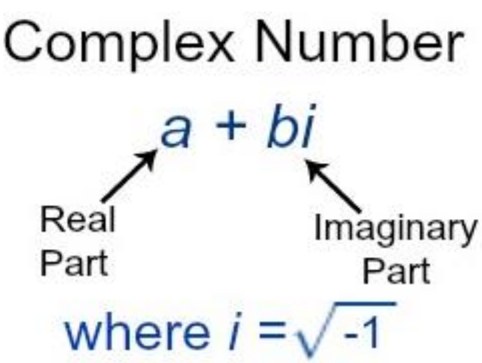
$12 = k(6)$ $\quad\quad$ $y = \frac{24}{5}$

$2 = k$ $\quad\quad$ $y = 4.8$

*You try these:

52. Y varies jointly with x and z and inversely with w. If $y = 5$, $x = 2$, $z = 3$ and $w = 1$, find y when $x = 3$, $z = 2$ and $w = 3$
53. Y varies jointly with x and z and inversely with w. If $y = 5$, $x = 4$, $z = 3$ and $w = 2$, find z when $y = 4$, $x = 3$ and $w = 6$

Complex & Imaginary Numbers



$i^0 = 1$

$i^1 = i$

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$

54. (5 – 3i)(7 + 2i)

55. $\frac{6+3i}{5+2i}$

56. Solve: $x^2 + 4x + 5 = 0$