Name: _____ Date: _____

A2H: Exponents Ms. Loughran

Do Now:

Simplify and express each answer using positive exponents only.

1. $\left(\dfrac{4m^{-5}p^{-8}}{12m^{-8}q^{7}}\right)^{3}$

$$\left(\frac{1m^{\cancel{8}\,3}}{3\cancel{m^{5}}p^{8}q^{7}}\right)^{3}$$

$$\left(\frac{m^{3}}{3p^{8}q^{7}}\right)^{3} = \frac{m^{9}}{27p^{24}q^{21}}$$

2. $\left(\dfrac{8^{4}h^{2}(4k)^{0}}{(4^{2}\cdot h)(2^{2}\cdot k^{5})}\right)^{-2}$

$$\left(\frac{8^{4}h^{2}}{(4\cdot 2)^{2}hk^{5}}\right)^{-2}$$

$$\left(\frac{8^{\cancel{4}\,2}h^{\cancel{2}\,1}}{\cancel{8^{2}}\cancel{h}k^{5}}\right)^{-2}$$

$$\left(\frac{8^{2}h}{k^{5}}\right)^{-2}$$

$$\left(\frac{k^{5}}{8^{2}h}\right)^{2} = \frac{k^{10}}{8^{4}h^{2}}$$

Name:_____ Date:_____

A2CC H:Dividing Radicals Ms. Loughran

Quotient Property of Radicals:

If $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are real numbers then, $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

Remember from our initial discussion of radicals, that in order for a radical to be in simplest form there should be no fractions underneath the radical and no radicals in the denominator.

Exercises: Simplify. Assume all variables represent positive values.

1. $\sqrt[3]{\frac{8}{27}} = \frac{\sqrt[3]{8}}{\sqrt[3]{27}} = \frac{2}{3}$

2. $\sqrt[3]{\frac{16x^4}{y^9}} = \frac{\sqrt[3]{16x^4}}{\sqrt[3]{y^9}} = \frac{\sqrt[3]{8\cdot 2x^3\cdot x}}{y^3} = \frac{2x\sqrt[3]{2x}}{y^3}$

3. $\frac{1}{\sqrt{2x}} \cdot \frac{\sqrt{2x}}{\sqrt{2x}} = \frac{\sqrt{2x}}{2x}$

$\sqrt{4x^2}$

$\sqrt{(2x)^2}$

4. $\sqrt[3]{\frac{27}{4x^2}} = \frac{\sqrt[3]{27}}{\sqrt[3]{4x^2}} = \frac{3}{\sqrt[3]{4x^2}} \cdot \frac{\sqrt[3]{2x}}{\sqrt[3]{2x}} = \frac{3\sqrt[3]{2x}}{2x}$

$\sqrt[3]{8x^3}$

5. $\sqrt[3]{\frac{16z^3}{y^7}} = \frac{\sqrt[3]{16z^3}}{\sqrt[3]{y^7}} \cdot \frac{\sqrt[3]{y^2}}{\sqrt[3]{y^2}} = \frac{\sqrt[3]{16z^3y^2}}{y^3} = \frac{\sqrt[3]{8\cdot 2z^3y^2}}{y^3}$

$\sqrt[3]{y^9}$

$= \frac{2z\sqrt[3]{2y^2}}{y^3}$

6. $\frac{3u^2}{\sqrt[4]{4u}} \cdot \frac{\sqrt[4]{4u^3}}{\sqrt[4]{4u^3}} = \frac{3u^{\cancel{2}}\sqrt[4]{4u^3}}{2\cancel{u}}$

$\sqrt[4]{16u^4}$

$\frac{3u\sqrt[4]{4u^3}}{2}$

7. $\frac{3}{2-\sqrt{3}}$

8. $\frac{4}{\sqrt{2a}+\sqrt{2b}}$

9. $\frac{3\sqrt{x}-4\sqrt{y}}{3\sqrt{x}+4\sqrt{y}}$

Homework 09-29

Exercises

Multiply.

1. $\sqrt{2}\sqrt{8}$
2. $\sqrt{3}\sqrt{27} = 9$
3. $\sqrt{x^2y^5}\sqrt{xy}$
4. $\sqrt{a^2b}\sqrt{ab^4}$
5. $\sqrt[3]{4x}\sqrt[3]{8x}$
6. $\sqrt{14y}\sqrt{35y}$
7. $\sqrt[3]{9t^2}\sqrt[3]{9t^2}$
8. $\sqrt[3]{18x}\sqrt[3]{4x^4}$
9. $\sqrt[3]{16x^4}\sqrt[3]{4x}$
10. $\sqrt[3]{10a^5}\sqrt[3]{50a^3}$
11. $\sqrt{5x^3y}\sqrt{10x^3y^4}$
12. $\sqrt{2x^2y}\sqrt{32xy} = 8xy\sqrt{x}$
13. $\sqrt[3]{9x^4y^2}\sqrt[3]{18xy}$
14. $\sqrt[3]{16xy^2}\sqrt[3]{12x^2y}$
15. $\sqrt[5]{27n^4m}\sqrt[5]{9n^2m^4}$
16. $\sqrt[3]{4ab^2}\sqrt[3]{18a^8b}$
17. $\sqrt[4]{18a^3b^5}\sqrt[4]{6a^5b^3}$
18. $\sqrt[5]{8x^3y^4}\sqrt[5]{8x^4y^6}$
19. $\sqrt[4]{27a^2b^3}\sqrt[4]{9ab}$
20. $\sqrt[4]{8x^6y}\sqrt[4]{6x^2y^3} = 2x^2y\sqrt[4]{3}$
21. $\sqrt{y}\left(\sqrt{y}+4\right)$
22. $\sqrt{2x}\left(\sqrt{x}-3\right) = x\sqrt{2}-3\sqrt{2x}$
23. $\sqrt{3}\left(\sqrt{3}-\sqrt{4}\right)$
24. $\sqrt{12}\left(\sqrt{3}-\sqrt{12}\right)$
25. $2\sqrt{y}\left(\sqrt{2x}-\sqrt{y}\right)$
26. $\sqrt{ab}\left(a\sqrt{b}+3\sqrt{b}\right)$
27. $\left(\sqrt{5x}+6\right)^2$
28. $\left(\sqrt{x}+\sqrt{y}\right)^2$
29. $\left(4-\sqrt{20}\right)^2 = 36-16\sqrt{5}$
30. $\left(\sqrt{a}+2\sqrt{b}\right)^2$
31. $\left(x\sqrt{y}+\sqrt{z}\right)^2$
32. $\left(\sqrt{2a}+\sqrt{2b}\right)^2$
33. $\left(\sqrt{a}-\sqrt{4b}\right)^2$
34. $\left(\sqrt{9x}+1\right)^2$
35. $\left(\sqrt{x}+2\right)\left(2\sqrt{x}-3\right)$
36. $\left(2-\sqrt{a}\right)\left(7+4\sqrt{a}\right)$
37. $\left(3+\sqrt{2}\right)\left(2-\sqrt{8}\right)$
38. $\left(1-\sqrt{27}\right)\left(1+\sqrt{3}\right)$
39. $\left(\sqrt{\alpha}+\beta\sqrt{\chi}\right)\left(\sqrt{\alpha}-2\beta\sqrt{\chi}\right)$
40. $\left(3\sqrt{n}+4\sqrt{m}\right)\left(\sqrt{n}-\sqrt{m}\right)$
41. $\left(2\sqrt{p}-3\sqrt{q}\right)\left(\sqrt{p}+2\sqrt{q}\right)$
42. $\left(7\sqrt{x}-3\sqrt{y}\right)\left(2\sqrt{x}+\sqrt{y}\right)$
43. $\left(\sqrt{a}+2\sqrt{b}\right)\left(\sqrt{a}-3\sqrt{b}\right)$
44. $\left(2\sqrt{x}-\sqrt{y}\right)\left(\sqrt{x}-2\sqrt{y}\right) = 2x-5\sqrt{xy}+2y$
45. $\left(\sqrt{x}+\sqrt{2}\right)\left(\sqrt{x}-\sqrt{2}\right) = x-2$
46. $\left(\sqrt{x}+5\right)\left(\sqrt{x}-5\right)$
47. $\left(2\sqrt{a}-\sqrt{b}\right)\left(2\sqrt{a}+\sqrt{b}\right)$
48. $\left(5\sqrt{b}-3\sqrt{a}\right)\left(5\sqrt{b}+3\sqrt{a}\right) = 25b-9a$
49. $\left(\sqrt{x}+1\right)\left(x+\sqrt{x}-1\right)$
50. $\left(\sqrt{a}-1\right)\left(a-\sqrt{a}+1\right)$
51. $\left(a+\sqrt{b}+\sqrt{a}\right)\left(\sqrt{a}+\sqrt{b}\right)$
52. $\left(2a+b-\sqrt{a}\right)\left(\sqrt{a}-1\right) = 2a\sqrt{a}+b\sqrt{a}-3a-b+\sqrt{a}$
53. $\left(\sqrt{x}+\sqrt{y}\right)\left(\sqrt{x}+\sqrt{y}+\sqrt{xy}\right)$
54. $\left(\sqrt{a}+\sqrt{2}\right)\left(\sqrt{a}+\sqrt{2}-1\right)$
55. $\left(\sqrt[3]{y}+2\right)\left(\sqrt[3]{y^2}-5\right)$
56. $\left(\sqrt[3]{a^2}+1\right)\left(\sqrt[3]{a}-3\right)$
57. $\left(\sqrt[3]{x}-2\right)\left(1+5\sqrt[3]{x^2}\right)$
58. $\left(\sqrt[3]{y^2}+3\right)\left(1-\sqrt[3]{y}\right)$
59. $\left(\sqrt[4]{2x}-1\right)\left(\sqrt[4]{8x^3}-2\right)$
60. $\left(\sqrt[4]{4a^2}+1\right)\left(\sqrt[4]{4a^2}-1\right)$
61. $\left(\sqrt{x+1}+2\right)^2$
62. $\left(\sqrt{2x-1}-3\right)^2$
63. $\left(\sqrt{x}-\sqrt{x-2}\right)^2$
64. $\left(\sqrt{x-3}+\sqrt{2x}\right)^2$
65. $\left(\sqrt{3x-1}-\sqrt{2x+1}\right)^2$
66. $\left(\sqrt{x+4}+\sqrt{5x-1}\right)^2$
67. $\left(\sqrt{2x}+\sqrt{2x-1}\right)^2$
68. $\left(\sqrt{4x+2}-\sqrt{2x+3}\right)^2 = 6x+5-2\sqrt{(2x+3)(4x+2)}$

68. $\left(\sqrt{4x+2}-\sqrt{2x+3}\right)^2$

$\left(\sqrt{4x+2}-\sqrt{2x+3}\right)\left(\sqrt{4x+2}-\sqrt{2x+3}\right)$

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

$6x+5-2\sqrt{(2x+3)(4x+2)}$

44. $\left(2\sqrt{x}-\sqrt{y}\right)\left(\sqrt{x}-2\sqrt{y}\right)$

$2\sqrt{x^2}$ $+2\sqrt{y^2}$

$2x-\sqrt{xy}-4\sqrt{xy}+2y$

$2x-5\sqrt{xy}+2y$

29. $\left(4-\sqrt{20}\right)^2$

$\left(4-\sqrt{20}\right)\left(4-\sqrt{20}\right)$

$16-4\sqrt{20}-4\sqrt{20}+20$

$36-8\sqrt{20}$

$36-8\sqrt{5\cdot 4}$

$36-8(2\sqrt{5})$

$36-16\sqrt{5}$

45. $\left(\sqrt{x}+\sqrt{2}\right)\left(\sqrt{x}-\sqrt{2}\right)$

$-\sqrt{2x}$

$\sqrt{2x}$

$x-2$