

Operations with Radicals

Date _____ Period _____

Notes:**Simplify.**

1) $5\sqrt{128n^5}$

2) $-3\sqrt{210x}$

Now you try:**Simplify.**

3) $8\sqrt{72m^2n^5p^2}$

4) $4\sqrt{40x^4y^4z^3}$

5) $-2\sqrt{12p^5q^5r}$

6) $4\sqrt{72m^4p^4q^5}$

7) $7\sqrt{175x^5y^5z}$

8) $-9\sqrt{36x^4y^5z^4}$

9) $8\sqrt{147x^4y^2z^4}$

10) $-4\sqrt{112x^3y^4z^3}$

11) $7\sqrt{36h^5j^5k^4}$

12) $-2\sqrt{8hjk^5}$

Notes:**Simplify.**

13) $3\sqrt{12} + 2\sqrt{3} - \sqrt{6}$

14) $-\sqrt{12} - 2\sqrt{27} + 2\sqrt{18}$

Now you try:**Simplify.**

15) $2\sqrt{45} - \sqrt{20} + 4\sqrt{8} - \sqrt{8}$

16) $-4\sqrt{5} - 4\sqrt{6} - 2\sqrt{45} - \sqrt{45}$

17) $-3\sqrt{63} - \sqrt{72} - 4\sqrt{7} - 2\sqrt{48}$

18) $2\sqrt{72} - \sqrt{8} + 4\sqrt{80} - 2\sqrt{8}$

19) $4\sqrt{6} - 4\sqrt{8} - \sqrt{96} + 3\sqrt{18}$

20) $3\sqrt{28} + 3\sqrt{112} - 4\sqrt{6} - 3\sqrt{20}$

21) $3\sqrt{72} - 2\sqrt{5} + 4\sqrt{32} - 2\sqrt{96}$

22) $-2\sqrt{18} + 4\sqrt{20} - 2\sqrt{2} + 2\sqrt{48}$

23) $-4\sqrt{18} + 2\sqrt{8} - 3\sqrt{24} + 2\sqrt{8}$

24) $-4\sqrt{80} - 2\sqrt{112} - \sqrt{112} - 3\sqrt{7}$

Notes:
Simplify.

25) $-4\sqrt{6}(\sqrt{5} + 3\sqrt{3})$

26) $\sqrt{15}(3 + \sqrt{5})$

Now you try:
Simplify.

27) $\sqrt{2}(3\sqrt{2} + \sqrt{6})$

28) $\sqrt{5}(\sqrt{5} + 2)$

29) $\sqrt{15}(2\sqrt{5} + 3)$

30) $\sqrt{3}(3 - \sqrt{2})$

31) $-4\sqrt{5}(\sqrt{5} + \sqrt{2})$

32) $(6\sqrt{5} - 2\sqrt{7b})(2\sqrt{5} + 7\sqrt{6})$

33) $(7\sqrt{7} - 2\sqrt{5n})(5\sqrt{6} + 3\sqrt{5n})$

34) $(5\sqrt{6} - 4\sqrt{2})(-\sqrt{3} + 5\sqrt{2})$

35) $(-4\sqrt{2} - 2\sqrt{3x})(-\sqrt{2x} - 3\sqrt{3})$

36) $(-3\sqrt{2m} - 7)(4\sqrt{2m} + 5)$

Notes:
Simplify.

37) $\frac{4\sqrt{15}}{\sqrt{125}}$

38) $\frac{2\sqrt{12}}{\sqrt{64}}$

39) $\frac{3}{2+3\sqrt{3}}$

40) $\frac{2\sqrt{5}}{3-3\sqrt{2}}$

41) $\frac{2+4\sqrt{3}}{-5-3\sqrt{3}}$

42) $\frac{-3-\sqrt{5}}{\sqrt{2}+\sqrt{5}}$

**Now you try:
Simplify.**

43) $\frac{3}{2\sqrt{2}}$

44) $\frac{5\sqrt{3}}{5\sqrt{6}}$

45) $\frac{2\sqrt{3}-2\sqrt{2}}{5\sqrt{6}}$

46) $\frac{2\sqrt{5}-2\sqrt{2}}{\sqrt{11}}$

47) $\frac{3}{5\sqrt{2}+3\sqrt{5}}$

48) $\frac{4}{-2-\sqrt{5}}$

49) $\frac{4-5\sqrt{2}}{\sqrt{5}+5\sqrt{2}}$

50) $\frac{\sqrt{3}-2\sqrt{5}}{4\sqrt{5}+4}$

51) $\frac{-3-\sqrt{5}}{\sqrt{2}-4}$

52) $\frac{-5-\sqrt{2}}{4-\sqrt{2}}$

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Notes:**Simplify.**

$$1) 5\sqrt{128n^5}$$

$$40n^2\sqrt{2n}$$

$$2) -3\sqrt{210x}$$

$$-3\sqrt{210x}$$

Now you try:**Simplify.**

$$3) 8\sqrt{72m^2n^5p^2}$$

$$48n^2|m| \cdot |p|\sqrt{2n}$$

$$4) 4\sqrt{40x^4y^4z^3}$$

$$8x^2y^2|z|\sqrt{10z}$$

$$5) -2\sqrt{12p^5q^5r}$$

$$-4p^2q^2\sqrt{3pqr}$$

$$6) 4\sqrt{72m^4p^4q^5}$$

$$24m^2p^2q^2\sqrt{2q}$$

$$7) 7\sqrt{175x^5y^5z}$$

$$35x^2y^2\sqrt{7xyz}$$

$$8) -9\sqrt{36x^4y^5z^4}$$

$$-54x^2y^2z^2\sqrt{y}$$

$$9) 8\sqrt{147x^4y^2z^4}$$

$$56x^2z^2|y|\sqrt{3}$$

$$10) -4\sqrt{112x^3y^4z^3}$$

$$-16y^2|x| \cdot |z|\sqrt{7xz}$$

$$11) 7\sqrt{36h^5j^5k^4}$$

$$42h^2j^2k^2\sqrt{hj}$$

$$12) -2\sqrt{8hjk^5}$$

$$-4k^2\sqrt{2hjk}$$

Notes:**Simplify.**

$$13) 3\sqrt{12} + 2\sqrt{3} - \sqrt{6}$$

$$8\sqrt{3} - \sqrt{6}$$

$$14) -\sqrt{12} - 2\sqrt{27} + 2\sqrt{18}$$

$$-8\sqrt{3} + 6\sqrt{2}$$

Now you try:**Simplify.**

$$15) 2\sqrt{45} - \sqrt{20} + 4\sqrt{8} - \sqrt{8}$$

$$4\sqrt{5} + 6\sqrt{2}$$

$$16) -4\sqrt{5} - 4\sqrt{6} - 2\sqrt{45} - \sqrt{45}$$

$$-13\sqrt{5} - 4\sqrt{6}$$

$$17) -3\sqrt{63} - \sqrt{72} - 4\sqrt{7} - 2\sqrt{48}$$

$$-13\sqrt{7} - 6\sqrt{2} - 8\sqrt{3}$$

$$18) 2\sqrt{72} - \sqrt{8} + 4\sqrt{80} - 2\sqrt{8}$$

$$6\sqrt{2} + 16\sqrt{5}$$

$$19) 4\sqrt{6} - 4\sqrt{8} - \sqrt{96} + 3\sqrt{18}$$

$$\sqrt{2}$$

$$21) 3\sqrt{72} - 2\sqrt{5} + 4\sqrt{32} - 2\sqrt{96}$$

$$34\sqrt{2} - 2\sqrt{5} - 8\sqrt{6}$$

$$23) -4\sqrt{18} + 2\sqrt{8} - 3\sqrt{24} + 2\sqrt{8}$$

$$-4\sqrt{2} - 6\sqrt{6}$$

$$20) 3\sqrt{28} + 3\sqrt{112} - 4\sqrt{6} - 3\sqrt{20}$$

$$18\sqrt{7} - 4\sqrt{6} - 6\sqrt{5}$$

$$22) -2\sqrt{18} + 4\sqrt{20} - 2\sqrt{2} + 2\sqrt{48}$$

$$-8\sqrt{2} + 8\sqrt{5} + 8\sqrt{3}$$

$$24) -4\sqrt{80} - 2\sqrt{112} - \sqrt{112} - 3\sqrt{7}$$

$$-16\sqrt{5} - 15\sqrt{7}$$

Notes:
Simplify.

$$25) -4\sqrt{6}(\sqrt{5} + 3\sqrt{3})$$

$$-4\sqrt{30} - 36\sqrt{2}$$

$$26) \sqrt{15}(3 + \sqrt{5})$$

$$3\sqrt{15} + 5\sqrt{3}$$

Now you try:
Simplify.

$$27) \sqrt{2}(3\sqrt{2} + \sqrt{6})$$

$$6 + 2\sqrt{3}$$

$$28) \sqrt{5}(\sqrt{5} + 2)$$

$$5 + 2\sqrt{5}$$

$$29) \sqrt{15}(2\sqrt{5} + 3)$$

$$10\sqrt{3} + 3\sqrt{15}$$

$$30) \sqrt{3}(3 - \sqrt{2})$$

$$3\sqrt{3} - \sqrt{6}$$

$$31) -4\sqrt{5}(\sqrt{5} + \sqrt{2})$$

$$-20 - 4\sqrt{10}$$

$$32) (6\sqrt{5} - 2\sqrt{7b})(2\sqrt{5} + 7\sqrt{6})$$

$$60 + 42\sqrt{30} - 4\sqrt{35b} - 14\sqrt{42b}$$

$$33) (7\sqrt{7} - 2\sqrt{5n})(5\sqrt{6} + 3\sqrt{5n})$$

$$35\sqrt{42} + 21\sqrt{35n} - 10\sqrt{30n} - 30n$$

$$34) (5\sqrt{6} - 4\sqrt{2})(-\sqrt{3} + 5\sqrt{2})$$

$$-15\sqrt{2} + 50\sqrt{3} + 4\sqrt{6} - 40$$

$$35) (-4\sqrt{2} - 2\sqrt{3x})(-\sqrt{2x} - 3\sqrt{3})$$

$$26\sqrt{x} + 12\sqrt{6} + 2x\sqrt{6}$$

$$36) (-3\sqrt{2m} - 7)(4\sqrt{2m} + 5)$$

$$-24m - 43\sqrt{2m} - 35$$

Notes:
Simplify.

$$37) \frac{4\sqrt{15}}{\sqrt{125}} \frac{4\sqrt{3}}{5}$$

$$38) \frac{2\sqrt{12}}{\sqrt{64}} \frac{\sqrt{3}}{2}$$

$$39) \frac{3}{2+3\sqrt{3}} \frac{-6+9\sqrt{3}}{23}$$

$$40) \frac{2\sqrt{5}}{3-3\sqrt{2}} \frac{-2\sqrt{5}-2\sqrt{10}}{3}$$

$$41) \frac{2+4\sqrt{3}}{-5-3\sqrt{3}} \frac{-13+7\sqrt{3}}{15}$$

$$42) \frac{-3-\sqrt{5}}{\sqrt{2}+\sqrt{5}} \frac{3\sqrt{2}-3\sqrt{5}+\sqrt{10}-5}{3}$$

**Now you try:
Simplify.**

$$43) \frac{3}{2\sqrt{2}} \frac{3\sqrt{2}}{4}$$

$$44) \frac{5\sqrt{3}}{5\sqrt{6}} \frac{\sqrt{2}}{2}$$

$$45) \frac{2\sqrt{3}-2\sqrt{2}}{5\sqrt{6}} \frac{3\sqrt{2}-2\sqrt{3}}{15}$$

$$46) \frac{2\sqrt{5}-2\sqrt{2}}{\sqrt{11}} \frac{2\sqrt{55}-2\sqrt{22}}{11}$$

$$47) \frac{3}{5\sqrt{2}+3\sqrt{5}} \frac{15\sqrt{2}-9\sqrt{5}}{5}$$

$$48) \frac{4}{-2-\sqrt{5}} \frac{8-4\sqrt{5}}{11}$$

$$49) \frac{4-5\sqrt{2}}{\sqrt{5}+5\sqrt{2}} \frac{-4\sqrt{5}+20\sqrt{2}+5\sqrt{10}-50}{45}$$

$$50) \frac{\sqrt{3}-2\sqrt{5}}{4\sqrt{5}+4} \frac{\sqrt{15}-\sqrt{3}-10+2\sqrt{5}}{16}$$

$$51) \frac{-3-\sqrt{5}}{\sqrt{2}-4} \frac{3\sqrt{2}+12+\sqrt{10}+4\sqrt{5}}{14}$$

$$52) \frac{-5-\sqrt{2}}{4-\sqrt{2}} \frac{-22-9\sqrt{2}}{14}$$