Name: Key Per:

T 6-4: I can simplify radical expressions by multiplying and dividing.

Simplify each expression and box your answer.

1. $\sqrt[5]{\frac{-1024}{243}}$ $\frac{\sqrt[5]{-4^5}}{\sqrt[5]{3^5}}$ $= \boxed{\frac{-4}{3}}$

2. $\sqrt[5]{243x^{10}}$ $\sqrt[5]{3^5x^{10}} = \boxed{3x^2}$

3. $\sqrt{14a^2} = \boxed{|a|\sqrt{14}}$

4. $\sqrt{-(14a)^2}$ $\boxed{\text{not a real \#}}$

5. $\sqrt{49m^2t^8}$ $\boxed{7|m|t^4}$

6. $\sqrt{\frac{16m^2}{25}} = \frac{\sqrt{16m^2}}{\sqrt{25}} = \boxed{\frac{4|m|}{5}}$

7. $\sqrt[3]{-64r^2w^{15}}$ $\boxed{-4w^5\sqrt[3]{r^2}}$

8. $\sqrt{(2x)^8} = (2x)^4 = 16x^4$

9. $-\sqrt[4]{625s^8}$ $-\sqrt[4]{5^4s^8}$ $\boxed{-5s^2}$

10. $\sqrt[3]{216p^3q^9}$ $\sqrt[3]{6^3}\sqrt[3]{p^3}\sqrt[3]{q^9}$ $\boxed{6pq^3}$

11. $\sqrt{x^2+10x+25}$ $\sqrt{(x+5)^2}$ $\boxed{(x+5)}$

12. $\sqrt[3]{27x^9y^{12}}$ $\sqrt[3]{3^3x^9y^{12}}$ $\boxed{3x^3y^4}$

13. $\frac{3}{7-\sqrt{2}}\cdot\frac{(7+\sqrt{2})}{(7+\sqrt{2})}$ $\frac{21+3\sqrt{2}}{49-2}$ $\boxed{\frac{21+3\sqrt{2}}{47}}$

14. $\frac{4}{3+\sqrt{3}}\cdot\frac{(3-\sqrt{3})}{(3-\sqrt{3})}$ $\frac{12-4\sqrt{3}}{9-3} = \frac{12-4\sqrt{3}}{6}$ $\frac{12}{6} - \frac{4\sqrt{3}}{6} = \boxed{2-\frac{2}{3}\sqrt{3}}$

15. $\frac{\sqrt{2}-1}{\sqrt{8}}\cdot\frac{\sqrt{8}}{\sqrt{8}}$ $\frac{\sqrt{16}-\sqrt{8}}{8}$ $\frac{4-2\sqrt{2}}{8} = \frac{4}{8} - \frac{2\sqrt{2}}{8} = \boxed{\frac{1}{2}-\frac{1}{4}\sqrt{2}}$

16. $y^{-\frac{1}{2}} = \frac{1}{y^{1/2}}\cdot\frac{1}{\sqrt{y}}\cdot\frac{\sqrt{y}}{\sqrt{y}} = \boxed{\frac{\sqrt{y}}{y}}$

17. $\sqrt{12}\cdot\sqrt[5]{12^3}$ $12^{\frac{1}{2}}\cdot12^{\frac{3}{5}}$ $12^{\frac{1}{2}+\frac{3}{5}} = 12^{\frac{11}{10}} = 12^1\cdot12^{\frac{1}{10}} = \boxed{12\sqrt[10]{12}}$

18. $g^{\frac{4}{7}}\cdot g^{\frac{3}{7}} = g$

19. $s^{\frac{3}{4}}\cdot s^{\frac{13}{4}} = s^{\frac{16}{4}} = s^4$

20. $\left(u^{\frac{1}{3}}\right)^{\frac{4}{5}}$ $\frac{1}{3}\cdot\frac{4}{5} = \frac{4}{15}$ $u^{\frac{4}{15}} = \sqrt[15]{u^4}$

21. $b^{\frac{-3}{5}} = \frac{1}{b^{3/5}}\cdot\frac{b^{3/5}}{b^{3/5}} = \frac{b^{2/5}}{b}$ $\boxed{\frac{\sqrt[5]{b^2}}{b}}$

22. $\sqrt{\frac{1}{32}c^4d^7} = \frac{1}{4\sqrt{2}}c^2d^3\sqrt{d}\cdot\frac{\sqrt{2}}{\sqrt{2}}$ $\boxed{\frac{c^2d^3\sqrt{2d}}{8}}$

$\sqrt{32}$ $2\wedge16$

23. $\sqrt{\frac{9a^5}{64b^4}}$ $\boxed{\frac{3a^2\sqrt{a}}{8b^2}}$

24. $\sqrt[4]{\frac{16}{125a^3}} = \frac{\sqrt[4]{2^4}}{\sqrt[4]{125a^3}} = \frac{2}{\sqrt[4]{5^3a^3}}\cdot\frac{\sqrt[4]{5a}}{\sqrt[4]{5a}} = \boxed{\frac{2\sqrt[4]{5a}}{5a}}$

25. BRAKING The formula $s = 2\sqrt{5\ell}$ estimates the speed s in miles per hour of a car when it leaves skid marks ℓ feet long. Use the formula to write a simplified expression for s if $\ell = 85$. Then evaluate s to the nearest mile per hour.

$S = 2\sqrt{5(85)} = 2\sqrt{5\cdot5\cdot17} = 2(5)\sqrt{17} = \boxed{10\sqrt{17}}$

$\boxed{S \approx 41 \text{ mph}}$

26. PYTHAGOREAN THEOREM The measures of the legs of a right triangle can be represented by the expressions $6x^2y$ and $9x^2y$. Use the Pythagorean Theorem to find a simplified expression for the measure of the hypotenuse.

$a^2+b^2=c^2$

$(6x^2y)^2 + (9x^2y)^2 = c^2$

$36x^4y^2 + 81x^4y^2 = c^2$

1 ART

$\sqrt{c^2} = \sqrt{117x^4y^2}$

$\boxed{c = 3x^2|y|\sqrt{13}}$

117 $3\wedge39$ $3\wedge13$

Name: Key Per: _____

$\frac{\quad}{5}$

T 6-5: I can simplify radical expressions by adding, subtracting and multiplying.

1. $2\sqrt{48} - \sqrt{75} - \sqrt{12}$ $= \boxed{\sqrt{3}}$

$2\sqrt{16\cdot3} - \sqrt{25\cdot3}$

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

2. $(2+\sqrt{3})(6-\sqrt{2})$

$\boxed{12 - 2\sqrt{2} + 6\sqrt{3} - \sqrt{6}}$

3. $(1-\sqrt{5})(1+\sqrt{5})$

$1 + \sqrt{5} - \sqrt{5} - 5$

$\boxed{-4}$

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

$\boxed{15 + 3\sqrt{2} - 5\sqrt{7} - \sqrt{14}}$

5. $(\sqrt{2}-\sqrt{6})^2$

$(\sqrt{2}-\sqrt{6})(\sqrt{2}-\sqrt{6})$

$2 - \sqrt{12} - \sqrt{12} + 6$

$8 - 2\sqrt{12} = 8 - 2(2)\sqrt{3} = \boxed{8 - 4\sqrt{3}}$

6. $(4\sqrt{12})(3\sqrt{20}) = 12\sqrt{12\cdot20}$

$2\cdot3\cdot4 \quad 4\cdot5$

$12\sqrt{4^2\cdot2\cdot3\cdot5} = 12(4)\sqrt{2\cdot3\cdot5}$

$\boxed{48\sqrt{30}}$

7. $\sqrt{2} + \sqrt{8} + \sqrt{50}$

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

$\boxed{8\sqrt{2}}$

8. $\sqrt{12} - 2\sqrt{3} + \sqrt{108}$

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

$\boxed{6\sqrt{3}}$

9. $8\sqrt{5} - \sqrt{45} - \sqrt{80}$

$8\sqrt{5} - 3\sqrt{5} - 4\sqrt{5}$

$\boxed{\sqrt{5}}$

10. $\sqrt{2}(\sqrt{1} - \sqrt{10})$

$\sqrt{2} - \sqrt{20}$

$\boxed{\sqrt{2} - 2\sqrt{5}}$

$\boxed{9\sqrt{10} + 4\sqrt{15} - 5\sqrt{10}}$

11. $\sqrt{810} + \sqrt{240} - \sqrt{250}$

$2\,|\,405 \quad 2\,|\,120 \quad 10\cdot25$

$5\,|\,81 \quad 2\,|\,60$

$2\,|\,30$

$3\,|\,15$

12. $6\sqrt{20} + 8\sqrt{5} - 5\sqrt{45}$ $= \boxed{5\sqrt{5}}$

$6(2)\sqrt{5} + 8\sqrt{5} - 5(3)\sqrt{5}$

$12\sqrt{5} + 8\sqrt{5} - 15\sqrt{5}$

13. $8\sqrt{48} - 6\sqrt{75} + 7\sqrt{80}$

$8(4)\sqrt{3} - 6(5)\sqrt{3} + 7(4)\sqrt{5}$

$32\sqrt{3} - 30\sqrt{3} + 28\sqrt{5}$

$\boxed{2\sqrt{3} + 28\sqrt{5}}$

14. $\sqrt[4]{3}(\sqrt[4]{27} - \sqrt[4]{16})$

$\sqrt[4]{3\cdot3^3} - \sqrt[4]{3\cdot4^2}$

$\boxed{3 - \sqrt[4]{48}}$

15. $5\sqrt[3]{32} + 2\sqrt[3]{108} + \sqrt[3]{192} = 4\sqrt[3]{3}$

$2\,|\,16 \quad 2\,|\,54 \quad 2\,|\,96$

$2\,|\,8 \quad 3\,|\,27 \quad 2\,|\,48$

$2\,|\,4 \quad 3\,|\,9 \quad 2\,|\,24$

$2\,|\,12$

$5(2)\sqrt[3]{4} + 2(3)\sqrt[3]{4} + 4\sqrt[3]{3} = \boxed{16\sqrt[3]{4} + 4\sqrt[3]{3}}$

2 ART

16. $\sqrt[4]{48} + \sqrt[4]{162} + \sqrt[4]{256}$

$2\sqrt[4]{3} + 3\sqrt[4]{3} + 4$

$\boxed{5\sqrt[4]{3} + 4}$

Name: key Per: _____

T 6-6: I can solve equations containing radicals.

_/5

Solve the following equations. **VERIFY all solutions**. Solutions that don't work with a box around them are considered incorrect! Box your answer!

1. $2\sqrt{4x+8}-4=8$

$\frac{2\sqrt{4x+8}}{2}=\frac{12}{2}$

$(\sqrt{4x+8})^2=(6)^2$

$4x+8=36$

$-8 \quad -8$

$4x=28$

$\boxed{x=7}$

$2\sqrt{28+8}-4=8$

$12-4=8$

$8=8$ ✓

2. $(\sqrt{3x+1})^2=(\sqrt{5x}-1)^2$

$x=0$ or $\boxed{x=5}$

$(\sqrt{5x}-1)(\sqrt{5x}-1)$

$5x-\sqrt{5x}-\sqrt{5x}+1$

$5x-2\sqrt{5x}+1$

$3x+1=5x-2\sqrt{5x}+1$

$+2\sqrt{5x} \quad -3x-1 \quad -3x+2\sqrt{5x} \quad -1$

$\frac{2\sqrt{5x}}{2}=\frac{2x}{2}$

$(\sqrt{5x})^2=x^2$

$5x=x^2$

$0=x^2-5x$

$0=x(x-5)$

3. $3+2x\sqrt{3}=5$

$-3 \quad -3$

$\frac{2x\sqrt{3}}{2\sqrt{3}}=\frac{2}{2\sqrt{3}}$

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

$\boxed{x=\frac{\sqrt{3}}{3}}$ ✓

4. $(9x-11)^{\frac{1}{2}}=(x+1)^2$

$9x-11=x^2+2x+1$

$-9x+11 \quad -9x+11$

$0=x^2-7x+12$

$0=(x-3)(x-4)$

$\boxed{x=3 \text{ or } x=4}$

12 | -7

-3 | -4

$(9(3)-11)^{\frac{1}{2}}=3+1$

$4=4$ ✓

$(9(4)-11)^{\frac{1}{2}}=4+1$

$5=5$ ✓

5. $\sqrt{5-x}-4=6$

$\sqrt{5-x}^2=10^2$

$5-x=100$

$-x=95$

$\boxed{x=-95}$

$\sqrt{5-(-95)}-4=6$

$\sqrt{100}-4=6$

$10-4=6$ ✓

6. $\sqrt{2x+1}+\sqrt{x}=5$

UGLY ONE

$\sqrt{2x+1}^2=(5-\sqrt{x})^2$

$2x+1=25-5\sqrt{x}-5\sqrt{x}+x$

$-x \quad -25 \quad -25 \quad -x$

$(x-24)^2=(-10\sqrt{x})^2$

$x^2-48x+576=100x$

$x^2-148x+576=0$

$(x-144)(x-4)=0$

$x=144 \quad \boxed{x=4}$

7. $(3x+1)^{\frac{1}{3}}+5=0$

$-5 \quad -5$

$(3x+1)^{\frac{1}{3}3}=-5^3$

$3x+1=-125$

$3x=-126$

$\boxed{x=-42}$ ✓

8. $\sqrt[4]{2x+1}-3=0$

$\sqrt[4]{2x+1}^4=3^4$

$2x+1=81$

$2x=80$

$\boxed{x=40}$ ✓

9. $5+\sqrt{9x}=4$

You can't add a pos # to a pos # and get 4 :)

$\sqrt{9x}^2=-1^2$

$\frac{9x}{9}=\frac{1}{9}$

$x=\frac{1}{9}$

$5+\sqrt{9(\frac{1}{9})}=4$

$5+\sqrt{1}=4$

$5+1\neq 4$

No Solution

10. $3+5x^{\frac{1}{2}}=0$

$5x^{\frac{1}{2}}=-3$

$x^{\frac{1}{2}2}=-\frac{3}{5}^2$

$x=\frac{9}{25}$

$3+5\sqrt{\frac{9}{25}}=6\neq 0$

NO SOLUTION

11. $(2\sqrt{2x-7})^2=(\sqrt{2x+2})^2$

$4(2x-7)=2x+2$

$8x-28=2x+2$

$-2x+28 \quad -2x \quad +28$

$\frac{6x}{6}=\frac{30}{6}$

$\boxed{x=5}$ ✓

12. $\sqrt{2x^2+5x}^2=(-x-10)^2$

$(-x-10)(-x-10)$

$x^2+10x+10x+100$

$2x^2+5x=x^2+20x+100$

$-x^2-20x-100 \quad -x^2-20x-100$

$x^2-15x-100=0$

$(x-20)(x+5)=0$

$x=20 \quad x=-5$

-100 | -15

-20 | 5

$30\neq -30$

$5\neq -5$

NO SOLUTION!