Name: _____ Period: Key

SM2H Unit 2 - Rational Exponents and Radicals Review

Simplify the following expressions. Your answers should contain only positive exponents.

1. $4a^{-3} \cdot 2a^2r^4$

$8a^{-3+2} \cdot r^4$

$8a^{-1} \cdot r^4 = \boxed{\frac{8r^4}{a}}$

2. $\frac{2}{1}\frac{18y^{-5}}{9y^2}$

$\frac{2}{y^{2+5}} = \boxed{\frac{2}{y^7}}$

3. $\left(3x^{-3}\right)^{-3} = \frac{1}{(3x^3)^3} = \boxed{\frac{1x^9}{27}}$ or $\boxed{\frac{x^9}{27}}$

4. $a^{\frac{1}{4}} \cdot a^{\frac{2}{3}}$

$a^{\frac{1}{4}+\frac{3}{3}} = \boxed{a^{\frac{11}{12}}}$

5. $\frac{p^1}{p^{\frac{1}{9}}} = p^{1-\frac{1}{9}}$

$= \boxed{p^{\frac{8}{9}}}$

6. $\left(x^{\frac{2}{7}}\right)^{-\frac{3}{4}} = x^{\frac{-6}{28}} = x^{-\frac{3}{14}}$

$= \boxed{\frac{1}{x^{3/14}}}$

Simplify each radical expression.

7. $\sqrt{324x^5y^4}$

$\sqrt{324x^4xy^4}$

perfect square

$\boxed{18xy^2\sqrt{x}}$

8. $3\sqrt{56x^5y^2}$

$3\sqrt{4 \cdot 14x^4xy^2}$

$3 \cdot 2x^2y\sqrt{14x}$

$\boxed{6x^2y\sqrt{14x}}$

9. $\sqrt[3]{40x^3y^8}$

$\sqrt[3]{8 \cdot 5x^3y^6y^2}$

$\boxed{2xy^2\sqrt[3]{5y^2}}$

10. $\sqrt{-64}$

$\boxed{8i}$

Rewrite each expression in radical form, then simplify if possible.

11. $4^{\frac{5}{2}}$

$\left(\sqrt[2]{4}\right)^5 = 2^5 = \boxed{32}$

12. $2(ab)^{\frac{2}{7}}$

$\boxed{2\sqrt[7]{(ab)^2} \text{ or } 2\sqrt[7]{a^2b^2}}$ or $\boxed{2\left(\sqrt[7]{ab}\right)^2}$

Rewrite each expression using a rational exponent.

13. $\sqrt[4]{7r}$

$\boxed{(7r)^{1/4}}$

14. $9\sqrt[3]{x^7}$

$\boxed{9x^{7/3}}$

OR $\boxed{9(x)^{7/3}}$

Rewrite using rational exponents, use the rules of exponents to simplify, then write your answer in radical form.

15. $\sqrt[8]{r^4} = r^{4/8} = r^{1/2} = \sqrt{r}$

$= \boxed{\sqrt{r}}$

16. $\sqrt[5]{t^4} \cdot \sqrt[10]{t} = t^{4/5} \cdot t^{1/10} = t^{4/5 + 1/10}$

$= t^{9/10}$

$= \boxed{\sqrt[10]{t^9}}$

Add or subtract and simplify.

17. $\sqrt{75} - 5\sqrt{3}$

$\sqrt{25 \cdot 3} - 5\sqrt{3}$

$5\sqrt{3} - 5\sqrt{3} = \boxed{0}$

18. $2\sqrt{45} - 9\sqrt{3} + 3\sqrt{20}$

$\sqrt{9 \cdot 5}$ $\sqrt{4 \cdot 5}$

$2 \cdot 3\sqrt{5} - 9\sqrt{3} + 3 \cdot 2\sqrt{5}$

$6\sqrt{5} - 9\sqrt{3} + 6\sqrt{5}$

$\boxed{12\sqrt{5} - 9\sqrt{3}}$

19. $\sqrt{7} + \sqrt{28} - \sqrt{63}$

$\sqrt{4 \cdot 7}$ $\sqrt{9 \cdot 7}$

$1\sqrt{7} + 2\sqrt{7} - 3\sqrt{7} = \boxed{0}$

20. $(-9 + 5i) + (12 + 6i)$

$\boxed{3 + 11i}$

21. $(5 - i) + (+6 + 12i)$

$\boxed{11 - 13i}$

Multiply and simplify.

22. $4\sqrt{3}(5 + \sqrt{6})$

$20\sqrt{3} + 4\sqrt{18}$

$\sqrt{9 \cdot 2}$

$20\sqrt{3} + 4 \cdot 3\sqrt{2}$

$\boxed{20\sqrt{3} + 12\sqrt{2}}$

23. $(5 + \sqrt{3})(5 - \sqrt{3})$

$25 - 5\sqrt{3} + 5\sqrt{3} - \sqrt{9}$

$25 - 3 = \boxed{22}$

24. $\sqrt{-30} \cdot \sqrt{-100}$

$i\sqrt{30} \cdot 10i$

$10i^2\sqrt{30}$

$10(-1)\sqrt{30}$

$\boxed{-10\sqrt{30}}$

25. $7i(11 - 6i)$

$77i - 42i^2$

$77i - 42(-1)$

$77i + 42$ switch order

$\boxed{42 + 77i}$

26. $(-7i)(-8 + 9i)$

$56i - 63i^2$

$56i - 63(-1)$

$56i + 63$

$\boxed{63 + 56i}$

27. $(-6 - 2i)^2$ rewrite

$(-6 - 2i)(-6 - 2i)$

$36 + 12i + 12i + 4i^2$

$36 + 24i + 4(-1)$

$36 + 24i - 4$

$\boxed{32 + 24i}$

Simplify.

28. $\frac{5\sqrt{5}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{5\sqrt{15}}{\sqrt{9}}$

$= \boxed{\frac{5\sqrt{15}}{3}}$

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

$\frac{8+4\sqrt{5}+2\sqrt{7}+\sqrt{35}}{4-5} = \frac{8+4\sqrt{5}+2\sqrt{7}+\sqrt{35}}{-1}$

$= \boxed{-8-4\sqrt{5}-2\sqrt{7}-\sqrt{35}}$

30. $\frac{(6-5i)(6-3i)}{(6+3i)(6-3i)} = \frac{36-18i-30i+15i^2}{36-18i+18i-9i^2}$

$36-9(-1)$

$= \frac{36-48i+15(-1)}{45} = \frac{21-48i}{45} \overset{\div 3}{\underset{\div 3}{}} = \boxed{\frac{7-16i}{15}}$

Simplify.

31. $(8w^2+8w)+(14w^2+w)$

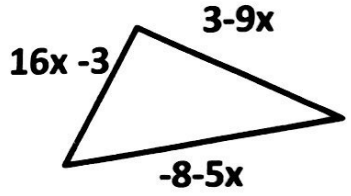
$\boxed{-6w^2+7w}$

32. $(6x+6)(7x-3)$

$42x^2-18x+42x-18$

$\boxed{42x^2+24x-18}$

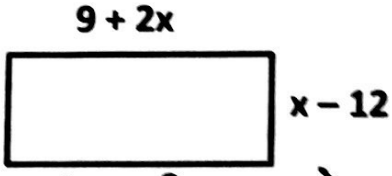
33. Find the perimeter.



$16x-3+3-9x-8-5x$

$\boxed{2x-8}$

34. Find the area.



$(9+2x)(x-12)$

$9x-108+2x^2-24x$

$\boxed{2x^2-15x-108}$