Advanced Algebra   Name_____ hr_____

Exponent Rules and Shortcuts Practice- Yellow 2021 FOUNDATIONAL

MULTIPLYING LIKE BASES   Shortcut: $b^m b^n = b^{m+n}$

DIVIDING LIKE BASES   Shortcut: $\dfrac{b^m}{b^n} = b^{m-n}$

PARENTHESIS EXPONENTS   Shortcut: $(ab)^n = a^n b^n$ and $(b^m)^n = b^{m \cdot n}$

NEGATIVE EXPONENTS   Shortcuts: $b^{-m} = \dfrac{1}{b^m}$ and $\dfrac{a^{-n}}{b^{-m}} = \dfrac{b^m}{a^n}$

ZERO EXPONENTS   Shortcut: $b^0 = 1$

Use the shortcuts to simplify these expressions. They should be quick one-step problems.
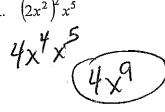
1. $b^2 b^6$ b^8

2. $\dfrac{x^2}{x}$ x

3. $(2f)^{10}$ $2^{10} f^{10}$

4. $r^{-2} s^7$ $\dfrac{s^7}{r^2}$

5. $\dfrac{a^{15}}{a^{13}}$ a^2

6. $(2xy^2)^0$ 1

7. $(x^5)^6$ x^{30}

8. $\dfrac{x^9}{x^3}$ x^6

9. $(xy)^6$ $x^6 y^6$

10. $x^7 x^7 x^0$ x^{14}

11. x^{-3} $\dfrac{1}{x^3}$

12. x^0 1

13. $a^7 a^{-3}$ a^4

14. $(a^2)^9$ a^{18}

15. $a^4 b^{-3}$ $\dfrac{a^4}{b^3}$

16. $(a^2 bc^7)^{11}$ $a^{22} b^{11} c^{77}$

17. m^{-1} $\dfrac{1}{m}$

18. y^0 1

19. $a^{10} b^{-2} c^{-5}$ $\dfrac{a^{10}}{b^2 c^5}$

Use two of the rules together to simplify these expressions.

1. $\left(2x^2\right)^2 x^5$

$4x^4 x^5$

$4x^9$

2. $\left(a^3 b^2\right)^7 ab^3$

$a^{21} b^{14} ab^3$

$a^{22} b^{17}$

3. $\dfrac{\left(a^3 b^2\right)^7}{ab^3}$

$\dfrac{a^{21} b^{14}}{ab^3}$

$a^{20} b^{11}$

4. $\dfrac{\left(2x^2\right)^2}{x^5}$

$\dfrac{4x^4}{x^5}$

$\dfrac{4}{x}$

5. $x^4 y^2 z^3 x^{-2} y^3 z^7$

$x^3 y^5 z^{10}$

$\dfrac{y^5 z^{10}}{x^3}$

6. $a^5 b^7 c^3 a^{-4} b^3 c^{-7}$

$\dfrac{ab^{10}}{c^4}$

7. $\left(x^2 y^4\right)^{-2}$

$x^{-4} y^{-8}$

$\dfrac{1}{x^4 y^8}$

8. $\left(a^4 b^9\right)^{-10}$

$a^{-40} b^{-90}$

$\dfrac{1}{a^{40} b^{90}}$

9. $\left(\dfrac{a^6}{2b}\right)^3$

$\dfrac{a^{18}}{8 b^3}$

10. $\dfrac{4w^{-11} y^{-3}}{16w^{-51} y^7}$

$\dfrac{w^{40}}{4 y^{10}}$

$\dfrac{w^{51}}{4 w^{11} y^7 y^3}$