480/81
HW

CH 6 TEST REVIEW WS

Name KEY

Date _____ Period ____

Properties of Exponents:

1. $(18x^2y^4z^8)(-2x^4y^6z^8)$

$-36x^6y^{10}z^{16}$

2. $\dfrac{(-4x^{-3}yz^2)^3}{2x^4y^7z^{-9}}$

$\dfrac{-64x^{-9}y^3z^6}{2x^4y^7z^{-9}}$

$\dfrac{-32z^{15}}{x^{13}y^4}$

3. $\left(\dfrac{5x^{10}}{25x^6}\right)^2$

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

$\dfrac{x^8}{25}$

4. $\left(\dfrac{8a^4b^{12}}{32a^{10}b^3}\right)^{-2}$

$\left(\dfrac{b^9}{4a^6}\right)^{-2}$

$\dfrac{16a^{12}}{b^{18}}$

5. $(-3a^2b^{-3})^0(9a^{-1}b^2)(-3a^4b^{-3})^2$

$1\cdot\dfrac{9b^2}{a}\cdot\dfrac{9a^8}{b^6}$

$\dfrac{81a^7}{b^4}$

Rational Exponents without a Calculator and Radical Expressions with Rational Exponents:

6. $\sqrt{8}\cdot\sqrt[3]{16}$

$\sqrt{2^3}\cdot\sqrt[3]{2^4}$

$(2^3)^{\frac{1}{2}}\cdot(2^4)^{\frac{1}{3}}$

$2^{3/2}\cdot2^{4/3}$

$2^{\frac{9}{6}+\frac{8}{6}}$

$2^{\frac{17}{6}}$

7. $\sqrt[3]{9}\cdot\sqrt[4]{9}$

$\sqrt[3]{3^2}\cdot\sqrt[4]{3^2}$

$(3^2)^{\frac{1}{3}}\cdot(3^2)^{\frac{1}{4}}$

$3^{2/3}\cdot3^{1/2}$

$3^{4/6+3/6}$

$3^{7/6}$

8. $(16x^4y^{-6}z^8)^{\frac{3}{4}}$

$(2^4)^{\frac{3}{4}}x^3y^{-9/2}z^6$

$\dfrac{8x^3z^6}{y^{9/2}}$

9. $\dfrac{(-27x^6y)^{\frac{2}{3}}}{(3xy^5)^{-\frac{1}{3}}}$

$\dfrac{((-3)^3x^6y)^{2/3}}{3^{-1/3}x^{-1/3}y^{-5/3}}$

$(-3)^2x^4y^{2/3}\cdot3^{1/3}x^{1/3}y^{5/3}$

$3^{7/3}x^{13/3}y^{7/3}$

10. $(81a^2b)^{\frac{3}{4}}(8a^4b^{-7})^{\frac{1}{3}}$

$(3^4)^{3/4}a^{3/2}b^{3/4}\cdot(2^3)^{1/3}a^{4/3}b^{-7/3}$

$3^3a^{\frac{3}{2}+\frac{4}{3}}b^{\frac{3}{4}+\frac{-7}{3}}\cdot2$

$54a^{17/6}b^{-19/12}$

$\dfrac{54a^{17/6}}{b^{19/12}}$

11. $\sqrt[5]{\left(\dfrac{-243a^{10}b^{-5}}{32ab^3}\right)}$

$\left(\dfrac{(-3)^5a^9}{2^5b^8}\right)^{\frac{1}{5}}$

$\dfrac{-3a^{9/5}}{2b^{8/5}}$

12. $\sqrt[3]{125x^9y^{-12}z^{10}}$

$(5^3x^9y^{-12}z^{10})^{\frac{1}{3}}$

$\dfrac{5x^3z^{10/3}}{y^4}$

Solving Rational Equations

13. $\frac{1}{x^3} = \frac{27}{64}$

$x^{-3} = \left(\frac{3}{4}\right)^3$

$\left(x^{-3}\right)^{-\frac{1}{3}} = \left(\left(\frac{3}{4}\right)^3\right)^{-\frac{1}{3}}$

$x = \frac{4}{3}$

14. $32^{x+3} = 64^{x-4}$

$\left(2^5\right)^{x+3} = \left(2^6\right)^{x-4}$

$5x+15 = 6x-24$

$-x = -39$

$x = 39$

15. $9^{-x} = 243$

$\left(3^2\right)^{-x} = 3^5$

$-2x = 5$

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

16. $\sqrt{7}^{x-6} = \left(\frac{1}{49}\right)^x \cdot 7^{x+4}$

$\left(7^{\frac{1}{2}}\right)^{x-6} = \left(7^{-2}\right)^x \cdot 7^{x+4}$

$\frac{1}{2}x - 3 = -2x + x + 4$

$\frac{3}{2}x = 7$

$x = \frac{14}{3}$

Graphing Rational Equations

17. Sketch the graph of $y = 2^x - 8$.

x	y
-2	-7.75
-1	$-\frac{15}{2}$
0	-7
1	-6
2	-4

$2^x - 8 = 0$

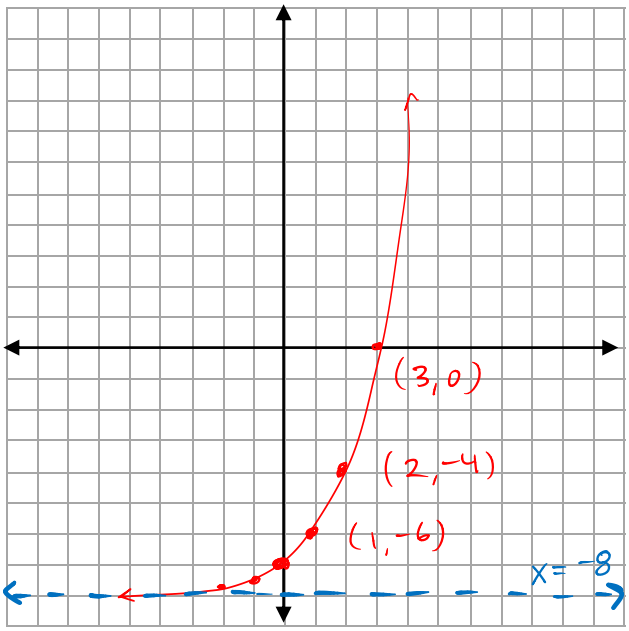
$2^x = 8$

$x = 3$

x-int: $(3, 0)$ y-int: $(0, -7)$

Domain: $\mathbb{R}$ Range: $y > -8$

Asymptote: $y = -8$



18. Sketch the graph of $y = -\left(\frac{1}{3}\right)^x + 9$.

$y = -(3)^{-x} + 9$

x	y
-2	0
-1	6
0	8
1	$8\frac{2}{3}$
2	$8\frac{8}{9}$

x int: $0 = -(3)^{-x} + 9$

$-9 = -(3)^{-x}$

$9 = 3^{-x}$

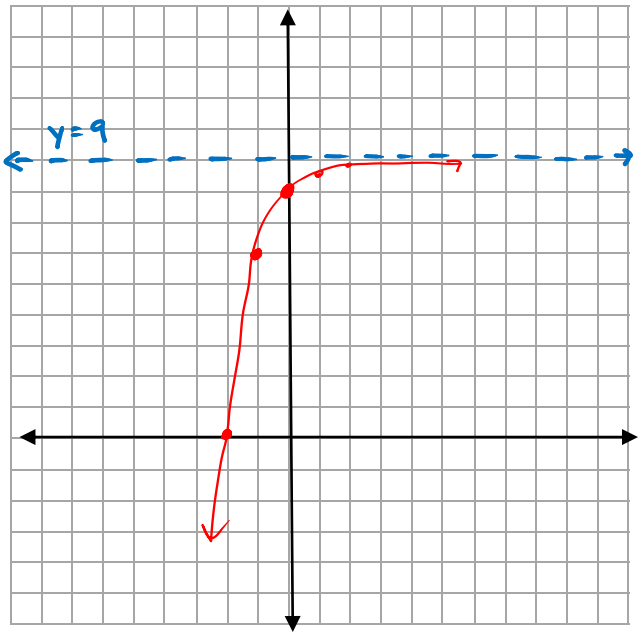
$3^2 = 3^{-x}$

$x = -2$

x-int: $(-2, 0)$ y-int: $(0, 8)$

Domain: $\mathbb{R}$ Range: $y < 9$

Asymptote: $y = 9$



Exponential Models

19. You deposit $1000 into a CD that pays 3.5% annual interest compounded yearly. After you graduate from college you decide to take out the money.

a) How much is in your account in 8 years? x = # of years y = account balance

$y = 1000(1+.035)^x$ $y = 1000(1.035)^8$ $\$1316.80$

b) When will you double your money?

$2000 = 1000(1.035)^x$

$2 = 1.035^x$

↳ next chapter!

$y_1 = 1000(1.035)^x$ 2nd calc: intersect

$y_2 = 2000$ (20.15, 2,000)

$\approx$ 20 years & 2 months

20. You owe $895 to your parents after borrowing it to purchase a new car. Every month you pay back 10% of the remaining total and there is no interest because your parents are nice to you.

a) After 1 year, how much do you still owe? x = # of months y = account balance

$y = 895(1-.1)^x$ $y = 895(.9)^{12}$

$\approx \$252.77$

b) When you pay your balance down to $50, you plan to pay off your loan. When will you have $50 left to pay?

$50 = 895(.9)^x$ $y_1 = 895(.9)^x$ 2nd calc: intersect

$y_2 = 50$ (27.38, 50)

after $\approx$ 27.38 months

Writing Exponential Equations

Assuming the data represents an exponential function, calculate 2 values larger and smaller than the data. Then find the equation that represents the data.

21.

x	y
-4	$\frac{1}{972}$
-2	$\frac{1}{54}$
0	$\frac{1}{3}$
2	6
4	108
6	1944

$y = \frac{1}{3}(b)^x$

$6 = \frac{1}{3}(b)^2$

$18 = b^2$

$b = 3\sqrt{2}$

$y = \frac{1}{3}(3\sqrt{2})^x$

22.

x	y
-15	32
-12	8
–9	2
–6	$\frac{1}{2}$
-3	$\frac{1}{8}$
0	$\frac{1}{32}$

$y = \frac{1}{32}(b)^x$

$\frac{1}{8} = \frac{1}{32}(b)^{-3}$

$4 = b^{-3}$

$4^{-\frac{1}{3}} = (b^{-3})^{-\frac{1}{3}}$

$4^{-\frac{1}{3}} = b$

$y = \frac{1}{32}\left(\frac{1}{\sqrt[3]{4}}\right)^x$

Naming the Type of Function

Determine the type of function and write the equation of the function represented by the data.

23.

x	y
–7	18
–4	13
–1	8
2	3
5	–2
8	–7

+3, +3, +3, +3, +3 → −5, −5, −5, −5

Linear!

$m = \frac{-5}{3}$

$y - 3 = -\frac{5}{3}(x - 2)$

$y - 3 = -\frac{5}{3}x + \frac{10}{3}$

$y = -\frac{5}{3}x + \frac{19}{3}$

24.

x	y
–3	22
–2	–1
–1	–14
0	–17
1	–10
2	7

+1 → −23, −13, −3, +7, +17 → +10, +10, +10

Quadratic!

y int: (0, −17), no vertex

(1, −10)

(2, 7)

$-17 = 0a + 0b + c$

$-10 = 1a + 1b + c$

$7 = 4a + 2b + c$

$A = \begin{bmatrix} 0 & 0 & 1 & -17 \\ 1 & 1 & 1 & -10 \\ 4 & 2 & 1 & 7 \end{bmatrix}$

$\text{rref } A = \begin{bmatrix} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & -17 \end{bmatrix}$

$y = 5x^2 + 2x - 17$

25.

x	y
–6	–576
–4	–144
–2	–36
0	–9
2	–2.25
4	–.5625

+2, +2, +2, +2, +2 → ×¼, ×¼, ×¼, ×¼, ×¼

Exponential!

$y = a(b)^x$ $\quad a = -9$

$y = -9(b)^x$ plug in (2, −2.25)

$-2.25 = -9(b)^2$

$\frac{1}{4} = b^2$

$b = \frac{1}{2}$

$y = -9\left(\frac{1}{2}\right)^x$