Algebra 313
Chapter 8 Review

Name KEY

Simplify:

1) 2^{-3}

$\frac{1}{2^3}$

$\frac{1}{8}$

2) 5^0

1

3) $\frac{1}{4^{-3}}$

4^3

64

4) $5x^{-7}$

$\frac{5}{x^7}$

5) $2a^4b^{-1}c^{-9}$

$\frac{2a^4}{bc^9}$

6) $6x^5x^4$

$6x^9$

7) 4^34^{-1}

$\frac{4^3}{4^1}$

4^2

16

8) $\frac{1}{x^{-4}y^5}$

$\frac{x^4}{y^5}$

9) $(4p^5q^{-3})(8pq^{-2})$

$32p^6q^{-5}$

$\frac{32p^6}{q^5}$

10) $2^{-7}2^02^4$

2^{-3}

$\frac{1}{2^3}$

$\frac{1}{8}$

11) $(-7a^3b^{-5})(2a^4b^2)$

$-14a^7b^{-3}$

$\frac{-14a^7}{b^3}$

12) $(k^5)^{-2}$

K^{-10}

$\frac{1}{K^{10}}$

13) $(v^{-6})^{-2}$

y^{12}

14) $(3x^5)^2$

$3^2x^{5\cdot 2}$

$9x^{10}$

15) $(2ab^8z^2)^4$

$2^4a^4b^{8\cdot 4}z^{2\cdot 4}$

$16a^4b^{32}z^8$

16) $x^3(x^{-2})^{-7}$

x^3x^{14}

x^{17}

CH.8 Review

Simplify:

17) $\frac{a^4}{a}$

a^3

18) $\frac{x^8y^3}{x^{-5}y}$

$x^{13}y^2$

19) $\left(\frac{x^{12}}{x^5}\right)^2$

$\frac{x^{24}}{x^{10}}$

x^{14}

20) $\left(\frac{a^3}{b^{-7}}\right)^3$

$\frac{a^9}{b^{-21}}$

a^9b^{21}

21) $\frac{n^{-4}}{n^{-8}}$

n^4

22) $\left(\frac{3}{2}\right)^3$

$\frac{9}{4}$

23) $\left(\frac{2a^{-5}b^4}{c^2}\right)^4$

$\frac{16a^{-20}b^{16}}{c^8}$

$\frac{16b^{16}}{a^{20}c^8}$

24) $\frac{a^6b^{-3}c^{-7}}{a^2b^{-7}c^3}$

$a^4b^4c^{-10}$

$\frac{a^4b^4}{c^{10}}$

25) $(5y^{19})^0$

1

26) $\frac{x^8y}{x^3y^5}$

x^5y^{-4}

$\frac{x^5}{y^4}$

27) $\frac{p^3}{p^{13}}$

p^{-10}

$\frac{1}{p^{10}}$

28) $\left(\frac{r^5s^{-3}}{rs^{-3}}\right)^{-4}$

$\frac{r^{-20}\cancel{s^{12}}}{r^{-4}\cancel{s^{12}}}$

r^{-16}

$\frac{1}{r^{16}}$

CH.8 Review

Write each number in Standard Notation:

29) 5×10^{3} 30) 8.2×10^{-2} 31) 7.3×10^{6} 32) 9.26×10^{-8}

5,000 0.082 7,300,000 0.0000000926

Write each number in Scientific Notation: * Move NEW → OLD *

33) 9,800 34) 0.023 35) 123,000,000 36) 0.000409

9.8×10^{3} 2.3×10^{-2} 1.23×10^{8} 4.09×10^{-4}

Simplify:

37) $\frac{9.6\times10^{7}}{1.2\times10^{3}}$ 38) $\frac{2\times10^{13}}{16\times10^{4}}$ 39) $\frac{2.3\times10^{3}}{6.9\times10^{7}}$ 40) $\frac{16.2\times10^{10}}{14.4\times10^{7}}$

$0.125\times10^{9-1}$ (−1) $0.33\overline{3}\times10^{-4-1}$ (−1)

8×10^{4} 1.25×10^{8} 3.33×10^{-5} 1.125×10^{3}

41) $(2\times10^{3})(3.5\times10^{6})$ 42) $(4\times10^{4})(3.3\times10^{-6})$ 43) $(.25\times10^{7})(3\times10^{-3})$ 44) $(7.4\times10^{-6})(3\times10^{-2})$

$13.2\times10^{-2+1}$ (+1) $0.75\times10^{4-1}$ (−1) $22.2\times10^{-8+1}$ (+1)

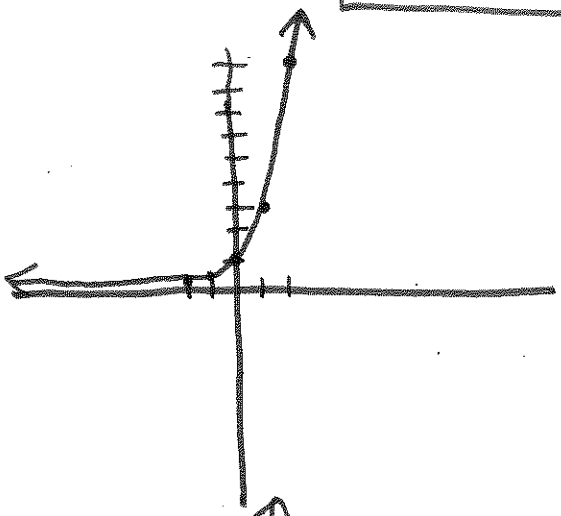
7×10^{9} 1.32×10^{-1} 7.5×10^{3} 2.22×10^{-7}

CH. 8 Review

Graph each function:

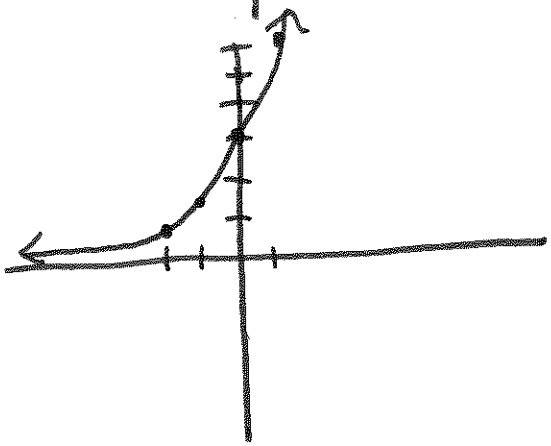
45) $y = 3^x$

x	$y = 3^x$	(x,y)
-2	$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$	$(-2, \frac{1}{9})$
-1	$3^{-1} = \frac{1}{3}$	$(-1, \frac{1}{3})$
0	$3^0 = 1$	$(0, 1)$
1	$3^1 = 3$	$(1, 3)$
2	$3^2 = 9$	$(2, 9)$



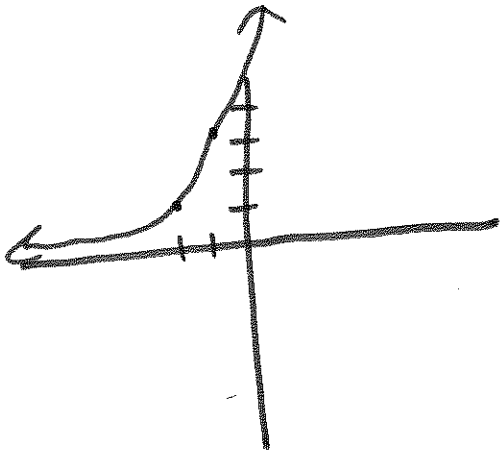
46) $y = 3 \bullet 2^x$

x	$y = 3 \bullet 2^x$	(x,y)
-2	$3 \cdot 2^{-2} = 3 \cdot \frac{1}{4} = \frac{3}{4}$	$(-2, \frac{3}{4})$
-1	$3 \cdot 2^{-1} = 3/2 = 1\frac{1}{2}$	$(-1, 1\frac{1}{2})$
0	$3 \cdot 2^0 = 3 \cdot 1 = 3$	$(0, 3)$
1	$3 \cdot 2^1 = 3 \cdot 2 = 6$	$(1, 6)$
2	$3 \cdot 2^2 = 3 \cdot 4 = 12$	$(2, 12)$



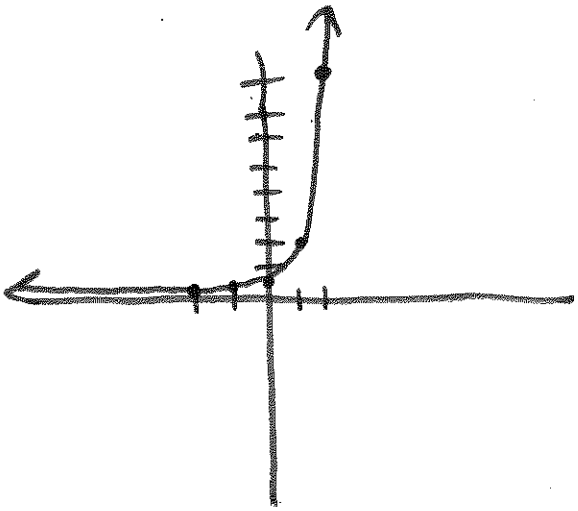
47) $y = 10 \bullet 3^x$

x	$y = 10 \cdot 3^x$	(x,y)
-2	$10 \cdot 3^{-2} = 10/9 = 1\frac{1}{9}$	$(-2, 1\frac{1}{9})$
-1	$10 \cdot 3^{-1} = 10/3 = 3\frac{1}{3}$	$(-1, 3\frac{1}{3})$
0	$10 \cdot 3^0 = 10 \cdot 1 = 10$	$(0, 10)$
1	$10 \cdot 3^1 = 10 \cdot 3 = 30$	$(1, 30)$
2	$10 \cdot 3^2 = 10 \cdot 9 = 90$	$(2, 90)$



48) $y = \frac{1}{2} \bullet 4^x$

x	$y = \frac{1}{2} \cdot 4^x$	(x,y)
-2	$\frac{1}{2} \cdot 4^{-2} = \frac{1}{2(16)} = \frac{1}{32}$	$(-2, \frac{1}{32})$
-1	$\frac{1}{2} \cdot 4^{-1} = \frac{1}{2(4)} = \frac{1}{8}$	$(-1, \frac{1}{8})$
0	$\frac{1}{2} \cdot 4^0 = \frac{1}{2} \cdot 1 = \frac{1}{2}$	$(0, \frac{1}{2})$
1	$\frac{1}{2} \cdot 4^1 = \frac{1}{2} \cdot 4 = 2$	$(1, 2)$
2	$\frac{1}{2} \cdot 4^2 = \frac{1}{2} \cdot 16 = 8$	$(2, 8)$



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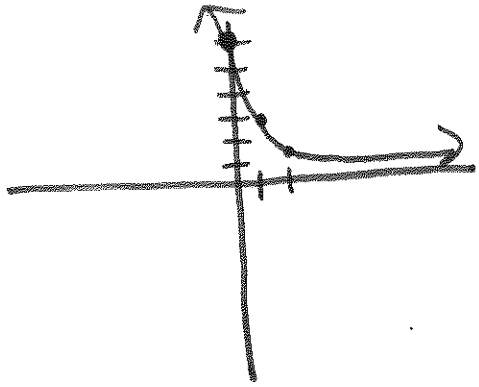
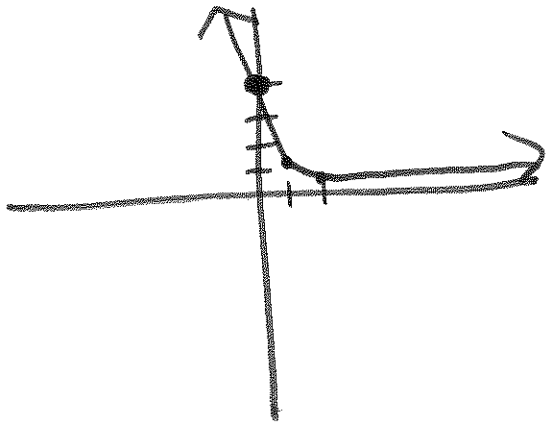
49) $y = 6 \bullet (0.5)^x$

x	$y = 6 \cdot (0.5)^x$	(x,y)
-2	$6 \cdot (0.5)^{-2} = 24$	(-2,24)
-1	$6 \cdot (0.5)^{-1} = 12$	(-1,12)
0	$6 \cdot (0.5)^0 = 6 \cdot 1 = 6$	(0,6)
1	$6 \cdot (0.5)^1 = 3$	(1,3)
2	$6 \cdot (0.5)^2 = 6(.25) = (2, 1.5)$	



50) $y = 4 \bullet \left(\frac{1}{3}\right)^x$

x	$y = 4 \cdot \left(\frac{1}{3}\right)^x$	(x,y)
-2	$4 \cdot \left(\frac{1}{3}\right)^{-2} = 4 \cdot 9 = 36$	(-2,36)
-1	$4 \cdot \left(\frac{1}{3}\right)^{-1} = 4 \cdot 3 = 12$	(-1,12)
0	$4 \cdot \left(\frac{1}{3}\right)^0 = 4 \cdot 1 = 4$	(0,4)
1	$4 \cdot \left(\frac{1}{3}\right)^1 = \frac{4}{3} = 1\frac{1}{3}$	$(1, 1\frac{1}{3})$
2	$4 \cdot \left(\frac{1}{3}\right)^2 = \frac{4}{9}$	$(2, \frac{4}{9})$



51) Suppose one of your ancestors invested \$4000 in 2002 on an account paying 5.5% compounded annually. Write an equation to model the exponential growth of the money. Then find out how much would be in the account by the year 2009.

$y = a \cdot b^x$

$a = 4000$

$b = 100\% + 5.5\% = 105.5\% = 1.055$

$x = 2009 - 2002 = 7$

Equation: $y = 4000(1.055)^7$

2009: \$5818.72

52) Mount Prospect currently (2011) has 52,000 people living in it. Every year the population of Mount Prospect increases by 3%. How many people will be living in Mount Prospect by the year 2018.

$y = a \cdot b^x$

$a = 52{,}000$

$b = 100\% + 3\% = 103\% = 1.03$

$x = 2018 - 2011 = 7$

Equation: $y = 52{,}000(1.03)^7$

2018: $y = 63{,}953$ people

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53) In 2009, the cost of tuition of at Eastern Illinois University is $7000. The cost increases by 17% a year. What will be the cost of the university in 2013.

Growth

$y = a \cdot b^x$

$a = 7000$

$b = 100\% + 17\% = 117\% = 1.17$

$x = 2013 - 2009 = 4$

Equation: $y = 7000(1.17)^4$

2013: $13,117.21

54) The half-life of iodine-131 is 8 days. A patient receives a 400-mCi (start) treatment. How much iodine-131 is left in the patient after 32 days? (9 points)

Decay

$\frac{32 \text{ days}}{8 \text{ days}} = 4$ half-lives

*Divide original # by 2, 4 times

① $\frac{400}{2} = 200$

② $\frac{200}{2} = 100$

③ $\frac{100}{2} = 50$

④ $\frac{50}{2} = 25$

~~Equation~~:

Amount Left: 25 mCi

55) The population of Winton, Minnesota (2011) is 170 people. The population decreases by 22% each year. What will the population be by 2030?

$y = a \cdot b^x$

$a = 170$

$b = 100\% - 22\% = 78\% = 0.78$

$x = 2030 - 2011 = 19$

Decay

Equation: $y = 170(0.78)^{19}$

People Left: 1.5...., OR 1 person

56) The half-life of cesium-134 is 2 years. I have a 2500 mCi (start) sample of cesium-134, how much will I have left in 14 years?

Decay

$\frac{14 \text{ years}}{2 \text{ years}} = 7$ half-lives

*Divide original # by 2, 7 times

⑦ $\frac{39.0625}{2} =$

① $\frac{2500}{2} = 1250$

② $\frac{1250}{2} = 625$

③ $\frac{625}{2} = 312.5$

④ $\frac{312.5}{2} = 156.25$

⑤ $\frac{156.25}{2} = 78.125$

⑥ $\frac{78.125}{2} = 39.0625$

~~Equation~~: 19.53125

Amount Left: 19.5 mCi