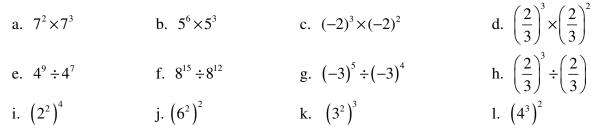
Exponential Review

1. Use the exponent rules to express each of the following as a single power. Then evaluate.



2. Use the exponent rules to express each of the following as a single POSITIVE power. Then evaluate. Express your answers in fractional form.

a.
$$3^4 \times 3^{-3}$$
b. $4^{-2} \times 4^{-3}$ c. $(-5)^{-3} \times (-5)^5$ d. $\left(\frac{2}{3}\right)^{-3} \times \left(\frac{2}{3}\right)^{-2}$ e. $4^{-9} \div 4^{-7}$ f. $3^{-5} \div 3^2$ g. $(-9)^4 \div (-9)^4$ h. $\left(\frac{3}{4}\right)^2 \div \left(\frac{3}{4}\right)^5$ i. $(3^{-2})^4$ j. $(4^2)^{-2}$ k. $(2^{-2})^{-3}$ l. $(7^3)^{-1}$

3. Use the exponent rules to express each of the following as a single POSITIVE power. Then evaluate. Express your answers in fractional form.

a.
$$27^{\frac{2}{3}} \times 27^{\frac{4}{3}}$$
 b. $9^{\frac{3}{2}} \div 9^{3}$ c. $\left(64^{\frac{2}{3}}\right)^{-2}$ d. $\left(\frac{25}{16}\right)^{-\frac{1}{2}} \times \left(\frac{25}{16}\right)^{-1}$

4. Graph the following exponential equations. Then state the domain, range, x and y – intercepts.

a.
$$y = 2(3)^{x}$$
 b. $y = 4\left(\frac{1}{2}\right)^{x}$ c. $y = (2)^{x-5} + 3$ d. $f(x) = -(3)^{-(x+2)} - 1$

5. Today you purchased a 1975 Reggie Jackson baseball card for \$40. It's value increases by 4% every year.

- a. What is the equation that represents the price of the baseball card?
- b. How much is the card worth in 10 years?
- c. How much is the card worth in 30 years?
- d. How much was the card worth 15 years ago?
- e. When will the card be worth \$100?

6. In 1985 there were approximately 1500 beluga whales left in the St. Lawrence Seaway. Its population is decreasing by 2.5% every year.

- a. What is the equation that represents the Beluga Whale population?
- b. How many whales are currently left in the St. Lawrence Seaway?
- c. How many whales were present in 1950?
- d. When will there be only 100 belugas left?

- 7. A bacteria doubles every 25 min. You initially started with 3 bacteria.
- a. What is the equation that models the growth of bacteria?
- b. How many bacteria are there in 75 min?
- c. How many bacteria are there in 150 min?
- d. How many bacteria are there in 4 hours?
- e. When will there be 10 000 bacteria?

8. Plutonium-243 is a radioactive element with a half life of 5 years. Initially there is 800 grams.

- a. What is the equation that models the amount of Plutonium left?
- b. How much plutonium is there after 15 years?
- c. How much plutonium is there after 100 years?
- d. How much plutonium was there 17 years ago?
- e. When will there be 5 grams of plutonium left?

8. Solve the following exponential equations.
a.
$$2^{x+1} = 2^9$$
 b. $3^{x+2} = 3^{-2}$ c. $4^{2x} = 4^8$ d. $3^{-2x+1} = 3^{x-2}$
e. $6^{5x-1} = 6^{11-x}$ f. $3^{3x} = 27$ g. $3^{x-2} = 81$ h. $2^x = \frac{1}{4}$
i. $64^x = \left(\frac{1}{4}\right)^{x+1}$ j. $4^{3x-2} = 32^{x+1}$ k. $16^{2x-5} = 8^{3x+4}$ l. $3^{2x+8} = 9^{-x-2}$
9. Solve for x.
a) $4^{x+1} + 4^x = 160$ d) $10^{x+1} - 10^x = 9000$
b) $2^{x+2} + 2^x = 320$ e) $3^{x+2} + 3^x = 30$
c) $2^{x+2} - 2^x = 96$ f) $4^{x+3} - 4^x = 63$
10. Solve.
a) $49^{x-1} = 7\sqrt{7}$ d) $36^{2x+4} = (\sqrt{1296})^x$
b) $2^{3x-4} = 0.25$ e) $2^{2x+2} + 7 = 71$
c) $\left(\frac{1}{4}\right)^{x+4} = \sqrt{8}$ f) $9^{2x+1} = 81(27^x)$

II. Solve.II. Solve.a)
$$4^x + 6(4^{-x}) = 5$$
II. Learn Mb) $8(5^{2x}) + 8(5^x) = 6$ II. Learn M12. Rewrite each equation in logarithmic form.II. Comparison of the second second

a. $7 = \log_2 128$ b. $x = \log_b n$ c. $\log_3 243 = 5$ d. $\log_b 4 = 19$

- 14. Evaluate.
- a. $\log_2 16$ b. $\log_3 81$ c. $\log_2 32^3$ d. $\log 1000^{-3}$ e. $\log_6 8 + \log_6 27$ f. $\log_4 128 - \log_4 8$ g. $2\log 3 + \log\left(\frac{25}{2}\right)$
- 15. Solve for x, to the thousandths.
- a. $x = \log_3 17$ b. $x = \log_2 0.35$ c. $4^x = 10$ d. $80 = 100 \left(\frac{1}{2}\right)^x$
- e. $\log(2x+10) = 2$ f. $1 \log(2x) = 1$