

## 5.1 In-class Practice

1. Match the expression in **Column I** with its equivalent expression in **Column II**. Choices may be used once, more than once, or not at all.

I	II	I	II	I	II
(a) $8x^0$	A. 0	(a) $4^{-3}$	A. 64	(a) $\left(\frac{2}{5}\right)^{-2}$	A. $\frac{25}{4}$
(b) $-8x^0$	B. 1	(b) $-4^{-3}$	B. -64	(b) $\left(-\frac{2}{5}\right)^{-2}$	B. $-\frac{25}{4}$
(c) $(8x)^0$	C. -1	(c) $(-4)^{-3}$	C. $\frac{1}{64}$	(c) $-\left(\frac{2}{5}\right)^{-2}$	C. $\frac{4}{25}$
(d) $(-8x)^0$	D. 8	(d) $-(-4)^{-3}$	D. $-\frac{1}{64}$	(d) $-\left(-\frac{2}{5}\right)^{-2}$	D. $-\frac{4}{25}$
	E. -8				

2. Simplify each expression so that **no negative exponents** appear in the final result. Assume that all variables represent nonzero real numbers.

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|---|--|
| a) $-8^0 - k^0$   | b) $-4x^{-2}$  |
| c) $\frac{(-3)^{-2}}{2^{-3}}$   | d) $\frac{r^3}{-2r^{-6}}$  |
| e) $\left(\frac{-5n^4}{m^2}\right)^3$   | f) $(3p^{-4})^2(p^3)^{-1}$                                       |
| g) $7k^2(-2k)(4k^{-5})^0$   | h) $(2y^{3m})(-4y^{-9m})$  |
| i) $\frac{(3rs)^{-2}}{3^2r^2s^{-4}}$  | j) $\frac{(3r^{-2})^2r^{-5}}{6r^{-2}r^3}(2r^{-6})^2$             |
| k) $\left(\frac{-3x^4y^6}{15x^{-6}y^7}\right)^{-3}$                                       | l) $\frac{9a^{x-2}}{3a^{2x+2}}$                                  |
| m) $\left(\frac{-6a^{-2}}{5b^{-4}}\right)^2 \left(\frac{2b^{-1}a^2}{3b^{-2}}\right)^{-1}$ | n) $\left[\frac{(-3x^{-2}y^5)^{-3}}{(2x^4y^{-8})^{-2}}\right]^2$ |
| o) $[(-2x^{-4}y^{-2})^{-3}]^{-2}$   | p) $\left(\frac{125a^2b^{-3}}{-5a^4b^{-2}}\right)^{-5}$          |
| r) $(m^{x-b}n^{x+b})^x(m^bn^{-b})^x$  | s) $\frac{25x^{a+b}y^{b-a}}{-5x^{a-b}y^{b+a}}$                   |

3. Write each number in scientific notation.

- |           |                 |
|-----------|-----------------|
| a) 0.0072 | b) -979,000,000 |
|-----------|-----------------|

4. Write each number in standard notation.

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|-------------------------|--------------------|
| a) $5.42 \cdot 10^{-4}$ | b) $-9 \cdot 10^3$ |
|-------------------------|--------------------|

5. Evaluate. Express answers in standard notation.

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|---|---|
| a) $\frac{0.003 \cdot 40,000}{0.00012}$ | b) $\frac{16 \cdot 10^5}{4 \cdot 10^8}$ |
|---|---|

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6. In 2009, the population of Costa Rica was approximately  $4.25 \cdot 10^6$ . The population density was 83.3 people per square kilometer. (Source: The World Factbook.)
  - a) Write the population density in scientific notation.
  - b) To the nearest square kilometer, what is the area of Costa Rica?
  
7. Venus has a nearly circular orbit of the sun. The average distance from the sun to Venus is about  $6.71 \cdot 10^7$  mi. How far does Venus travel in one orbit?