

**Worksheet #5-Review for Unit 3 Test****Do all questions on lined paper without a calculator:****1. Evaluate.**

**a)**  $(-1)^{90}$     **b)**  $-1^{90}$     **c)**  $(-1)^{91}$     **d)**  $(1000)^0$     **e)**  $\left(-\frac{2}{3}\right)^3$     **f)**  $\left(-2\frac{1}{4}\right)^2$     **g)**  $2^{-4}$   
**h)**  $\left(\frac{2}{5}\right)^{-2}$     **i)**  $\frac{1}{4^{-3}}$     **j)**  $(-2)^2 + (-3)^3$     **k)**  $-5(1-8)^0$     **l)**  $\left(\frac{3}{7}\right)^0 - \left(\frac{3}{7}\right)^2$     **m)**  $4^{-1} + 3^{-1} + 6^{-1}$   
**n)**  $\left(\frac{1}{2}\right)^{-1} + \left(\frac{1}{2}\right)^{-2}$     **o)**  $\left(\frac{2}{3} - 1\right)^3$     **p)**  $\left(1\frac{1}{2}\right)^2 - 6^{-2}$     **q)**  $\frac{2^{-3} + 2^{-2}}{4^{-2} - 4^0}$     **r)**  $\frac{3^{-2} - 3^{-3}}{3^{-2} + 3^{-3}}$

**2. Evaluate each expression when  $x = -3$  and  $y = 2$ .**

**a)**  $2x^2 - y^5 - xy$     **b)**  $(x - y)^x$     **c)**  $(x^{-1} + y^{-1})^y$     **d)**  $(2x)^2 y^{-4}$

**3. Simplify to single powers, and then evaluate.**

**a)**  $0.2^3 \times 0.2^4 \div 0.2^5$     **b)**  $\left[\left(\frac{3}{5}\right)^{-2}\right]^{-1}$     **c)**  $4^{-8} \div (4^{-6} \times 4 \times 4^{-2})$     **d)**  $(-6)^5 \div (-6)^{-2} (-6)^{-7}$   
**e)**  $\left(\frac{2}{3}\right)^8 \div \left(\frac{2}{3}\right)^4$     **f)**  $\left(-\frac{1}{4}\right)^2 \div \left(-\frac{1}{4}\right)^{-1}$     **g)**  $\frac{(2^2)^6 \times (2^3)^2}{(2^8)^3}$     **h)**  $\frac{(4^3)^3 (5^{-2})}{(5^2)^{-2} (4^2)^4}$

**4. Simplify to a single power of the indicated base, and then evaluate.**

**a)**  $\frac{25^3 \times 5^2}{125^2}$ , base 5    **b)**  $\frac{27^3 \times 9^{-2}}{81 \times 3^3}$ , base 3

**5. Simplify to a single power of base  $x$ , and then evaluate for  $x = -4$ .**

**a)**  $\frac{(x^4)^5 (x^3)^4}{(x^7)(x^{23})}$     **b)**  $\frac{(3x^{-5})(-2x^{-2})}{-6x^{-4}}$

**6. Simplify using the exponent laws. Express your final answer with only positive exponents, if applicable.**

**a)**  $y^{12} \cdot y^{-13}$     **b)**  $\frac{c^5}{c^{-3}}$     **c)**  $(m^{-3})^{-2}$     **d)**  $\frac{c^5 \times c^8}{c^3 \times c^4}$     **e)**  $x^{-5} \cdot x \div x^2$     **f)**  $(6m^3)^2$     **g)**  $\frac{60x^7 y^4}{-12xy^2}$

**h)**  $\frac{(-3k^2)^3}{(3k^3)^2}$     **i)**  $5n^4(-2n^{-8})$     **j)**  $\left(\frac{3x}{y}\right)^3$     **k)**  $\left(\frac{2x^2}{3y^3}\right)^4$     **l)**  $(-21x^{10}y^{-3}) \div (-3x^{12}y^{-4})$

**m)**  $[6x^2(-2x^5)]^2$     **n)**  $\left(\frac{8a^6b^4}{2a^4b^3}\right)^2$     **o)**  $\left(\frac{9a^2b^3}{3a^5b^{-2}}\right)^{-2}$     **p)**  $(2x^4y^{-2}z^{-5})(3xy^3z^4)^3$

**7. Simplify first using the exponent laws, and then evaluate for  $x = 2$  and  $y = -1$ .**

**a)**  $\frac{(-6x^5y^2)(8x^3y)}{(8x^2y)^2}$     **b)**  $\left(\frac{4^9x^{-18}}{8^6y^{-15}}\right)^{\frac{1}{3}}$

8. Express in standard form.

a)  $3.0 \times 10^5$

b)  $2.4 \times 10^{-6}$

c)  $3.05 \times 10^{-3}$

d)  $6.12 \times 10^9$

9. Express in scientific notation.

a) 0.000 000 12

b) 21 000 000 000

c) 0.000 231

d) 710 000 000 000 000

10. Evaluate using the exponent laws and express the final answer in scientific notation.

a)  $(2 \times 10^{-19})(3 \times 10^8)$

b)  $(9 \times 10^{12}) \div (3 \times 10^5)$

c)  $(3.2 \times 10^{-6}) \div (6.4 \times 10^2)$

d)  $(8 \times 10^5)(3 \times 10^3)$

e)  $(72\,000\,000) \div (0.000\,05)$

f)  $(120\,000\,000\,000)(0.000\,003)$

11. The human body contains about  $3.2 \times 10^{-2}$  litres of blood for each pound of body weight. Each litre of blood contains about  $5 \times 10^{12}$  red blood cells. About how many blood cells are in the body of a 100-pound person?

12. The speed of light in space is  $3 \times 10^8$  km/s. Sirius A, the brightest star in the heavens, is  $8.1 \times 10^{13}$  km from the earth. How many seconds does it take for light to travel from Sirius A to the earth? **Note:**  $time = distance \div speed$

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**Answers**

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1. a) 1   b) -1   c) -1   d) 1   e)  $-\frac{8}{27}$    f)  $5\frac{1}{16}$    g)  $\frac{1}{16}$    h)  $6\frac{1}{4}$    i) 64   j) -23   k) -5   l)  $\frac{40}{49}$    m)  $\frac{3}{4}$

n) 6   o)  $-\frac{1}{27}$    p)  $2\frac{2}{9}$    q)  $-\frac{2}{5}$    r)  $\frac{1}{2}$    2. a) -8   b)  $-\frac{1}{125}$    c)  $\frac{1}{36}$    d)  $2\frac{1}{4}$

3. a) 0.04   b)  $\frac{9}{25}$    c)  $\frac{1}{4}$    d) 1   e)  $\frac{16}{81}$    f)  $-\frac{1}{64}$    g)  $\frac{1}{64}$    h) 100   4. a)  $5^2, 25$    b)  $3^{-2}, \frac{1}{9}$

5. a)  $x^2, 16$    b)  $x^{-3}, -\frac{1}{64}$    6. a)  $\frac{1}{y}$    b)  $c^8$    c)  $m^6$    d)  $c^6$    e)  $\frac{1}{x^6}$    f)  $36m^6$    g)  $-5x^6y^2$    h) -3

i)  $-\frac{10}{n^4}$    j)  $\frac{27x^3}{y^3}$    k)  $\frac{16x^8}{81y^{12}}$    l)  $\frac{7y}{x^2}$    m)  $144x^{14}$    n)  $16a^4b^2$    o)  $\frac{a^6}{9b^{10}}$    p)  $54x^7y^7z^7$

7. a)  $-\frac{3}{4}x^4y, -12$    b)  $\frac{y^5}{x^6}, -\frac{1}{64}$

8. a) 300 000   b) 0.000 002 4   c) 0.003 05   d) 6 120 000 000

9. a)  $1.2 \times 10^{-7}$    b)  $2.1 \times 10^{10}$    c)  $2.31 \times 10^{-4}$    d)  $7.1 \times 10^{14}$

10. a)  $6 \times 10^{-11}$    b)  $3 \times 10^7$    c)  $5 \times 10^{-9}$    d)  $2.4 \times 10^9$    e)  $1.44 \times 10^{12}$    f)  $3.6 \times 10^5$

11.  $1.52 \times 10^{13}$    12.  $2.7 \times 10^5$