p. 305, #47-53 all

47. $(3 \times 10^2)(1.5 \times 10^{-5}) = 3(1.5) \times (10^2)(10^{-5})$

$= 4.5 \times 10^{2+(-5)}$

$= 4.5 \times 10^{-3}$

The product is 4.5×10^{-3}, or 0.0045.

48. $(6.1 \times 10^{-3})(8 \times 10^9) = 6.1(8) \times (10^{-3})(10^9)$

$= 48.8 \times 10^{-3+9}$

$= 4.88 \times 10^1 \times 10^6$

$= 4.88 \times 10^{1+6}$

$= 4.88 \times 10^7$

The product is 4.88×10^7, or 48,800,000.

49. $\dfrac{(6.4 \times 10^7)}{(1.6 \times 10^5)} = \dfrac{6.4}{1.6} \times \dfrac{10^7}{10^5}$

$= 4 \times 10^{7-5}$

$= 4 \times 10^2$

The quotient is 4×10^2, or 400.

50. $\dfrac{(3.9 \times 10^{-5})}{(7.8 \times 10^{-8})} = \dfrac{3.9}{7.8} \times \dfrac{10^{-5}}{10^{-8}}$

$= 0.5 \times 10^{-5-(-8)}$

$= 0.5 \times 10^{-5+8}$

$= 5 \times 10^{-1} \times 10^{3}$

$= 5 \times 10^{-1+3}$

$= 5 \times 10^{2}$

The quotient is 5×10^2, or 500.

51. $\dfrac{4.8 \times 10^{6}}{4 \times 10^{-2}} = \dfrac{4.8}{4} \times \dfrac{10^{6}}{10^{-2}}$

$= 1.2 \times 10^{6-(-2)}$

$= 1.2 \times 10^{6+2}$

$= 1.2 \times 10^{8}$

1.2×10^8, or 120,000,000, red blood cells are produced in the human body per minute.

52. $t = \dfrac{d}{r} = \dfrac{7.8 \times 10^{8}}{3 \times 10^{5}} = \dfrac{7.8}{3} \times \dfrac{10^{8}}{10^{5}}$

$= 2.6 \times 10^{8-5}$

$= 2.6 \times 10^{3}$

So, it takes 2.6×10^3, or 2600 seconds for sunlight to reach Jupiter.

53. Rewrite $(7 \cdot 7)^{-8}$ with a positive exponent to get $(7 \cdot 7)^{-8} = \frac{1}{(7 \cdot 7)^8} < 1$. A number raised to an exponent of 0 is equal to 1, so $(7 \cdot 7)^0 = 1$. And lastly, because $(7 \cdot 7)^5$ already has a positive exponent, $(7 \cdot 7)^5 > 1$.
So, $(7 \cdot 7)^{-8} < (7 \cdot 7)^0 < (7 \cdot 7)^5$.