

10/19/2014

15. (a) $3 \times 10^3 = 3,000 = \text{THREE THOUSAND}$

(b) $6 \times 10^6 = 6,000,000 = \text{SIX MILLION}$

(c) $3.4 \times 10^5 = 340,000 = \text{THREE HUNDRED FOUR THOUSAND}$

(d) $2 \times 10^{-2} = .02 = \text{TWO HUNDREDS}$

(e) $2.1 \times 10^{-4} = .00021 = \text{TWENTY ONE HUNDRED THOUSANDTHS}$

(f) $4 \times 10^{-5} = .00004 = \text{FOUR HUNDRED THOUSANDTHS}$

16. (a) $8 \times 10^2 = 800 = \text{EIGHT HUNDRED}$

(b) $5 \times 10^3 = 5,000 = \text{FIVE THOUSAND}$

(c) $9.6 \times 10^4 = 96,000 = \text{NINETY SIX THOUSAND}$

(d) $2 \times 10^{-3} = .002 = \text{TWO THOUSANDTHS}$

(e) $3.3 \times 10^{-5} = .000033 = \text{THIRTY THREE MILLIONTHS}$

(f) $7.66 \times 10^{-2} = .0766 = \text{SEVEN HUNDRED SIXTY SIX TEN THOUSANDTHS}$

17. (a) $233 = 2.33 \times 10^2$

(b) $126,547 = 1.26547 \times 10^5$

(c) $0.11 = 1.1 \times 10^{-1}$

(d) $9736.23 = 9.73623 \times 10^4$

(e) $124.58 = 1.2458 \times 10^2$

(f) $.8642 = 8.642 \times 10^{-1}$

18. (a) $4327 = 4.327 \times 10^3$

(b) $984.35 = 9.8435 \times 10^2$

(c) $.6045 = 4.5 \times 10^{-3}$

(d) $624.87 = 6.2487 \times 10^2$

(e) $.1357 = 1.357 \times 10^{-1}$

(f) $98.180004 = 9.8180004 \times 10$

19. (a) $(3 \times 10^3) \times (2 \times 10^2) = 6 \times 10^5$

(b) $(4 \times 10^2) \times (3 \times 10^8) = 12 \times 10^{10} = 1.2 \times 10^{12}$

(c) $(3 \times 10^3) + (2 \times 10^2) = 3000 + 200 = 3200 = 3.2 \times 10^3$

(d) $(8 \times 10^{12}) \div (4 \times 10^4) = 2 \times 10^8$

20. (a) $(4 \times 10^7) \times (2 \times 10^8) = 8 \times 10^{15}$

(b) $(3.2 \times 10^5) \times (2 \times 10^4) = 6.4 \times 10^9$

(c) $(4 \times 10^3) + (5 \times 10^2) = 4000 + 500 = 4500 = 4.5 \times 10^3$

(d) $(9 \times 10^{13}) \div (3 \times 10^{10}) = 3 \times 10^3$

21. (a) 10^{35} is 10^9 , or 1 billion, times as large as 10^{26}

(b) 10^{17} " 10^{10} " 10 ONE BILLIONTH'S " 10^{27}

(c) 1 billion " 10^3 " 1 THOUSAND " 1 MILLION

(d) 7 trillion " 10^9 " 1 BILLION " 7 THOUSAND

(e) 2×10^{-6} " 10^3 " 1 THOUSAND " 2×10^{-9}

(f) 6.1×10^{27} " 10^{-2} " 1 ONE HUNDREDTH " 6.1×10^{29}

22. (a) 250 MILLION IS 5×10^{-2} , OR .05, TIMES AS LARGE AS 5 BILLION

(b) 9.3×10^2 IS 3×10^4 , OR 30,000, TIMES AS LARGE AS 3.1×10^{-2}

(c) 10^{-8} IS 5×10^4 , OR 50,000, TIMES AS LARGE AS 2×10^{-13}

(d) 3.5×10^{-2} IS 5×10^5 , OR 500,000, TIMES AS LARGE AS 7×10^{-8}

(e) 1 THOUSAND IS 10^6 , OR 1,000,000, TIMES AS LARGE AS 1 THOUSANDTH

(f) 10^{12} IS 10^{21} , OR 1,000,000,000,000, TIMES AS LARGE AS 10^{-9}

"ONE SEXTILLION"

23. 340 GIGABYTES = $340 \times 10^9 = 3.4 \times 10^{11}$

24. 2608 BILLION = $2608 \times 10^9 = 2.608 \times 10^{12}$

25. 2564 BILLION = $2564 \times 10^9 = 2.564 \times 10^{12}$

26. 2.8 TRILLION = 2.8×10^{12}

27. .000001 = 1×10^{-6}

28. $30 \times 10^{-9} = 3 \times 10^{-8}$

29. (a) $300,000 \times 100 = 3 \times 10^5 \times 10^2 = 3 \times 10^7 = 30,000,000$ (EXACT)

(b) $5.1 \times 10^6 \times 1.9 \times 10^3 \approx 5 \times 10^6 \times 2 \times 10^3 = 10 \times 10^9 = 1 \times 10^{10}$

$\hookrightarrow \approx 9.69 \times 10^9$ (close) 

(c) $(4 \times 10^9) \div (2.1 \times 10^6) \approx (4 \times 10^9) \div (2 \times 10^6) = 2 \times 10^3$

$\hookrightarrow \approx 1.9 \times 10^3$ (close) 

(d) $33 \times 10^6 \times 3.1 \times 10^3 \approx 99 \times 10^9$

$\hookrightarrow \approx 102.3 \times 10^9$ (close)

$$(e) 4,288,364 \div 2132 \approx (4 \times 10^6) \div (2 \times 10^3) = 2 \times 10^3$$

$$\approx 2,009 = 2.009 \times 10^3 \quad (\text{close})$$

$$(f) (6.129845 \times 10^6) \div (2.198 \times 10^4) \approx (6 \times 10^6) \div (2 \times 10^4) = 3 \times 10^2$$

$$\hookrightarrow \approx 279 = 2.79 \times 10^2 \quad (\text{close})$$

30. $(5.6 \times 10^9) \div (2 \times 10^2) = 2.8 \times 10^7$

$$(b) (4 \times 10^{12}) \div (2.6 \times 10^8) \approx 1.5 \times 10^4 \quad (\text{BECAUSE } 2.6 \times 1.5 = 3.9)$$

$$\approx 1.54 \times 10^4 \quad (\text{close})$$

$$(c) 9 \times 10^3 \times 5.5 \times 10^4 = 49.5 \times 10^7 = 4.95 \times 10^8$$

$$\hookrightarrow 9000 \times 54,986 = 494,874,000 = 4.94874 \times 10^8 \quad (\text{close})$$

$$(d) 3 \times 10^9 \div 2.5 \times 10^4 \approx 1 \times 10^5$$

$$\hookrightarrow = 1.2 \times 10^5 \quad (\text{close})$$

$$(e) 6 \times 10^3 \times 3 \times 10^2 = 18 \times 10^5 = 1.8 \times 10^6$$

$$5987 \times 341 = 2,041,567 = 2.041567 \times 10^6 \quad (\text{close})$$

$$(f) (4 \times 10) \div (8 \times 10^2) = .5 \times 10^{-1} = 5 \times 10^{-2}$$

$$43 \div 765 = 0.05620915 \approx 5.6 \times 10^{-2} \quad (\text{close})$$

49. $\frac{2 \text{ cm}}{100 \text{ km}} = \frac{2 \times 10^{-2} \text{ m}}{100 \times 10^3 \text{ m}} = \frac{2 \times 10^{-2} \text{ m}}{1 \times 10^5 \text{ m}} \times \frac{10^2}{10^2}$

$$= \frac{2}{10^7} \quad \text{or}$$

$$2 : 10,000,000$$

$$\text{or } 1 : 5,000,000$$

50. $10 \text{ mi} \times \frac{5280 \text{ ft}}{1 \text{ mi}} \times \frac{12 \text{ in}}{1 \text{ ft}} = 633,600 \text{ in}$

$\Rightarrow \frac{1 \text{ in}}{10 \text{ mi}} = \frac{1 \text{ in}}{633,600 \text{ in}} = \boxed{1:633,600}$

51. $\frac{1 \text{ cm}}{500 \text{ km}} = \frac{1 \times 10^{-2} \text{ m}}{500 \times 10^3 \text{ m}} \times \frac{10^3}{10^2}$

$= \frac{1 \text{ m}}{500 \times 10^5 \text{ m}} = \boxed{1:50,000,000}$

52. Note: $1 \text{ in} \approx 2.54 \text{ cm}$

so $.5 \text{ in} \approx 1.27 \text{ cm}$

$\frac{.5 \text{ in}}{1 \text{ km}} \approx \frac{1.27 \text{ cm}}{1 \text{ km}} = \frac{1.27 \times 10^{-2} \text{ m}}{1 \times 10^3 \text{ m}} \times \frac{10^3}{10^2}$

$= \frac{1.27}{10^5} \quad \boxed{1.27:100,000}$

OR ABOUT $\boxed{1:78,740}$

55. (a) $\frac{1 \times 10^1 \text{ YEARS}}{4.5 \times 10^1 \text{ YEARS}} \times 100 \text{ yd} \approx \boxed{22.2 \text{ yd.}}$

(b) $\frac{1 \times 10^4}{4.5 \times 10^9} \times 100 \text{ yd} \approx \boxed{.000222 \text{ yd}}$

$$60. \frac{1.27 \text{ BILLION DOLLARS}}{1 \text{ Year}} \times \frac{1 \text{ yr}}{365 \text{ DAYS}} \times \frac{1 \text{ DAY}}{24 \text{ HR}} \times \frac{1 \text{ HR}}{60 \text{ MIN}}$$

$$= \frac{1.27 \text{ BILLION DOLLARS}}{525,000 \text{ MIN}} = \frac{1.27 \times 10^9 \text{ DOLLARS}}{5.25 \times 10^5 \text{ MIN}}$$

$$= \frac{1.27}{5.25} \times 10^4 \text{ DOLLARS/MIN}$$

$$\approx .242 \times 10^4 \text{ DOLLARS/MIN} = \boxed{2.42 \times 10^3 \text{ DOLLARS/MIN}}$$

or \$2,420 / MIN

$$62. \frac{1.6 \text{ MILLION}}{50,000} = \frac{1,600,000}{50,000} = \boxed{32}$$

$$64. 5,200,000,000 \text{ BYTES} \times \frac{1 \text{ mm}}{10 \text{ BYT}} \times \frac{1 \text{ km}}{1000 \text{ mm}} = \frac{5.2 \times 10^9}{10^4}$$

$$= 5.2 \times 10^5 = \boxed{520,000 \text{ km}}$$