

Math 5a HW #4,

#1. a. $2^4 + 2^4 = 2 \cdot 2^4 = 2^5$

b. $2^m + 2^m = 2 \cdot 2^m = 2^{m+1}$

c. $2^m \cdot 2^m = 2^{m+m} = 2^{2m}$

d. $3^2 + 3^2 + 3^2 = 3 \cdot 3^2 = 3^3$

e. $3^k + 3^k + 3^k = 3 \cdot 3^k = 3^{k+1}$

f. $3^k \cdot 3^k \cdot 3^k = 3^{k+k+k} = 3^{3k}$

#2. a. $-4 - (-9) = -4 + 9 = 5$

b. $-(-8 + (-4)) = -(-8 - 4) = 12$

c. $-3 - (9 + (-6)) = -3 - (9 - 6) = -3 - 3 = -6$

d. $-3 - (-7) + (-5) = -3 + 7 - 5 = -1$

e. $-2 \cdot (-5) \cdot (-2) = -20$

d. $-\frac{3}{5} - (-1\frac{1}{3}) = -\frac{3}{5} - (-\frac{4}{3}) = -\frac{3}{5} + \frac{4}{3} = -\frac{9}{15} + \frac{20}{15} = \frac{11}{15}$

#3.

$$\begin{array}{r} 221_5 \\ 104_5 \\ \hline 330_5 \end{array}$$

$$221_5 = 25 \cdot 2 + 5 \cdot 2 + 1 = 50 + 10 + 1 = 61.$$

$$104_5 = 25 \cdot 1 + 0 + 4 = 29.$$

$$61 + 29 = 90$$

$$\begin{aligned} 90 &= 75 + 15 = 5^2 \cdot 3 + 5^1 \cdot 3 + 5^0 \cdot 0 = \\ &= 330_5 \end{aligned}$$

$$\begin{array}{r} 11 \\ 432_5 \\ 114_5 \\ \hline 1101_5 \end{array}$$

$$432 = 25 \cdot 4 + 5 \cdot 3 + 2 = 100 + 15 + 2 = 117$$

$$114 = 25 + 5 + 4 = 34$$

$$117 + 34 = 151$$

$$\begin{aligned} 151 &= 125 + 25 + 1 = 5^3 \cdot 1 + 5^2 \cdot 1 + 5^1 \cdot 0 + 1 = \\ &= 1101_5 \end{aligned}$$

#4.
a. $11011011_2 = 2^7 \cdot 1 + 2^6 \cdot 1 + 2^5 \cdot 0 + 2^4 \cdot 1 + 2^3 \cdot 1 + 2^2 \cdot 0 + 2^1 \cdot 1 + 2^0 \cdot 1$
 $= 128 + 64 + 0 + 16 + 8 + 2 + 1 =$
 $= 128 + 80 + 10 + 1 = 219$

b. $10001101_2 = 2^7 \cdot 1 + 2^6 \cdot 0 + 2^5 \cdot 0 + 2^4 \cdot 0 + 2^3 \cdot 1 + 2^2 \cdot 1 +$
 $+ 2^1 \cdot 0 + 2^0 \cdot 1 =$
 $= 128 + 8 + 4 + 1 = 141$

#5.

a. $55 = 32 + 16 + 4 + 2 + 1 = 2^5 \cdot 1 + 2^4 \cdot 1 + 2^3 \cdot 0 + 2^2 \cdot 1 + 2^1 \cdot 1 + 1$
 $= 11011_2$

b. $93 = 64 + 16 + 8 + 4 + 1 = 2^6 \cdot 1 + 2^5 \cdot 0 + 2^4 \cdot 1 + 2^3 \cdot 1$
 $+ 2^2 \cdot 1 + 2^1 \cdot 0 + 2^0 \cdot 1 = 1011101$

#4 c

$$1111111_2 = 2^8 + 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 =$$

$$= 256 + 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1$$

$$= 511$$

#5 c.

$$174 = 128 + 32 + 8 + 4 + 2 = 2^7 \cdot 1 + 2^6 \cdot 0 + 2^5 \cdot 1 +$$

$$+ 2^4 \cdot 0 + 2^3 \cdot 1 + 2^2 \cdot 1 + 2^1 \cdot 1 + 2^0 \cdot 0 =$$

$$= 10101110$$

#6. 64, 32, 16, 8, 4, 2, 1

#7. $1400 : 3 = 466 \text{ R}(2)$

8.

v_t - speed (rate) of the truck

$$S' = v_t \cdot 10$$

$$S' = (v_t + 10) \cdot 8.$$

$$v_t \cdot 10 = (v_t + 10) \cdot 8$$

$$v_t \cdot 10 = v_t \cdot 8 + 80$$

$$10v_t - 8v_t = 80$$

$$2v_t = 80$$

$$v_t = 40 \text{ km/h}$$

$$S' = 10 \cdot 40 = 400 \text{ km}$$

