Math 310 - Dr. Miller - Homework #6: Positive/Negative Chips

1. Describe three different chip arrangements to represent each integer below.
   (a) $-2$
   (b) $4$
   (c) $1$
2. Describe in 1-2 sentences how to act out each addition using positive/negative chips. Remember to tell how to see the final answer.
   (a) $(-10) + (-2)$
   (b) $(-3) + 5$
   (c) $6 + (-1)$
   (d) $(-7) + 3$
3. Describe in 2-3 sentences how to act out each subtraction as a *take away* problem. If zero pairs are involved, tell how many to include AND why we include them. State the final answer, too.
   (a) $(-5) - (-1)$
   (b) $(-5) - 2$
   (c) $4 - (-2)$
   (d) $4 - 6$
   (e) $(-2) - (-8)$
   (f) $(-2) - 5$
   (g) $(-6) - (-2)$
   (h) $2 - (-3)$
4. Describe in 2-3 sentences how to act out each subtraction above as a *missing addend* problem. State the final answer, too.
5. Describe in 2-3 sentences how to act out each multiplication or division problem below; if not possible, say why. State the final answer, too.
   (a) $5 \times (-2)$
   (b) $(-2) \times 4$
   (c) $(-2) \times (-3)$
   (d) $(-4) \times 3$
   (e) $(-12) \div 4$
   (f) $(-12) \div (-4)$
   (g) $(-20) \div 4$
   (h) $20 \div (-4)$
   (i) $20 \div 4$
   (j) $(-20) \div (-4)$

1. (a) 2 $\oplus$, 3 $\oplus$ *and* 1 $\ominus$, 5 $\oplus$ *and* 3 $\ominus$
   (b) 4 $\oplus$, 5 $\oplus$ *and* 1 $\ominus$, 12 $\oplus$ *and* 8 $\ominus$
   (c) 1 $\oplus$, 3 $\oplus$ *and* 2 $\ominus$, 9 $\oplus$ *and* 8 $\ominus$

2. (a) Set out 10 $\ominus$ and 2 more $\ominus$. Put them together to make 12 $\ominus$, or $-12$.
   (b) Set out 3 $\ominus$ and 5 $\oplus$. Put them together and ignore the three zero pairs, leaving 2 $\oplus$, or 2.
   (c) Set out 6 $\oplus$ and 1 $\ominus$. Put them together and ignore the zero pair, leaving 5 $\oplus$, or 5.
   (d) Set out 7 $\ominus$ and 3 $\oplus$. Put them together and ignore the zero pairs, leaving 4 $\ominus$, or $-4$.

3. (a) Set out 5 $\ominus$. Take away 1 $\ominus$, leaving 4 $\ominus$, or $-4$.
   (b) Set out 5 $\ominus$. You don't have enough $\oplus$ to take 2 of them away, so include two zero pairs. Remove 2 $\oplus$, leaving 7 $\ominus$, or $-7$.
   (c) Set out 4 $\oplus$. You don't have enough $\ominus$ to take 2 of them away, so include two zero pairs. Remove 2 $\ominus$, leaving 6 $\oplus$, or 6.
   (d) Set out 4 $\oplus$. There aren't enough to take 6 of them away, so include two zero pairs. Remove 6 $\oplus$, leaving 2 $\ominus$, or $-2$.
   (e) Set out 2 $\ominus$. There aren't enough to take 8 of them away, so include six zero pairs. Remove 8 $\ominus$, leaving 6 $\oplus$, or 6.
   (f) Set out 2 $\ominus$. You don't have enough $\oplus$ to take 5 of them away, so include 5 zero pairs. Remove 5 $\oplus$, leaving 7 $\ominus$, or $-7$.
   (g) Set out 6 $\ominus$. Take away 2 $\ominus$, leaving 4 $\ominus$, or $-4$.
   (h) Set out 2 $\oplus$. You don't have enough $\ominus$ to take 3 of them away, so include three zero pairs. Remove 3 $\ominus$, leaving 5 $\oplus$, or 5.

4. (a) $(-5)-(-1)$ asks $(-1)+\_\_ = -5$. We must add $-4$.
   (b) $(-5)-2$ asks $2+\_\_ = -5$. We must add $-7$.
   (c) $4-(-2)$ asks $(-2)+\_\_ = 4$. We must add 6.
   (d) $4-6$ asks $6+\_\_ = 4$. We must add $-2$.
   (e) $(-2)-(-8)$ asks $(-8)+\_\_ = -2$. We must add 6.
   (f) $(-2)-5$ asks $5+\_\_ = -2$. We must add $-7$.
   (g) $(-6)-(-2)$ asks $(-2)+\_\_ = -6$. We must add $-4$.
   (h) $2-(-3)$ asks $(-3)+\_\_ = 2$. We must add 5.

5. (a) Set out 5 groups of 2 $\ominus$. Count 10 $\ominus$, or $-10$.
   (b) Set out 4 groups of 2 $\ominus$. Count 8 $\ominus$, or $-8$.
   (c) $(-2)\times(-3)$ cannot be acted out using repeated sets.
   (d) Set out 3 groups of 4 $\ominus$. Count 12 $\ominus$, or $-12$.
   (e) Separate 12 $\ominus$ into 4 groups. Count 3 $\ominus$ in each group, for an answer of $-3$.
   (f) Separate 12 $\ominus$ into groups of 4 $\ominus$. Count 3 groups, for an answer of 3.
   (g) Separate 20 $\ominus$ into 4 groups. Count 5 $\ominus$ in each group, for an answer of $-5$.
   (h) $20\div(-4)$ cannot be acted out using repeated subtraction or sharing.
   (i) Separate 20 $\oplus$ into 4 groups. Count 5 $\oplus$ in each group, for an answer of 5.
   (j) Separate 20 $\ominus$ into groups of 4 $\ominus$. Count 5 groups, for an answer of 5.