Work on these with your partner(s) at the board

1. Write each of the following in set-builder notation:
   (a) The set of integers that are multiples of 3
   (b) The set of rational numbers whose square is less than 2

2. Let $A = \{n \in \mathbb{Z} \mid n = 2k \text{ for some } k \in \mathbb{Z}\}$ and $B = \{m \in \mathbb{Z} \mid m = 4j \text{ for some } j \in \mathbb{Z}\}$.
   Prove $B \subseteq A$. Is $B \subset A$?

3. Let $A = \{a, b, c\}$ and $B = \{a, c, d, e\}$ with universal set $U = \{a, b, c, d, e, f\}$.
   Find each of the following:

   (a) $A \cup B$ (d) $B - A$ (g) $A^c \cup B^c$

   (b) $A \cap B$ (e) A^c (h) $(A \cap B)^c$

   (c) $A - B$ (f) $A \times B$ (i) $P(A)$

4. Determine whether each of these statements is true or false.

   (a) $x \in \{x\}$ (c) $\{x\} \in \{x\}$

   (b) $\{x\} \subseteq \{x\}$ (d) $\emptyset \subseteq \{x\}$

5. Use an element argument to prove that $B - A = B \cap A^c$

6. Consider DeMorgan's law: $(A \cap B)^c = A^c \cup B^c$
   (a) Sketch a Venn diagram to convince yourself that this statement is true.
   (b) Use an element argument to prove it is true.

7. Formulate the other version of DeMorgan's law and repeat #6 using it.

Based on a worksheet from Rachelle DeCoste