

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

- Write each of the following in set-builder notation:
  - The set of integers that are multiples of 3
  - The set of rational numbers whose square is less than 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  $B \subset A$ ?
  
- 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:
  - $A \cup B$
  - $A \cap B$
  - $A - B$
  - $B - A$
  - $A^c$
  - $A \times B$
  - $A^c \cup B^c$
  - $(A \cap B)^c$
  - $P(A)$

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.