**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_Block\_\_\_\_\_\_**

**Applied Math**

**Section 2.2 Subsets and Set Operations**

**Fill – In Notes**

**Vocabulary**

* A **Set** is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Objects in a set are called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The **roster method** of specifying a set consists of surrounding the collection of elements with braces.
  + Example:
* **Set builder** notation has the general form

{variable | descriptive statement }.

* + Examples:
* The symbol **∈** means **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**
  + Example: If A = {3, 17, 2 } then 3 **∈** A,17 **∈** A, 2 **∈** A and 5 ∉ A.
* The **Empty Set** – symbolized by \_\_\_\_, is the set of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The **Universal Set** – Symbolized by \_\_\_\_, is the set of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The **Complement** of Set A –symbolized A’ – is the set of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Example 1: Let U = {v, w, x, y, z} and A = {x, y, z}. Find the complement *A*’.

Solution: Cross out the elements in U that are also in *A…* so, *A*’ = {v, x}

* + Example 2: Let U = {10, 20, 30, 40, 50, 60, 70 ,80, 90} and *A* = {10, 30, 50}. Find the complement *A*’.

Solution: A’ =

**Subsets**

* A set A is a **subset** of the set B if \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + If A is a subset of B and B contains elements which are not in A, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + The symbol ⊆ means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + A few notes about subsets…
    - Every set is a subset of itself -> all elements in A are of course in A, so A ⊆ A.
    - The empty set is a subset of every set. So, Ø ⊆ A.
  + Example 1 – Find all subsets of *A* = { *American Idol*, *Survivor* }.

The subsets are:

{ *American Idol*, *Survivor*}

{ *American Idol* }

{ *Survivor* }

Ø

* + Example 2 - Find all subsets of *A* = { *Verizon*, *AT&T, T-Mobile* }.

The subsets are:

{*\_\_\_\_\_\_*, *\_\_\_\_\_\_\_, \_\_\_\_\_\_* },

{*\_\_\_\_\_\_\_, \_\_\_\_\_\_* }, { *\_\_\_\_\_\_\_, \_\_\_\_\_\_* }, {*\_\_\_\_\_\_\_, \_\_\_\_\_\_* }

{*\_\_\_\_\_\_* }, { *\_\_\_\_\_\_*}, {*\_\_\_\_\_\_*},

Ø

* + Example 3 – State whether each statement is true or false.

1. { 1, 3, 5} ⊆ { 1, 3, 5, 7} \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. { a, b } ⊆ { a, b } \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. { 2, 10 } ⊄ { 2, 4, 6, 8, 10 } \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. { r, s, t } ⊄ { t, s, r } \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. { Lake Erie, Lake Huron } ⊆ The set of Great Lakes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * Example 4 – State whether each statement is true or false.
     + 1. Ø ⊆ { 5, 10, 15} \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
       2. { 100, 200, 300, 400 } ⊆ { 200, 300, 400 } \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
       3. { 0 } ⊆ Ø \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
       4. Ø ⊆ Ø \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Intersections & Unions**

* The **intersection** of two sets A and B is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + We write it as \_\_\_\_\_\_\_\_\_
  + Example 1: If A = {3, 4, 6, 8} and B = { 1, 2, 3, 5, 6} then A **∩** B = {3, 6}
  + Example 2:

1. If A is the set of prime numbers and B is the set of even numbers then A **∩** B =\_\_\_\_\_\_\_\_\_\_\_.
2. If A = {x | x > 5 } and B = {x | x < 3 } then A **∩** B =\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   * Example 3:
3. If A = {x | x < 4 } and B = {x | x >1 } then A **∩** B =\_\_\_\_\_\_\_\_\_\_\_.
4. If A = {x | x > 4 } and B = {x | x >7 } then A **∩** B =\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* The **union** of two sets A and B is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + We write it as \_\_\_\_\_\_\_\_\_
  + Example 1: If A = {3, 4, 6} and B = { 1, 2, 3, 5, 6} then A **∪** B = {1, 2, 3, 4, 5, 6}.
  + Example 2:

1. If A is the set of prime numbers and B is the set of even numbers then A **∪** B = \_\_\_\_\_\_\_\_.
2. If A = {x | x > 5 } and B = {x | x < 3 } then A **∪** B = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_Block\_\_\_\_\_\_**

**Applied Math**

**Section 2.2 Subsets and Set Operations**

**Partner Practice**

**Finding Complements**

*For Exercises 1-4, let the Universal Set U = {2, 3, 5, 7, 11, 13, 17, 19}*

1. If A = { 5, 7, 11, 13}, then A’ = \_\_\_\_\_\_\_\_ 2. If B = { 2 }, then B’ = \_\_\_\_\_\_\_\_\_\_\_

3. If C = { 13, 17, 19}, then C’ = \_\_\_\_\_\_\_\_\_ 4. If D = {2, 3, 5}, then D’ = \_\_\_\_\_\_\_\_\_\_\_

**Finding All Subsets**

*For Exercises 5-12, find all subsets of each set.*

5. { r, s, t } 6. { 2, 5, 7 }

7. { 1, 3 } 8. { p, q }

9. { } 10. Ø

11. { 5, 12, 13, 14 } 12. { m, o, r, e }

**True or False**

*For Exercises 13-20, answer true or false. If False, say why.*

13. { 3 } ⊆ { 1, 3, 5 } \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 14. { a, b, c } ⊆ {c, b, a} \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

15. { 1, 2, 3 } ⊆ { 123 } \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 16. Ø ⊆ Ø \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

17. { Ø } ⊆ Ø \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 18. Ø ⊆ { a, b, c } \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19. If A = { apple, banana, potato} and B = the set of all fruit, then A **∩** B = {the set of all fruit, potato} \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

20. If A = { 1, 2, 3, 4, 5, 6 } and B = { 3, 4, 6}, then A **∪** B = set A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Venn Diagram**

*For Exercises 21-26, use the Venn diagram and find the elements in each set.*

21. U = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 22. A = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

23. B = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 24. A’ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

25. A **∩** B = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 26. A **∪** B = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

