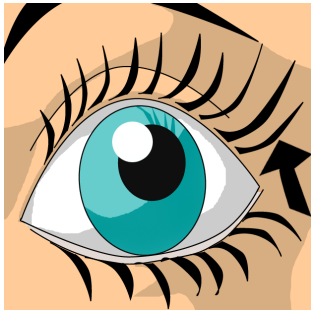
Eye Opener



Determine whether each set represents the set of natural numbers, whole numbers, or integers

the non-negative integers

the counting numbers

. . . ,-3,-2,-1,0,1,2,3,....

Essential Understanding

A **set** is a collection of distinct elements

A **subset** contains elements from a set ($\subset$)

You can write sets in different forms:

Roster form: lists the elements of a set by name in brackets (i.e. { 2,4,6,8,...})

Set builder notation (rule form): describes the properties an element must have to be included in a set (i.e. { x | x is a multiple of 2 })

The **empty set** (null set) is the set that contains no elements. (i.e. { } or $\varnothing$)

The universal set (universe) is the largest set you are working with

The complement of a set is all elements in the universal set that are not in the set (A')

Using roster form and set builder notation

Write each set in roster form and in set-builder notation.

M is the set of integers that are greater than −1 and less than 4.

$M = \{0, 1, 2, 3\}$

P is the set of natural numbers that are less than 11.

$P = \{10, 9, 8, \ldots 1\}$

Inequalities and set-builder notation

Write the solutions of each inequality in set-builder notation.

$4y + 7 \geq 23$

$y \geq 4$

$\{y : y \text{ is real } \# \geq 4\}$

$2(3p - 11) \geq -16$

$p \geq 1$

$\{p : p \text{ is } \mathbb{R} \geq 1\}$

$13 - 9m < 58$

$-13 \quad -13$

$-9m < 45$

$\frac{-9m}{-9} < \frac{45}{-9}$

$m > -5$

$\{m : m \text{ is } \mathbb{R} > -5\}$

* Roster — List members by name

Q

Rule — describe

Set-Builder Notation

Finding Subsets

List all the subsets of each set.

{1}

2 subsets

{ 1 }

{ } or ∅

{dog, cat, fish}

8 subsets

{dog}
{cat}
{fish}
{C, F}
{C, D}
{F, D}
∅

{a, e, i, o}

16 subsets

{A}
{E}
{I}
{O}
{A, E}
{A, I}
{A, O}
{E, I}
{E, O}
{I, O}
{A, E, I}
{A, E, O}
{E, I, O}
{A, I, O}
{A, E, I, O}
∅

Suppose $U = \{0, 1, 2, 3, 4, 5, 6\}$, $A = \{2, 4, 6\}$, and $B = \{1, 2, 3\}$. Tell whether each statement is *true* or *false*. Explain your reasoning.

$U \subseteq B$ False

B ⊂ U True

$\emptyset \subseteq B$ Yes

∅ is a subset of B

Finding the Complement of a Set

$R' = \{\text{even integers}\}$

Suppose $U = \{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$ is the universal set and $R = \{\ldots, -3, -1, 1, 3, \ldots\}$. What is R'?

$R' = \{\ldots -2, 0, 2, \ldots\}$

Suppose $U = \{1, 2, 3, 4, 5\}$ is the universal set and $A = \{2, 3\}$. What is A'?

$A' = \{1, 4, 5\}$

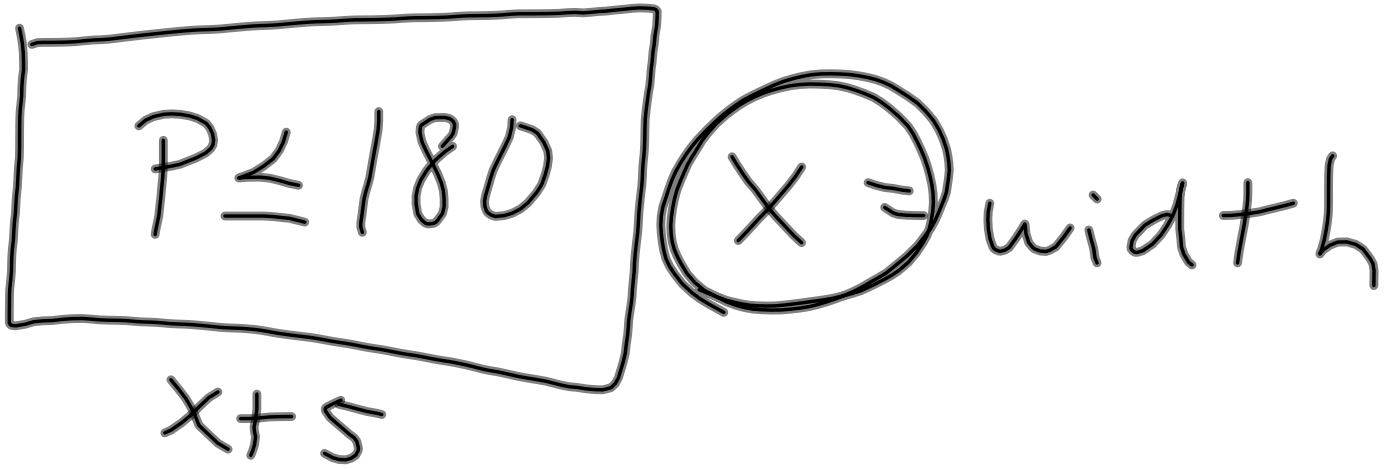
Think About a Plan Universal set U and set A are defined below. What are the elements of A'?

$U = \{\text{days of the week}\}$

$A = \{\text{days of the week that contain the letter N}\}$

- What are the elements of the universal set?
- What are the elements of set A?
- How can you find the complement of set A?

$A' = \{\text{Tues, Thurs, Fri, ~~Sat~~}\}$



$2x + 2w = P$

$2(w+5) + 2w \leq 180$

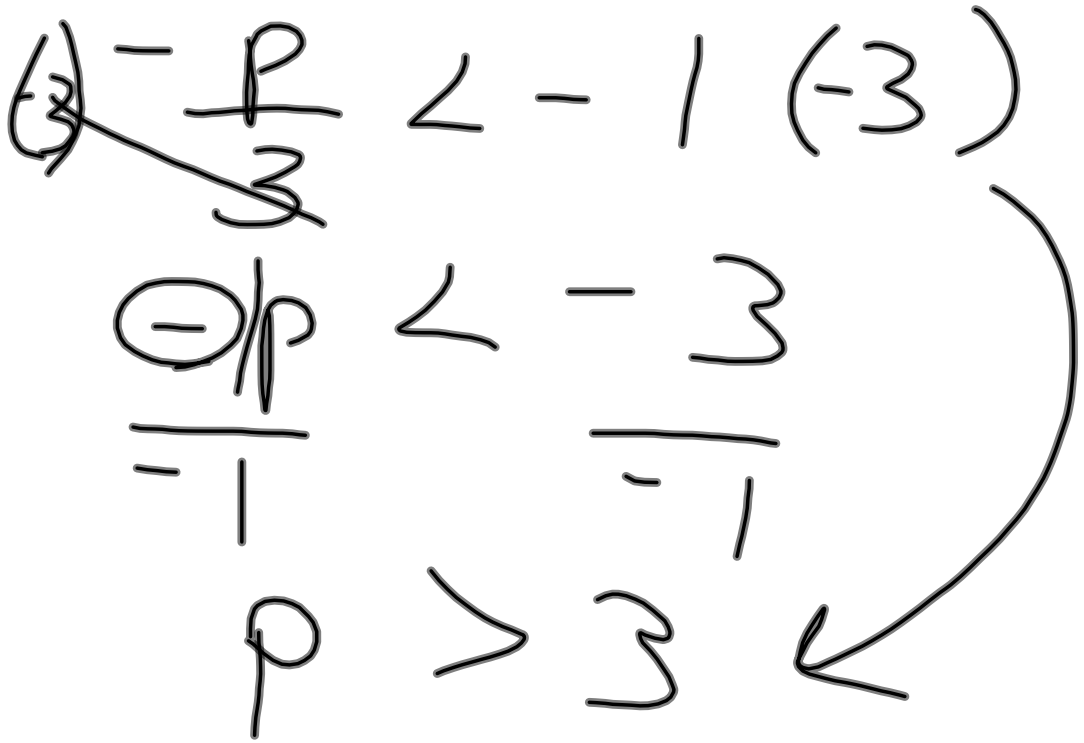
$$(-3) - \frac{1}{3}p < \left(\frac{1}{2}p - 6\right)(-3)$$

$$1p > -\frac{3}{2}p + 18$$

$$+\frac{3}{2}p \qquad +\frac{3}{2}p$$

$$\frac{2.5p}{2.5} > \frac{18}{2.5}$$

$$p > 36/5 \text{ or } 7.2$$


(3) $-\frac{p}{3} < -1$ (-3)
$-p < -3$
$\frac{-p}{-1} < \frac{-3}{-1}$
$p > 3$