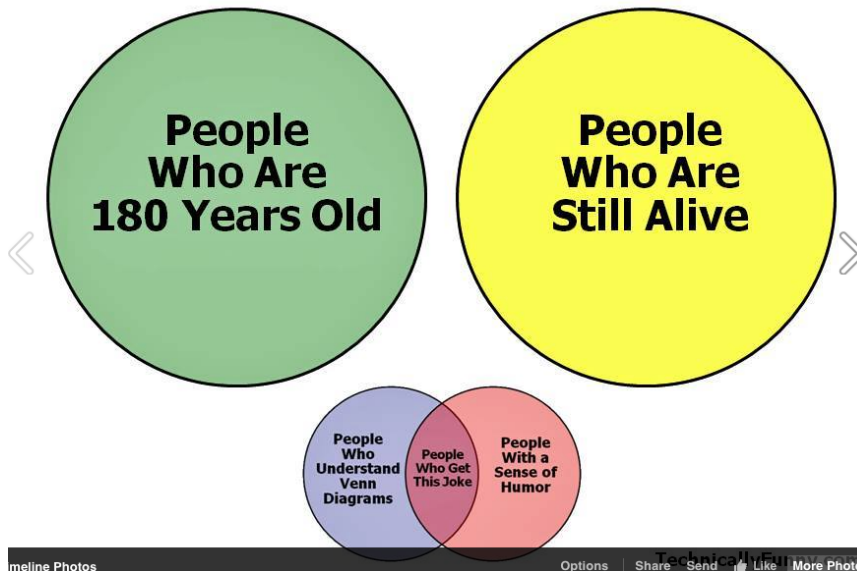


In Honor of John Venn's 180th Birthday



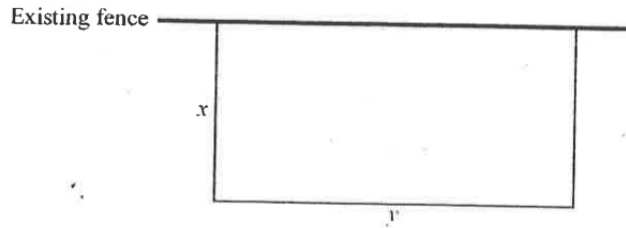
Go to the *textbook office*
to check out The soft cover

Mathematical Studies textbook.

On the way to the library
use the HW Tally as necessary.

1

A farmer wishes to enclose a rectangular field using an existing fence for one of the four sides.



- (a) Write an expression in terms of x and y that shows the total length of the new fence. (1)
- (b) The farmer has enough materials for 2500 metres of new fence. Show that

$$y = 2500 - 2x$$

(1)

(c) $A(x)$ represents the area of the field in terms of x .

(i) Show that

$$A(x) = 2500x - 2x^2$$

$y = 2500 - 2x$

$$\begin{aligned} \text{Area} &= \text{length} \times \text{width} \\ &= x \cdot y \\ &= x(2500 - 2x) \end{aligned}$$

(2)

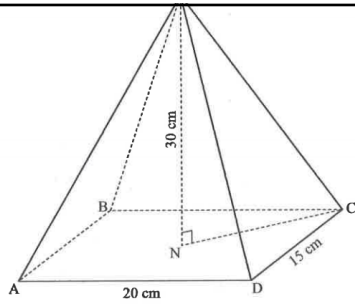
(ii) Find $A'(x)$.

=

(1)

(iii) Hence or otherwise find the value of x that produces the maximum area of the field.

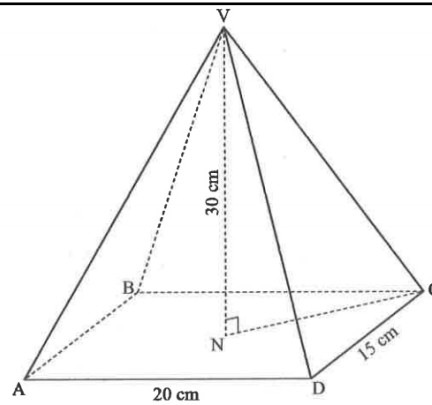
(3)

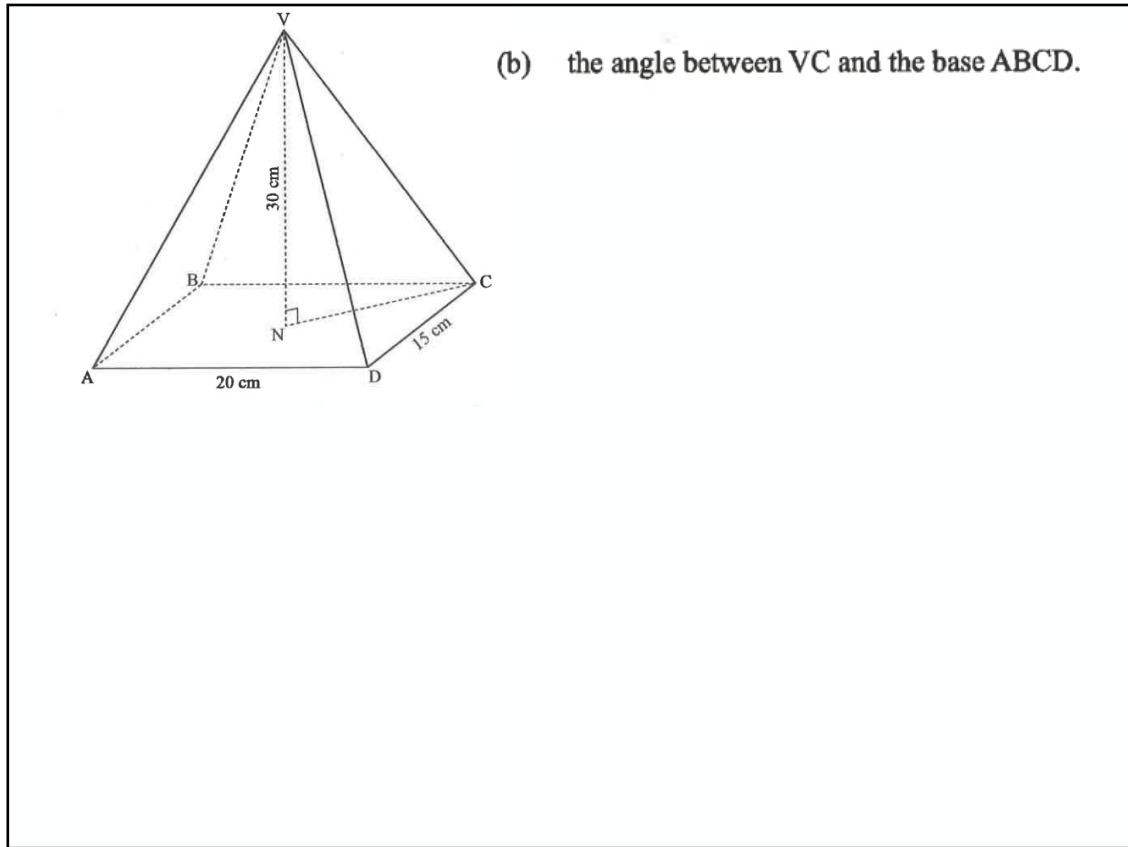


Calculate

- (a) (i) the length of AC ;

- (ii) the length of VC .





Sets, Venn Diagrams and Probability

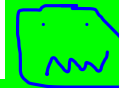
H.H. textbook
Ch. 1, 4, 13

There will a combination of in class assignments and out of class assignments, occasionally no homework or shorter assignments.

Many of these, including in-class assignments, will get recorded on your new HW recording sheet as usual.

A city has three newspapers A, B, and C. Of the adult population, 1% read none of these, 36% read A, 40% read B, 52% read C, 8% read both A and B, 11% read both B and C, and 13% read all three newspapers. What percentage of the adult population read:

- a) Newspaper A only ?
- b) Newspaper B or newspaper C ?
- c) Newspaper A or B or C ?



The work we will do in this unit will enable us to organize the this information and deal with questions like the newspaper problem.

but first we need to :

- Understand Types of Number Sets
- Use Set Vocabulary
- Write in Set Builder Notation

Pick Up

W.S. #1

Warm Up -----Sets of Numbers

(look at your Notation List at the end of your Formula Packet)

List the factors of 10: _____

List the multiples of 3: _____

List the first six prime numbers: _____

List the first five numbers in the set, \mathbf{N} : _____

List a variety of numbers in the set, \mathbf{Z} : _____

List a variety of numbers in the set, \mathbf{Q} : _____

List a few numbers that are not in the set, \mathbf{R} : _____

Warm Up ----- Sets of Numbers

(look at your Notation List at the end of your Formula Packet)

List the factors of 10: 1, 2, 5, 10 1.2

List the multiples of 3: 3, 6, 9, 12, 15, ... 4

List the first six prime numbers: 2, 3, 5, 7, 11, 13

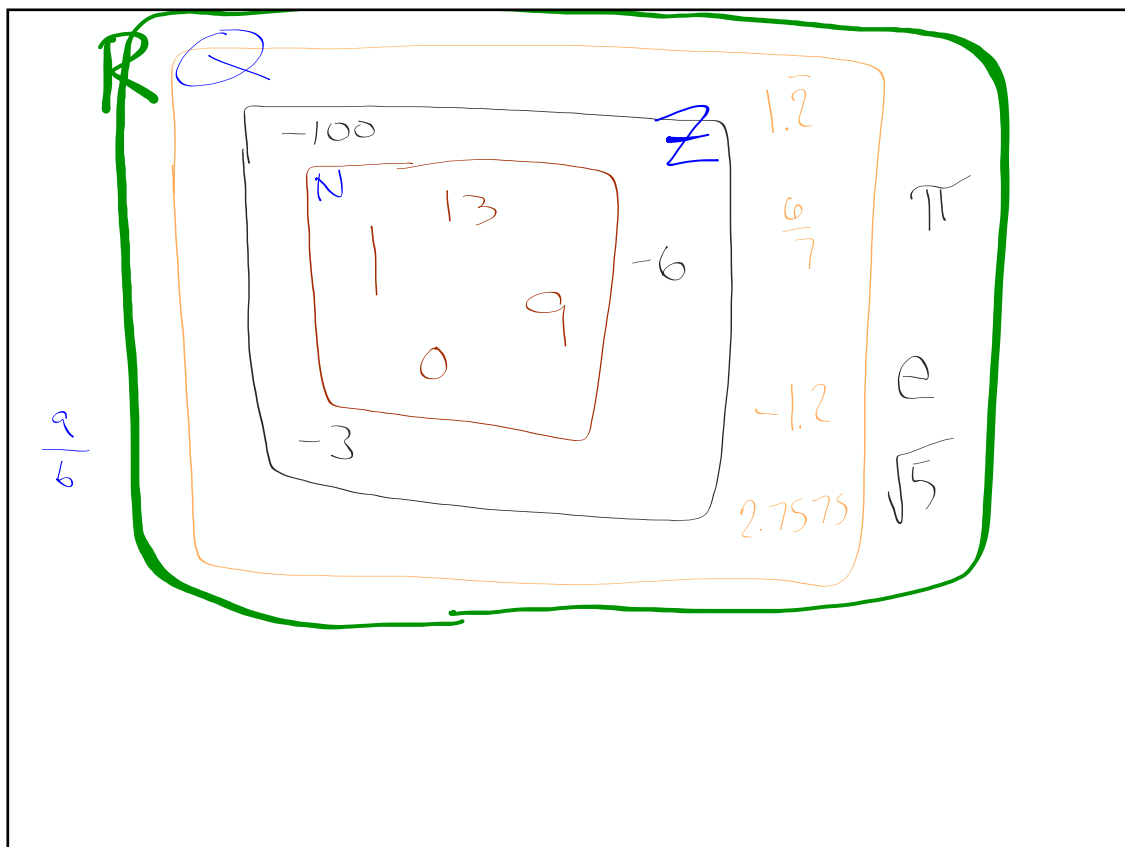
List the first five numbers in the set, \mathbb{N} : 0, 1, 2, 3, 4

List a variety of numbers in the set, \mathbb{Z} : 7 -3 0 162 -11

List a variety of numbers in the set, \mathbb{Q} : $\frac{2}{3}$ -0.23 6 $2\frac{1}{3}$

List a few numbers that are not in the set, \mathbb{R} : $\sqrt{-6}$ $3i$ $5-4i$

a number in \mathbb{R} but not in any other above ??



Warm Up :

Quietly read through HH
pp. 18-19
up to example 1

then answer as many questions as
you can on the **back** side
"What Are Sets?"

What are sets?

Definitions

In the table below, define the terms on the left hand side

Set	
Subset	
Union of two sets	
Complement of a set	
Intersection of two sets	
Element	

What are sets?

Definitions

In the table below, define the terms on the left hand side

Set	A collection of numbers or objects
Subset	A portion of a larger set
Union of two sets	A list of all elements of the combined sets
Complement of a set	The elements NOT in the set.
Intersection of two sets	The elements that belong to <u>both</u> sets
Element	A member

And now state what is meant by each of these symbols in the context of set notation

\cup	first set OR 2 nd set or both
\cap	first set AND 2 nd set
\in	is an element of
\subset	proper subset

Examples

Give an example of two sets of people that would have no intersection.

Give another where you would expect an intersection.

Now, a third where one would be a subset of another.

If $A \subseteq B$, and $A \neq B$, then A is said to be a proper subset of B and can also be denoted by $A \subset B$.

For example $\{1, 2\} \subseteq \{1, 2, 3\}$.

Also $\{1, 2\} \subset \{1, 2, 3\}$.

example

Let's make a union of sets A and B.

$$A \cup B$$

$$A = \{4, 7, 10, 13\} + B = \{-1, 0, 1, 2\}$$

$$\{-1, 0, 1, 2, 4, 7, 10, 13\}$$

- When giving a **list** showing the elements of a set,
use curly brackets:

e.g. $A = \{3, 6, 9, 12\}$

Learning
Check

Consider the sets $A = \{2,3,5,7\}$ and $B = \{2,4,6,8\}$. Which of the following are true?

$$3 \in A ?$$

$$4 \in A ?$$

$$\{5\} \subseteq A ?$$

$$\{5\} \subset A ?$$

Go back to the
front side

Given two sets :

$A = \{1, -3, 5, -7, 9\}$

$B = \{\frac{1}{2}, 2, 4, -5, 5, 6\}$

Find the following.

1. $A \cup B$

$$\{-7, -5, -3, \frac{1}{2}, 1, 2, 4, 5, 6, 9\}$$

2. $A \cap B$

$$= \{5\}$$

3. $\mathbb{N} \cap B$

Natural numbers

$$\{2, 4, 5, 6\}$$

4. $\mathbb{Z} \cap A$

$$\{-7, -3, 1, 5, 9\}$$

$$\{-7, -3, 1, 5, 9\}$$

| [}

5. $N \cup B$
 \uparrow
 $\left\{ \frac{1}{2} \right\}$
 $\left\{ -5, \frac{1}{2} \text{ and all Natural Numbers} \right\}$
 $\left\{ -5, \frac{1}{2}, 0, 1, 2, \dots \right\}$

6. $(A \cap B) \cap N$
 \uparrow
 intersection
 $\{5\}$

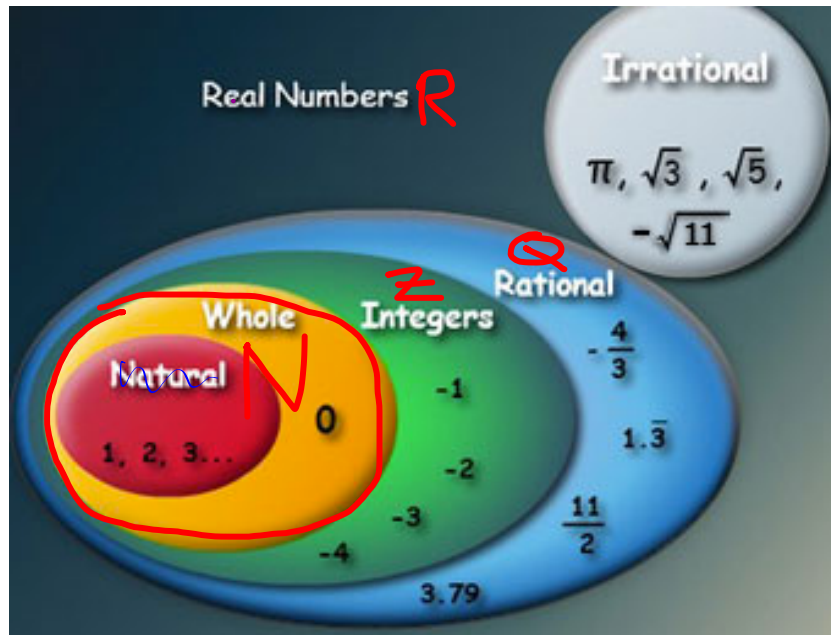
7. $R \cap Q = \{Q\} = \{5\}$
 1.2

5. $N \cup B$
 \uparrow all
 \uparrow Natural
 $\{-5, 0, \frac{1}{2}, 1, 2, 3, \dots\}$

6. $(A \cap B) \cap N$
 \uparrow And
 $\{-7, 5, -3, \frac{1}{2}, 1, 2, 3, 4, 5, 6, 7\} \cap \{0, 1, 2, 3, \dots\}$
 $= \{1, 2, 4, 5, 6, 9\}$

7. $R \cap Q$
 \uparrow Real
 \uparrow Rational
 - All natural
 - All integers
 - All decimals/fractions
 $\{Q\}$

$A = \{1, -3, 5, -7, 9\}$ $B = \{\frac{1}{2}, 2, 4, -5, 5, 6\}$



\mathbb{Z}^+

B.B.

Set Builder
Notation

read page 69 and 70

$$A = \{3, 7, 10, 13, 16\}$$

$$n(A) = 5$$

$$A = \{ \quad | \quad \}$$

$$A = \{x \mid x \in Z, -2 \leq x \leq 4\}$$

↑ such that
↑ the set of all

reads “the set of all x such that x is an integer between -2 and 4 , including -2 and 4 .”

Pick up WS #2

do \boxed{A} and \boxed{B} and \boxed{C}

\boxed{A}

Finite or infinite?

$\{x \mid x \in \mathbb{Q}, 4 \leq x \leq 8\}$ *rational* *infinite* infinite

$\{x \mid x \in \mathbb{Z}, 4 \leq x \leq 8\}$ *integers* *finite* finite

B

For the following sets:

- i Write down the meaning of the set builder notation.
- ii If possible, list the elements of A.
- iii Find $n(A)$.
- iv Is A infinite?

$$A = \{x \mid x \in \mathbb{Z}, -1 \leq x < 7\}$$

- i the set of all x values such that x is an element of the integers and it's between -1 and 6 , inclusive
- ii $\{-1, 0, 1, 2, 3, \dots, 5, 6\}$
- iii $n(A) = 8$
- iv

B

For the following sets:

- i Write down the meaning of the set builder notation.
- ii If possible, list the elements of A.
- iii Find $n(A)$.
- iv Is A infinite?

$$A = \{x \mid x \in \mathbb{Z}, -1 \leq x < 7\}$$

- i the set of all x such that x is an integer from -1 to 6 .
- ii $A = \{-1, 0, 1, 2, 3, 4, 5, 6\}$
- iii $nA = 8$
- iv finite

C

Write in set builder notation:

The set of all rational numbers between 2 and 3, inclusive.

$$\left\{ x \mid x \in \mathbb{Q}, 2 \leq x \leq 3 \right\}$$

$$\left\{ x \mid x \in \mathbb{Q}, 2 \leq x \leq 3 \right\}$$

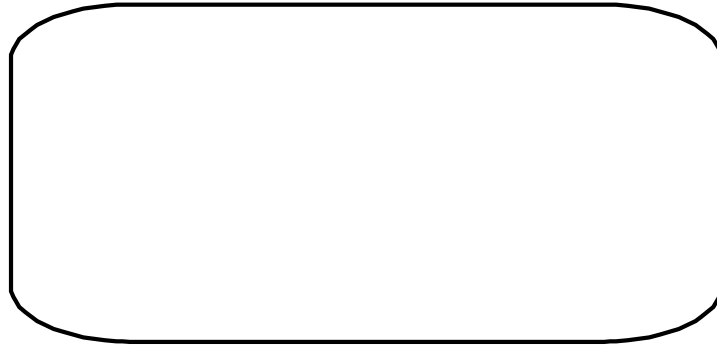
Universal Sets

Read
page 70

Complements of
Sets

The symbol U is used to represent a universal set.

$$U = \{x \mid x \in N, 1 \leq x \leq 10\}$$



φ.70

COMPLEMENTARY SETS

If the universal set is $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$

and $A = \{1, 3, 5, 7, 8\}$ then the

complement of A , denoted A' is $A' = \{2, 4, 6\}$.

The **complement** of A , denoted A'

is the set of all elements of U

which are **not in** A

D

If $U = \{x \mid x \in \mathbb{Z}, 0 \leq x \leq 8\}$, $A = \{x \mid x \in \mathbb{Z}, 2 \leq x \leq 7\}$ and $B = \{x \mid x \in \mathbb{Z}, 5 \leq x \leq 8\}$ list the elements of:

A $\{2, 3, 4, \dots, 7\}$

A' $\{0, 1, 8\}$

B $\{5, 6, 7, 8\}$

B' $\{0, 1, 2, 3, 4\}$

$A \cap B = \{5, 6, 7\}$

$A \cup B = \{2, 3, 4, 5, 6, 7, 8\}$

$A \cap B' = \{2, 3, 4\}$

D

If $U = \{x \mid x \in \mathbb{Z}, 0 \leq x \leq 8\}$, $A = \{x \mid x \in \mathbb{Z}, 2 \leq x \leq 7\}$ and $B = \{x \mid x \in \mathbb{Z}, 5 \leq x \leq 8\}$ list the elements of:

A $= \{2, 3, 4, 5, 6, 7\}$

A' $= \{0, 1, 8\}$

B $= \{5, 6, 7, 8\}$

B' $= \{0, 1, 2, 3, 4\}$

$A \cap B = \{5, 6, 7\}$

$A \cup B = \{2, 3, 4, 5, 6, 7, 8\}$

$A \cap B' = \{2, 3, 4\}$

Worksheet
Assignment:

Sets Assignment #1

part worksheet/part textbook

