

Number Sets

A set is a collection of objects or things.

For example:

The set of all fingers: $F = \{\text{thumb, index, middle, ring, pinky}\}$

The set of odd numbers: $D = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19, \dots\}$

↓
"continues on"

The number of elements in set S is represented by $n(S)$.

$n(F) = 5$
↓
FINITE SET

$n(D) = \text{INFINITE}$
↓
INFINITE SET

$\{a, b, c, \dots, x, y, z\} \rightarrow$ FINITE SET, " \dots " USED TO SAVE US FROM WRITING A LONG LIST

\in is the symbol that means 'is a member of' or 'is in'

$$\text{THUMB} \in F$$

$$73 \in D$$

\notin is the symbol that means 'is not a member of' or 'is not in'

$$\text{THUMB} \notin D$$

$$60 \notin D$$

$=$ EQUALS

\neq NOT EQUAL
TO

1. List the members of set S which contains the:

(a) factors of 12 $n(S) = 6$

$$S = \{1, 2, 3, 4, 6, 12\}$$

(PUT NUMBERS IN ORDER)

(b) multiples of 7 $n(S) = \text{INFINITE}$

$$S = \{7, 14, 21, 28, 35, \dots\}$$

(c) composite numbers between 2 and 10.

$$S = \{4, 6, 8, 9, 10\}$$

$$n(S) = 5$$

COMPOSITE \rightarrow NON-PRIME NUMBER

PRIME # \rightarrow ONLY FACTORS ARE
1 AND ITSELF

2. Find $n(S)$ for each set in question 1.

Special Number Sets

Natural Numbers $\mathcal{N} = \{0, 1, 2, 3, 4, 5, 6, \dots\}$



All Integers $\mathcal{Z} = \{0, \pm 1, \pm 2, \pm 3, \pm 4, \pm 5, \pm 6, \dots\} \rightarrow$ INCLUDES ZERO



All Positive Integers $\mathcal{Z}^+ = \{1, 2, 3, 4, 5, 6, \dots\} \rightarrow$ DOES NOT INCLUDE ZERO



NOTE : INTEGERS ARE "Z" NOT "I"
BECAUSE "Z" IS USED FOR
IMAGINARY NUMBERS

ZAHLEN :
GERMAN
FOR
"NUMBERS"

Rational Numbers \mathbb{Q}

Rational numbers have the form $\frac{p}{q}$
where p and q are integers, and $q \neq 0$.

("R" USED FOR REAL
NUMBERS)

("Q" IS FOR QUOTIENT)

For example, the following are all rational numbers:

\mathbb{Q} IS ALL FRACTIONS

$$\frac{17}{5} \quad 12 \quad 0.75 \quad -\frac{1}{4}$$

- WHOLE NUMBERS
- TERMINATING DECIMALS
- REPEATING DECIMALS
(FOLLOW A PATTERN)

Irrational Numbers $\overline{\mathbb{Q}}$

Irrational numbers are numbers which cannot be written in rational form.

For example:

Radicals (surds) $\sqrt{2}$ $\sqrt{11}$

π (3.14159265....)

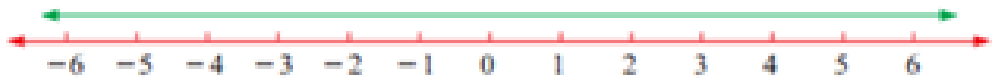
Non-recurring decimals (0.123456789....)

CAN NOT WRITE AS
A FRACTION

ONLY THOSE
THAT DO NOT
SIMPLIFY TO
WHOLE NUMBERS

Real Numbers \mathbb{R} \rightarrow ANYTHING THAT IS RATIONAL OR IRRATIONAL (DECIMALS OR INTEGERS)

Real numbers include all numbers which can be placed on the number line.



Real numbers: $\frac{1}{3}$ $\sqrt{5}$ π

Not real numbers: $\frac{4}{0}$
 (cannot write in decimal form)
 IMPOSSIBLE (NOT REAL)

$\sqrt{-5}$
 IMPOSSIBLE (IMAGINARY)

$$i = \sqrt{-1}$$

$$\sqrt{-16} = \sqrt{16(-1)}$$

$$= 4\sqrt{-1}$$

$$= 4i$$

3. Show that the following are rational numbers.

(a) $0.\overline{58}$

↓

$$0.585858\dots$$

$$\text{Let } x = 0.585858\dots$$

$$100x = 58.585858\dots$$

$$100x = 58 + x$$

$$99x = 58$$

$$x = \frac{58}{99}$$

(b) $0.\overline{6}$

↘

$$x = 0.\overline{6}$$

$$10x = 6.\overline{6}$$

$$10x = 6 + x$$

$$9x = 6$$

$$x = \frac{6}{9}$$

$$x = \frac{2}{3}$$

(c) $0.\overline{134}$

↘

$$x = 0.\overline{134}$$

$$1000x = 134.\overline{134}$$

$$1000x = 134 + x$$

$$999x = 134$$

$$x = \frac{134}{999}$$

$$d) -0.05 \rightarrow -0.05 \times \frac{100}{100} = \frac{-5}{100}$$

$$= -\frac{1}{20}$$

HW: PAGE 31 $\frac{1A}{(ALL)}$ + WORKSHEET