Complex Numbers, Part 7 - Why We Need Them
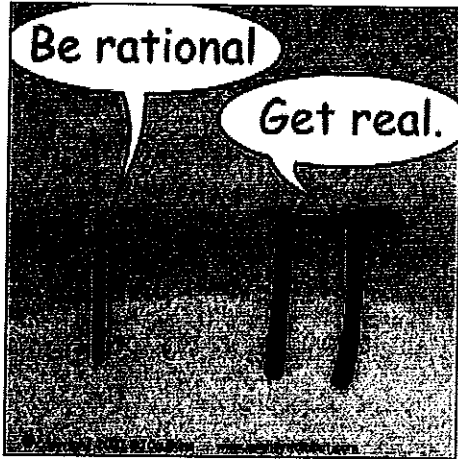
Pre-listening: What can we do with numbers?

....

....

....

....

....

....

Listening. Answer questions.

1) What are counting numbers? ....

2) What does the speaker say about the set of counting numbers? ....

3) Why is 0 useful in multiplication? ....

4) What is the difference between natural and whole numbers? ....

5) Which numbers are mathematically closed over subtraction? ....

6) What does "rational" mean in mathematics? ....

7) Where are equations useful in real life? ....

8) What is the real number line? ....

9) Which example of an imaginary number does the speaker give? ....

10) Which famous mathematician dealt with the topic of numbers? ....

2. Look and read:

Arithmetical operations on numbers include addition, subtraction, division and multiplication.

One number may be added to another. The result is called the sum. The sum of 9 and 14 is 23.

Make similar statements using these words:

a) subtracted/difference
b) multiplied/product
c) divided/quotient

3. Look and read:

An integer is even if it is divisible by 2.
An integer is odd if it is not divisible by 2.
An integer is divisible by 3 if the sum of its digits is divisible by 3.

Now make similar statements about the divisibility of integers by:

a) 10   b) 9   c) 4   d) 8   e) 5   f) 6   g) 11

4. Look at this set of numbers:

2, 3, 5, 7, 11, 13, 17, 19, 23 ......

a) Can you continue this set? It is made up of prime numbers.
b) What is a prime number?

Section 2   Development

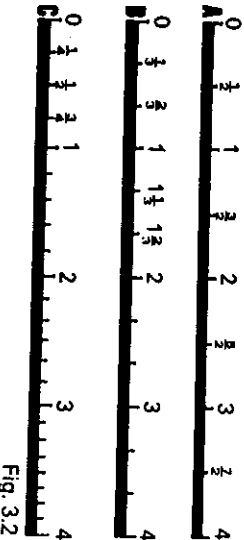**5. Look and read:**

Fractions

Fig. 3.2

a) In A, each unit is divided into halves.
b) In B, what is each unit divided into?
c) What is the first unit divided into in C?
d) Ask and answer similar questions about the other units in C

6. Read this:

A number such as $\frac{3}{4}$ is called a fraction. A fraction comprises two parts, the denominator and the numerator. The denominator is the number below the line.

a) What is the numerator?
b) What are the numerator and denominator separated by?

7. Read this:

If the numerator is less than the denominator, the fraction is known as a proper fraction.
If the denominator is less than the numerator, the fraction is known as an improper fraction.
In the fraction $\frac{153}{?}$ both the denominator and the numerator may be divided by the same number (51) to give $\frac{3}{?}$.

Make similar sentences about these fractions:

a) $\frac{48}{16}$ b) $\frac{24}{80}$ c) $\frac{17}{102}$ d) $\frac{342}{360}$ e) $\frac{243}{405}$

f) $\frac{28}{70}$ g) $\frac{81}{450}$ h) $\frac{40}{64}$ i) $\frac{15}{495}$ j) $\frac{41}{105}$

This is called *cancelling* or *reducing* the fraction. Can the following fractions be reduced?

8. Look and read:

- Both 12 and 18 are divisible by 6.
- 12 and 18 are both divisible by 6.
- Neither 12 nor 18 is divisible by 5.
- 18 is divisible by 9, whereas 12 is not (divisible by 9).
- 18 is divisible by 9. 12, on the other hand, is not (divisible by 9).

Now make similar sentences about the following pairs of numbers:

a) 10, 20   b) 14, 21   c) 118, 354

9. Look and read:

Any integer may be *represented* as the product of prime numbers.
For example, $150 = 2 \cdot 3 \cdot 5^2$.
This is known as factorising a number.
20 can be factorised into $2^2 \cdot 5$.

Make similar statements about these numbers:

a) 16   b) 24   c) 36   d) 370

NUCLEUS MATHEMATICS, D. HALL, LONGMAN 1980

Unit 3
The number system

The set of positive and negative integers consists of all the natural numbers 1, 2, 3, 4, ..., plus the same numbers preceded by the minus sign, −1, −2, −3, ... We can represent any of these numbers on the number line. We can also represent fractions of numbers, e.g. 1·5, $\frac{3}{4}$, $\frac{2}{3}$, −3·4 etc., on the number line. The rational numbers are composed of both the integers (or whole numbers) and the non-integers (or fractions). All rational numbers may be represented as a fraction where both the denominator and the numerator are integers, whereas irrational numbers cannot be expressed in this way. Irrational numbers include numbers like π (3·14159), $\sqrt{2}$ (1·41421), $\sqrt[3]{5}$ (1·70997), and so on. All these numbers, both rational and irrational, make up the set of real numbers, and may be represented as points on a number line. Imaginary numbers, on the other hand, cannot be represented as points on a number line. They include numbers such as $\sqrt{-1}$, which is usually expressed by the symbol i. Finally, a complex number is a number which contains both a real number and an imaginary number, for example $6 + \sqrt{-4}$.

The set of all numbers

real

integers

Pos.   Neg.   Pos.   Neg.   Pos.   Neg.
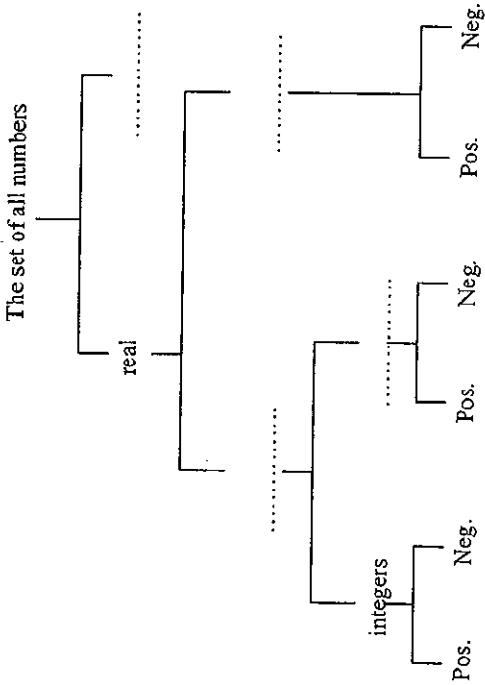
6. Read out the following:

a) $45 + 62 = 107$
b) $79 - 65 = 14$
c) $9 \times 18 = 162$
d) $14 . 27 = 378$
e) $112 \div 8 = 14$
f) $24 : 3 = 8$
g) $\frac{1}{13}$
h) $\frac{1}{2} \times \frac{3}{5} = \frac{3}{10}$
i) $2\frac{1}{2} + \frac{9}{10} = 3\frac{2}{5}$
j) 16.9761
k) $13,945.614$
l) $72.4 \times 61.5 = 4,452.6$

7. Use single words and fill in the blanks in the following sentences:

a) The .... of three and four is twelve.
b) The operation that uses the symbol ÷ is called ....
c) Eighteen subtracted .... twenty equals ....
d) An improper fraction exists when the .... is greater than the ....
e) The result of a division problem is called ....
f) The product is the result when one quantity is .... another.

11