| **Constructible numbers** | Season | 3 |
|---|---|---|
| | Episode | 06 |
| | Time frame | 1 period |

**Prerequisites :** General rules and methods of ruler and compass geometry

**Objectives :**
- Discover the concept of contructible numbers and study a few examples.

**Materials :**
- *Task sheet.*
- *Answer sheet.*

## 1 – The basic operations

15 mins

Students are working in groups of 3 or 4. They have to find out the method to construct the following quantities, from the unit 1 and two constructed numbers $a$ and $b$ :
- $a+b$ ;
- $a-b$ ;
- $ab$ ;
- $\frac{a}{b}$ ;
- $\sqrt{a}$.

Methods must be shown on the same answer sheet as part 2.

## 2 – Some special numbers

40 mins

Still working in groups, students have to construct the following numbers. At the end of the hour, an answer sheet by group must be given to the teacher to be marked.

| | | | |
|---|---|---|---|
| $\frac{5}{3}$ | $\frac{2}{7}$ | $\sqrt{2}$ | $\sqrt{3}$ |
| $\sqrt{2}+\sqrt{3}$ | $\sqrt{3}-\sqrt{2}$ | $\frac{5}{3}\sqrt{2}$ | $\frac{2}{7}\sqrt{3}$ |
| $\sqrt{2}\times\sqrt{3}$ | $\frac{\sqrt{2}}{2}$ | $\frac{1}{\sqrt{2}}$ | $\frac{\sqrt{3}}{2}$ |
| $1+\sqrt{5}$ | $\varphi=\frac{1+\sqrt{5}}{2}$ | $\frac{1}{\varphi}$ | $\frac{-1+\sqrt{5}}{2}$ |

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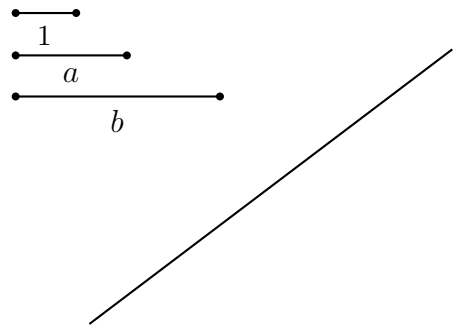
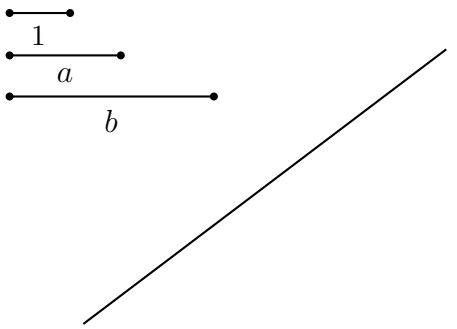
| | Document | Answer sheet |

# Part 1 – Methods

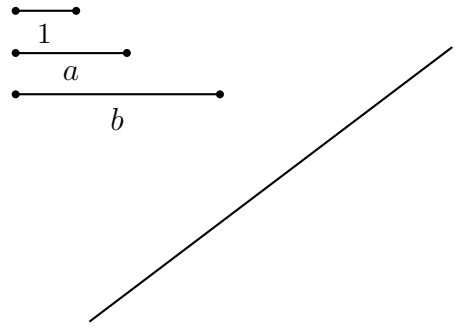
## Sum of two numbers $a + b$



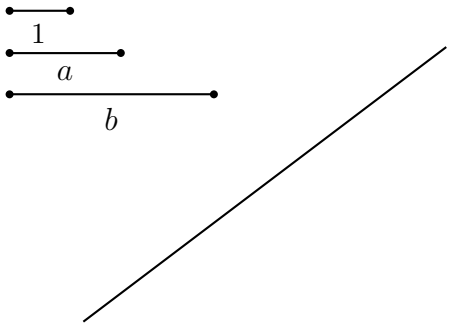

## Difference of two numbers $b - a$



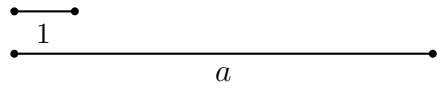

## Product of two numbers $a \times b$




## Quotient of two numbers $b/a$




## Square root of a number $\sqrt{a}$



# Part 2 – Construct some numbers

| | |
|---|---|
| $1$ |  |
| $\frac{5}{3}$ |  |
| $\frac{2}{7}$ |  |
| $\sqrt{2}$ |  |
| $\sqrt{3}$ |  |
| $\sqrt{2}+\sqrt{3}$ |  |
| $\sqrt{3}-\sqrt{2}$ |  |
| $\frac{5}{3}\sqrt{2}$ |  |
| $\frac{2}{7}\sqrt{3}$ |  |

| | |
|---|---|
| $\sqrt{2} \times \sqrt{3}$ |  |
| $\frac{\sqrt{2}}{2}$ |  |
| $\frac{1}{\sqrt{2}}$ |  |
| $\frac{\sqrt{3}}{2}$ |  |
| $1 + \sqrt{5}$ |  |
| $\varphi = \frac{1 + \sqrt{5}}{2}$ |  |
| $\frac{1}{\varphi}$ |  |
| $\frac{-1 + \sqrt{5}}{2}$ |  |

**Document 1** Answers - to be printed on a transparent sheet of paper

| | |
|---|---|
| $1$ |  |
| $\frac{5}{3}$ |  |
| $\frac{2}{7}$ |  |
| $\sqrt{2}$ |  |
| $\sqrt{3}$ |  |
| $\sqrt{2}+\sqrt{3}$ |  |
| $\sqrt{3}-\sqrt{2}$ |  |
| $\frac{5}{3}\sqrt{2}$ |  |
| $\frac{2}{7}\sqrt{3}$ |  |

| | |
|---|---|
| $\sqrt{2} \times \sqrt{3}$ |  |
| $\frac{\sqrt{2}}{2}$ |  |
| $\frac{1}{\sqrt{2}}$ |  |
| $\frac{\sqrt{3}}{2}$ |  |
| $1 + \sqrt{5}$ |  |
| $\varphi = \frac{1 + \sqrt{5}}{2}$ |  |
| $\frac{1}{\varphi}$ |  |
| $\frac{-1 + \sqrt{5}}{2}$ |  |