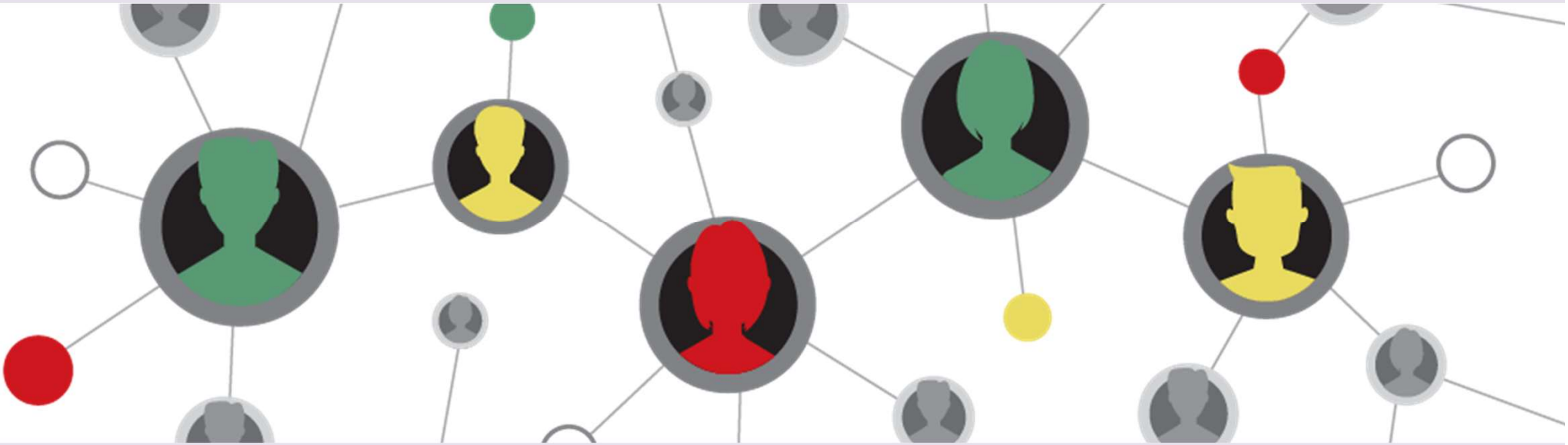
Welcome to the webinar
René Descartes would code a Rover if he could



Thursday 31st March 2022

Speaker T^3: Alexandre Técher
La Renaissance Highschool
(Reunion island)

Alexandre.Techer@ac-reunion.fr

TEXAS INSTRUMENTS

Overview:

- René Descartes brief introduction
- Main ideas and works
- Focus on Light refraction
- Descartes would code a Rover

Hardware and software:

Ti 83 premium CE Python Edition

Ti-innovator Hub

Ti Rover

vitta science

TEXAS INSTRUMENTS

René Descartes

Friday 11th February 1650

Stockholm (SE)

Sunday **31st March** 1596

La Haye [illegible]raine (FR)

Descartes (FR)

A crucial meeting

René Descartes

Isaac Beeckman

"To tell you the truth, it was really you who got me out of my idleness and made me remember things I once learned and had nearly forgotten: when my mind wandered from serious [mathematical] matters, you put me back on the right path."

RENÉ DESCARTES
1619

1637

Discourse on the Method of Rightly Conducting the Reason, and Searching for Truth in the Sciences

DISCOURS
DE LA METHODE
Pour bien conduire ſa raiſon,& chercher
la verité dans les ſciences.
PLUS
LA DIOPTRIQVE.
LES METEORES.
ET
LA GEOMETRIE.
Qui ſont des eſſais de cete METHODE.

A LEYDE
De l'Imprimerie de IAN MAIRE.
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Auec Priuilege.

Various models to understand the properties of light

Explanations of natural phenomena (wind, snow, rainbow…)

Idea of uniting Algebra and Geometry: birth of analytic geometry

1643

Marin Mersenne

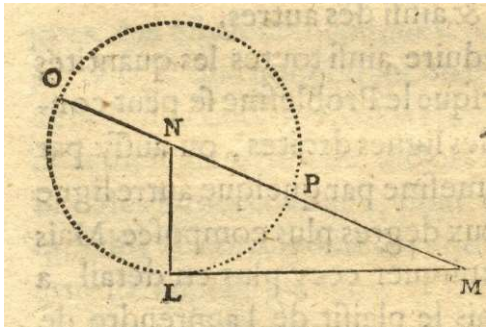
Girard Desargues

René Descartes

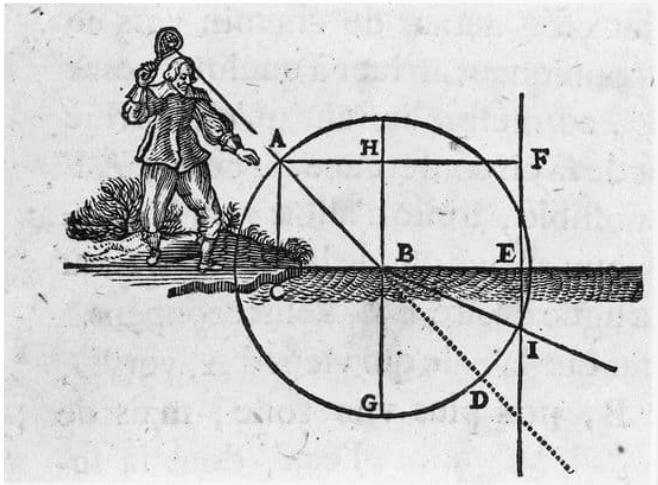
Blaise Pascal

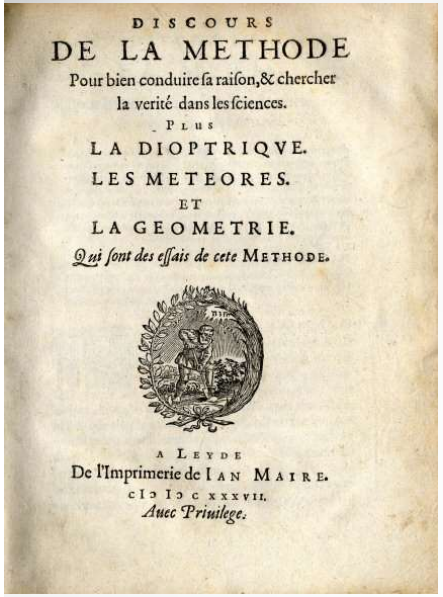
Father of Modern Philosophy

One of the first of the modern school of Mathematics



One of the key figures in the scientific revolution of the 17th




DISCOURS
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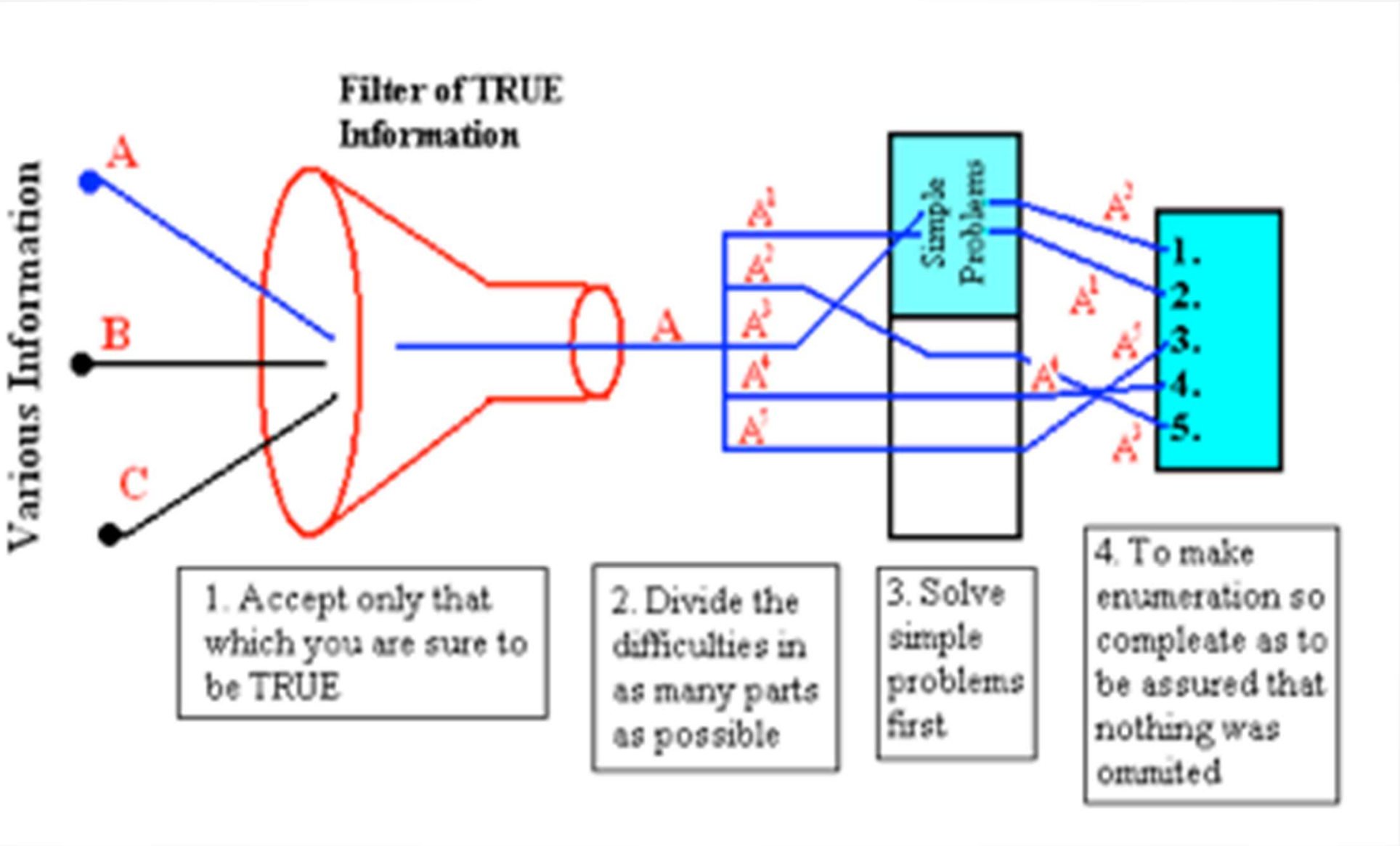
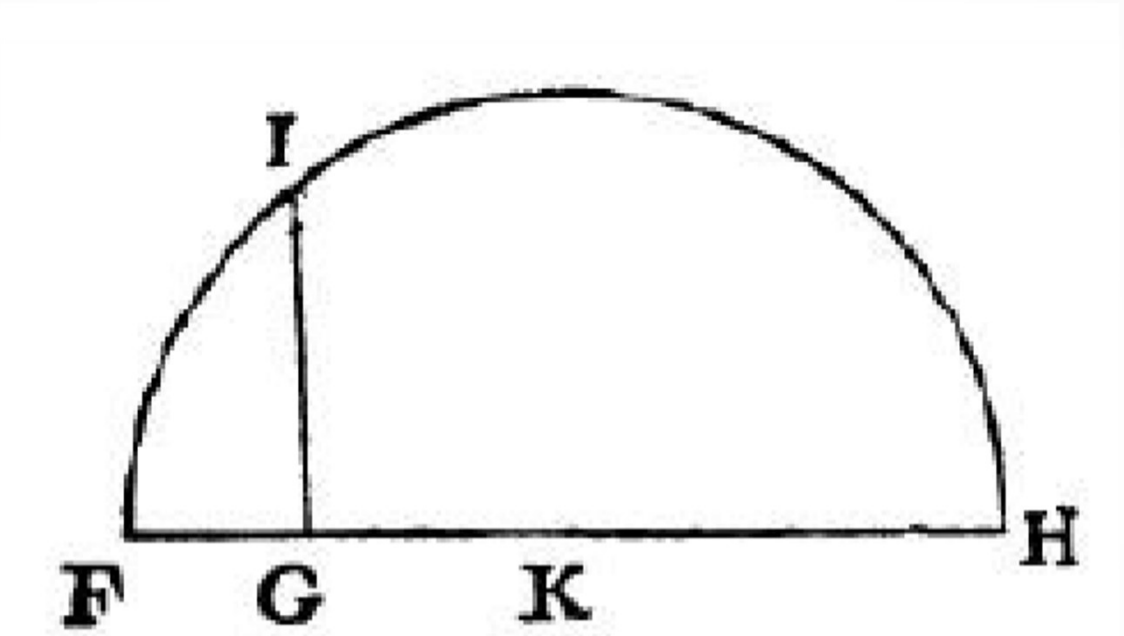
A LEYDE
De l'Imprimerie de IAN MAIRE.
clɔ Iɔ c xxxvii.
Auec Priuilege.

Four main precepts

- Accept nothing as true that is not self-evident.
- Divide problems into their simplest parts.
- Solve problems by proceeding from simple to complex.
- Recheck the reasoning.


Filter of TRUE Information
Various Information
A
B
C
A
A1
A2
A3
A4
A5
Simple Problems
A2
A1
A4
A3
1.
2.
3.
4.
5.
1. Accept only that which you are sure to be TRUE
2. Divide the difficulties in as many parts as possible
3. Solve simple problems first
4. To make enumeration so compleate as to be assured that nothing was omuited

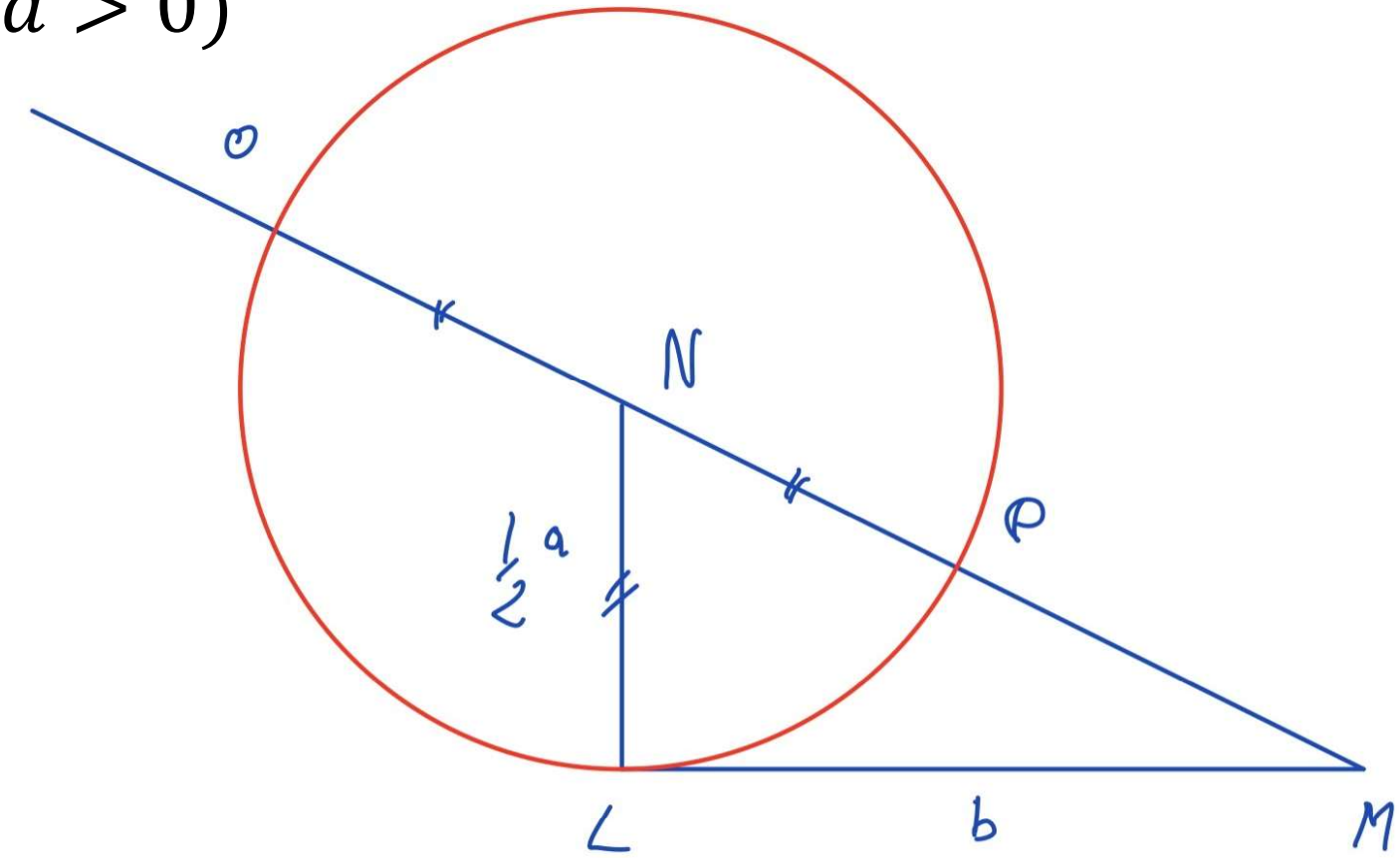
Construction of a square root



$$GI = \sqrt{GH}$$

Link to a translated version of La Géométrie

$z^2 = az + b^2 \ (a > 0)$



$OM = ON + NM$

ces $NM = \sqrt{b^2 + \frac{a^2}{4}}$ and $ON = \frac{1}{2}a$

Hence

$$OM = \frac{a}{2} + \sqrt{b^2 + \frac{a^2}{4}}$$

It follows :

$$OM^2 = \frac{a^2}{4} + b^2 + \frac{a^2}{4} + a\sqrt{b^2 + \frac{a^2}{4}}$$

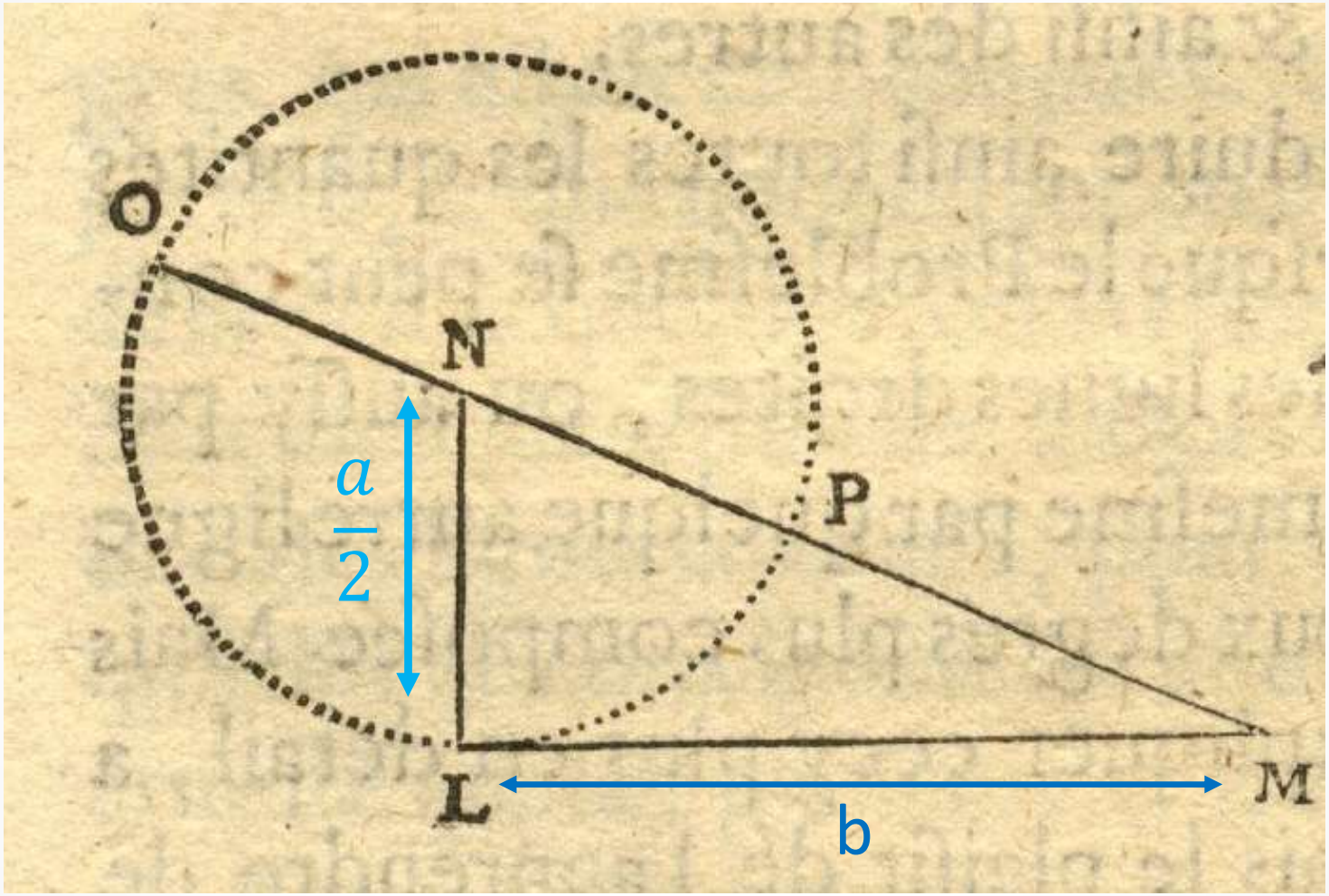
$$OM^2 = \frac{a^2}{2} + b^2 + a\sqrt{b^2 + \frac{a^2}{4}}$$

i.e. $$OM^2 = a\left(\frac{a}{2} + \sqrt{b^2 + \frac{a^2}{4}}\right) + b^2$$

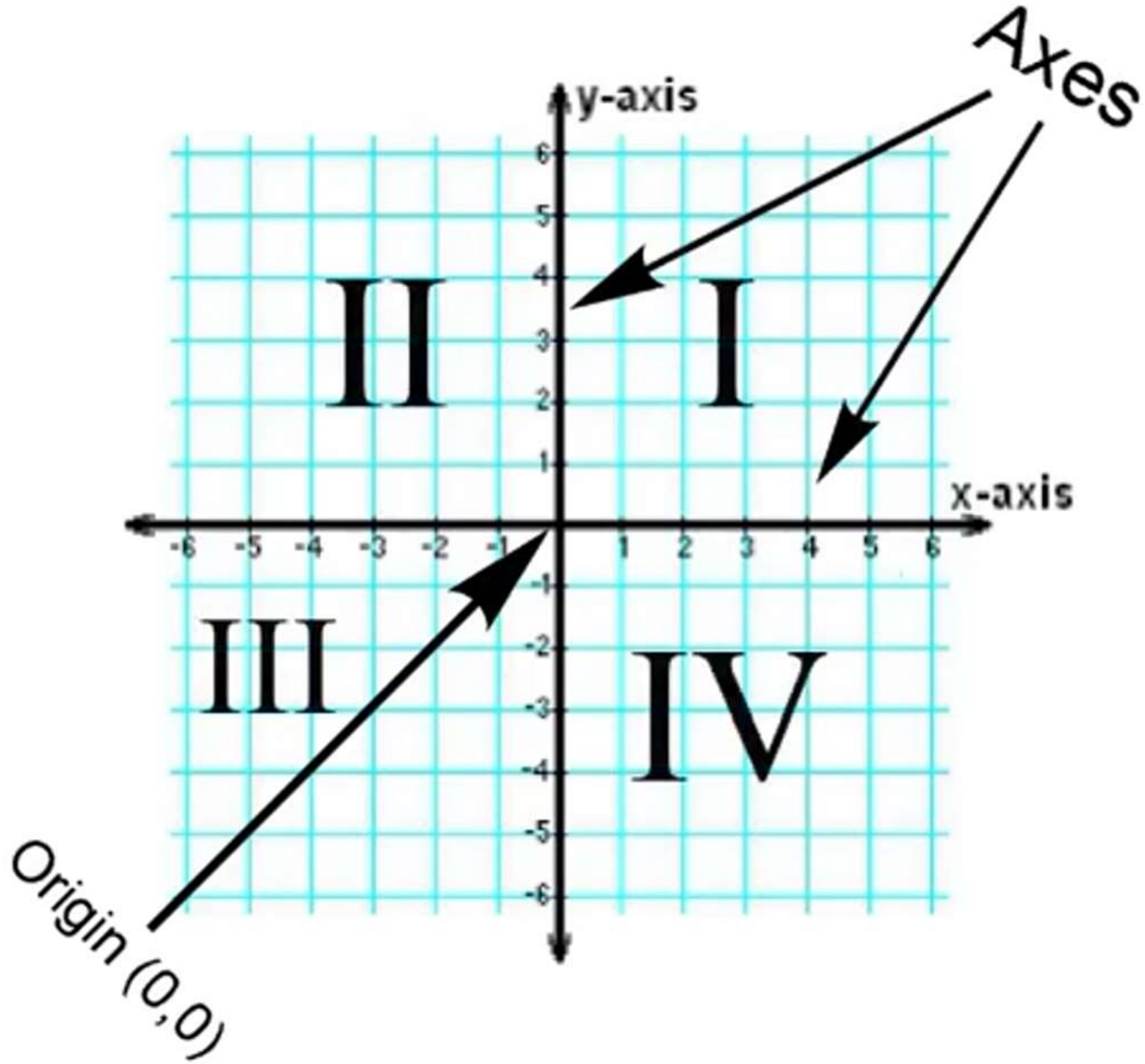
i.e. $$OM^2 = a \times OM + b^2$$

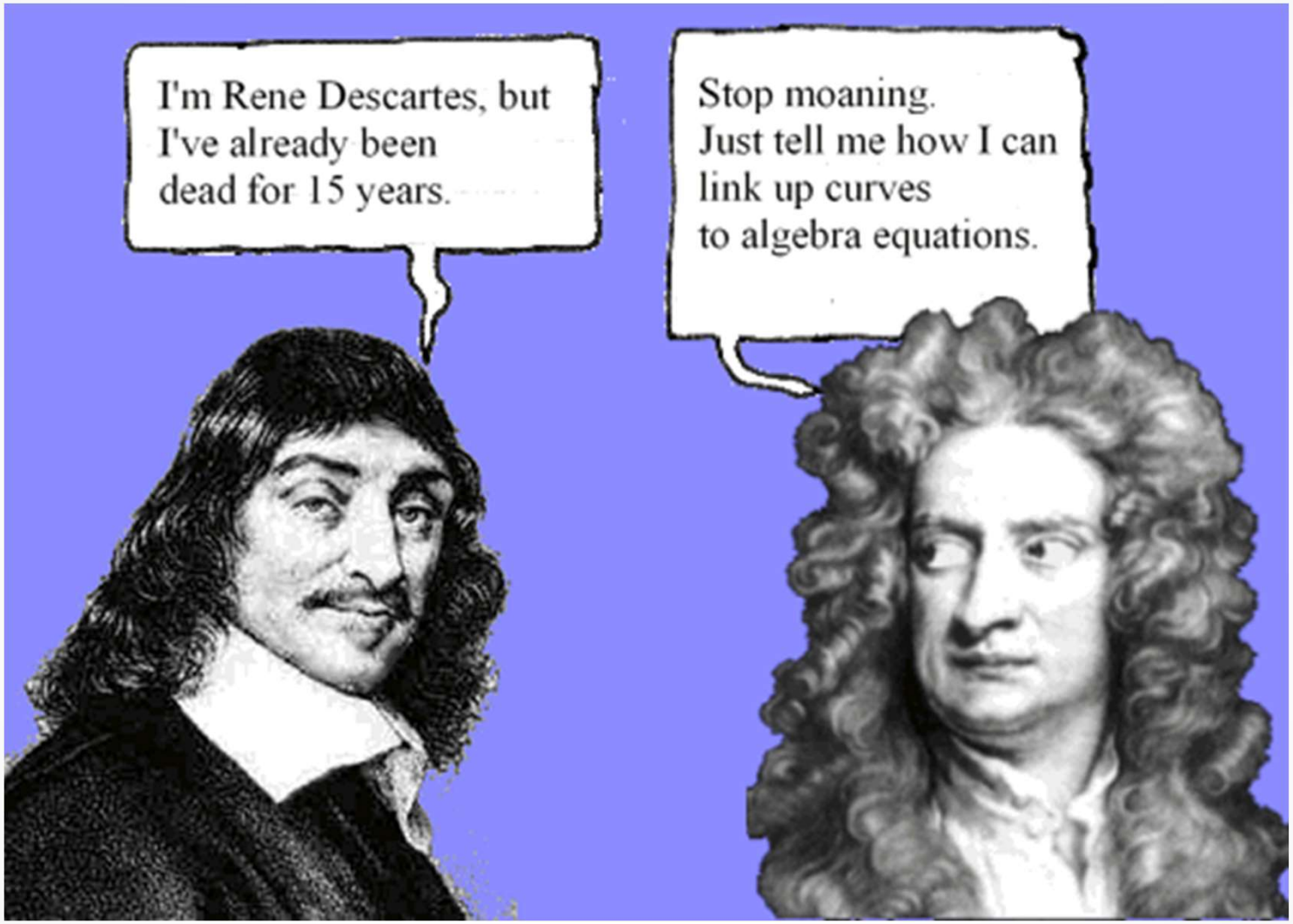
Then if we set $z = OM$: $$z^2 = az + b^2$$

$$z^2 = az + b^2 \ (a > 0)$$

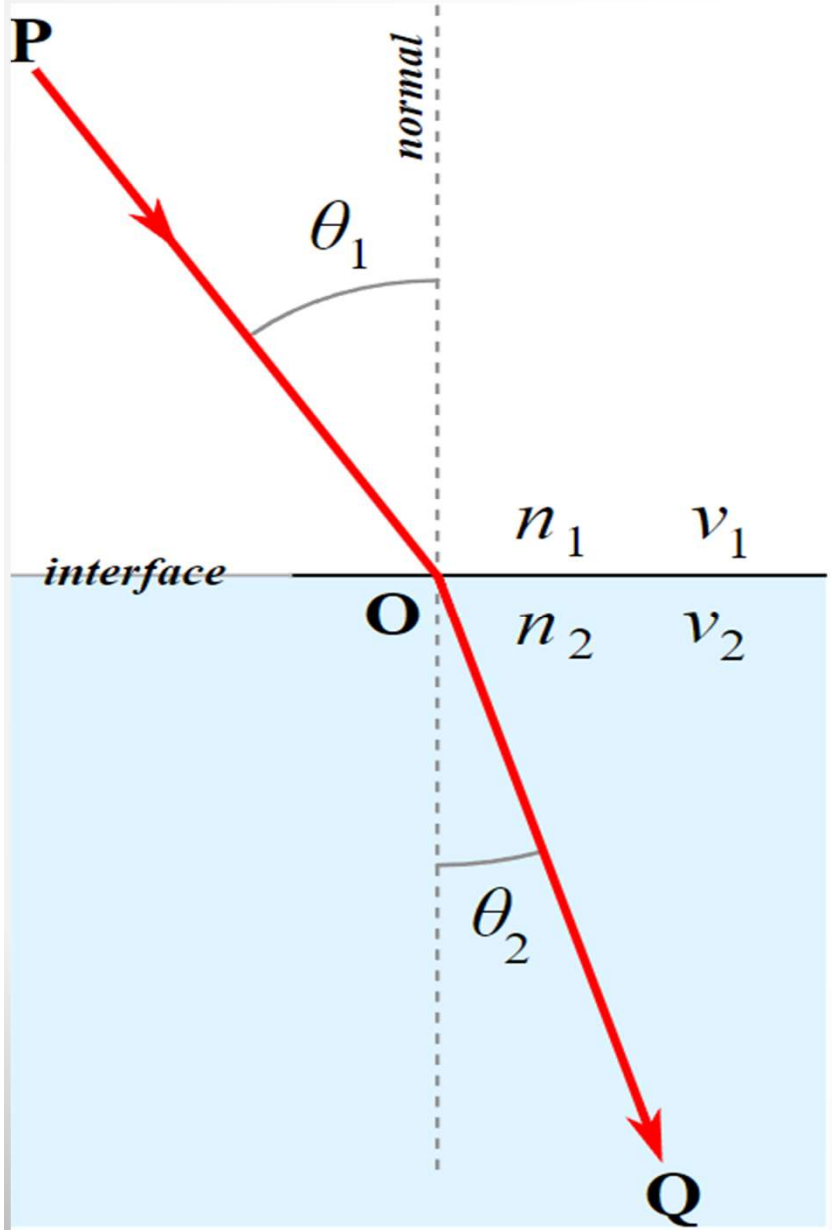


$z = OM$


Axes
y-axis
x-axis
II
I
III
IV
Origin (0,0)
6
5
4
3
2
1
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1 1 2 3 4 5 6


I'm Rene Descartes, but I've already been dead for 15 years.
Stop moaning. Just tell me how I can link up curves to algebra equations.

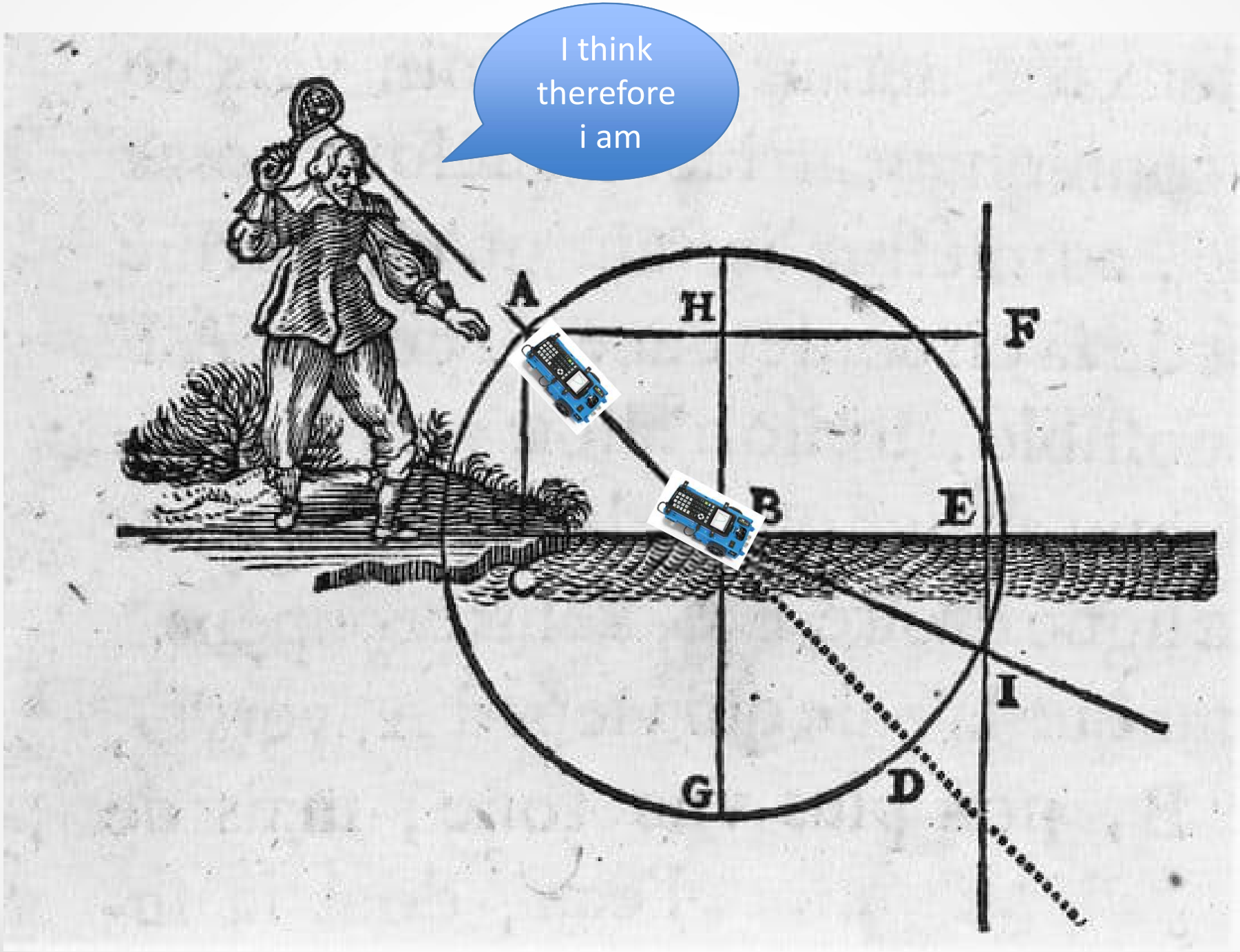
Snell-Descartes law
-Law of refraction-



$$\frac{\sin(\theta_2)}{\sin(\theta_1)} = \frac{v_2}{v_1} = \frac{n_1}{n_2}$$

$$n_1 \times \sin(\theta_1) = n_2 \times \sin(\theta_2)$$

Descartes would code a Rover



Vittascience : Pr

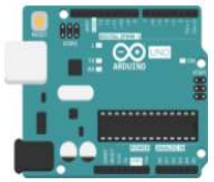
en.vittascience.com/code

vitta science

Programming Resources Classroom Hardware

Programming

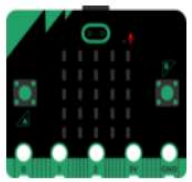
Get to the programming interface you want by clicking on the cards.



Arduino

Programming interface for the Arduino board

Find out more



Micro:bit

Programming interface for the BBC micro:bit board

Find out more

Python

Programming interface for Python 3 designed for education.

Find out more

Adacraft BETA

Interface based on Scratch enabling initiation to artifical intelligence and links to programming boards.

Find out more

STM32

Programming interface for the ST NUCLEO-WB55RG

Find out more

ESP32

Programming interface for ESP32 boards (Wemos D1R32, NodeMCU, Huzzah32, ...)

Find out more

TI-83 Premium CE BETA

Edition Python

Programming interface for calculator and cards BBC micro:bit or TI Innovator™ Hub

Find out more

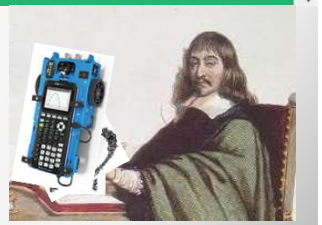
QuickPi

Programming interface for the QuickPi board

Find out more

Web BETA

Interface that allows the initiation to the creation of web page using HTML, CSS and JS.

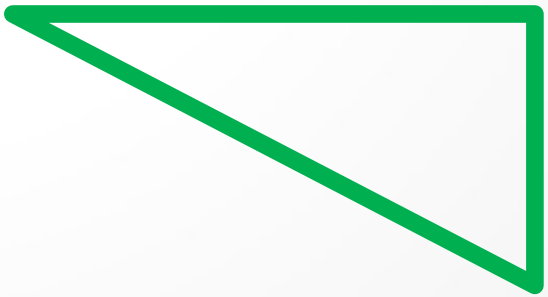


A colorized version of the Pythagorean theorem

Problem: Recognize a right angle on a colorized path

Sub-problems:

- Validate the path color.
- Stop when the color isn't the same anymore.
- Rotate 90°.
- Continue straight forward if the color is correct.



A colorized version of the Pythagorean theorem

Preamble activity:

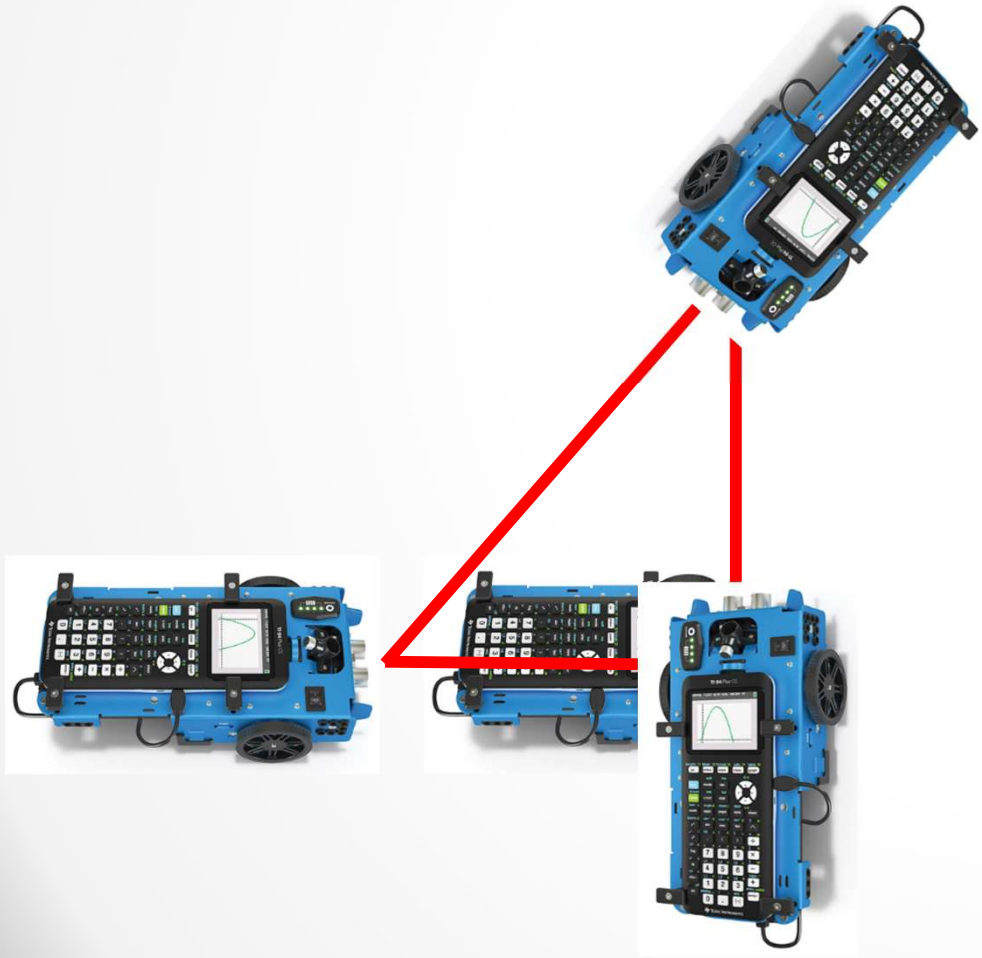
► Write a Python function that make the Rover draw a right triangle

```
EDITOR: PPARK
ti_rover module
Drive I/O Settings Commands
1:import ti_rover as rv
2:forward(distance)          unit
3:backward(distance)         unit
4:left(angle)              degrees
5:right(angle)             degrees
6:stop()
7:resume()
8:stay(time)               seconds
9:to_xy(x,y)
0↓to_polar(r,theta)     ∠ degrees
 Esc | Modul
```

A colorized version of the Pythagorean theorem

Preamble activity:

- Write a Python function that make the Rover draw a right triangle



```
EDITOR: TREC
PROGRAM LINE 0021

def tri_rec(a,b,c):
  k=1/10
  rv.forward(a*k)
  rv.left(90)
  rv.forward(b*k)
  rv.to_xy(0,0)

Fns… | a A # | Tools | Run | Files
```

A colorized version of the Pythagorean theorem

Problem: Recognize a right angle on a colorized path

Sub-problems

- Validate the path color.

ÉDITEUR : COUL1
LIGNE DU SCRIPT 0017

```
def reco():
    global r,g,b
    a=0
    while a!=1:
        rv.color_off()
        r=rv.red_measurement()
        g=rv.green_measurement()
        b=rv.blue_measurement()
        rv.color_rgb(r,g,b)
        a=int(input("couleur OK?"))
        sleep(3)
        rv.color_off()
    return r,g,b

def repro():
    r,g,b=reco()
    a=int(input("reproduire la cou
        leur?"))
    if a==1:
        rv.color_rgb(r,g,b)
        sleep(3)
        rv.color_off()
    else:
        rv.color_off()
```

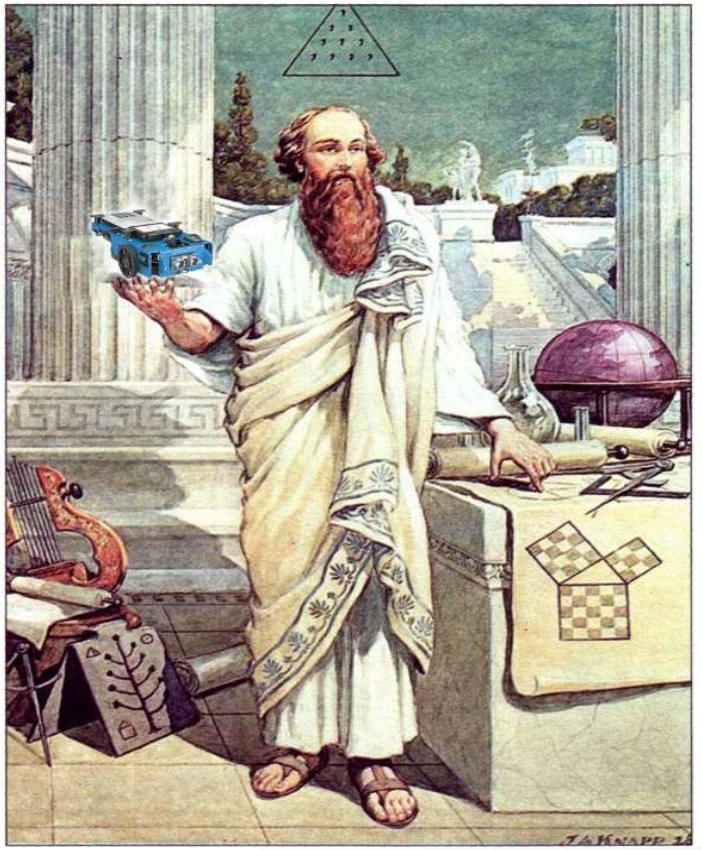
Fns... | a A # | Outils | Exéc | Script

A colorized version of the Pythagorean theorem

Problem: Recognize a right angle on a colorized path

Sub-problems

- Validate the path color.
- **Rotate 90°.**



A colorized version of the Pythagorean theorem

Problem: Recognize a right angle on a colorized path

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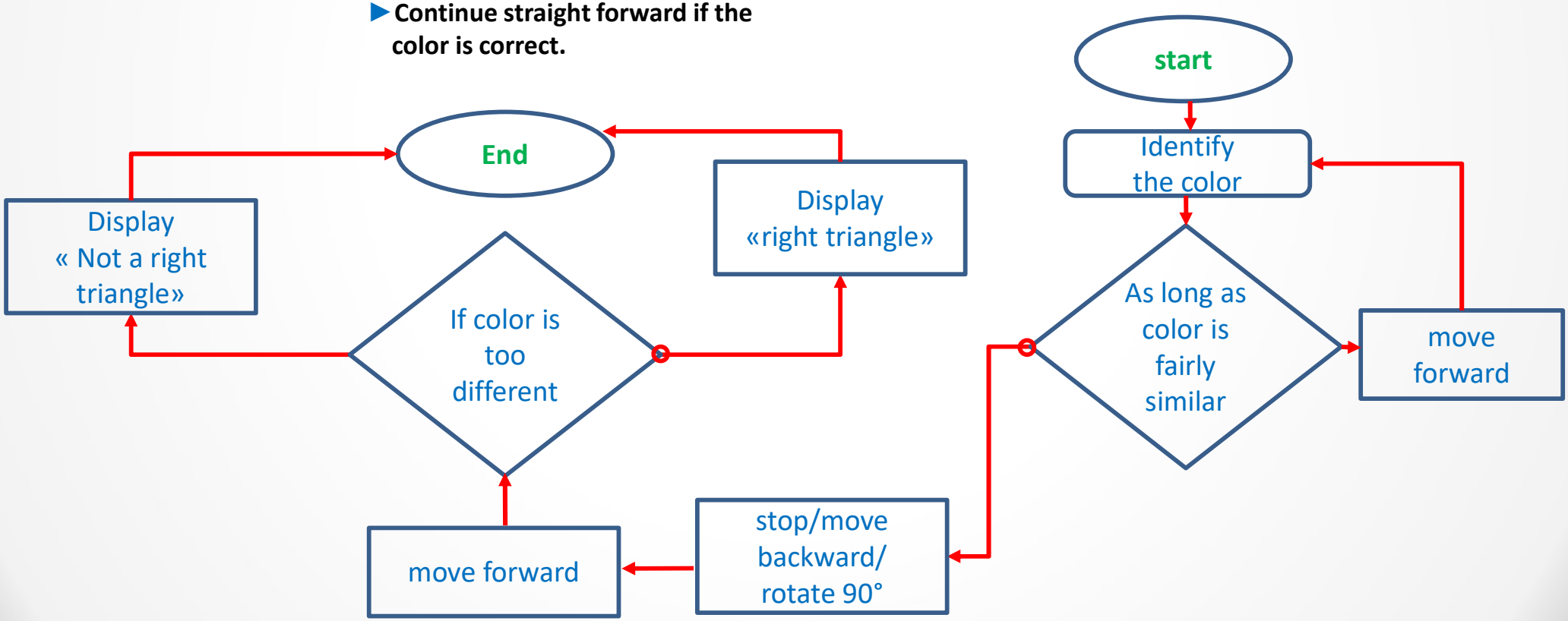

A colorized version of the Pythagorean theorem

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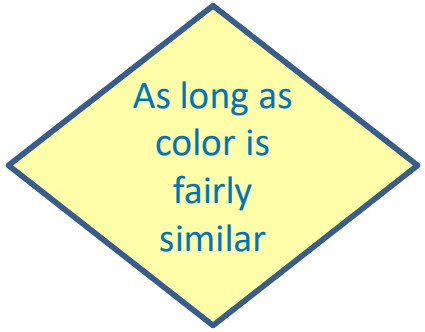


```
ÉDITEUR : COUL1
LIGNE DU SCRIPT 0038
def avance(d):
    reco()
    r1=r
    g1=g
    b1=b
    while r1>=0.8*r and r1<=1.2*r
          and g1>=0.8*g and g1<=1.2*
        g and b1>=0.8*b and b1<=1.2
        *b:
        rv.forward(10)
        r1=rv.red_measurement()
        g1=rv.green_measurement()
        b1=rv.blue_measurement()
    rv.stop()
    rv.backward(0.8)

    if d=="d":
        rv.right(90)
    else:
        rv.left(90)
    rv.forward(0.3)
Fns... | a A # | Outils | Exéc | Script
```

How to register for a webinar

- https://tiedtech.yello.co/external/events_central

THANK YOU !