# Huygens and Mathematics 

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## I. Huygens' <br> Mathematical Drawings

A short tour

Rolling


1678

## Catenary



1646

## Curves: Tangents and Areas



1657

Curves:
The Paracentric Isochrone


1694

Curves:
A spiralling Isochrone


1694

## Curves:

Solution of an "Inverse Tangent Problem"

$$
\begin{aligned}
& G E=x+y \\
& {[d y / d x=-y /(x+y)]}
\end{aligned}
$$



1694

At work on the Conchoid



## II. Seeing through the Figures

- The Infinitely small: Infinitesimals and Limits
- Motion
- Processes: Modelling


## Arclength and Areas

$$
s=\sqrt{ } \boxed{1+(d y / d x)^{2}} d x
$$



1657

## Unrolling a Curve



## Evolutes:

Second-order Infinitesimals


1659

## The radius of Curvature



Fall through medium with resistance $:: v$; Huygens' Model
velocity
acceleration
time
resistance

1668


Fall through medium with resistance $:: v$; Huygens' Model
velocity
acceleration
time
resistance

1668


Fall through medium with resistance $:: v$; Huygens' Model

## velocity

acceleration
time
resistance

1668


Fall through medium with resistance $:: v$; Huygens' Model
velocity
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Fall through medium with resistance $:: v$; Huygens' Model
velocity
acceleration
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resistance

1668


## Fall through medium with resistance $:: v$;

 Huygens' Model
## velocity :: resistance

Which curve?

Huygens: "Logarithmica"
$[y=\ln x]$

1668


Fall through medium with resistance $:: v$ ； Huygens＇Model

$$
\begin{aligned}
& d v / d t=g-\text { 國 } v \\
& v=g / \text { 國 }+e^{- \text {㿿 } t}
\end{aligned}
$$

1668


## Comments

- The figure represents a process of motion
- All variables etc. visible in their mutual relations
- A geometrical model
- (Not a collection of equations)
- Geometrical Physics


## Motion, <br> resistance $:: v$; <br> Huygens’ Model

Further results

1668

## Motion, <br> resistance :: $v^{2}$; Huygens' Model <br> ;



## Conclusion

- Huygens' Mathematics:

Geometrical Analysis

- A phase in the development of Analysis
- Wiped out by the Calculus
- Yet: authentic mathematics, performed by a brilliant master
- As valuable and enjoyable as any modern mathematics.

