



C3 - Buzau (Romania) - Leonardo the Anatomist May 2019

INSTITUT NARCÍS XIFRA I MASMITJÀ

Who has participated in this topic?

- Teachers:
 - Mathematics Department
 - Science Department (Biology and Physics)
 - Technology Department
 - Art Department
 - Health Care Department

- Students
 - Compulsory: 13-15 year old and 16-17 year old
 - Vocational: Health care

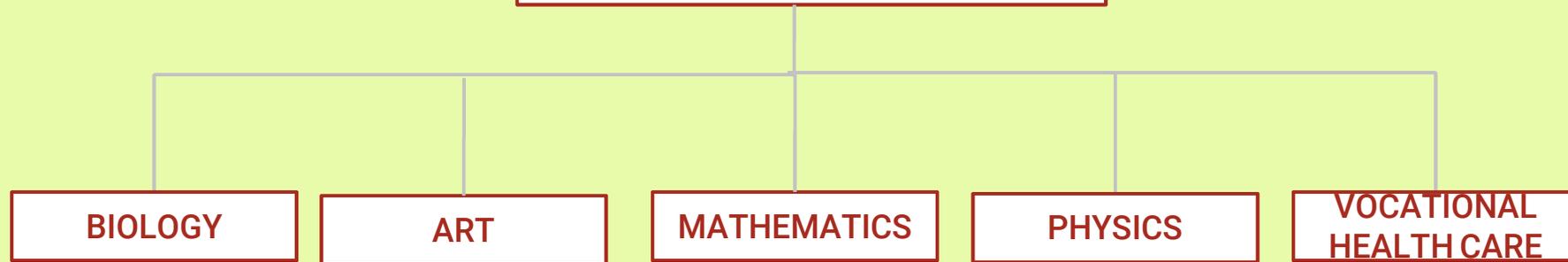
Our goals

- To involve as many participants as possible
 - more students, more teachers have participated
 - more interaction between Secondary and Vocational Education
- To promote our project (dissemination)
 - Ciència entre tots
 - 500th Anniversary of Leonardo's Death
- Team and STEAMwork
- ICT tools
 - Drive
 - Genially
 - Twinspace
 - Videoconferences



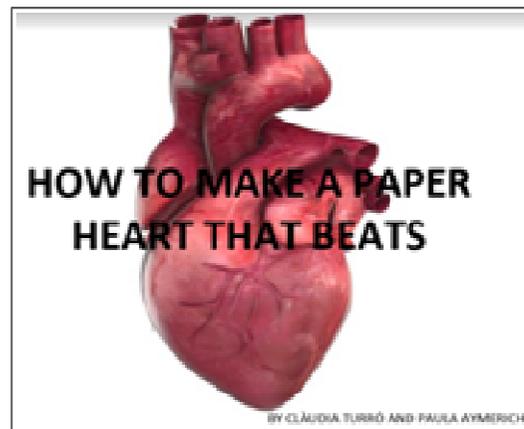
LEONARDO THE ANATOMIST

Areas



BIOLOGY

- HEART ARTIFEX: <https://ja.cat/uxGoP>



- HUMAN HAND – 14-15 y.o. students

Mystery science

<https://mysteryscience.com/body/mystery-1/muscles-skeleton/59?r=49666186#slide-id-0>

Students discover the mechanism by which their muscles control their bones (i.e., how their bodies move!) and develop a robotic finger based on how their own fingers work.



Human Machine > Mystery 1 [Student link](#)

Why do your biceps bulge?

★★★★★ 4.8 (14807 reviews)

- 🕒 Exploration (25 min)
- 🏠 Activity: Robot Finger (30 min)
- 🕒 Extras (3.5 hrs)

[View activity supplies](#)

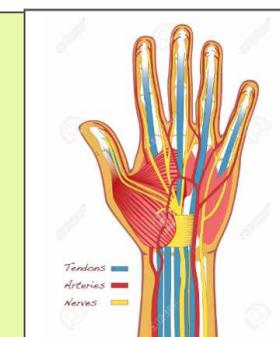
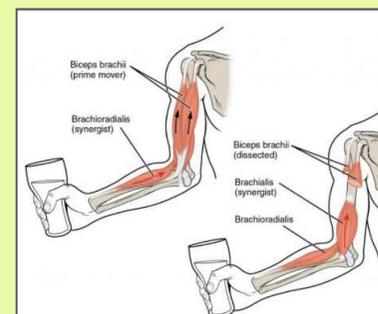
[Email parents](#)

[Start Mystery](#)

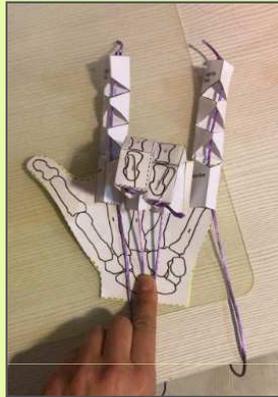
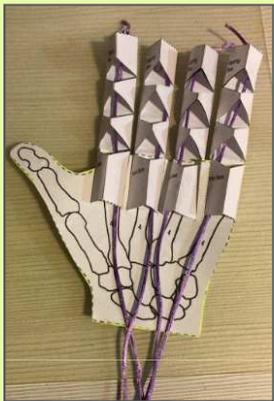
Slow Internet or video playback problems? [Download Mystery](#)



Students discover the mechanism by which their muscles control their bones (i.e., how their bodies move!). In the activity, students develop a robotic finger based on how their own fingers work.

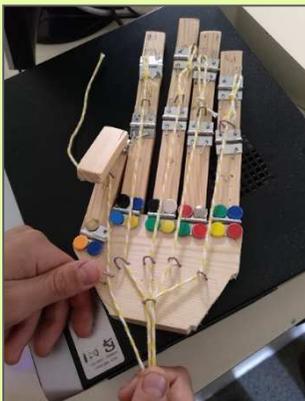


- Articulated hands: creating a robot hand that works just like yours.

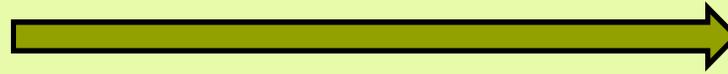


STEPS TO GET THE ARTICULATED HAND

- 1st- You have to make the shape of the hand with the cardboard
- 2nd- Then, you have to put threads that are linked together to make the hand move
- 3ed- Finally, you can add details to make it more elegant



- Medical mission: reconstruction of the skeleton of a hand



Problems

We have finished the deduction that the following pieces are missing:

THUMB: Proximal phalange and distal phalanx.

INDEX: They are all correct, but there are bones that are broken.

MIDDLE FINGER: Proximal phalange, phalanx and distal phalanx.

ANULAR: They are all correct, but there are bones that are broken.

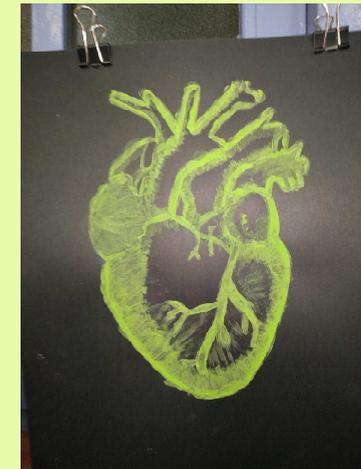
TINY FINGER: Proximal phalanx, medium phalanx and distal phalanx.



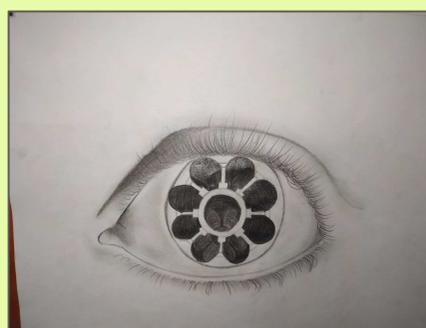
ART



We had to draw some parts of the body like Leonardo did it: only the pencil, even to make the shadows and no rubber



- Mapping:

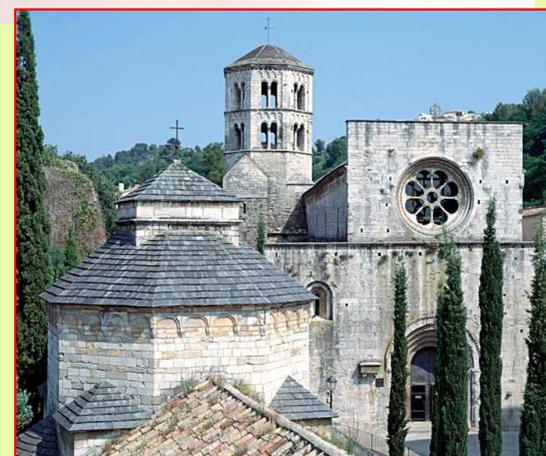


<https://vimeo.com/332598410> (mapping)

<https://vimeo.com/334118892> (Muntage Leo-2019)

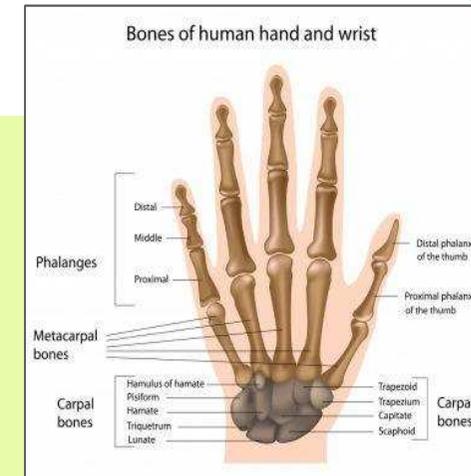
<https://vimeo.com/334119425> (còdex)

<https://vimeo.com/334419315>(muntage a l'absidiola)



MATHEMATICS

- LET'S MEASURE OUR HAND



Let's measure our hand:

PALM		WRIST	THUMB		INDEX FINGER		
Width (1)	Length (2)	Width (3)	Proximal phalange (4)	Distal phalange(5)	Proximal phalange (6)	Middle phalange (7)	Distal phalange (8)

- (1) Measure the width of the palm from where the fingers meet the palm.
- (2) Measure from the middle of the wrist until the place where the middle finger begins.
- (3) Measure the width of the wrist, without force.
- (4) You must look at the hand interior. Measure from where the thumb begins until the first articulation.
- (5) You must look at the hand interior and measure the distal phalange of the thumb.
- (6),(7) i (8) Measure the several parts of the index finger.



We watched a video that explains how to measure our hand with a vernier caliper. Then we measured many parts of our palm and the thumb, and we wrote the results in a chart. The activity was very interesting and it was a new experience for us.



PALM (2)			
LENGHT OF PALM (cm)	ABSOLUTE FREQUENCY		
(7'8 , 8,2]	3	7	21
(8'2 , 8,6]	4	8.4	33.6
(8'6 , 9]	5	8.8	44
(9 , 9'4]	3	9.2	27.6
(9'4 , 9'8]	1	9.6	9.6
(9'8 , 10]	3	9.9	29.7
(10 , 10'2]	1	10.1	10.1
(10'2 , 10'4]	0	10.3	0
(10'4 , 10'6]	1	10.5	10.5
(10'6 , 10'8]	0	10.7	0
(10'8 , 11]	2	10.9	21.8
(11 , 11'2]	1	11.1	11.1
(11'2 , 11'4]	1	11.3	11.3
	25		9.212

THUMB (4)			
PROXIMAL PHALANGE (cm)	ABSOLUTE FREQUENCY		
(1'6 , 2'0]	2	1.8	3.6
(2'0 , 2'4]	8	2.2	17.6
(2'4 , 2'8]	6	2.6	15.6
(2'8 , 3'2]	9	3	27
(3'2 , 3'6]	2	3.4	6.8
	27		2.61

		2A	2B	2C	2D	ARITHMETIC average
PALM	Width	7.22	7.54	7.36	7.29	7.353
	Lenght	9.02	9.212	9.46	9.36	9.263
THUMB	Prox. phalange	2.83	2.668	2.61	2.72	2.707
	Distal phalange	2.89	2.956	3.26	3.26	3.0915

- VOLUME OF A HAND

HAND VOLUME

Thumb

$$\pi \cdot r^2 \cdot h$$

$$3,14 \cdot 1^2 \cdot 5 = \underline{15,7 \text{ cm}^3}$$

Index

$$2 \cdot r^2 \cdot h$$

$$3,14 \cdot 0,75^2 \cdot 6,5 = \underline{11,48 \text{ cm}^3}$$

Middle

$$2 \cdot r^2 \cdot h$$

$$3,14 \cdot 0,75^2 \cdot 7,5 = \underline{13,24 \text{ cm}^3}$$

Ring

$$2 \cdot r^2 \cdot h$$

$$3,14 \cdot 0,75^2 \cdot 7 = \underline{12,36 \text{ cm}^3}$$

Pinky

$$\pi \cdot r^2 \cdot h$$

$$3,14 \cdot 0,5^2 \cdot 5 = \underline{3,9 \text{ cm}^3}$$

Palm

part 1

$$\frac{a \cdot b}{2} \cdot h$$

$$\frac{8 \cdot 4}{2} \cdot 2 = \underline{32 \text{ cm}^2}$$

part 2

$$\frac{a \cdot b}{2} \cdot h$$

$$\frac{6,5 \cdot 7,5}{2} \cdot 2 = \underline{48,75 \text{ cm}^2}$$

part 3

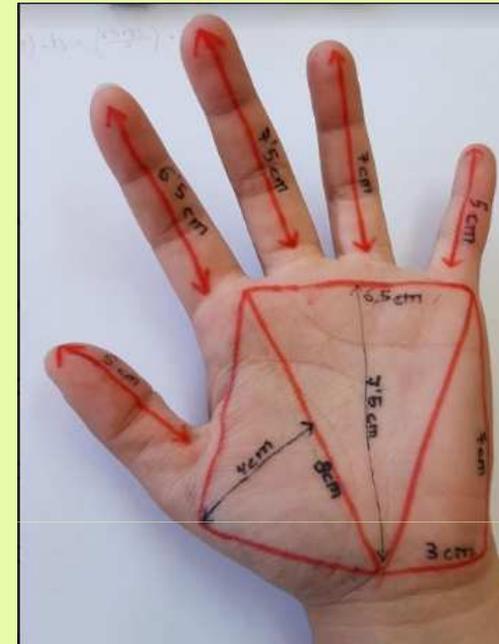
$$\frac{a \cdot b}{2} \cdot h$$

$$\frac{3 \cdot 7}{2} \cdot 2 = \underline{21 \text{ cm}^2}$$

TOTAL:

$$15,7 + 11,48 + 13,24 + 12,36 + 3,9 + 32 + 48,75 + 21$$

$$\underline{158,43 \text{ cm}^3}$$

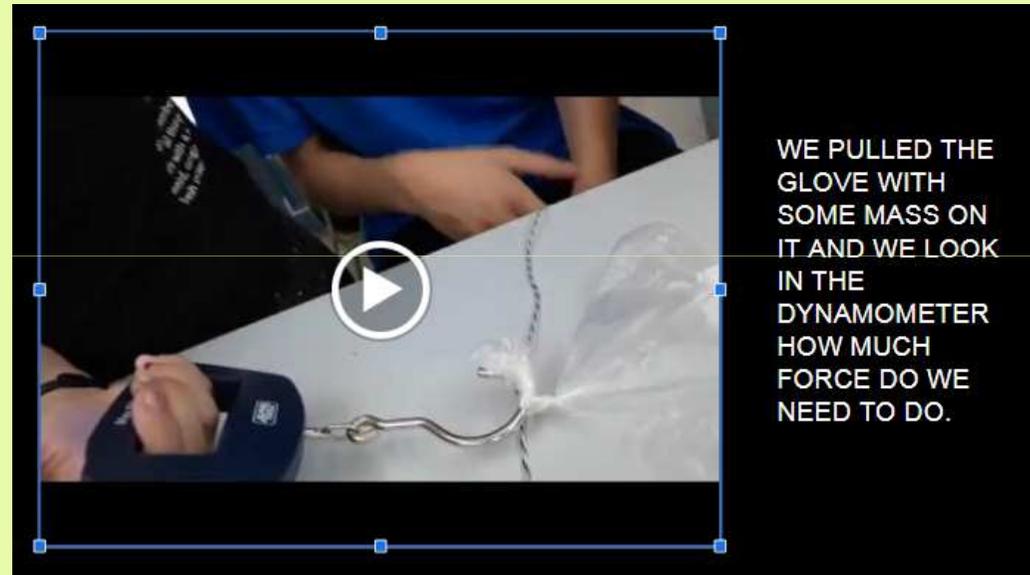


PHYSICS:

- to measure the force to hold a glass with gloves of different materials



Students from different years exchanging their conclusions



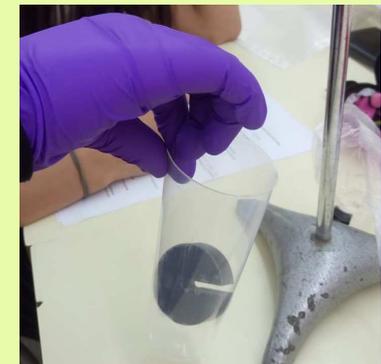


The force to hold it depends on the material of the glove: the friction force is different

- WHY DO OBJECTS FALL?

- Gloves made of different materials
- A Dynamometer
- A glass

Gravity makes objects fall
and friction is opposite to it



500th anniversaire
of Leonardo da
Vinci's death at INS
Narcís Xifra i
Masmitjà



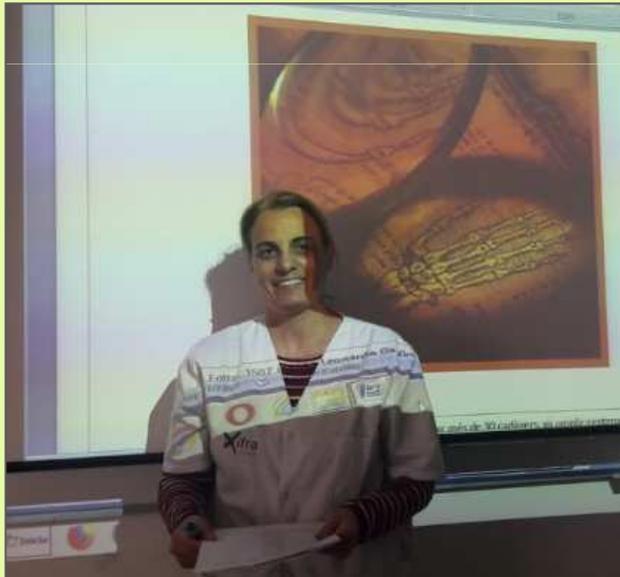
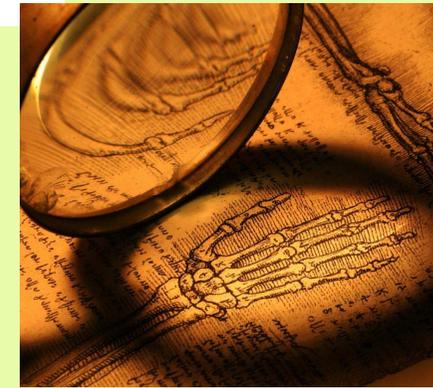
VOCATIONAL: HEALTH CARE

Departament de Sanitat - CFGM Cures auxiliars d'infermeria PROJECTE Leonardo da Vinci (joc de mans - Game of Hands)

Leonardo dissected 30 corpses in his lifetime. Through a workshop the students learnt about Leonardo and his contribution to anatomy

50 students + 10 teachers involved

Coordinator: **Montse Pont**



Kahoot:

<https://create.kahoot.it/share/joc-de-mans-leonardo-da-vinci/dac58939-c427-42f0-90f2-793749c03cdb>



Joc de mans. Leonardo Da Vinci

A public quiz

Leonardo Da Vinci i la seva relació amb el món sanitari seguint el fil conductor de la làmina de la mà

FULL DE RUTA



Què volem aprendre? Un cop vist el punt de partida hem de tenir clar:

- on volem arribar?
- quins passos seguirem?
- com ho mesurarem si ho hem aconseguit?
- i com ho podem mesurar?



Què he après i què em falta?

- Fer una Graella de pla de treball
- S'han trobat obstacles quins?



Què he après?

- Realitzar el portafolis final
- Realitzar el video final

Pregunta inicial	Activitats segons el crèdit
1. Quiera L. Da Vinci?	C1: Investigar què en sabem de Leonardo Da Vinci
2. Quina és la relació de L. Da Vinci amb el mon sanitari?	C8: L'home de Vitruvi C2: Comparar les làmines amb les imatges de les noves tecnologies
3. Ens atrevim a donar vida a una de les seves làmines?	C9: Caricatures grotesques

ACTIVITATS INICIALS

A1: CERCA D'INFORMACIÓ I CREACIÓ HIPÒTESIS

Cada alumne escull el producte FINAL	COM HO PODEM RELACIONA AMB EL GENI	Si passen les pistes dels experiments poden aconseguir diferents INSÍGNIES
Coneix el cirurgià de mans d'acer	C3 i C6	Les mans, les més precises
Com enganya la ment als nervis de la ma?	C5	El cervell enganya
Intervencions quirúrgiques de les mans	C4	Problemes de lligaments i nervis
Capacitat de reacció	C4	Reflexes i reaccions del sistema nerviós
Joc de mans	C7	Importància de la comunicació no verbal
CREACIÓ DE LA MA ARTICULADA	C4	Aplicació del moviment a la làmina de Da Vinci

ACTIVITATS D'EXPERIMENTACIÓ

A2: Validar hipòtesis

ACTIVITATS D'INTERCANVI D'IDEES

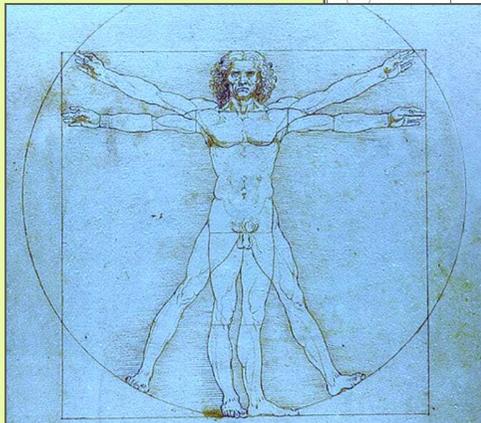
A3: INTERRELACIÓ SOCIAL, TREBALL COOPERATIU

A4: ACTIVITATS DAUTOREGULACIÓ i reflexió

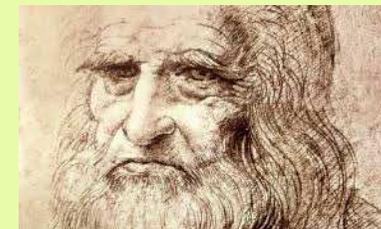
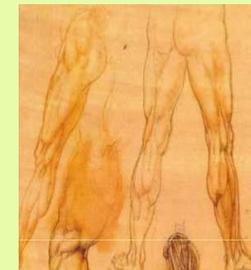
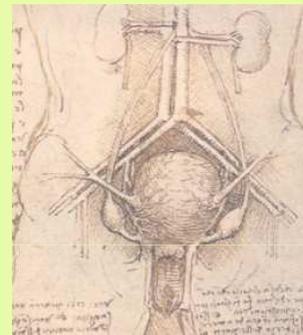
Realitzar en el pla de treball valoració activitats inici, generació de noves preguntes

- Anatomical studies and drawings

The students had to go on discovering about Leonardo da Vinci and anatomy. Once they finished each activity, they got a “label” to complete the Vitruvian

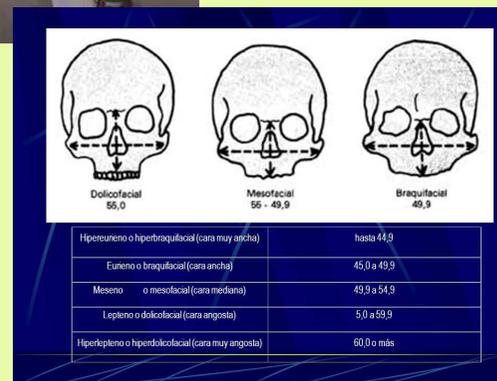


- Drawings of Leonardo and the means of administration of medication: oral, nasal, parental, topical, anal

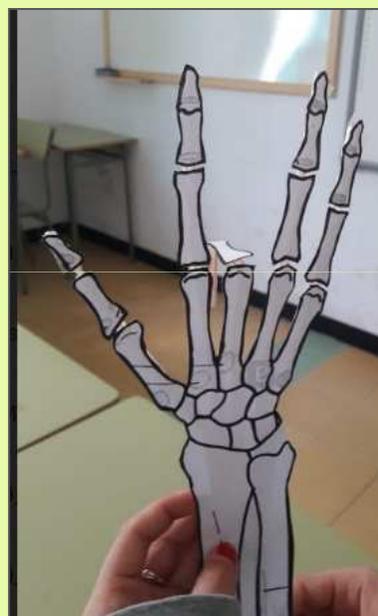
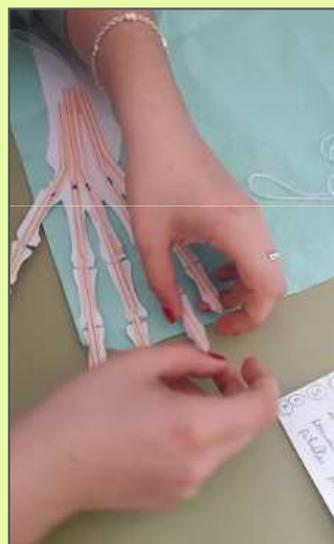


DENTISTRY AND ESTOMATOLOGICAL AID TECHNIQUES

Study of the pathologies of the grotesque cartoons made by da Vinci in the research for beauty



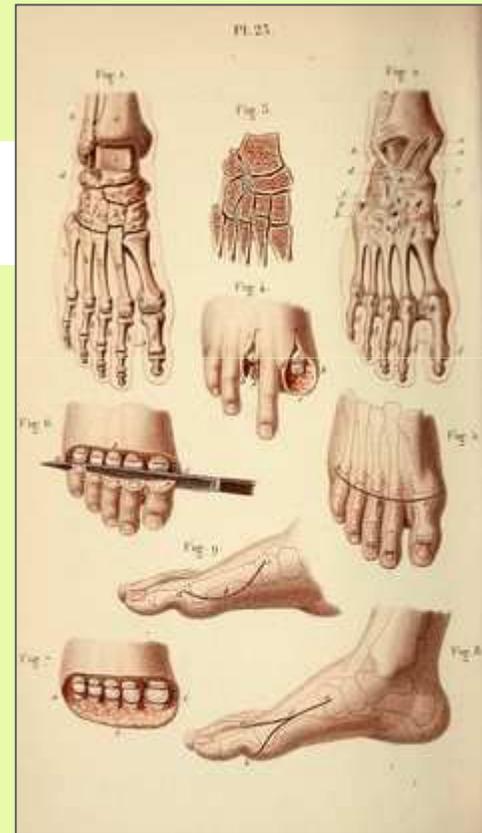
Model of an Articulated hand



First Aids: How the thermoreceptors of our skin work when they feel at the same time cold and hot water? 



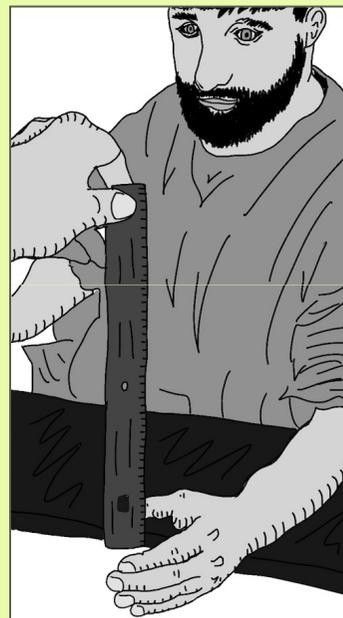
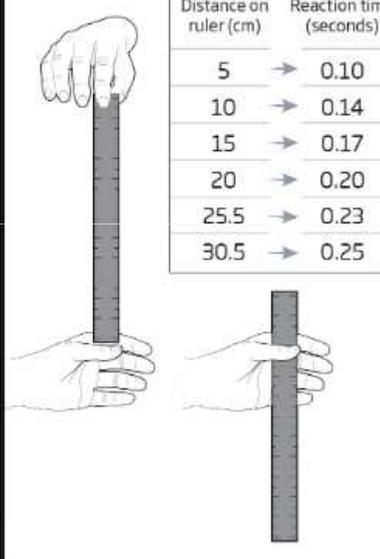
They related it to the sensitivity of the amputated zones



Nervous System: comparison between the visual, auditory and tactile reaction, stimulus and reflex topic

Quick, as a rule
Gauging a persons reaction time

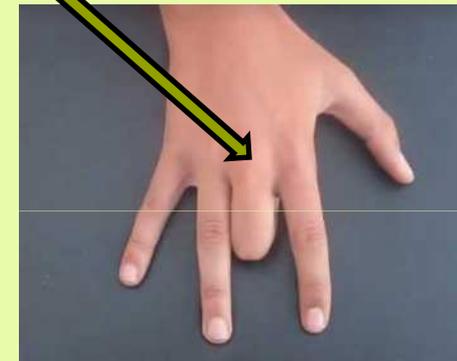
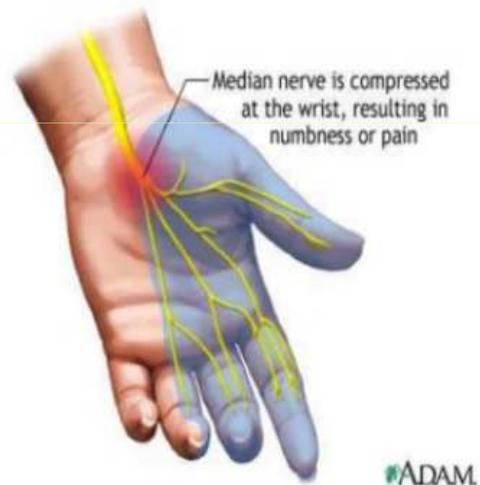
Distance on ruler (cm)	Reaction time (seconds)
5	→ 0.10
10	→ 0.14
15	→ 0.17
20	→ 0.20
25.5	→ 0.23
30.5	→ 0.25



Tendons don't let the finger in the picture be moved

Carpal Tunnel Syndrome

- Carpal tunnel syndrome (CTS) is a collection of symptoms and signs that occurs following entrapment of the median nerve within the carpal tunnel. [2]
- Usual symptoms include numbness, paresthesias, and pain in the median nerve distribution.
- These symptoms may or may not be accompanied by objective changes in sensation and strength of median-innervated structures in the hand. [2]



Supersurgeon: robot da Vinci in Hospitals vs human surgeon



Thanks



and looking forward to starting with the new topic
about Leonardo da Vinci