APPENDIX

HOW DOES THIS WORK:

A lot of the results are visible through the github page - including code, assets, images and videos. But not everything has the right format to be stored there - so it was attached in this file as an appendix.

Furthermore, also a lot of things that are available as other files - like presentations and clickprototypes - were added there. Because links can break and having it all on one place prevents the loss of information.

Ideation Phase

Storyboard impressions:

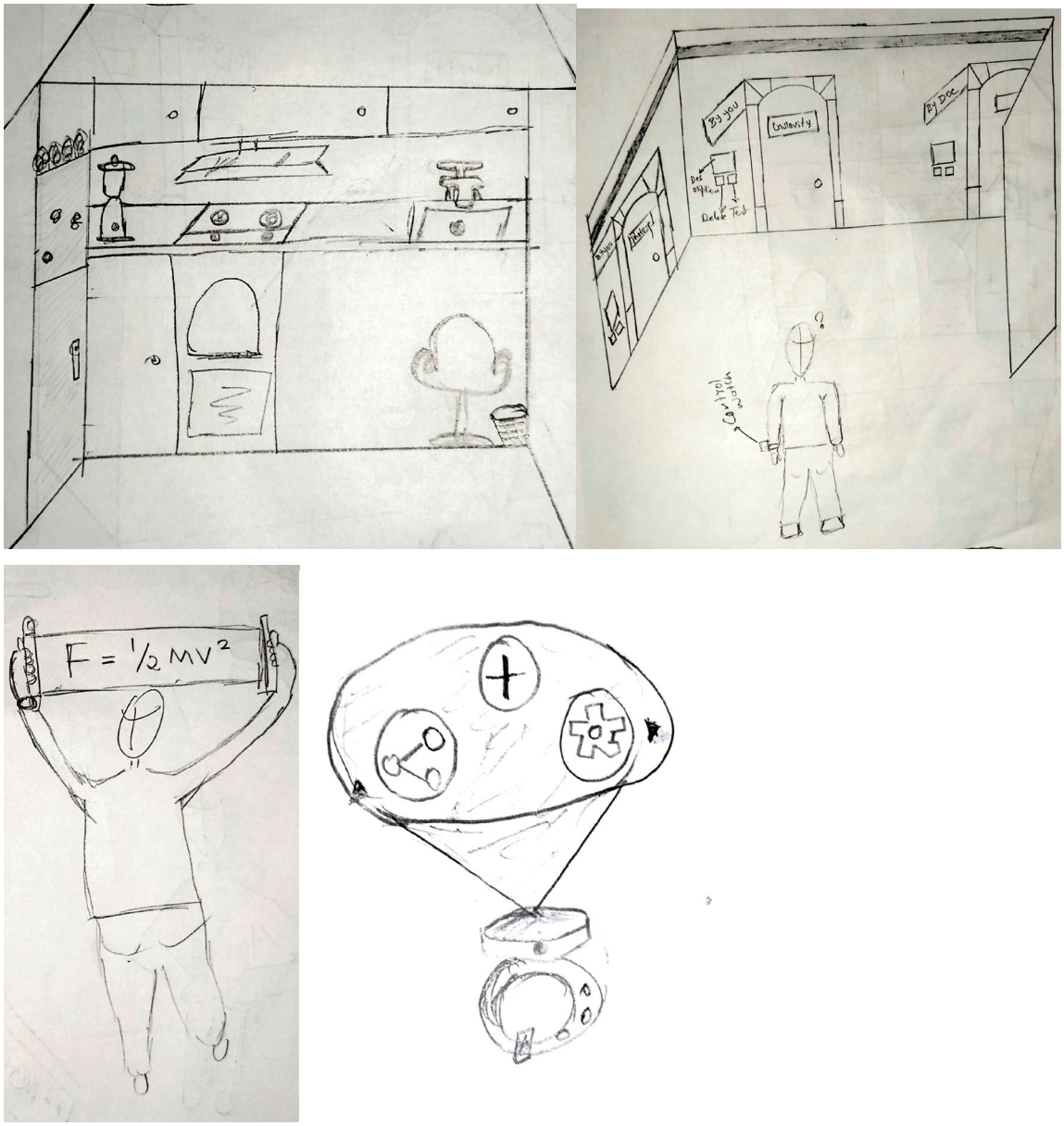


Figure 5

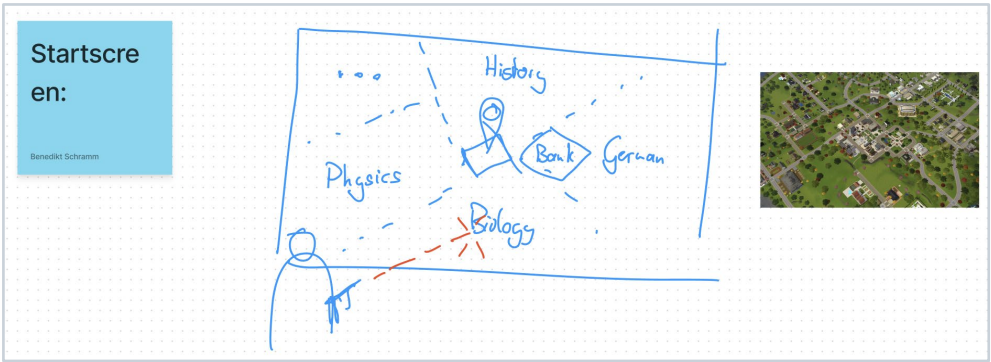


Figure 6

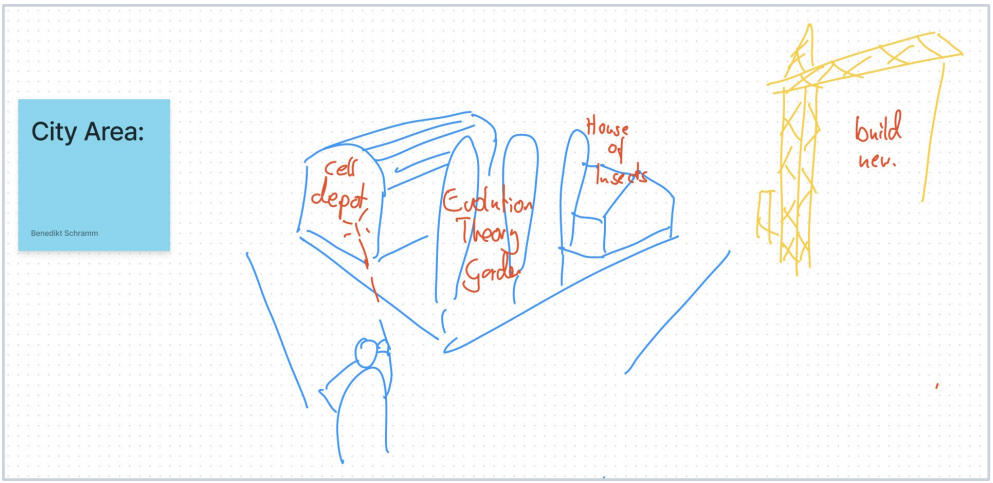
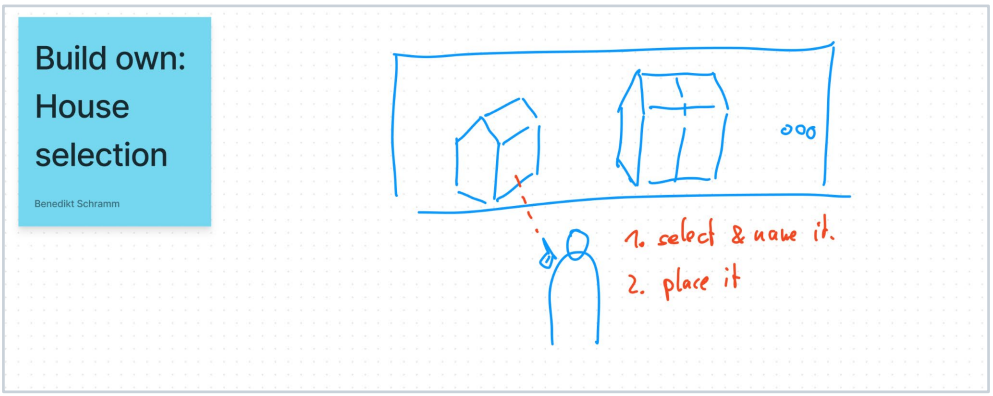
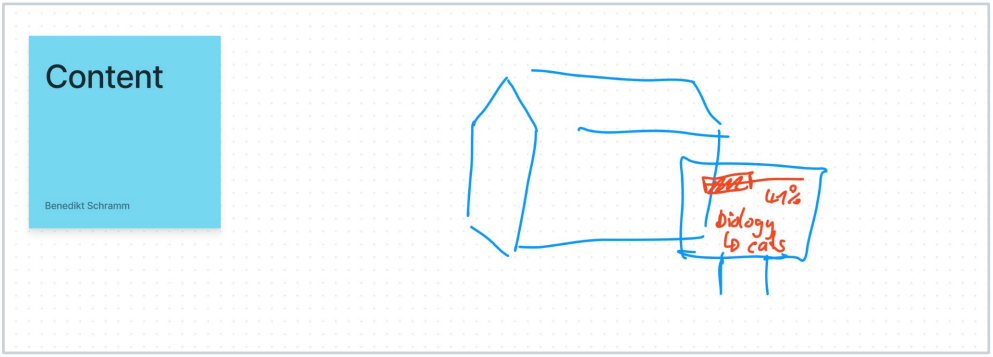
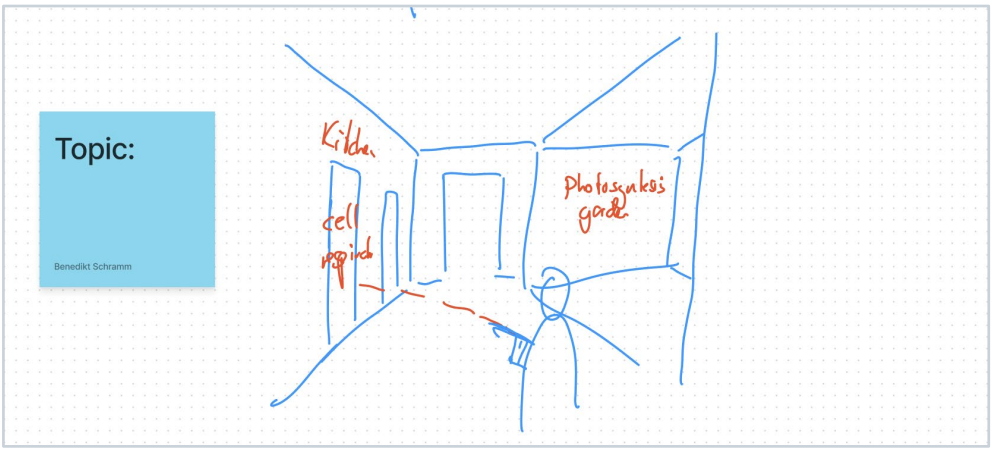
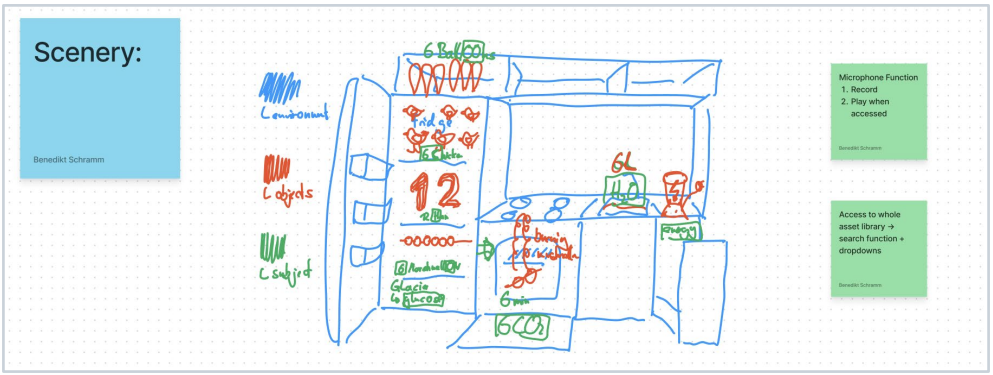

City Area:
Benedikt Schramm
cell depot
Evolution Theory Garden
House of Insects
build new.

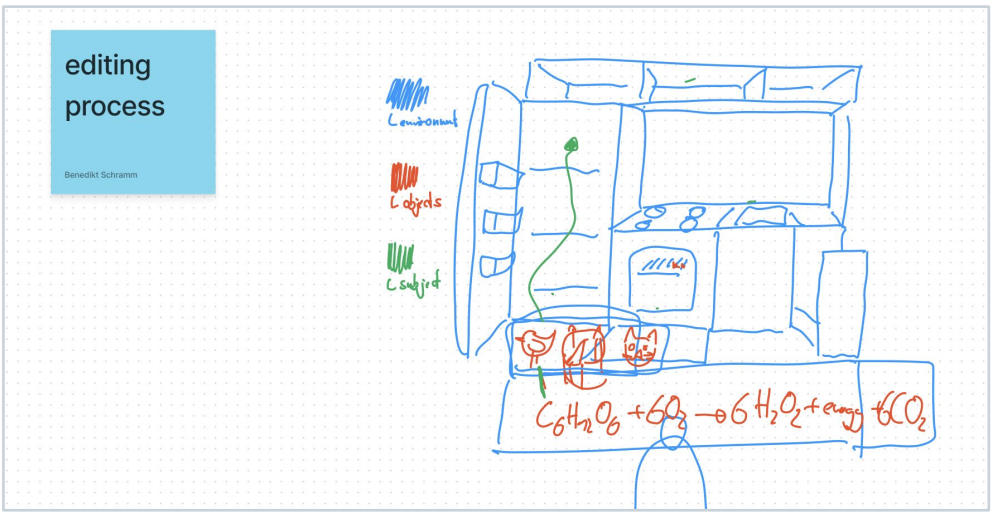
Figure 7


Build own: House selection
Benedikt Schramm
1. select & name it.
2. place it


Content
Benedikt Schramm
biology
cells


Topic:
Benedikt Schramm
Kitchen
cell respiration
Photosynthesis garden

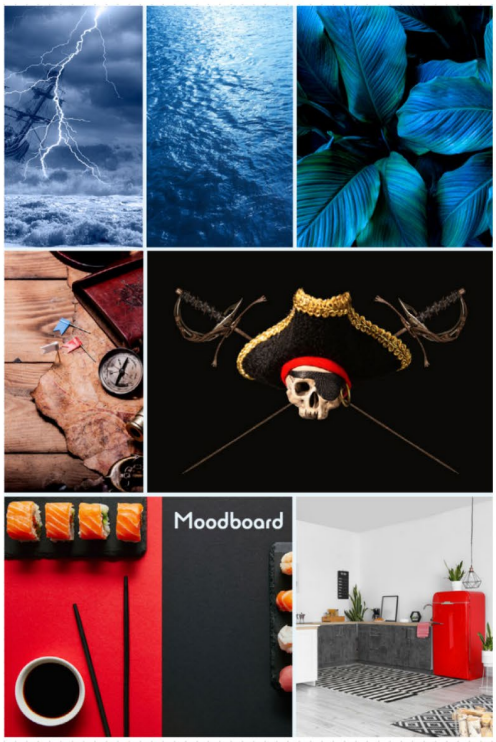




UI clickprototype

Welcome to **locispace**,
your personal space for learning complex memory-heavy topics in a visual way.
10
5
0
You are making great progress. Keep it up!
Show me around
Test my knowledge
New mindpalace
Okay lets make a **new mind palace**.
This room is reserved for topics related to basic physics equations.
The following options are next in line.
Please select what you would like to learn next.
kinetic energy
$T = \frac{1}{2}mv^2$
pendulum equation
$T = 2\pi\sqrt{\frac{L}{g}}$
Newtons law of gravity
$F = G\frac{m_1 m_2}{r^2}$
kinetic energy
Please select a field you want to code.
F = 1/2 m · v 2
force
mass
velocity
kinetic energy
F = 1/2 m · v 2
force
mass
velocity
fist
fist
fist
select & place in the room!
mass
The mass of an object gets measured in **gramms** and describes, how **heavy** it is.
fist
fist
fist
Select the object you find most fitting and place it in the room. The location should feel logical for you in relation to the other objects.
kinetic energy
Please select a field you want to code.
F = 1/2 m · v 2
force
mass
velocity
kinetic energy
Congratulations, you finished this mind palace.
F = 1/2 m · v 2
force
mass
velocity
Finish

Moodboard



PRIMARY

Black	#000000
Red	#F00C09
Mawa	#D28731
Skin	#E1B19A

SECONDARY

Reddish Brown	#621723
Orange	#F68008
Light Blue	#66ADDF
Dark Blue	#046A8A

GRAYSCALE

White	#FFFFFF
Gray 1	#EEEEEE
Gray 2	#DDDDDD
Med. Gray 1	#BBBBBB
Med. Gray 2	#888888
Dark Gray 1	#777777
Dark Gray 2	#454545
Black	#000000

OPACITY

100 90 80 70 60 50 40 30 20 10 0

FONT STYLES

AaBbCc

Source Sans Pro

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789
~%!@#$%^&*._=+
[]{}()|\/<>'",.;:?

FONT WEIGHTS

ExtraLight
ExtraLight Italic
Light
Light Italic
Regular
Regular Italic
Medium
Medium Italic
Bold
Bold Italic
Black
Black Italic

HEADINGS

HEADING 1
HEADING 2
HEADING 3
HEADING 4
HEADING 5
HEADING 6

Source Sans Pro Regular 36
Source Sans Pro Light 30
Source Sans Pro Medium 24
Source Sans Pro Regular 18
Source Sans Pro Regular 14
Source Sans Pro Regular 12

Personas

LISA Student

" Visualizing the concept I learn helps me to remember it better "

Age	21
Occupation	Student
Location	Ingolstadt, DE
Tier	Superior Memorizer
Archetype	Socially Awkward
Status	N/A

Wants and Needs

- Wants to graduate with excellent grades.
- Wants to avoid social contacts.
- Aspires to help friends learn.

- Memorizing concepts.
- Use Visual memory to remember.
- Help friends to learn.
- Test whether she remembers the concept that she learned.

Frustrations

- Less immersive.
- Getting out of home/travel.
- Memorizing without visual cues.
- Memorizing without visual cues.

Lisa is a student pursuing a bachelor's degree in the field of physics. She sees that sometimes it's hard to memorize physics equations that are complex and has no general meaning. She wants to visualize and memorize these in the comfort of her home. She also wishes to share and test the extent of her visual memory.

Technology

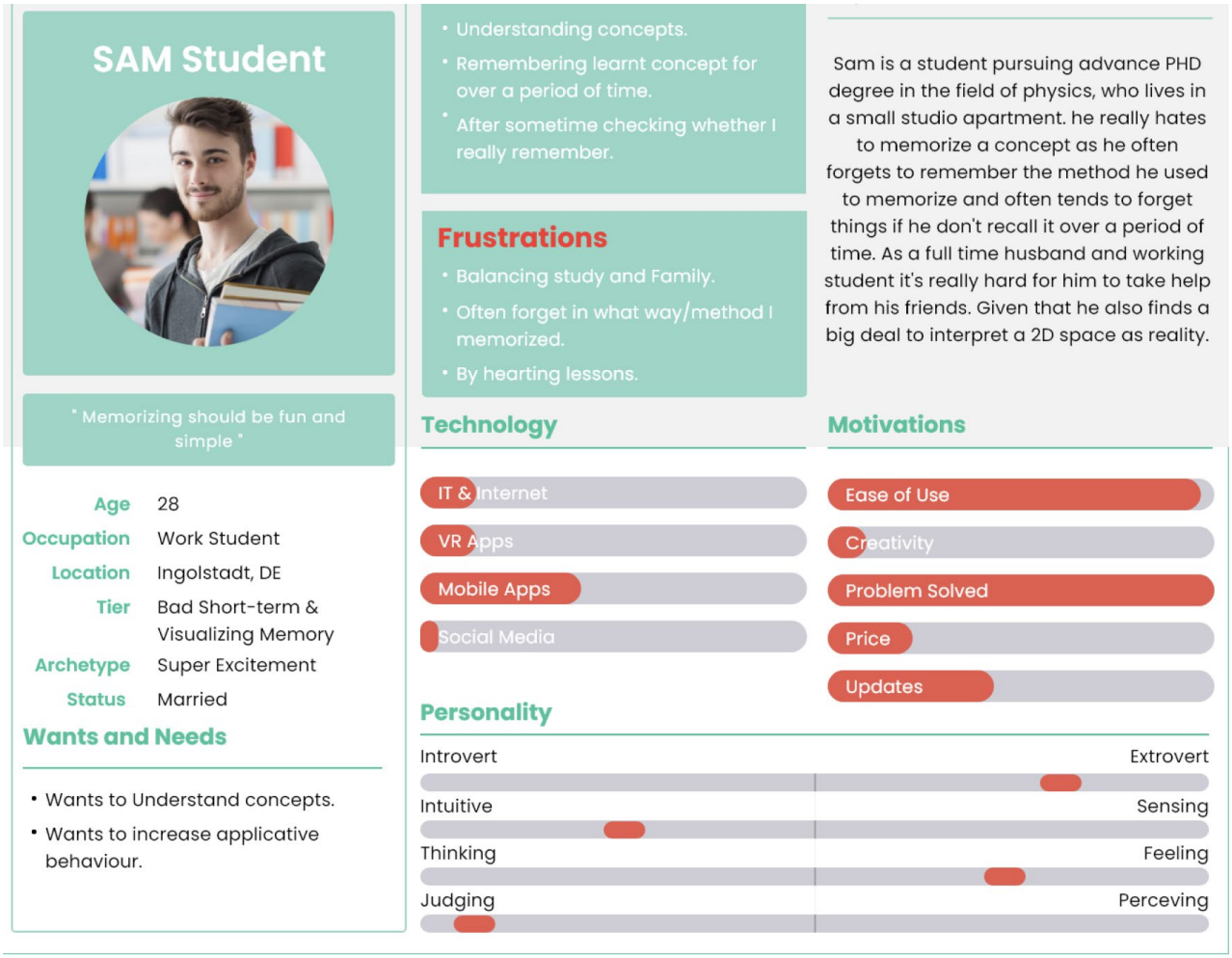
- IT & Internet
- VR Apps
- Mobile Apps
- Social Media

Motivations

- Ease of Use
- Creativity
- Problem Solved
- Price
- Updates

Personality

Introvert	Extrovert
Intuitive	Sensing
Thinking	Feeling
Judging	Perceving



Presentations:

Milestone 1: https://pitch.com/public/c918f367-c7ee-4abb-82d2-afe37ab37e81

#locispace group A UXDM_AVR

October 2022

Milestone 1 ↘

Pitch

team members

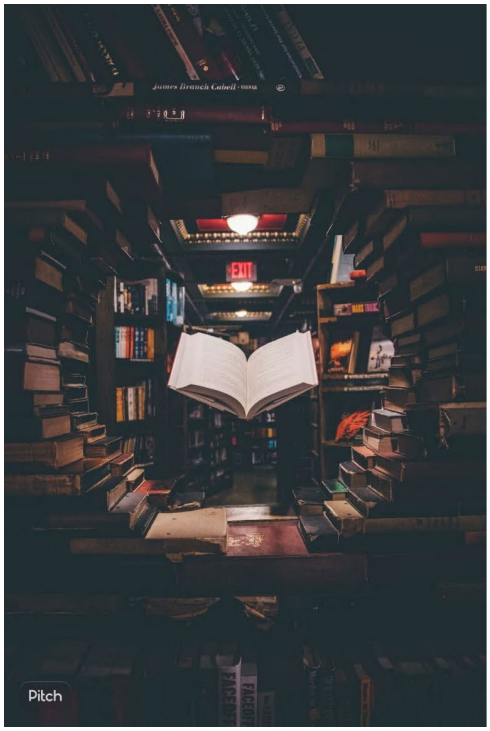
#locispace

Benedikt Schramm
3D Design and Concepts

Tilak Kamkar
Visual and Interface Design

Tanmesh Shah
Unity Code

Pitch



vision

#locispace

#locispace is a virtual learning environment where you build a 3D mind palace using Loci technique in order to remember complex concepts and check your progress with learning games.

loci technique

#locispace

What?

- Physical location
- increase speed of information processing
- ability to visualize

How?

- Choose a place
- define a route
- Select Markers
- Visualize and Associate
- Store Ideas at Location
- Implement, Practice and Improve

Why?

- Scientifically proven
- Effective in improvement of ability to learn

Pitch

concept

spacial visualisation of information

#locispace

Pitch

concept

mindpalace in practice

#locispace

$$F = \frac{1}{2} M \times V^2$$

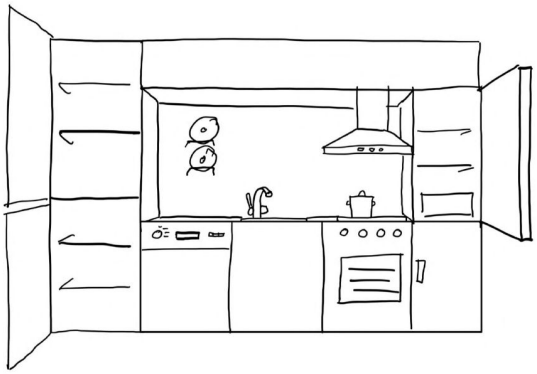
Pitch

concept

mindpalace in practice

#locispace

$$F = \frac{1}{2} M \times V^2$$



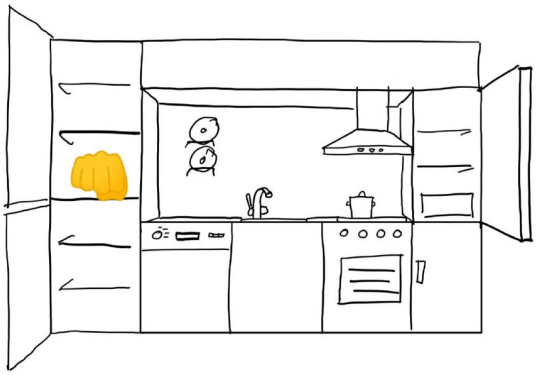
Pitch

concept

mindpalace in practice

#locispace

$$\boxed{F} = \frac{1}{2} M \times V^2$$



Fist in
the Fridge

Pitch

concept

mindpalace in practice

#locispace

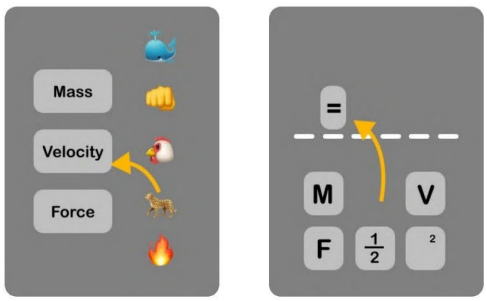
$$F = \frac{1}{2} M \times \boxed{V^2}$$

Pitch

concept

gamification

#locispace



minigames

Pitch

concept

mindpalace in practice

#locispace

$$F = \boxed{\frac{1}{2} M} \times V^2$$

Fist in the Fridge

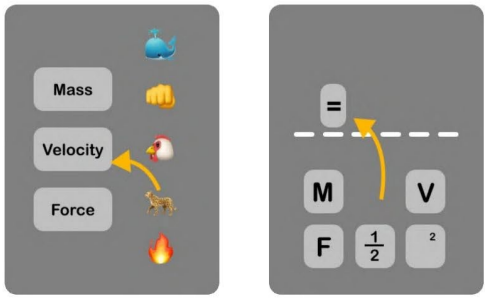
1/2 full heavy machine

Pitch

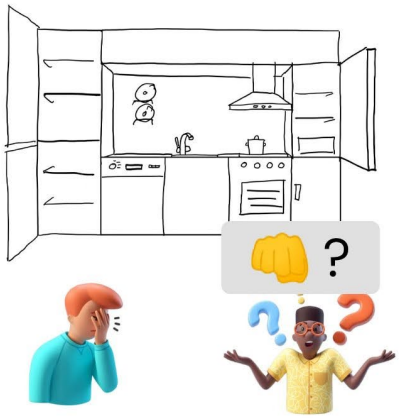
concept

gamification

#locispace



minigames



social component

Pitch

assets

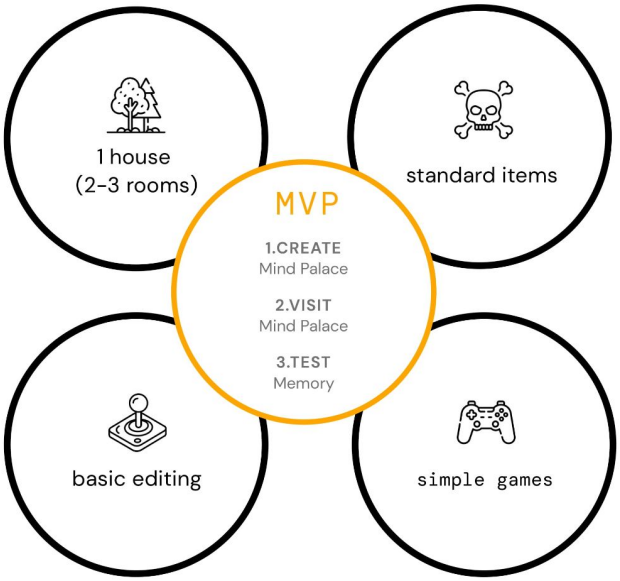
#locispace

loki items	environment	sounds	control elements	games
Themepacks of assets to build mindpalaces from	space to use for building mindpalaces	more immersive atmosphere	navigate & build efficently	check progress in a fun way
pirate pack standard items	houses interior	pirate sounds	portals city map editor mode	puzzles tests

Pitch

MVP

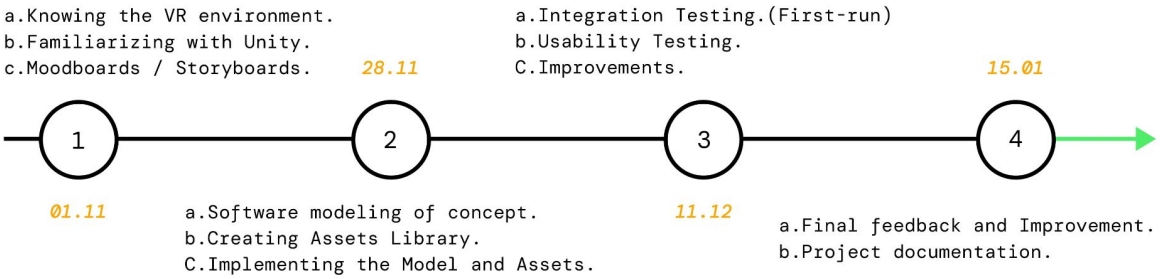
#locispace



Pitch

Plan

#locispace



Pitch

Questions

- Could you please show some reference projects so we can see what fidelity is expected?
- How can we use the multiuser capability of the environment?
- Can we please have a walktrough of the provided evironment?

Pitch

Update 1: https://pitch.com/public/62f3f661-068e-4315-8307-828e1703480a

</>

status update

TEAM LOCISPACE

30.11.2022

Pitch

concept

mindpalace in practice

#locispace

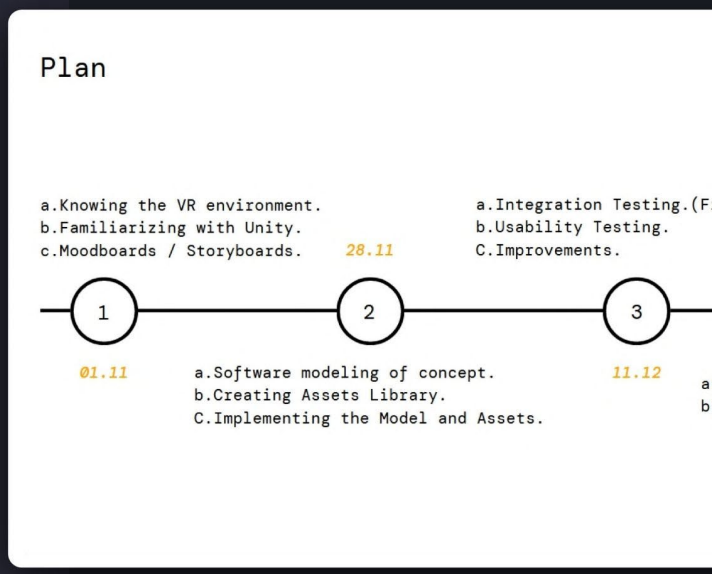
$$F = \boxed{\frac{1}{2} M} \times V^2$$

Fist in the Fridge

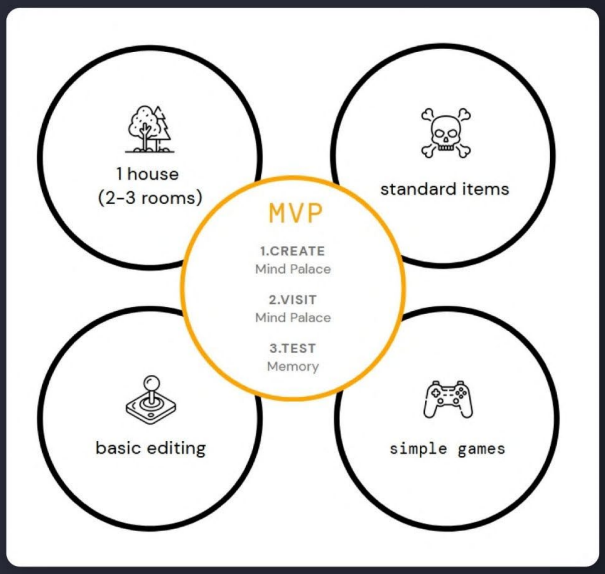
1/2 full heavy machine

Pitch

previously:



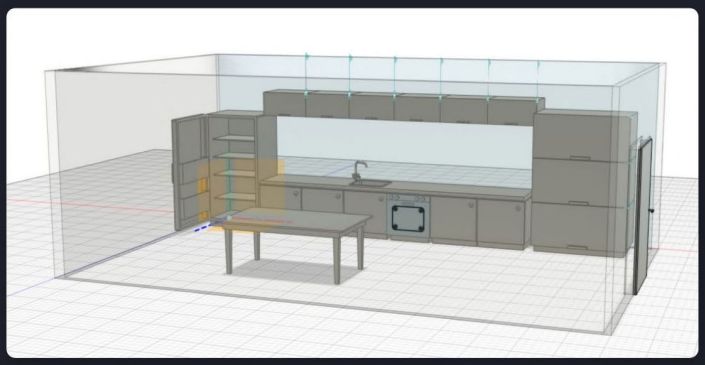
Pitch

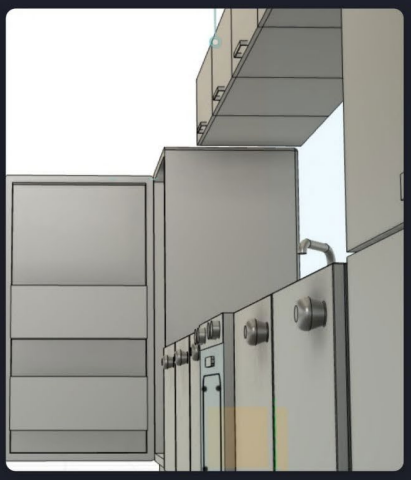


our goal for the user tests

Pitch

environment / room





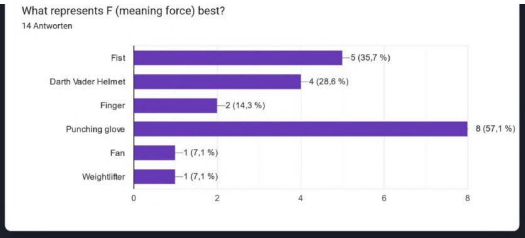
- basic kitchen model in fusion360
- transfered to unity and added colliders
- door functions: door open and close

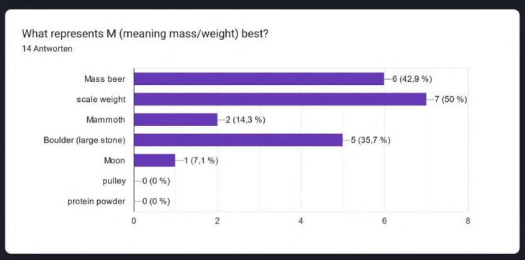
Pitch

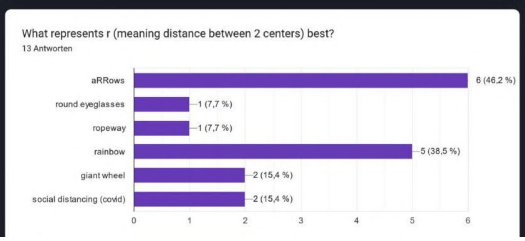
Pitch

assets

- conducted a study to find out which assets to build first
- 14 answers



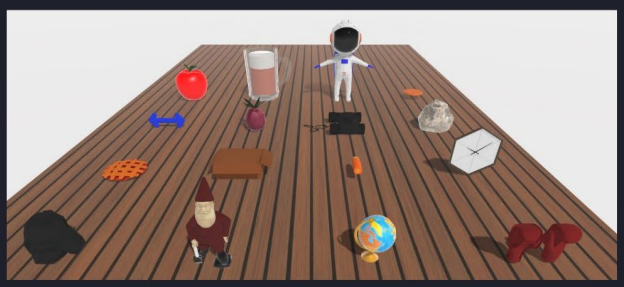


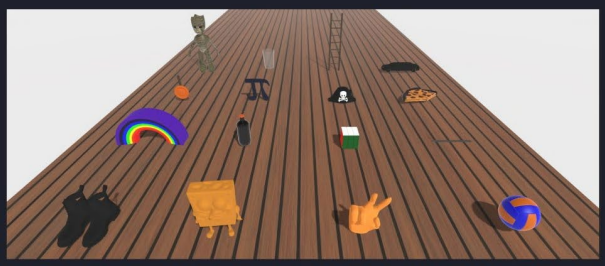


Pitch

assets

- The assets package was modeled using the blender.
- Materials are defined in Unity.
- All 36 assets are now available under one package in Unity.

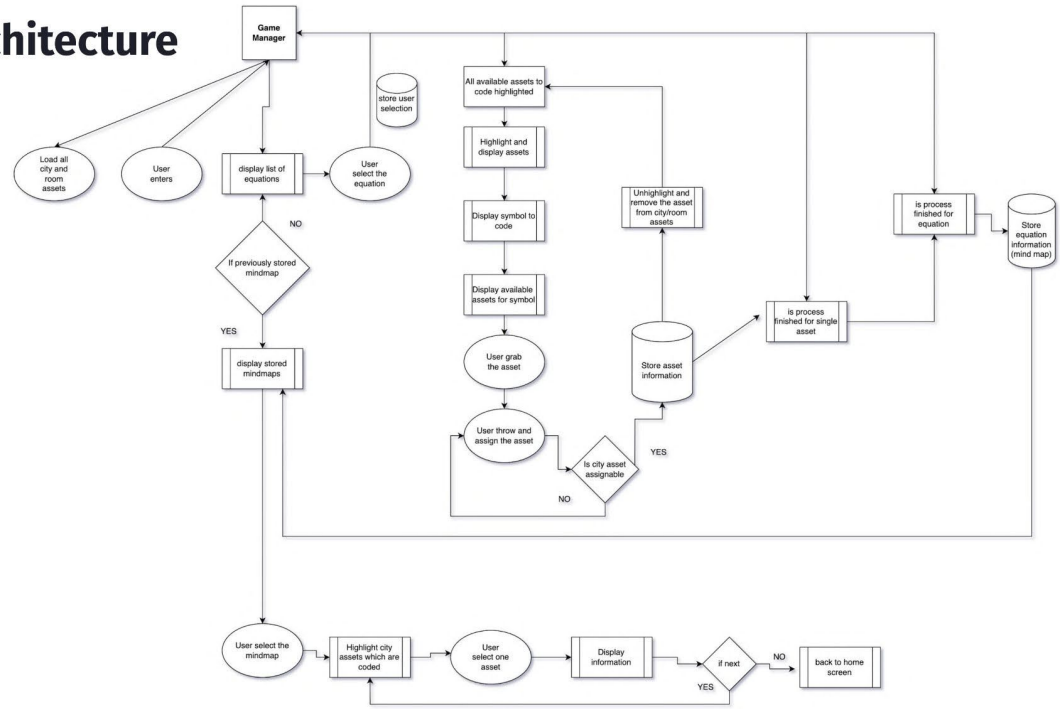


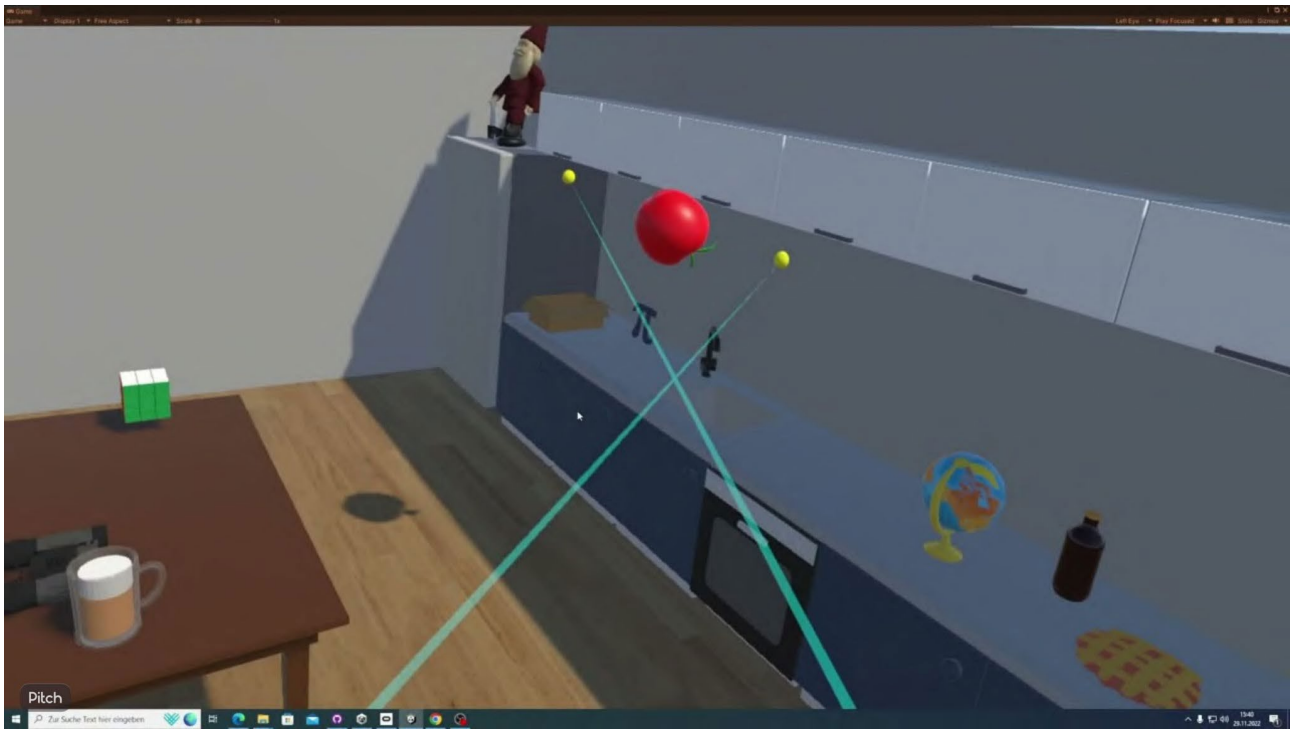


- Single material models.
- Multi-mesh models.
- Photo-realistic models.

Pitch

Architecture

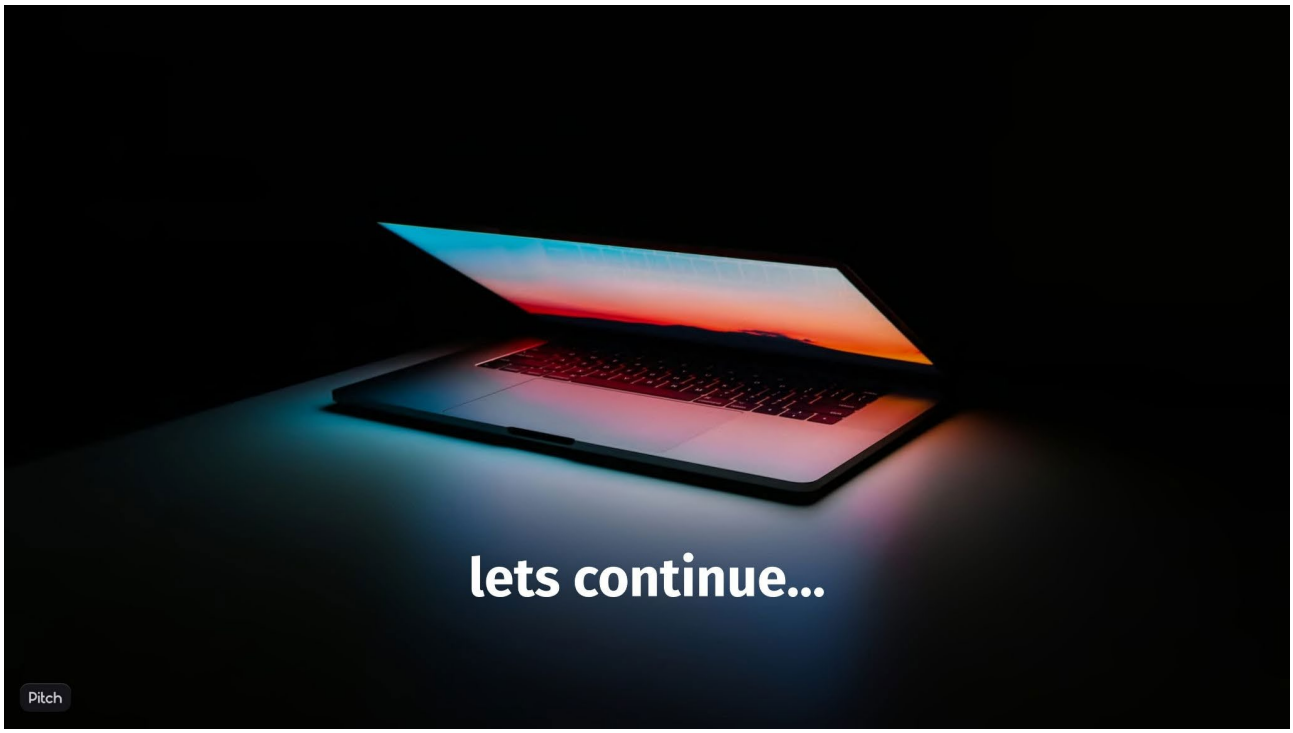




What are we working on?

1. Highlighting the assets, to move.
2. Complete the whole UI flow for Force Equation to apply in usability test.
3. Try to add sounds as notifications when an asset is selected.

Pitch



Usability Test: https://pitch.com/public/2ef2a01d-0fd1-4027-88e1-8e500c3fb2a7

usability test results

TEAM LOCISPACE

14.12.2022

Pitch

AGENDA

1 process

2 results

3 learnings

Pitch

PROCESS

1 2

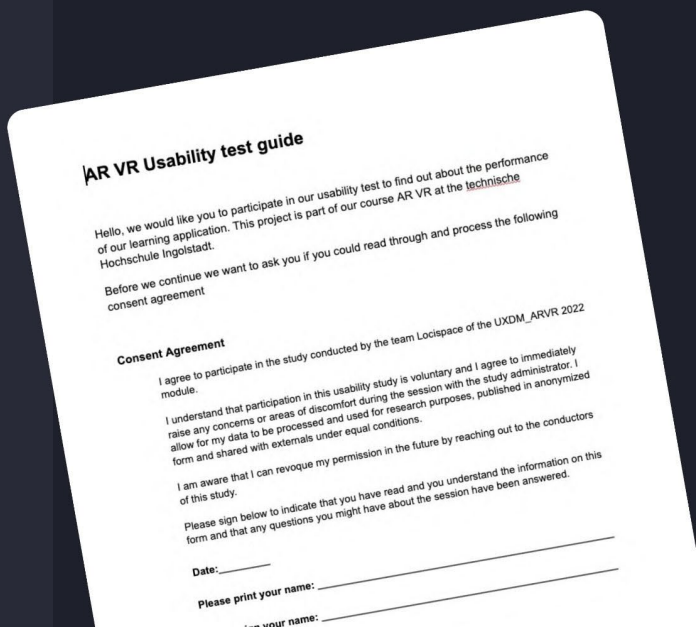
process

result

Pitch

PROCESS

comprehensive test guide



AR VR Usability test guide

Hello, we would like you to participate in our usability test to find out about the performance of our learning application. This project is part of our course AR VR at the technische Hochschule Ingolstadt.

Before we continue we want to ask you if you could read through and process the following consent agreement

Consent Agreement

I agree to participate in the study conducted by the team Locispace of the UXDM_ARVR 2022 module.

I understand that participation in this usability study is voluntary and I agree to immediately raise any concerns or areas of discomfort during the session with the study administrator. I allow for my data to be processed and used for research purposes, published in anonymized form and shared with externals under equal conditions.

I am aware that I can revoque my permission in the future by reaching out to the conductors of this study.

Please sign below to indicate that you have read and you understand the information on this form and that any questions you might have about the session have been answered.

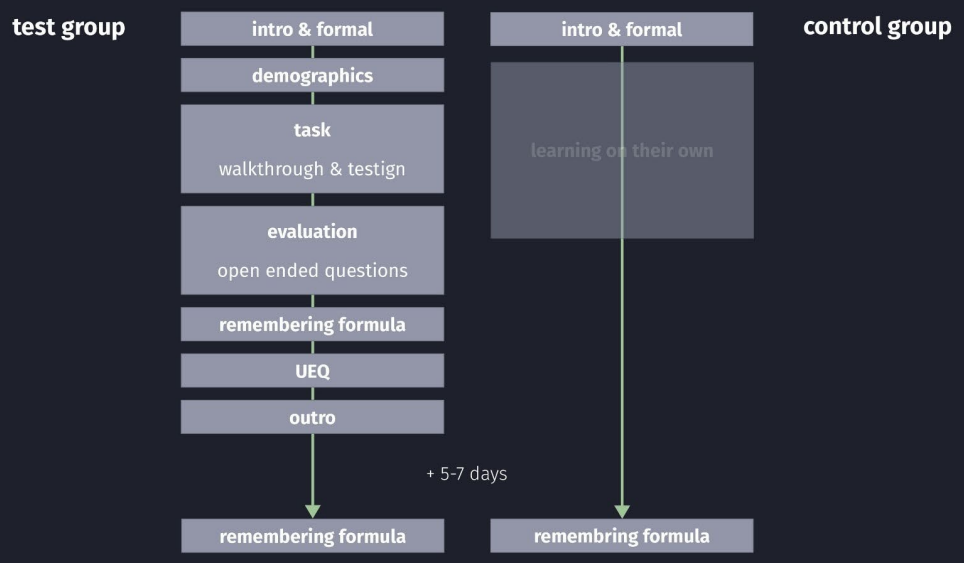
Date:_____

Please print your name: _____

Please sign your name: _____

Pitch

PROCESS



Pitch

PROCESS

conducting studys

- 5 participants (+ 4 for controll group)
- sessions à 25-60 min
- Monday - Thursday - Monday

Pitch

RESULTS

2

3

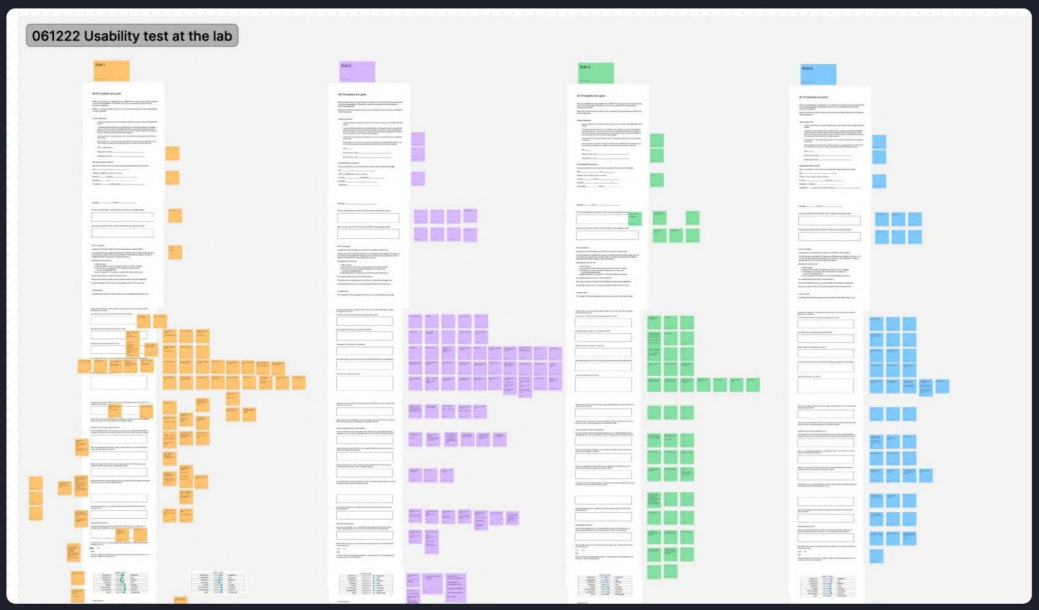
ss

results

learn

Pitch

RESULTS



Pitch

RESULTS

Pitch

RESULTS

UEQ results

English version

obstructive	o o o o o ■ o	supportive
complicated	o o o o ■ o o	easy
inefficient	o o o o ■ o o	efficient
confusing	o o o o ■ o o	clear
boring	o o o o o ■	exciting
not interesting	o o o o o ■	interesting
conventional	o o o o o o ■	inventive
usual	o o o o o ■ o	leading edge

→ locispace is good at sparking interest but the usability can still be improved

Pitch

LEARNINGS

3

learnings

Pitch

LEARNINGS

Room

- table position ✓
- assets need to fit to shelfs
- workflow freedom ✓
- more rooms
- ordering assets freely ✓

Pitch

LEARNINGS

UI

- readability
- multistate buttons ✓
- asset thumbnails
- users miss formula
- sounds on click ✓
- select assets in UI
- progress state

Pitch

LEARNINGS

Assets

- delete & change
- modifier assets
- outlines/colors
- directly edit
- hints / labels what it is
- own assets
- correlations
- physics properties

Pitch

LEARNINGS

Controllers

- using only 1 controller
- controls buggy
- assets interact by accident
- hints/tutorial on controllers
- users want to walk with controller
- option: scale
- lock orientation upwards

Pitch

LEARNINGS

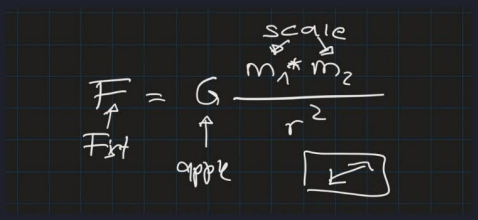
+ 5-7 days ...

Pitch

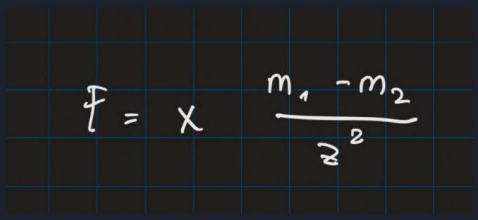
RESULTS

$$F = G\frac{m_1 m_2}{r^2}$$

original



with locispace



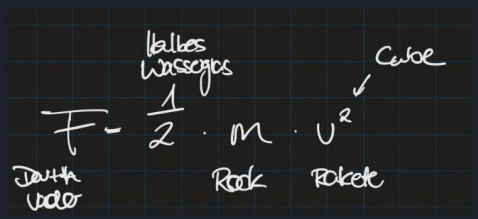
traditional

Pitch

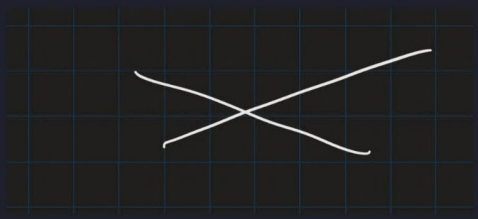
RESULTS

$$K = \frac{1}{2}mv^2$$

original

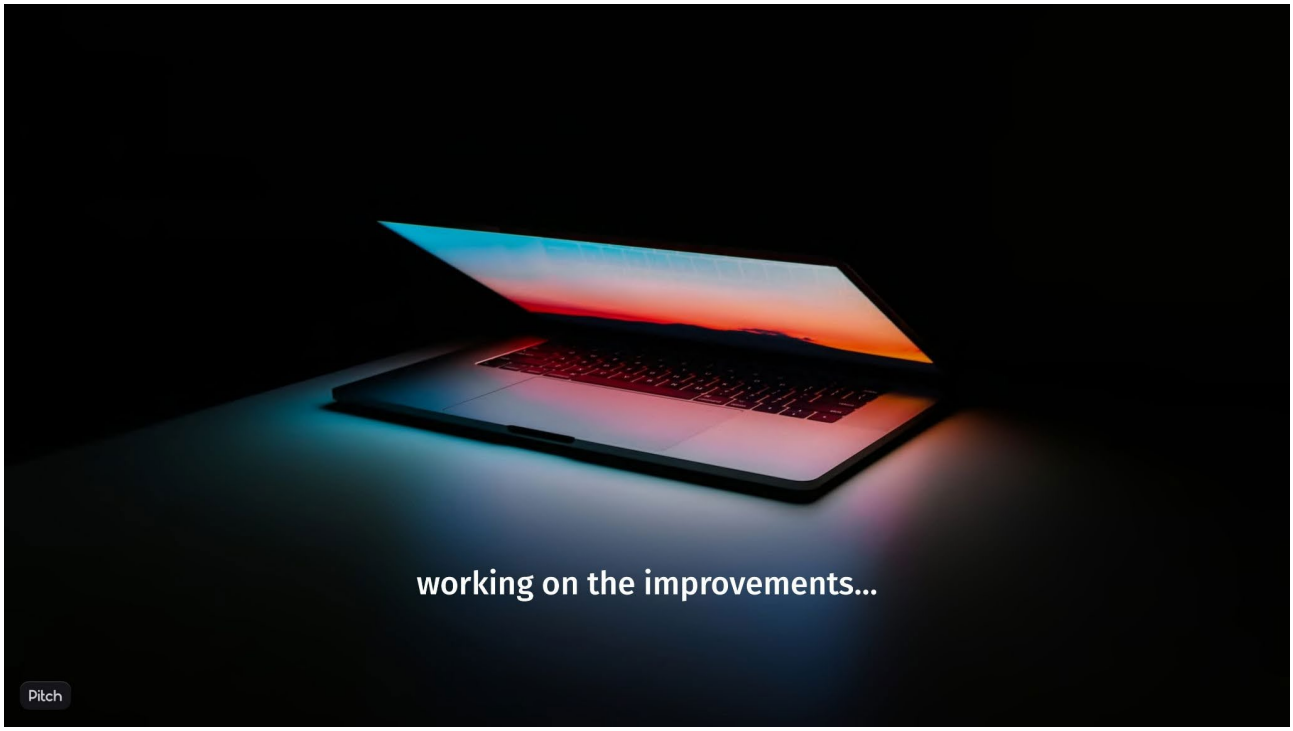


with locispace

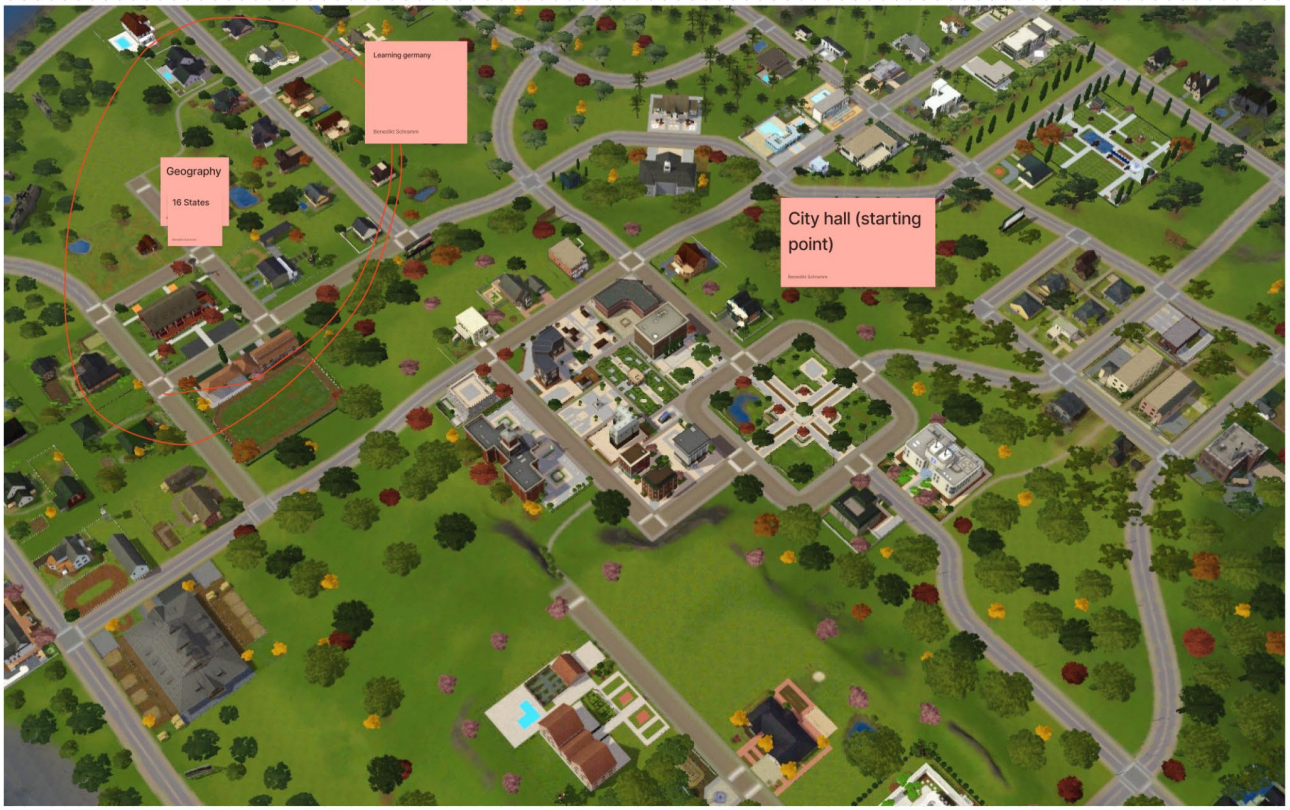


traditional

Pitch



Screenshots of the used figjam boards



F

Mass of object 1 times, Mass of object 2

$$F = G\frac{m_1 m_2}{r^2}$$

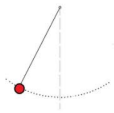
Force, equals, Gravity times

Divided by, distance between the center of those two objects, squared

Newton's Law of Gravity

$$T = 2\pi\sqrt{\frac{L}{g}}$$

T = period of simple pendulum (s)
L = length of pendulum (m)
g = gravitational acceleration (m/s²)



Simple Pendulum

Kinectic Energy as #1 formula
- easy
- well known

Benedikt Schramm

F = Force
1/2
m = mass
v = velocity
^2

Benedikt Schramm

gravity law as #2 formula
- okay to code
- graspable

Benedikt Schramm

F = Force
G = gravity
m = mass
r = distance of centers
^2

Benedikt Schramm

pendulum law as #3 formula
- also good to code
- not as easy as #1

Benedikt Schramm

T = Period
2
pi
square root
L = length
g = gravitational acceleration

Benedikt Schramm

F = Force
- Fist
- Darth Vader helmet

- **Finger**
- **Punching glove(Pow)**
- **Fan**

- pushing a wall or a box
- weightlifter

Benedikt Schramm

L = length
- long limusine
- line

- **Ruler**
- **Burf Khalifa Building**
- **Ladder**

- measuring tape
- xs s m L XL XXL
- shoe size
- lace

Benedikt Schramm

m = mass
- Beer
- weight
- Mammoth

- **Boulder(Larger stone)**
- **Elephant in Gym clothes**
- **Moon**

- scales (weighing, of justice)
- pulley
- protein powder

Benedikt Schramm

v = velocity
- bike/velo
- rocket

- **Bullet with speed trail**
- **Flash running(DC comics)**
- **Vulture (Flying)**

- bullet train
- speedo meter
- usain bolt, michael phelps

Benedikt Schramm

G = gravity
- (Newtons) apple
- grave (19.80)

- **Ball falling down**
- **Floating astronaut**
- **Globe**

- Disney's Gravity Falls
- astrounat in a spaceship

Benedikt Schramm

r = distance of centers
- aRRows

- **Round Eyeglasses**
- **Gaint Wheel (London Bin ben)**
- **Rainbow**

- Divider (gemoetric instrument)
- covid (social distancing)

T = Period
- tick-tack clock
- Metronom

- **Burglar alarm**
- **Time-Bomb**
- **Turtle**

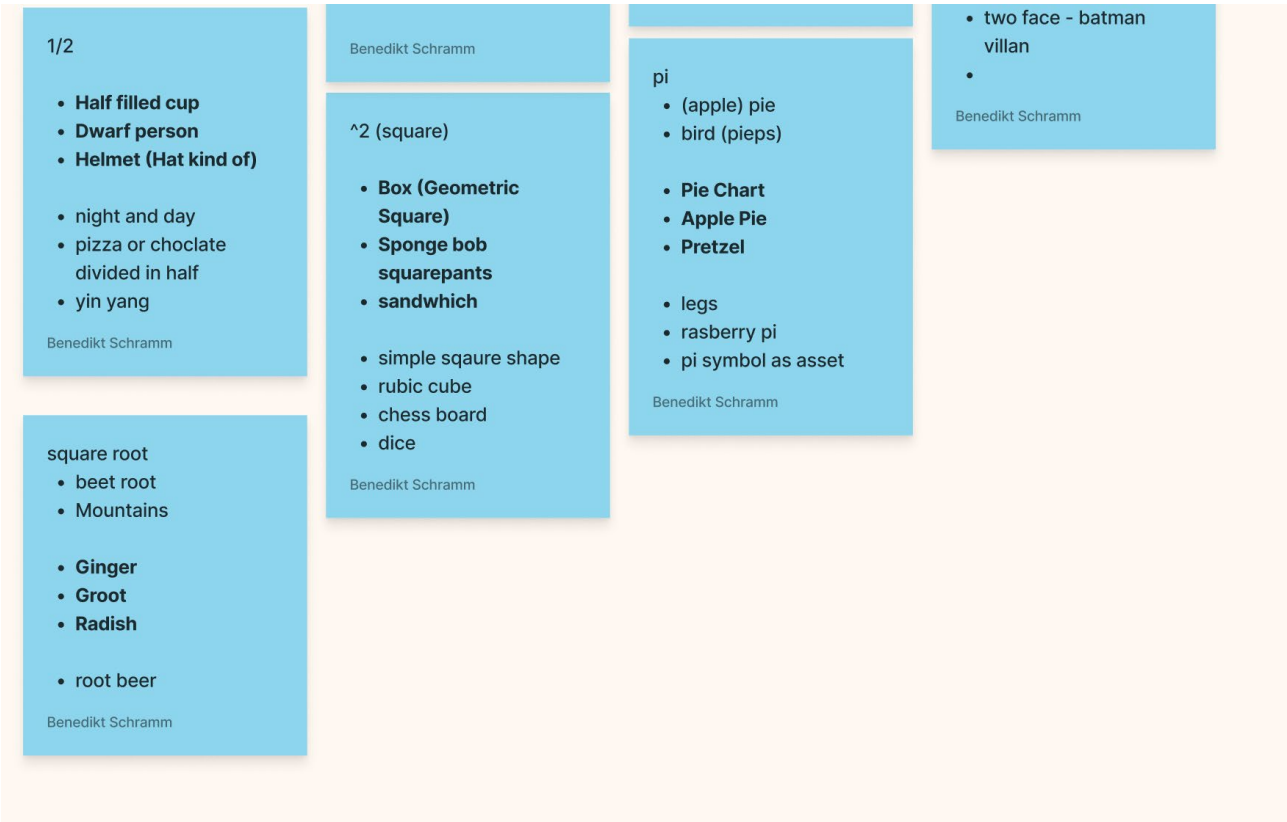
- Time machine
- news paper/ magzine
- sundial/hourglass

Benedikt Schramm

2
- DOSe
- U2 band

- **Two fingers (Victory symbol)**
- **Two Tacos Hifying (Mexican attire)**
- **Tooth**

- 2 euro coin
- two face - batman



Asset survey results:

Locitechnique - standard coding options

With this quick survey we want to find out what are good "standard" options for representing certain scientific terms in a more visual way.

Setting:

Imagine you have to learn physics
formulas with certain scientific terms in them. You can learn more efficent when using mnemonics. Which visual representations would you choose in order to memorize them easier?

Please pick 1 to 3 options that you like for the given term or give a better example.

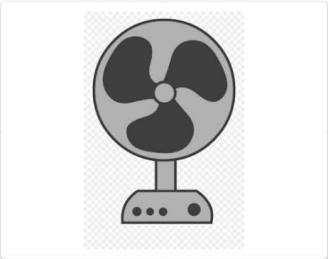
What represents **F (meaning force)** best?

- [ ] Fist

- [ ] Darth Vader Helmet

- [ ] Finger

- [x] Punching glove



- [ ] Fan

- [ ] Weightlifter

- [ ] Sonstiges:

What represents **L (meaning length)** best?

- [ ] liane

- [x] long limo

- [ ] ruler

- [ ] Burj Khalifa

- [ ] ladder

- [ ] (shoe) sizes XS S M L XL

- [ ] Sonstiges:

What represents **M (meaning mass/weight)** best?

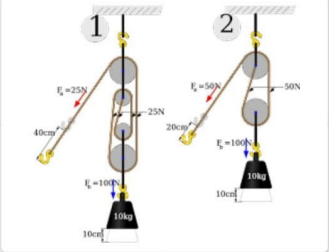
- [ ] Mass beer

- [x] scale weight

- [ ] Mammoth

- [ ] Boulder (large stone)

- [ ] Moon



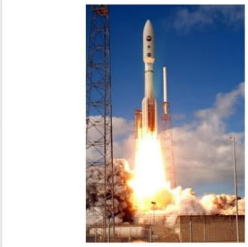
- [ ] pulley

- [ ] Sonstiges:

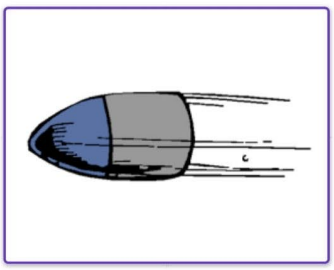
- [ ] protein powder

What represents **V (meaning velocity/speed)** best?

- [ ] bike/velo



- [ ] rocket



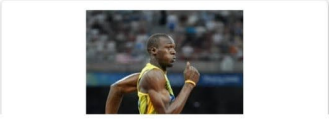
- [x] bullet

- [ ] Flash runnig (DC Comic)

- [ ] High speed train

- [ ] Speedometer

- [ ] Sonstiges:



usain bolt

What represents **G (meaning gravity)** best?

- [x] (Newtons) apple

- [ ] Grave

- [ ] Ball falling

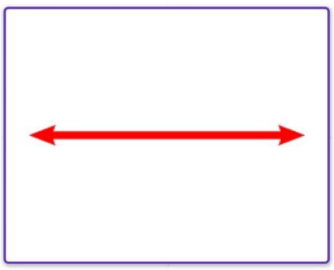
- [ ] Floating astronaut

- [ ] gravity falls (disney series)

- [ ] Gravity (Film)

- [ ] Sonstiges:

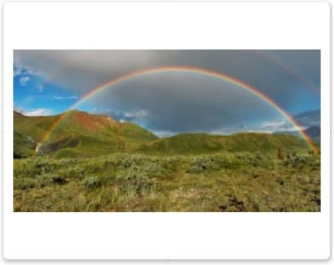
What represents **r (meaning distance between 2 centers)** best?



- [x] aRRows

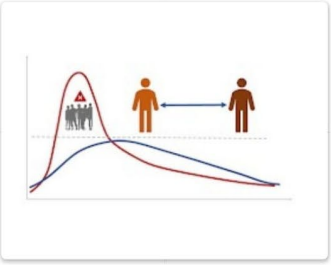
- [ ] round eyeglasses

- [ ] ropeway



- [ ] rainbow

- [ ] giant wheel



- [ ] social distancing (covid)

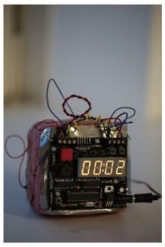
- [ ] Sonstiges:

What represents **P (meaning period)** best?

- [x] tick-tack clock

- [ ] metronom

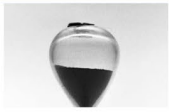
- [ ] bulglar alarm



- [ ] time bomb

- [ ] turtle

- [ ] time machine



- [ ] newsPaper / magazine
- [x] hourglass
- [ ] menstrual cycle
- [ ] Sonstiges:

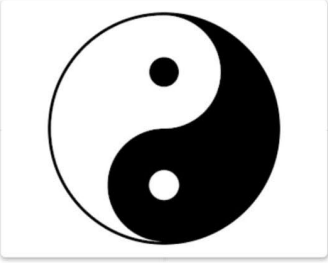
What represents **1/2 or 0.5** best?

- [ ] half filled cup

- [ ] Dwarf

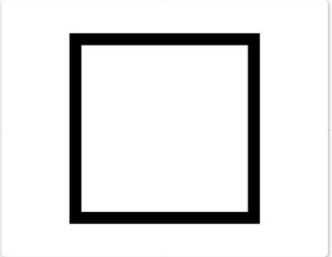
- [x] half a pizza
- [ ] Sonstiges:

- [ ] day / night



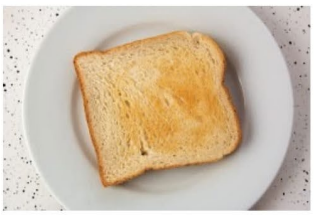
- [ ] yin yang

What represents **^2 (meaning squared)** best?



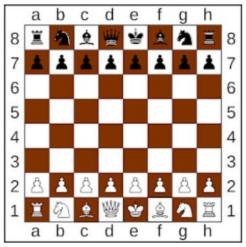
- [ ] Box (geometic shape)

- [ ] Spongebob



- [ ] Sandwich

- [x] rubic cube



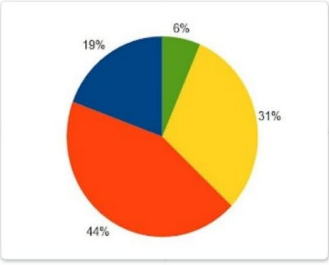
- [ ] chess board

- [ ] Sonstiges:

What represents **pi (meaning 3.14159...)** best?

- [x] (apple) pie

- [ ] bird (pieps)



- [ ] pie chart

- [ ] Prezel

- [ ] legs

- [ ] raspberry pi
- [ ] Sonstiges:

- [ ] pi symbol

What represents **2** best?

- [ ] two fingers

- [ ] U2 (Band)

- [ ] Tooth
- [ ] Sonstiges:

- [x] 2€ coin

- [ ] 2 face from Batman

What represents **square root** best?

$$\sqrt{}$$

- [x] beet root

- [ ] mountains

- [ ] ginger
- [ ] Sonstiges:

- [ ] groot
- [ ] root beer

Thanks!

A big thank you from the AR/VR Team A. You really help us figure out how our users will think and therefore pick relevant assets for our MVP library.

Dieser Inhalt wurde nicht von Google erstellt und wird von Google auch nicht unterstützt.

Google Formulare

Locitechnique - standard coding options

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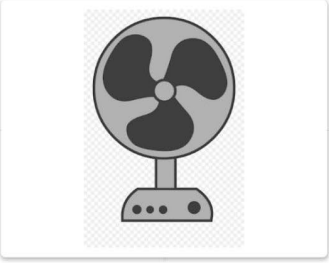
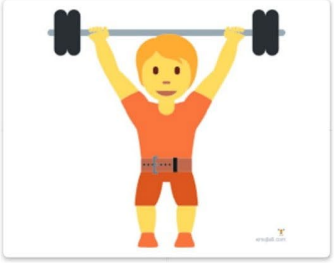
- [ ] Darth Vader Helmet

- [x] Finger

- [ ] Punching glove



- [ ] Fan



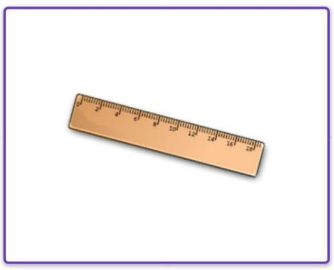
- [ ] Weightlifter

- [ ] Sonstiges:

What represents **L (meaning length)** best?

- [ ] liane

- [ ] long limo



- [x] ruler

- [ ] Burj Khalifa

- [ ] ladder

- [ ] (shoe) sizes XS S M L XL

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What represents **M (meaning mass/weight)** best?

- [x] Mass beer

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- [x] Boulder (large stone)

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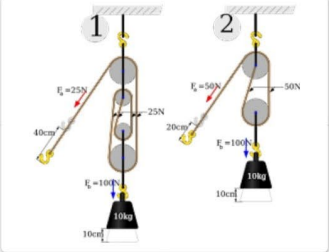
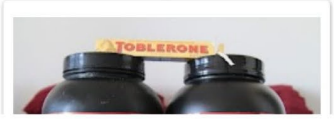


- [ ] pulley



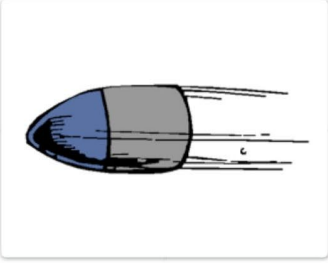
- [ ] Sonstiges:

- [ ] protein powder

What represents **V (meaning velocity/speed)** best?

- [ ] bike/velo

- [ ] rocket



- [ ] bullet

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usain bolt

What represents **G (meaning gravity)** best?

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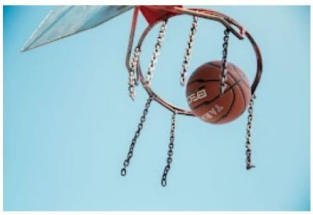
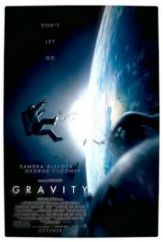


- [x] Ball falling

- [ ] Floating astronaut

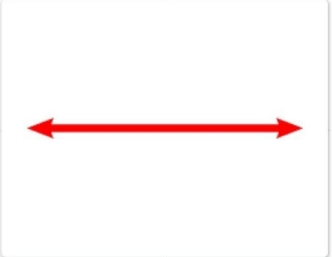
- [ ] gravity falls (disney series)



- [x] Gravity (Film)

- [ ] Sonstiges:

What represents **r (meaning distance between 2 centers)** best?



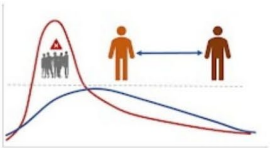
☐ aRRows

☐ round eyeglasses

☐ ropeway

☐ rainbow

☐ giant wheel



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☐ Sonstiges:

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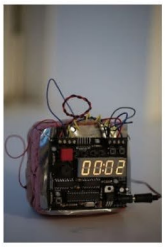
☐ metronom

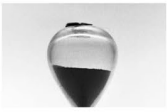
☐ bulglar alarm



☐ time bomb

☐ turtle

☐ time machine



- [ ] newsPaper / magazine

- [ ] hourglass

- [x] menstrual cycle

- [ ] Sonstiges:

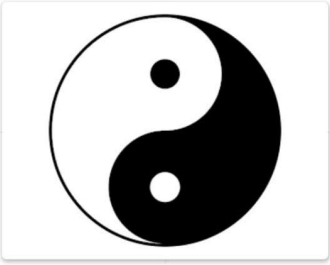
What represents **1/2 or 0.5** best?

- [x] half filled cup

- [ ] Dwarf

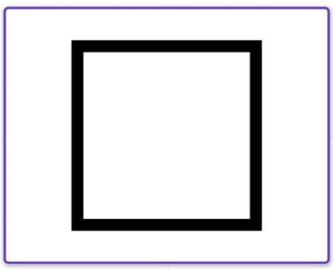
- [ ] half a pizza
- [ ] Sonstiges:

- [ ] day / night



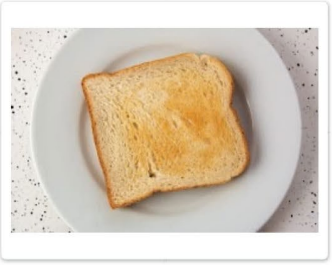
- [ ] yin yang

What represents **^2 (meaning squared)** best?



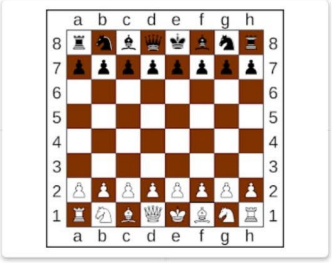
- [x] Box (geometic shape)

- [ ] Spongebob



- [ ] Sandwich

- [ ] rubic cube



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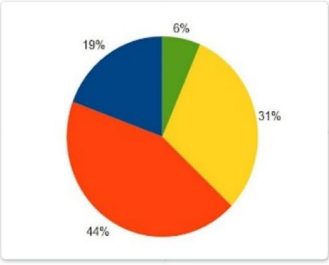

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$$\sqrt{}$$

beet root

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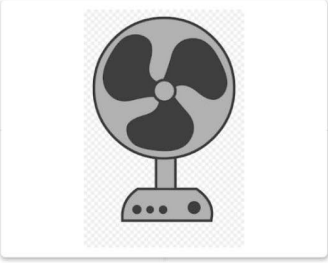

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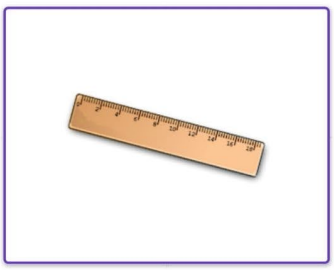

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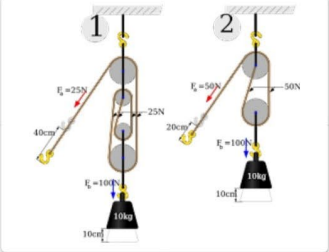

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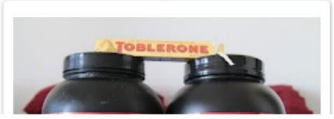

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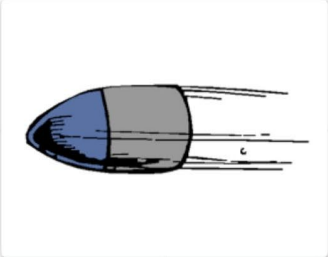

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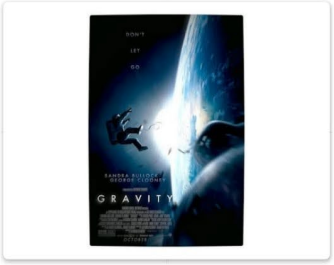

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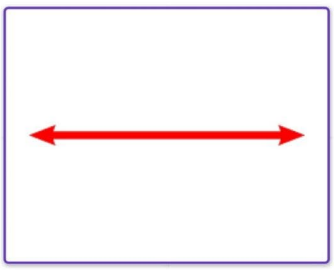

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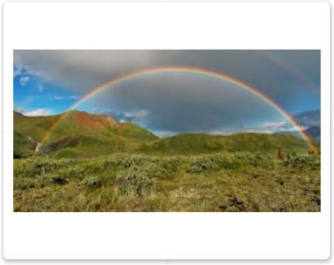

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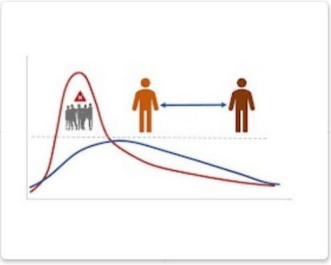

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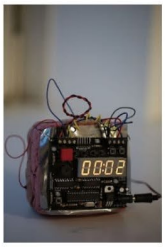

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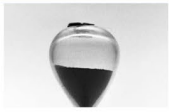

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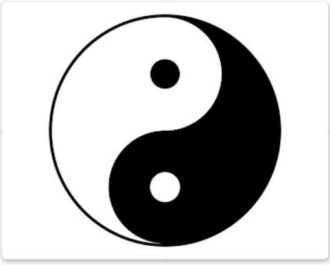

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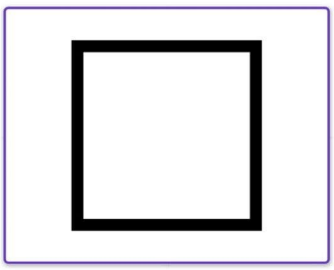

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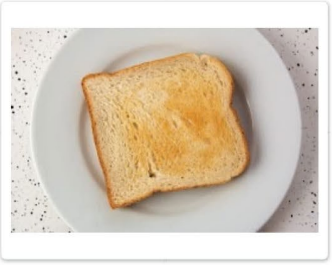

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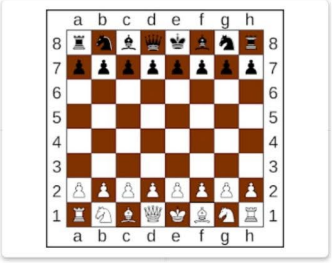

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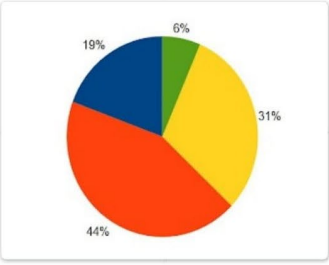

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$$\sqrt{}$$

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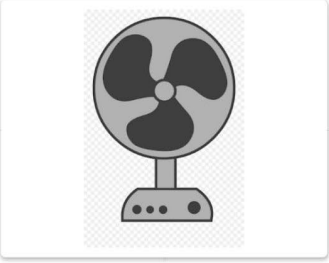

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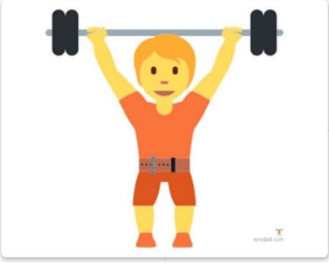

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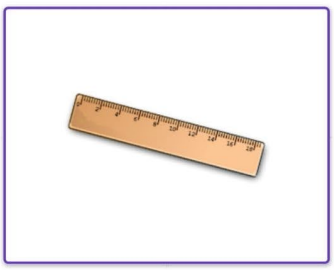

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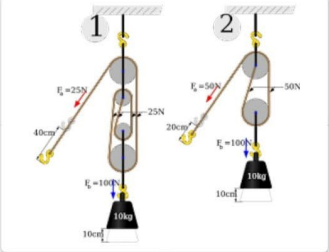

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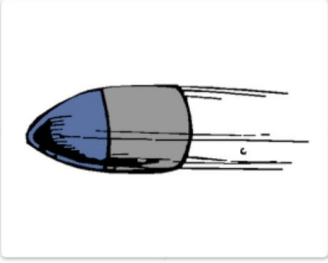

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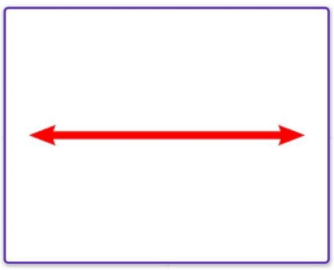

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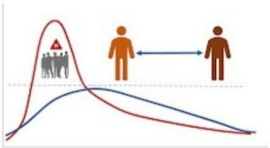

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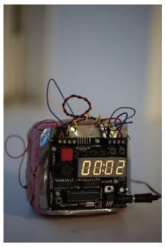

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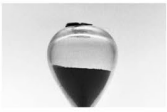

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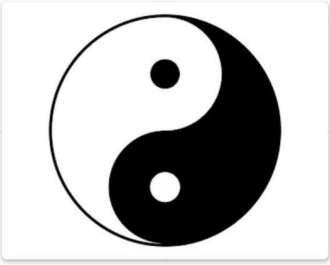

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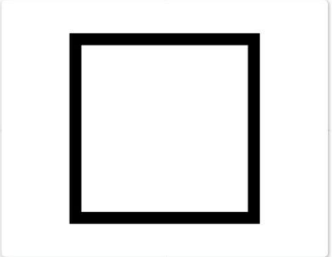

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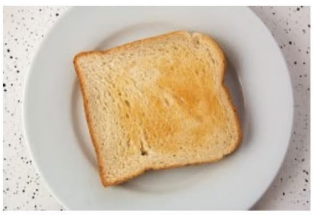

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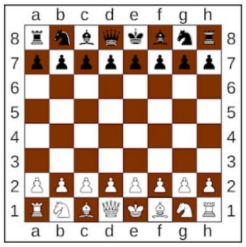

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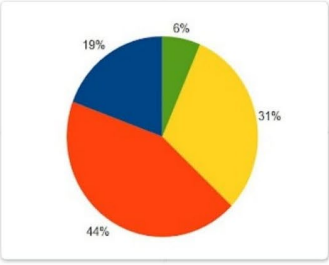

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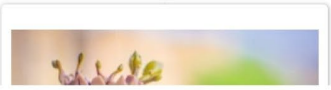

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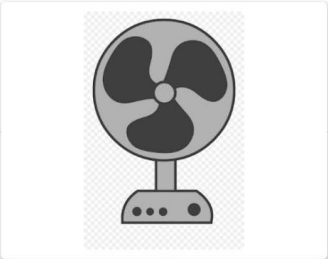

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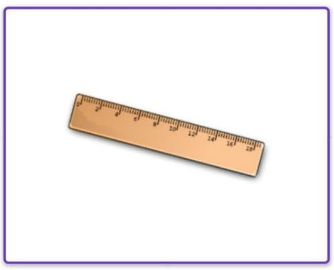

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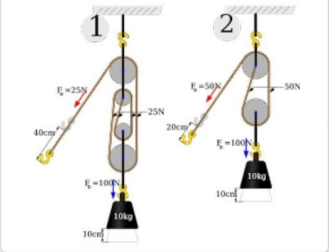

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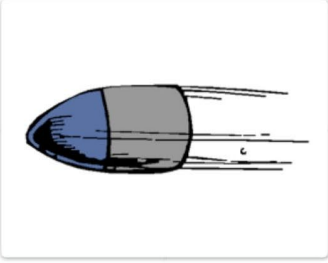

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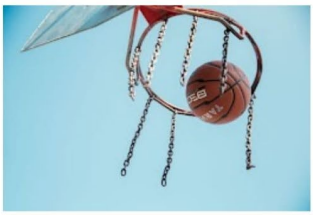

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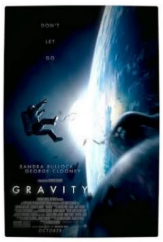

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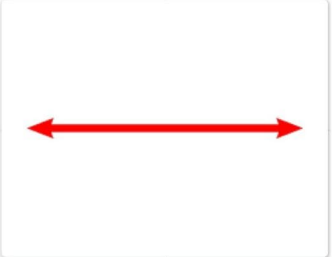

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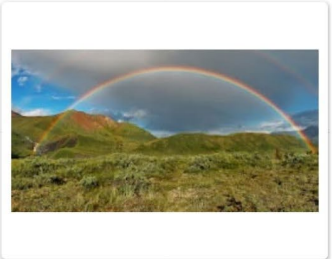

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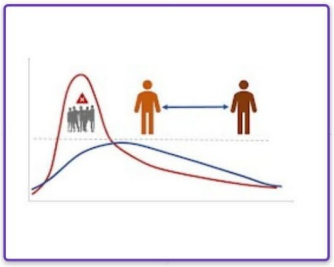

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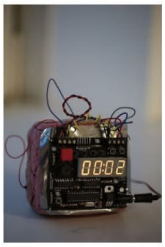

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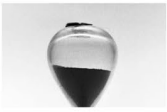

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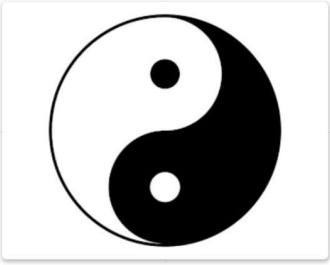

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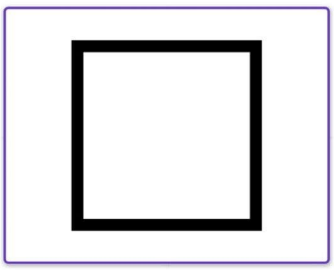

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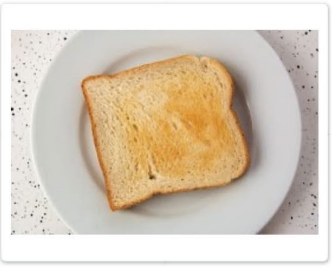

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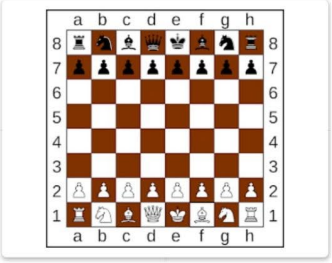

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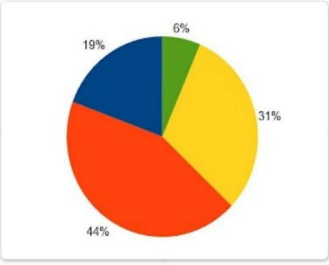

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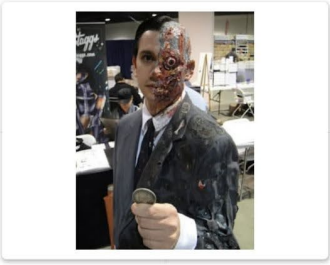

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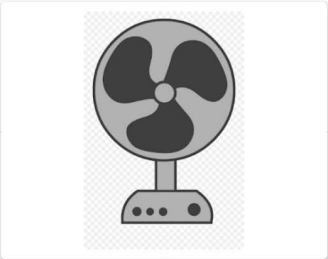

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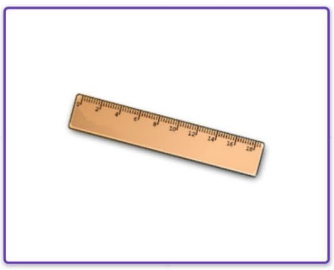

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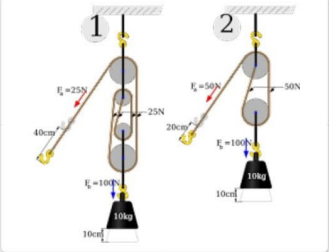

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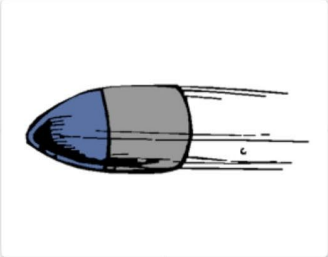

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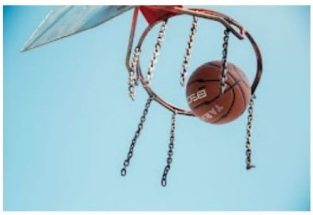

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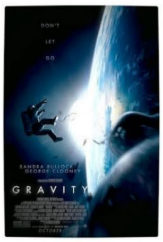

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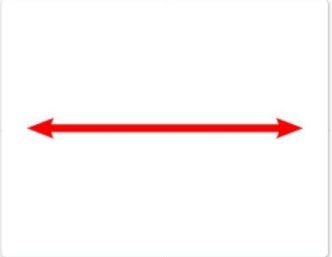

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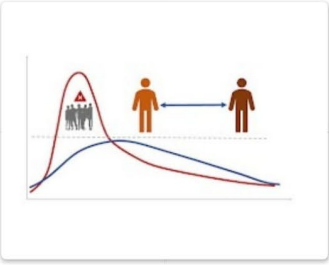

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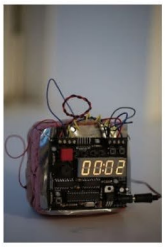

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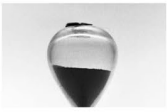

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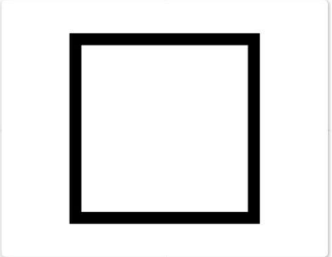

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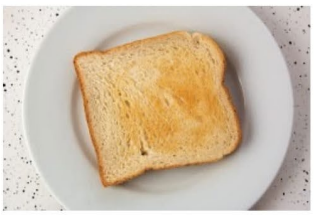

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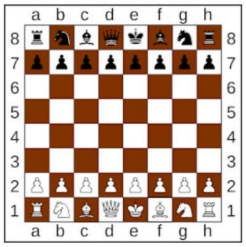

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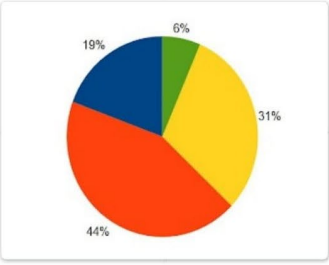

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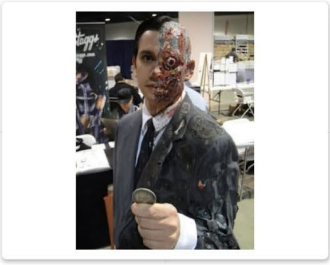

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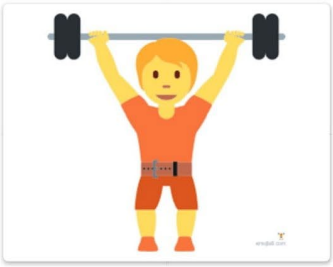

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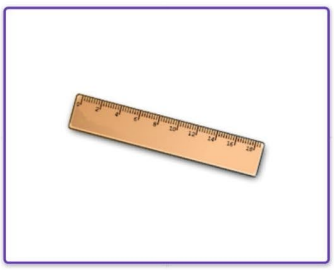

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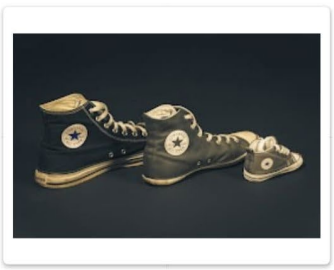

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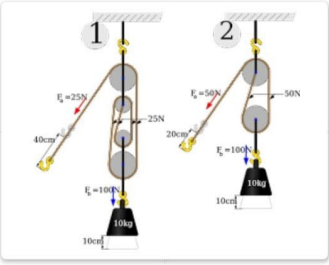

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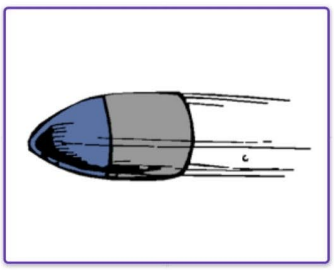

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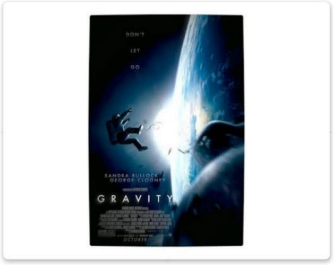

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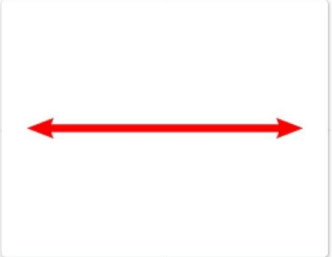

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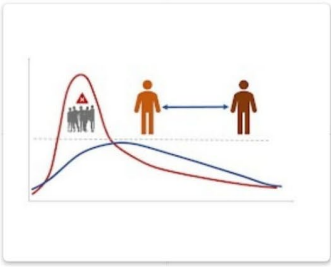

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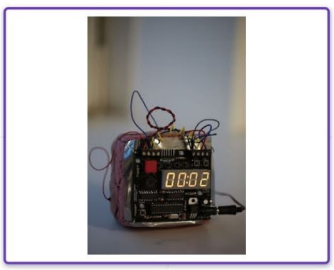

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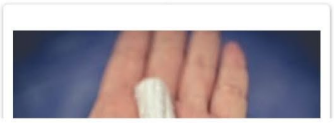

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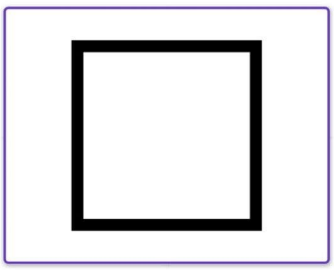

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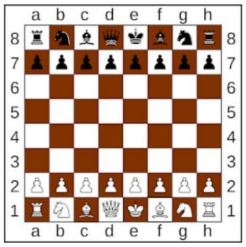

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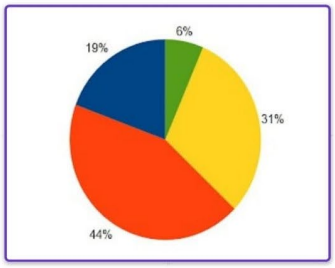

- [x] pie chart

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- [ ] Sonstiges:

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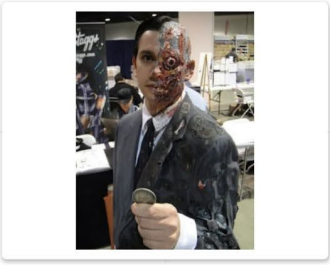
- [ ] Tooth
- [ ] Sonstiges:

- [ ] 2€ coin



- [ ] 2 face from Batman

What represents **square root** best?

$$\sqrt{}$$

beet root

mountains

ginger

Sonstiges:

groot

root beer

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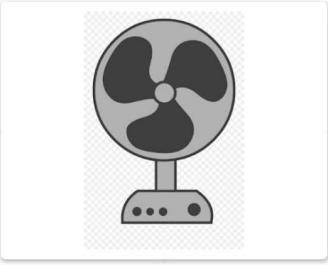
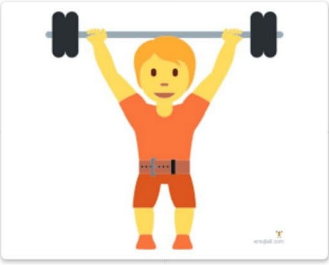


- [ ] Fan



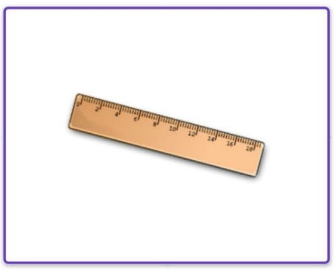
- [ ] Weightlifter

- [ ] Sonstiges:

What represents **L (meaning length)** best?

- [ ] liane

- [ ] long limo



- [x] ruler

- [ ] Burj Khalifa

- [ ] ladder

- [ ] (shoe) sizes XS S M L XL

- [ ] Sonstiges:

What represents **M (meaning mass/weight)** best?

- [ ] Mass beer

- [x] scale weight

- [ ] Mammoth

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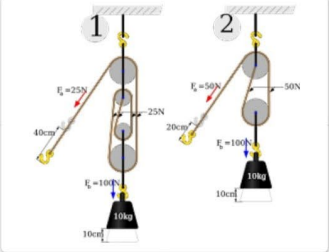

- [ ] pulley

- [ ] Sonstiges:

- [ ] protein powder

What represents **V (meaning velocity/speed)** best?

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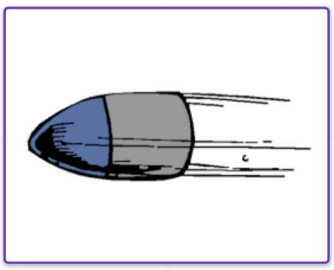

- [x] bullet

- [ ] Flash runnig (DC Comic)

- [x] High speed train

- [ ] Speedometer

- [ ] Sonstiges:

usain bolt

What represents **G (meaning gravity)** best?

- [x] (Newtons) apple

- [ ] Grave

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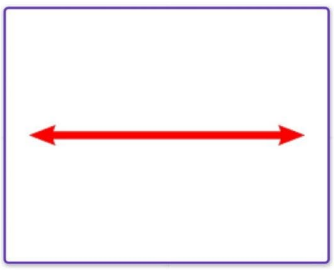

- [x] aRRows

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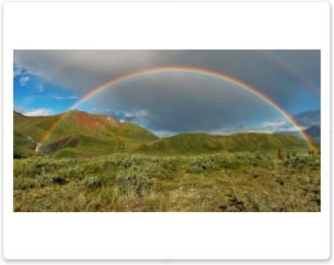
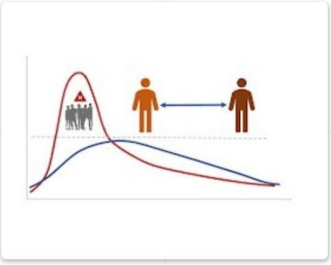


- [ ] rainbow

- [ ] giant wheel



- [ ] social distancing (covid)

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What represents **P (meaning period)** best?

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- [ ] metronom

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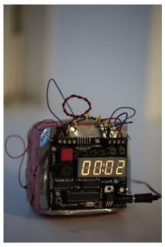
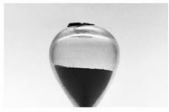


- [ ] time bomb

- [ ] turtle

- [ ] time machine



- [ ] newsPaper / magazine
- [x] hourglass
- [ ] menstrual cycle
- [ ] Sonstiges:

What represents **1/2 or 0.5** best?

- [x] half filled cup

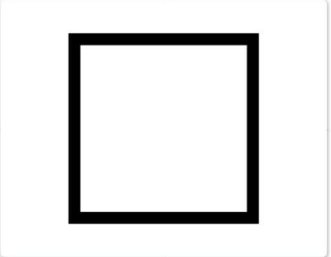
- [ ] Dwarf

- [x] half a pizza
- [ ] Sonstiges:

- [ ] day / night

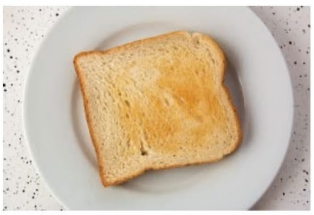
- [ ] yin yang

What represents **^2 (meaning squared)** best?



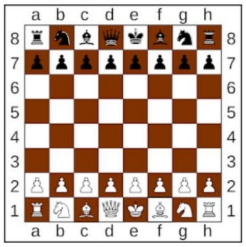
- [ ] Box (geometic shape)

- [ ] Spongebob



- [ ] Sandwich

- [ ] rubic cube



- [ ] chess board

- [ ] Sonstiges:

What represents **pi (meaning 3.14159...)** best?

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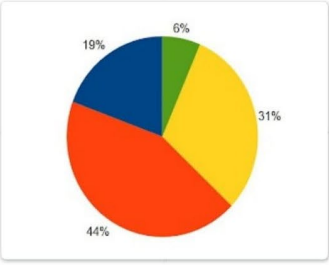

☐ pie chart

☐ Prezel

☐ legs

☐ raspberry pi

☐ Sonstiges:

- [x] pi symbol

What represents **2** best?

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- [ ] U2 (Band)

- [ ] Tooth

- [ ] 2€ coin

- [ ] 2 face from Batman

- [x] Sonstiges:
  2 of a kind (I.e. 2 apples)

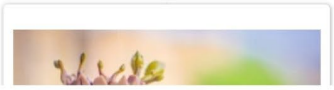
What represents **square root** best?

$$\sqrt{}$$

- [ ] beet root

- [ ] mountains

- [ ] ginger



- [x] Sonstiges:
  wooden root

- [ ] groot
- [ ] root beer

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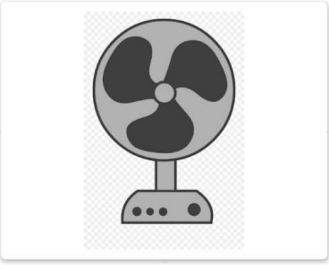

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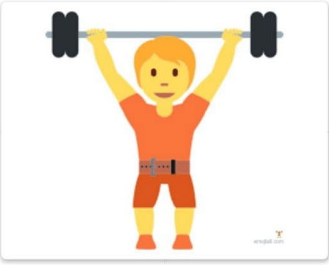

- [ ] Weightlifter

- [ ] Sonstiges:

What represents **L (meaning length)** best?

- [ ] liane

- [x] long limo

- [ ] ruler

- [ ] Burj Khalifa

- [x] ladder

- [ ] (shoe) sizes XS S M L XL

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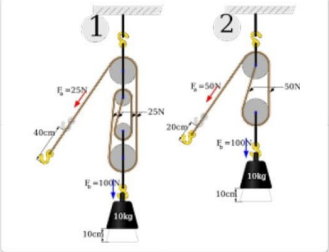

- [ ] pulley

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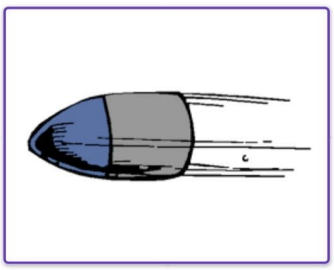

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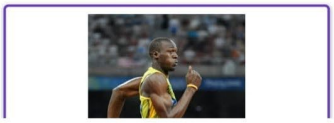

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- [x] Sonstiges:
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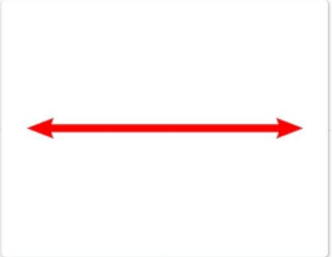
What represents **r (meaning distance between 2 centers)** best?



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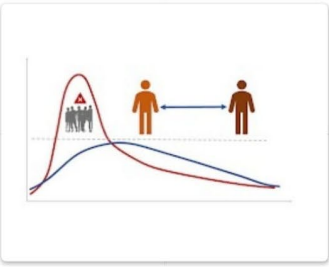

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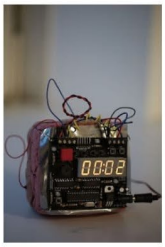

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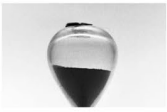

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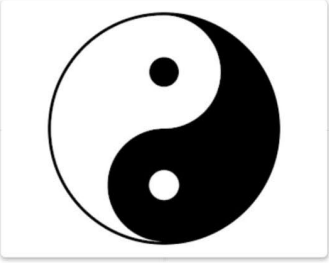

- [ ] yin yang

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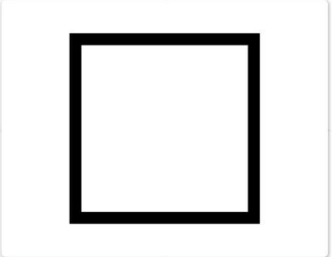

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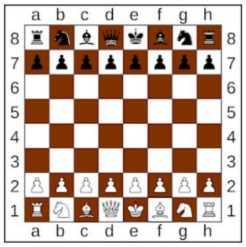

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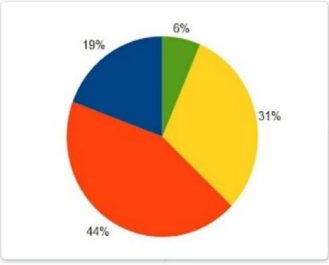

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  A pair of shoes, the wings of an angle, etc

What represents **square root** best?

$$\sqrt{}$$

- [x] beet root

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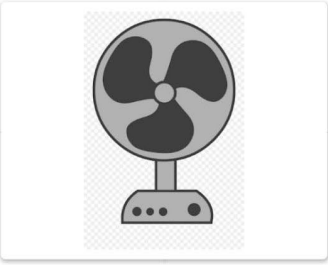

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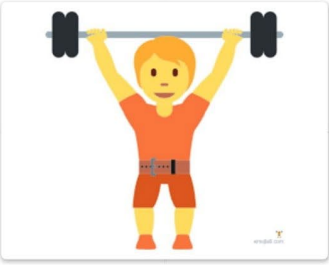

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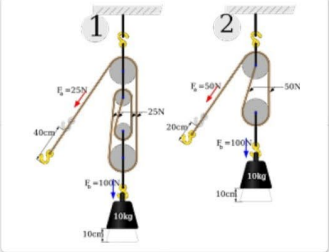

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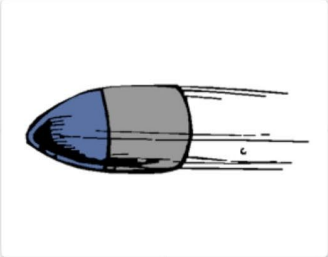

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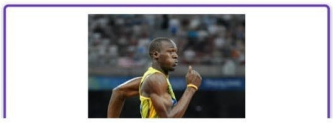

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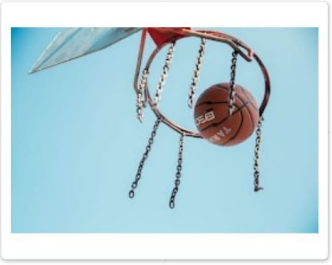

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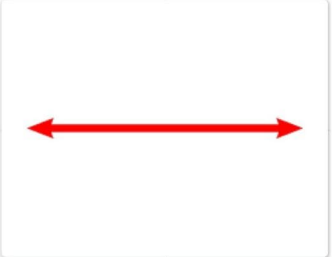

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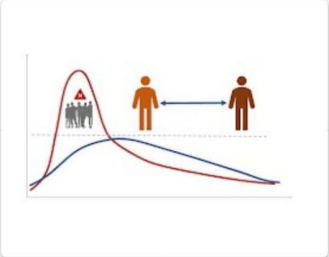

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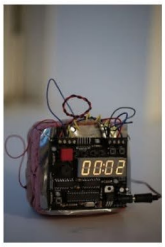

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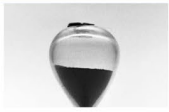

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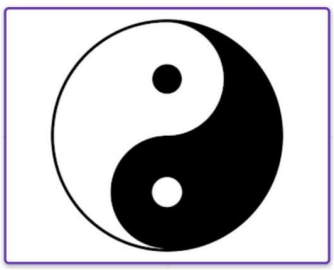

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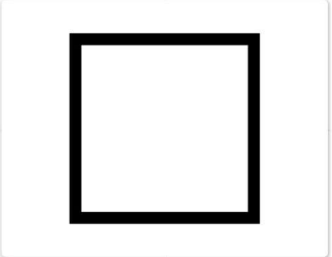

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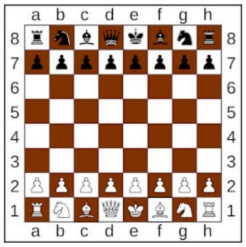

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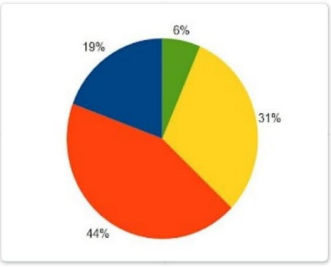

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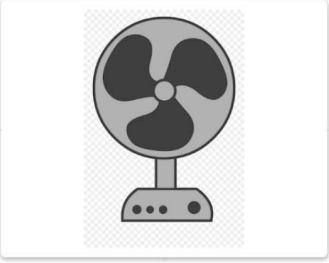

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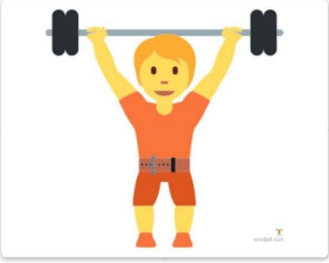

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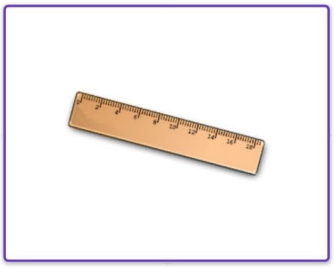

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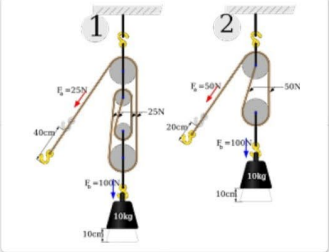

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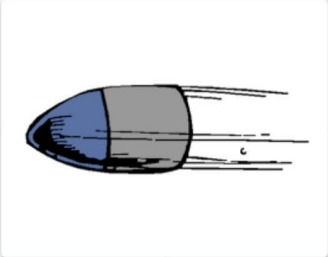

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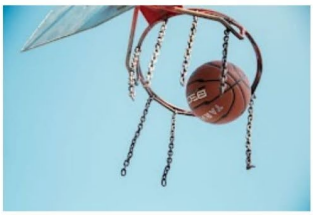

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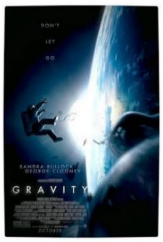

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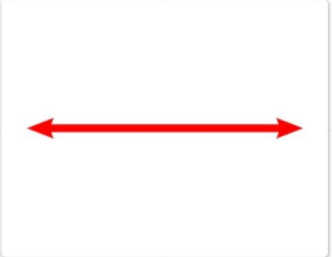

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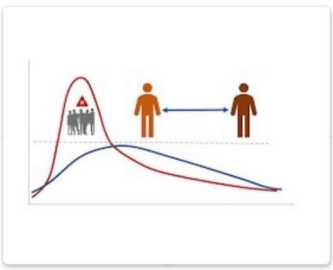

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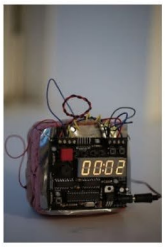

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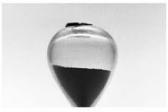

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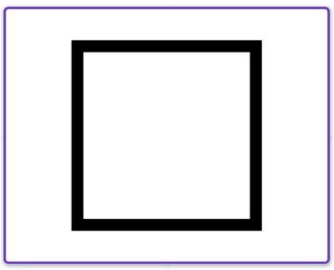

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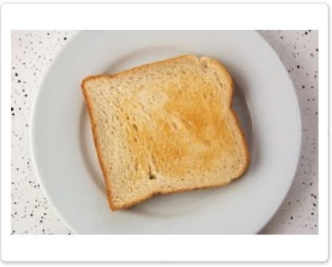

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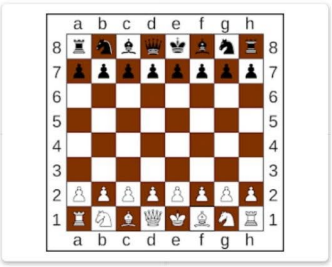

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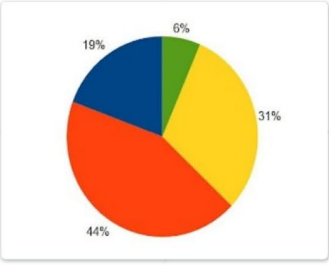

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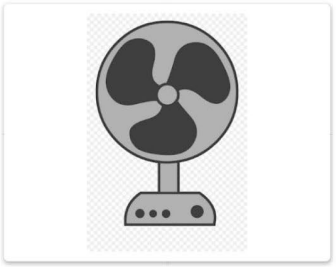

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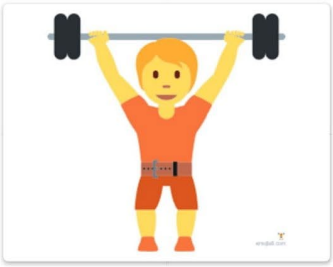

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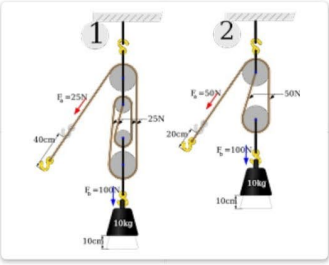

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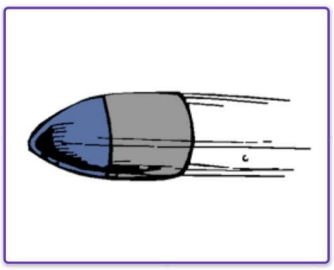

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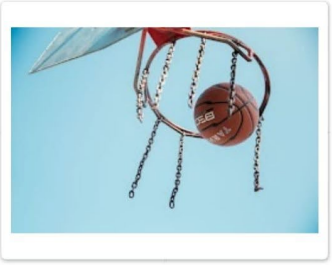

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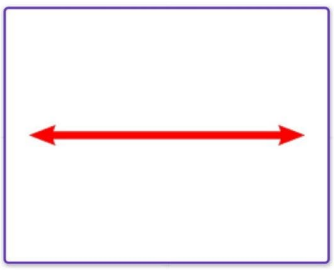

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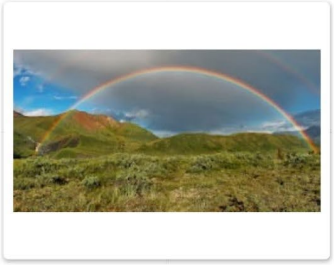

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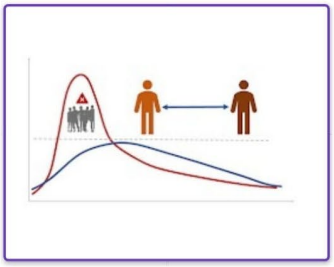

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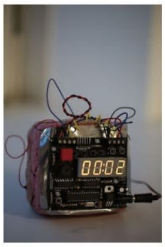

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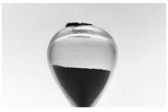

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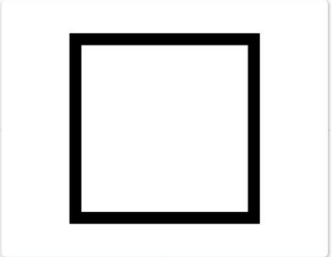

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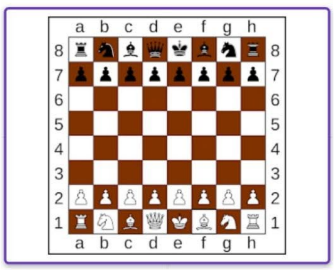

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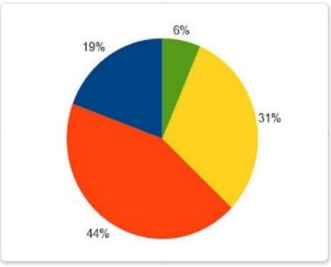

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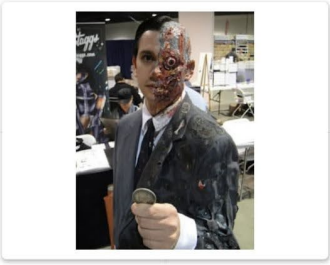

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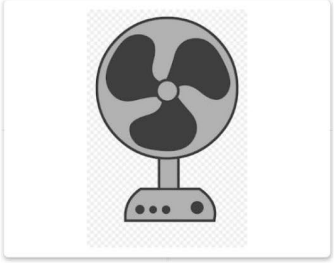

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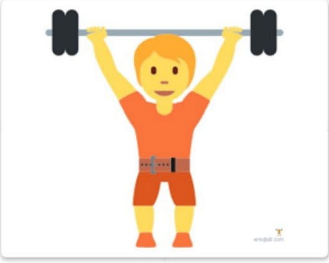

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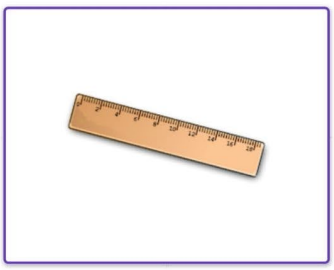
- [ ] long limo



- [x] ruler

- [ ] Burj Khalifa

- [ ] ladder

- [ ] (shoe) sizes XS S M L XL

- [ ] Sonstiges:

What represents **M (meaning mass/weight)** best?

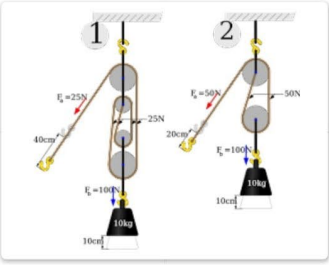
- [ ] Mass beer

- [x] scale weight

- [ ] Mammoth

- [x] Boulder (large stone)

- [ ] Moon



- [ ] pulley

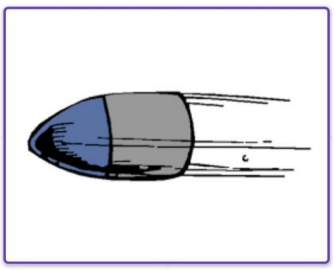
- [ ] Sonstiges:

- [ ] protein powder

What represents **V (meaning velocity/speed)** best?

- [ ] bike/velo

- [ ] rocket



- [x] bullet

- [x] Flash runnig (DC Comic)

- [ ] High speed train

- [x] Speedometer

- [ ] Sonstiges:

usain bolt

What represents **G (meaning gravity)** best?

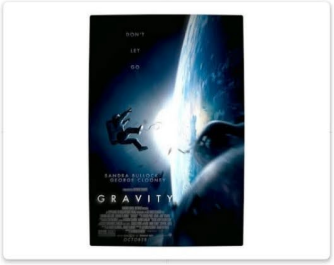
- [x] (Newtons) apple

- [ ] Grave

- [x] Ball falling

- [ ] Floating astronaut

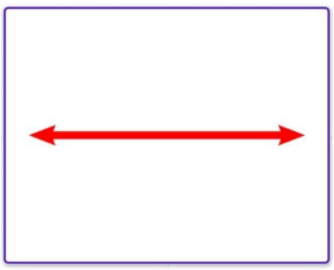
- [ ] gravity falls (disney series)



- [ ] Gravity (Film)

- [ ] Sonstiges:

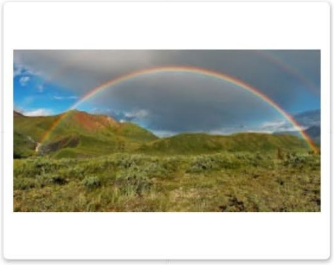
What represents **r (meaning distance between 2 centers)** best?



- [x] aRRows

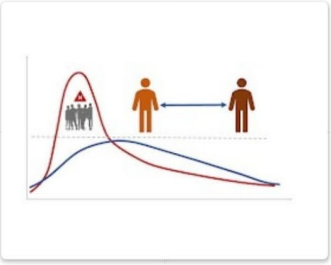
- [ ] round eyeglasses

- [ ] ropeway



- [ ] rainbow

- [ ] giant wheel



- [ ] social distancing (covid)

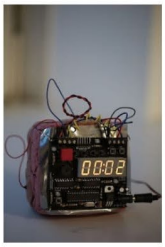
- [ ] Sonstiges:

What represents **P (meaning period)** best?

- [x] tick-tack clock

- [x] metronom

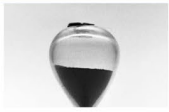
- [ ] bulglar alarm



- [ ] time bomb

- [ ] turtle

- [ ] time machine



- [ ] newsPaper / magazine
- [x] hourglass
- [ ] menstrual cycle
- [ ] Sonstiges:

What represents **1/2 or 0.5** best?

- [x] half filled cup

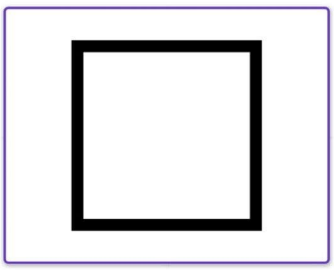
- [ ] Dwarf

- [x] half a pizza
- [ ] Sonstiges:

- [ ] day / night

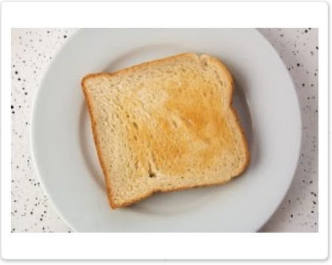
- [ ] yin yang

What represents **^2 (meaning squared)** best?



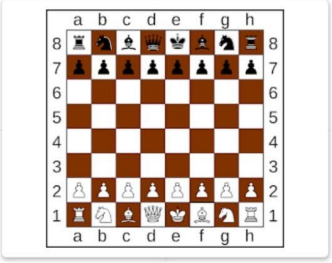
- [x] Box (geometic shape)

- [ ] Spongebob



- [ ] Sandwich

- [ ] rubic cube



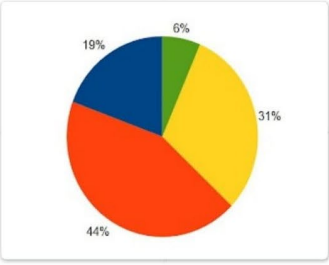
- [ ] chess board

- [ ] Sonstiges:

What represents **pi (meaning 3.14159...)** best?

☐ (apple) pie

☐ bird (pieps)



☐ pie chart

☐ Prezel

☐ legs

☐ raspberry pi

☐ Sonstiges:

- [x] pi symbol

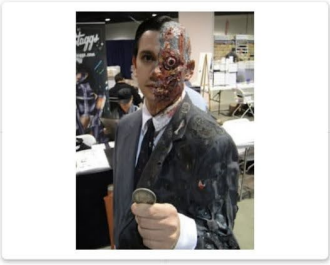
What represents **2** best?

- [x] two fingers

- [ ] U2 (Band)

- [ ] Tooth
- [ ] Sonstiges:

- [x] 2€ coin



- [ ] 2 face from Batman

What represents **square root** best?

$$\sqrt{}$$

beet root

mountains

ginger

Sonstiges:

- [ ] groot
- [ ] root beer

Thanks!

A big thank you from the AR/VR Team A. You really help us figure out how our users will think and therefore pick relevant assets for our MVP library.

Dieser Inhalt wurde nicht von Google erstellt und wird von Google auch nicht unterstützt.

Google Formulare

Locitechnique - standard coding options

With this quick survey we want to find out what are good "standard" options for representing certain scientific terms in a more visual way.

Setting:

Imagine you have to learn physics
formulas with certain scientific terms in them. You can learn more efficent when using mnemonics. Which visual representations would you choose in order to memorize them easier?

Please pick 1 to 3 options that you like for the given term or give a better example.

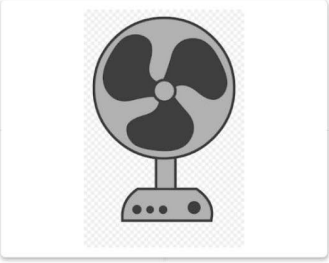
What represents **F (meaning force)** best?

- [x] Fist

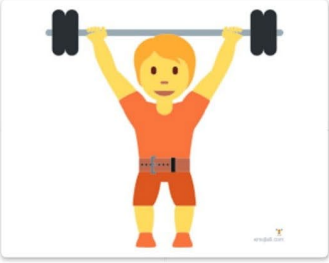
- [ ] Darth Vader Helmet

- [ ] Finger

- [ ] Punching glove



- [ ] Fan



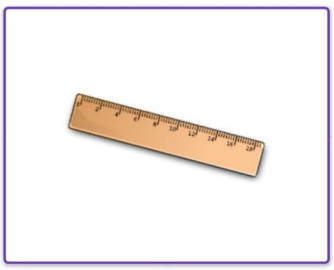
- [ ] Weightlifter

- [ ] Sonstiges:

What represents **L (meaning length)** best?

- [ ] liane

- [ ] long limo



- [x] ruler

- [ ] Burj Khalifa

- [ ] ladder

- [ ] (shoe) sizes XS S M L XL

- [ ] Sonstiges:

What represents **M (meaning mass/weight)** best?

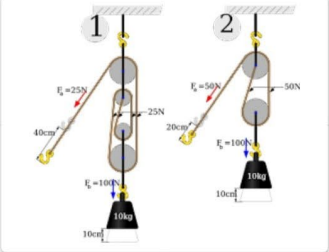
- [ ] Mass beer

- [ ] scale weight

- [x] Mammoth

- [ ] Boulder (large stone)

- [ ] Moon



- [ ] pulley

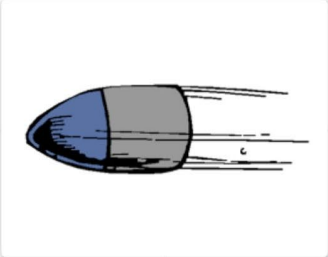
- [ ] Sonstiges:

- [ ] protein powder

What represents **V (meaning velocity/speed)** best?

- [ ] bike/velo

- [ ] rocket



- [ ] bullet

- [x] Flash runnig (DC Comic)

- [x] High speed train

- [ ] Speedometer

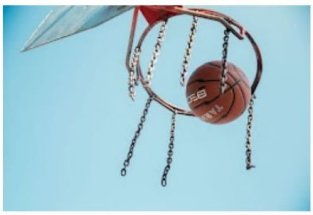
- [ ] Sonstiges:

usain bolt

What represents **G (meaning gravity)** best?

- [ ] (Newtons) apple

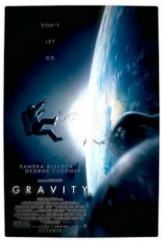
- [ ] Grave



- [ ] Ball falling

- [x] Floating astronaut

- [ ] gravity falls (disney series)



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- [ ] Sonstiges:

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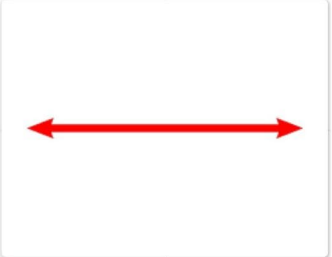


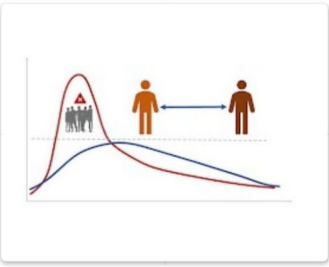
- [ ] aRRows

- [ ] round eyeglasses

- [ ] ropeway

- [x] rainbow

- [ ] giant wheel



- [ ] social distancing (covid)

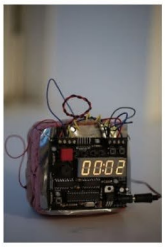
- [ ] Sonstiges:

What represents **P (meaning period)** best?

- [ ] tick-tack clock

- [ ] metronom

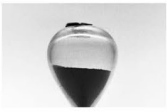
- [ ] bulglar alarm



- [x] time bomb

- [ ] turtle

- [ ] time machine



- [ ] newsPaper / magazine

- [ ] hourglass

- [ ] menstrual cycle

- [ ] Sonstiges:

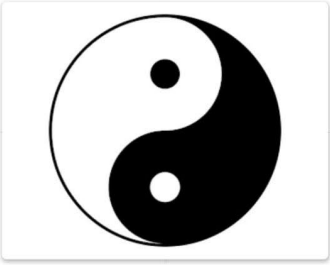
What represents **1/2 or 0.5** best?

- [x] half filled cup

- [ ] Dwarf

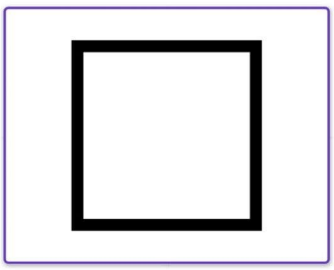
- [ ] half a pizza
- [ ] Sonstiges:

- [ ] day / night



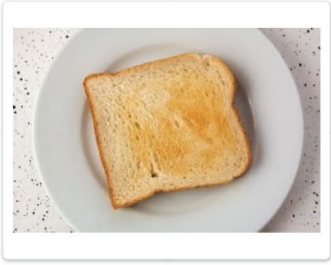
- [ ] yin yang

What represents **^2 (meaning squared)** best?



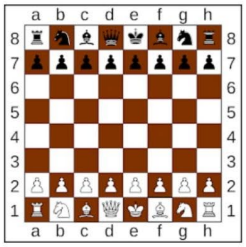
- [x] Box (geometic shape)

- [x] Spongebob



- [ ] Sandwich
- [ ] Sonstiges:

- [ ] rubic cube

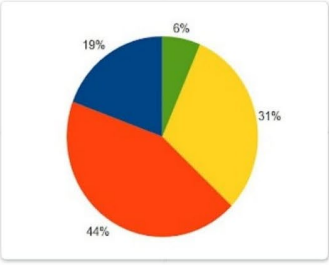


- [ ] chess board

What represents **pi (meaning 3.14159...)** best?

- [x] (apple) pie

- [ ] bird (pieps)



- [ ] pie chart

- [ ] Prezel

- [ ] legs

- [ ] raspberry pi
- [ ] Sonstiges:

- [ ] pi symbol

What represents **2** best?

- [ ] two fingers

- [ ] U2 (Band)

- [x] Tooth
- [ ] Sonstiges:

- [ ] 2€ coin

- [ ] 2 face from Batman

What represents **square root** best?

$$\sqrt{}$$

- [x] beet root

- [ ] mountains

- [ ] ginger

- [ ] Sonstiges:

- [x] groot
- [ ] root beer

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