# Smartphones put to the test

It is possible to measure acceleration, magnetic field, sound, rotation speed or light intensity with your smartphone! Introducing 8 fun challenges that will show you how to do it in just a few minutes. No special knowledge required, you will only need to download the Phyphox app.

Launch Accelerometer (with g) in PHYPHOX and start the measurement (press "Play").

From now on, hold your smartphone as still as possible!
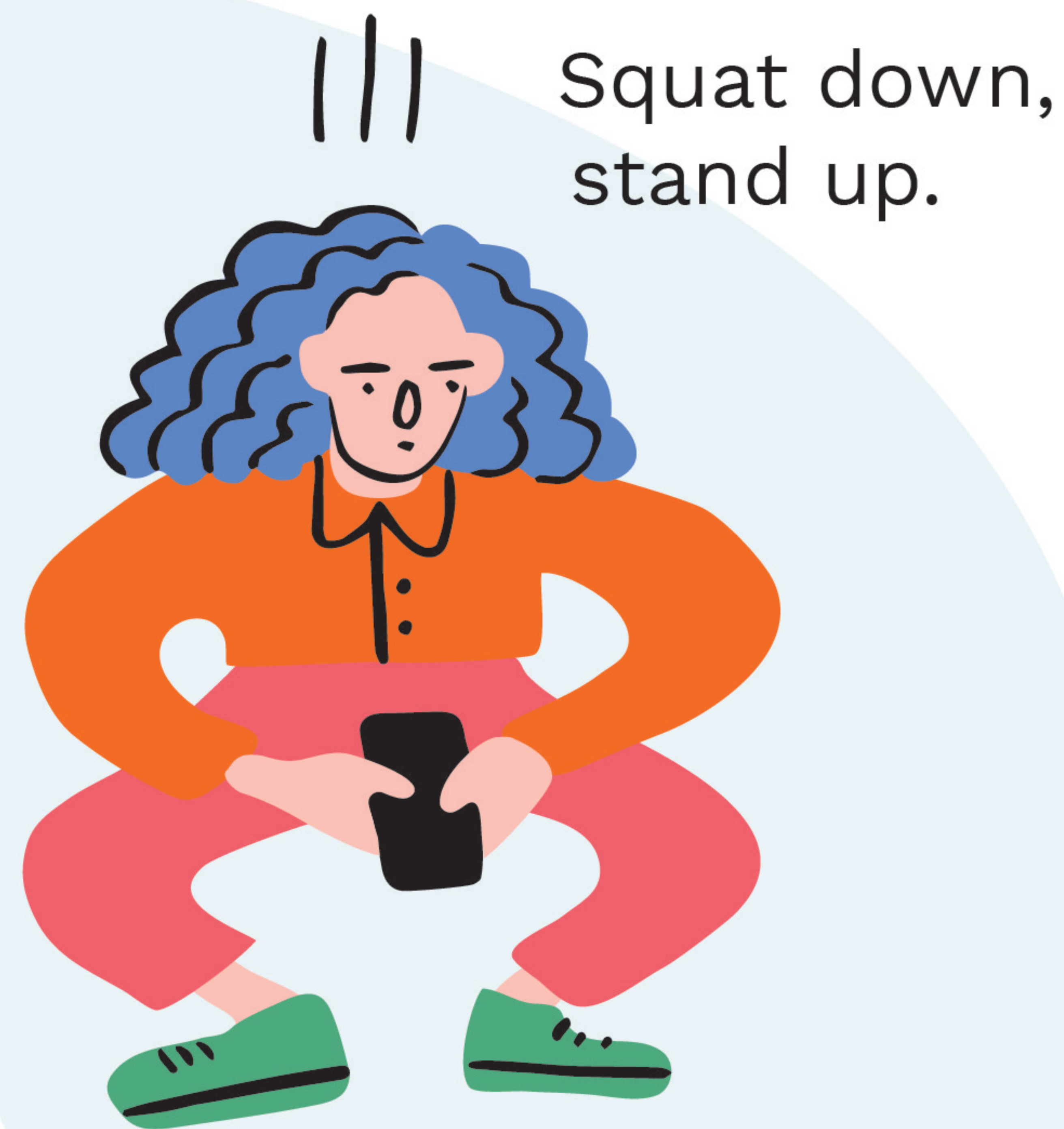
Squat down, stand up.

Challenge:
THE IMPOSSIBLE BALANCE

Turn around your smartphone.

Get down on one leg and then get back up.

Pass your leg over it!

Stop the measurement. Find your score on the "accelerometer z" curve: it's the largest distance between the bottom and the top of the curve.

distance:

Result: you are...

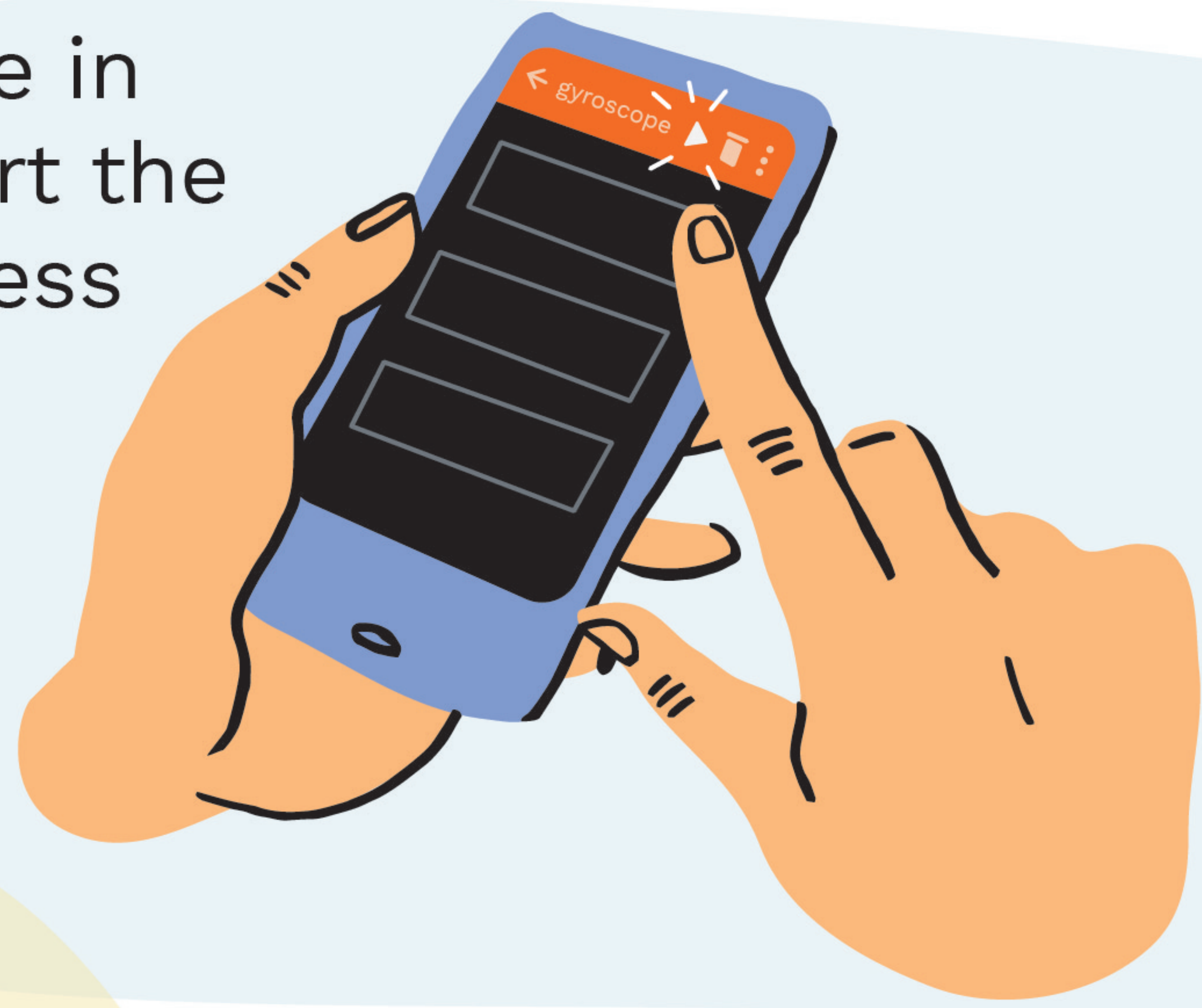| < 7	7-15	> 15
...a nimble sea lion	...a placid labrador	...an exuberant goat

Launch Gyroscope in PHYPHOX and start the measurement (press "Play").

Spin around in circles as fast and as evenly as possible (watch out for others!) holding the phone flat in outstretched arms.

Challenge :
THE INFERNAL ROTATION

Stop the measurement. To find your score, look for the highest value of your z-axis rotation speed.

the value:

Result: you are...

> 6	4-6	< 4
...a frantic monkey	...a swift dog	...a chill panda

Launch Inclination in PHYPHOX and start the measurement (press "Play").

Challenge:
THE ZEN OBSTACLE COURSE
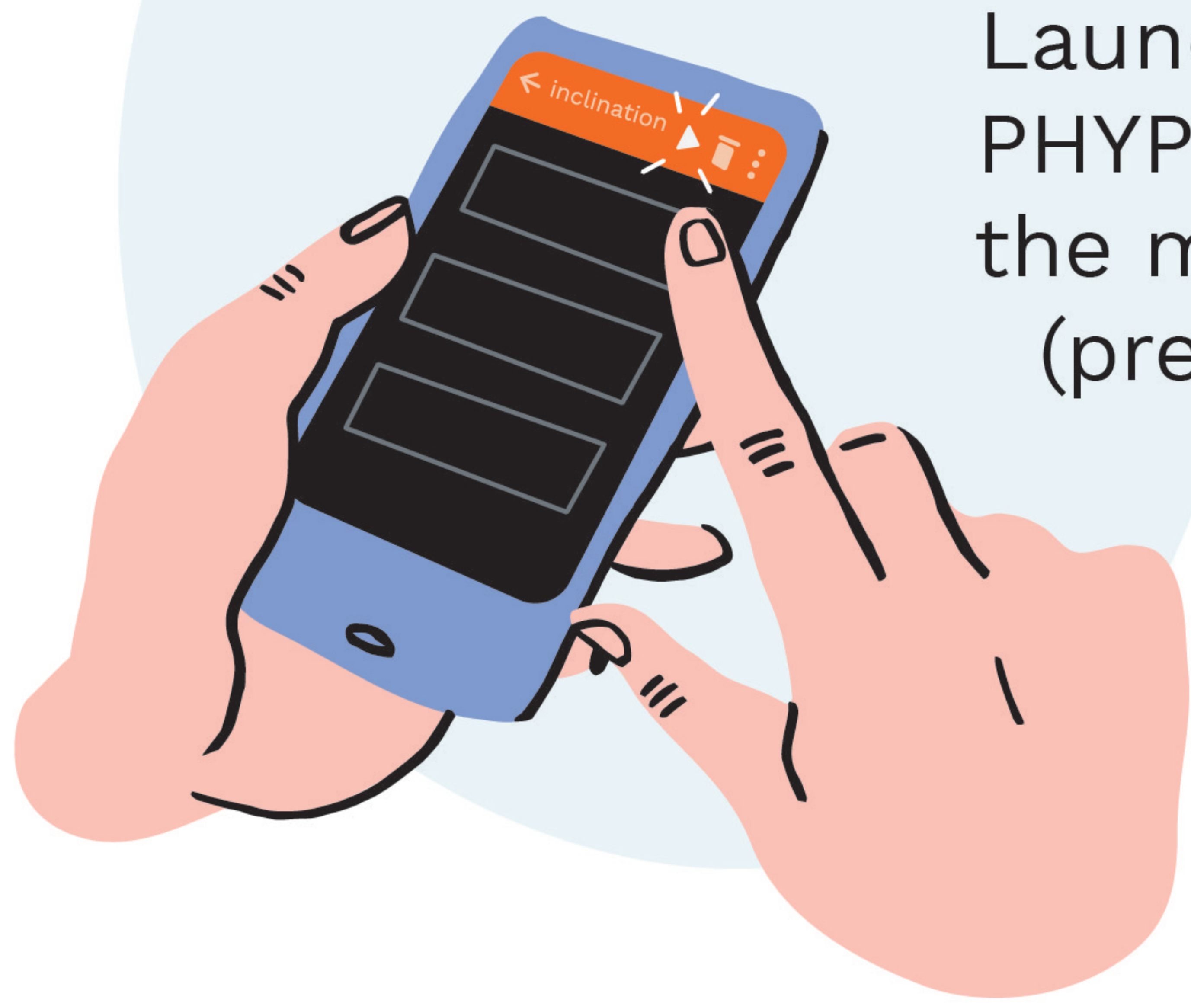
Follow the course maintaining your smartphone as flat as possible.

To build your route you can use a table, a chair, a taut piece of string...

Stop the measurement. To find out your score, look for the largest distance between the bottom and the top of the "Tilt up/down" curve

distance:

Result: you are...

< 12°

...a skillful cat

12° – 20°

...a flexible fox

> 20°

...a restless bunny

Launch Accelerometer (with g) in PHYPHOX and start the measurement (press "Play").

Challenge:
THE ULTIMATE ACCELERATION

Put the smartphone in your pocket. Then move, jump, run as fast and as briskly as possible (watch out for your neighbours!).

Stop the measurement. To find out your score, look for the largest distance between the bottom and the top of the "accelerometer z" curve.

distance:

Result: you are...

> 60

...a dazzling cheetah

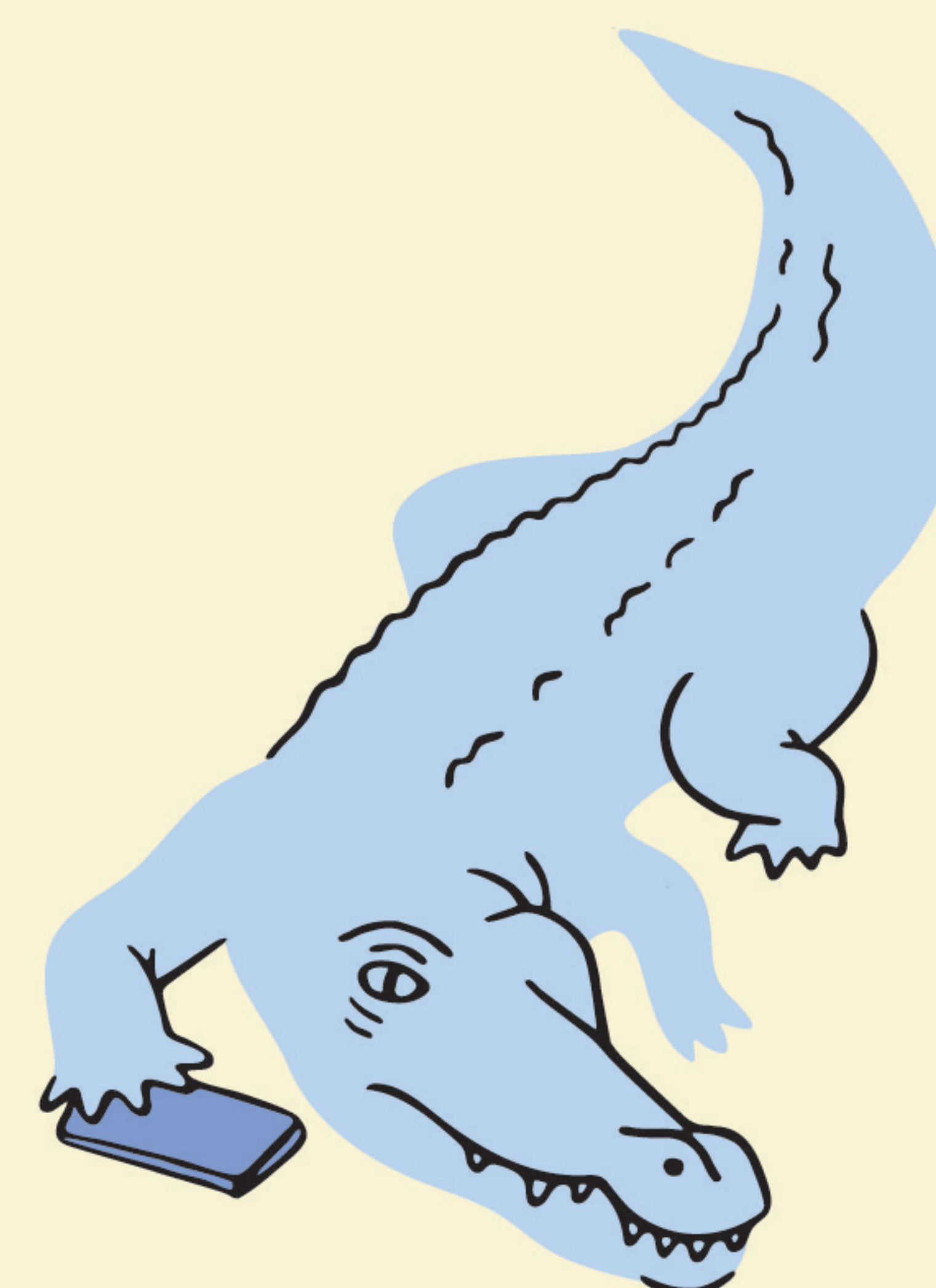**10-60**

...a rampant alligator

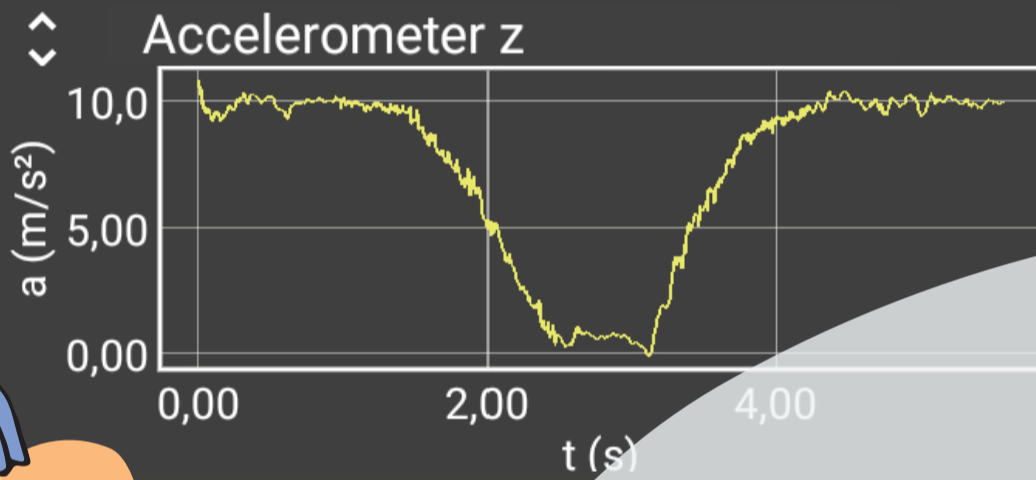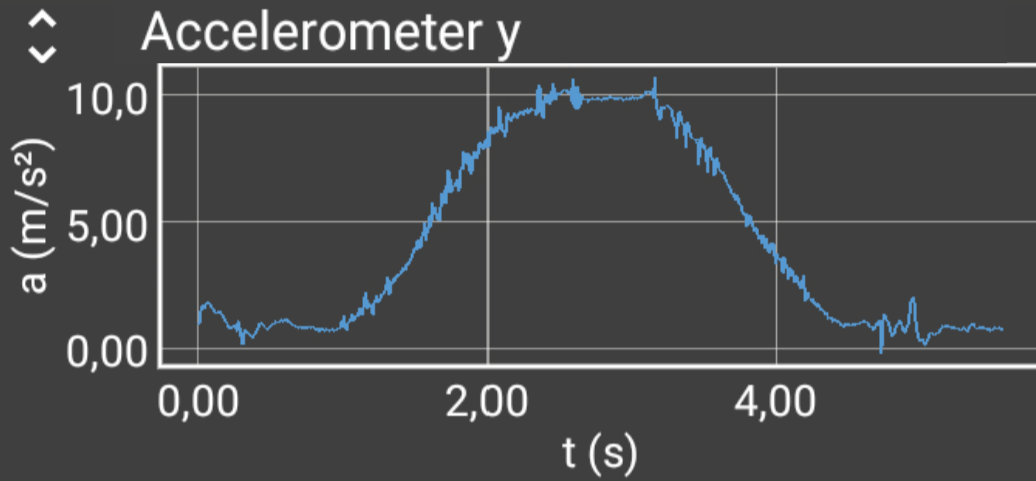**< 10**

...a carefree sloth

Find out how to manipulate your smartphone to produce this curve. Launch the Accelerometer (with g) on PHYPHOX. It's up to you now!

Accelerometer y

a (m/s²): 10,00 / 5,00 / 0,00
t (s): 0,00 / 2,00 / 4,00

Accelerometer z

a (m/s²): 10,0 / 5,00 / 0,00
t (s): 0,00 / 2,00 / 4,00

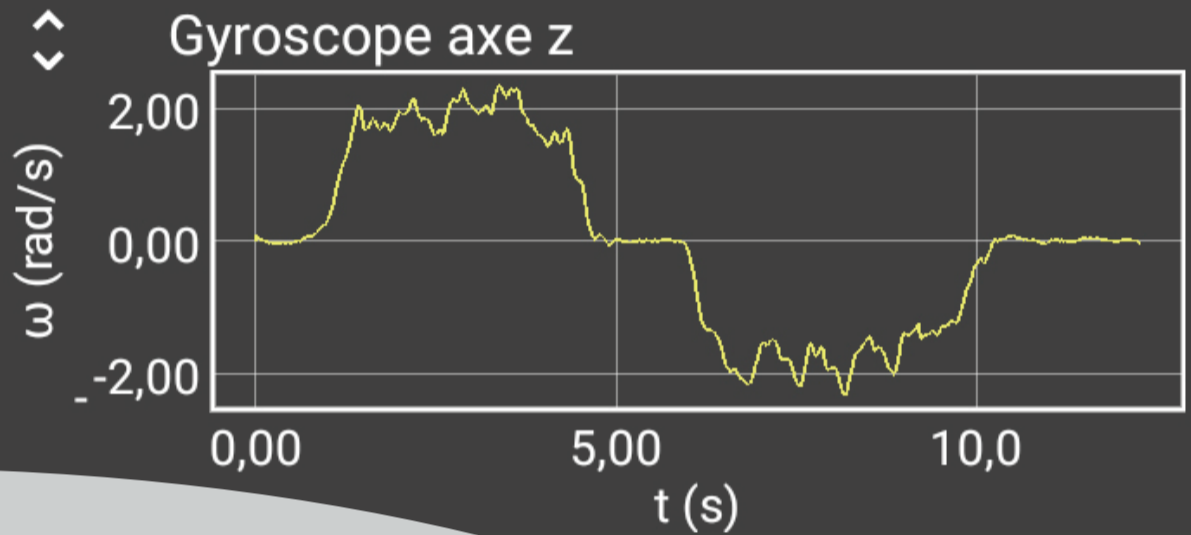# Riddle:

THE PRECISE GESTURE

Don't hesitate to move around to see the effect on the smartphone!

Solution: Hold the smartphone flat horizontally, then tilt it upright in front of you, then bring it back to its starting position. The accelerometer not only measures the acceleration of the smartphone, but also the Earth's gravity. That's why it changes when you tilt the smartphone, and that's how the switch between portrait and landscape modes is detected.

Find out how to manipulate your smartphone to produce this curve. Launch the Gyroscope on PHYPHOX. It's up to you now!

Gyroscope axe z

Riddle:
THE MYSTERIOUS MOVEMENT

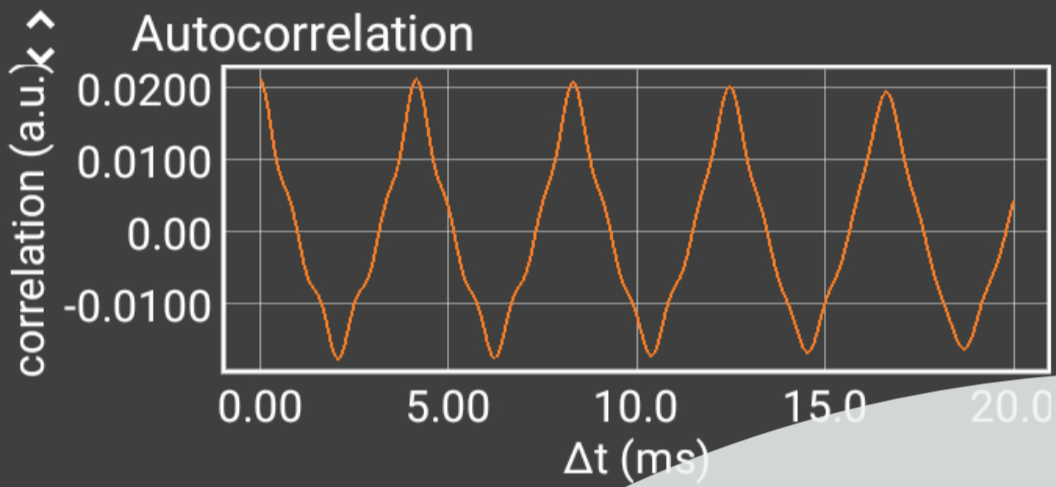Don't hesitate to move around to see the effect on the smartphone!

Solution: hold the smartphone flat in your hand at arm's length, then do one full spin to the left, then do the opposite. Here the gyroscope measures the speed of rotation and also the direction of rotation. This also works if you rotate the smartphone on its own.

Find out how to manipulate your smartphone to produce this curve. Launch the Audio autocorrelation on PHYPHOX. It's up to you now!

Period **4.15 ms**
Frequency **240.85 Hz**

Musical note **B3**
Cents from note **-43.22**

Riddle:
THE PUREST SOUND

Don't hesitate to use your voice to see the effect on the smartphone!

Solution: Sing a note and then tweak from low to high until you reach 240 Hz, then hold the sound. Here the smartphone measures the frequency of the sound, which is the physical measure of the note you are singing.

Find out how to manipulate your smartphone to produce this curve. Launch the Light on PHYPHOX. It's up to you now!

Illuminance
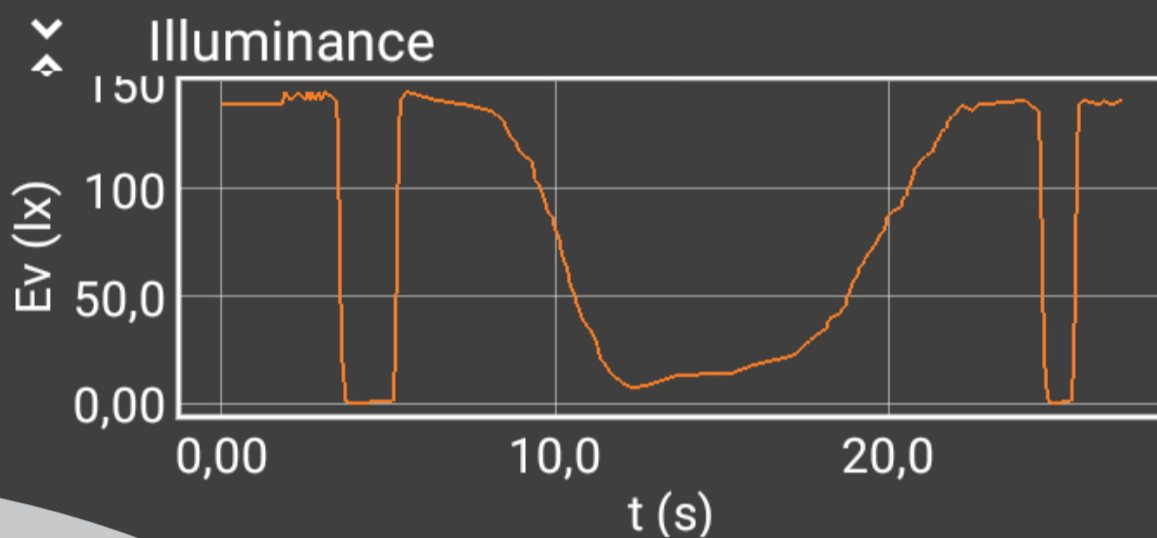
Riddle:
THE TAMED LIGHT

Don't hesitate to move around to see the effect on the smartphone!

Solution: Quickly cover the light sensor with your hand, wait a little, then withdraw your hand just as quickly. Repeat the same procedure, but slower, gradually concealing the light. Then repeat the first movement. Here the smartphone measures the amount of light that's detected by a sensor usually located in the upper part of the front panel. Attention, on some smartphones this sensor is not accessible, or only updates when the light varies.

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