



# penUp Science



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Issue 55  
Sports  
Science

# Welcome to OpenUpScience

from Cambridge Science Centre.

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## This issue is all about the science of exercise and sport.

Sports and exercise are great for our bodies and our minds.

When you exercise, your heart starts to beat faster, pumping more blood and oxygen to the muscles you are using.

The heat from your muscles working makes you feel warmer...

...so your body releases sweat to cool you down.

Over time our bodies get stronger...

...and our brains release chemicals called endorphins which make us feel good too!

Discover how your body responds to exercise and get active with science in this issue!

Did you know?

Exercise boosts your learning abilities because when you're active, your heart beats faster. This means more blood is pumped to your brain. Blood contains nutrients and oxygen, which means more brain power. So, if you're feeling a bit sluggish - get up and get moving!

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# Make A Stethoscope

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Stethoscopes are used to listen to a person's heartbeat. Make a very basic stethoscope with this activity.

## What to do

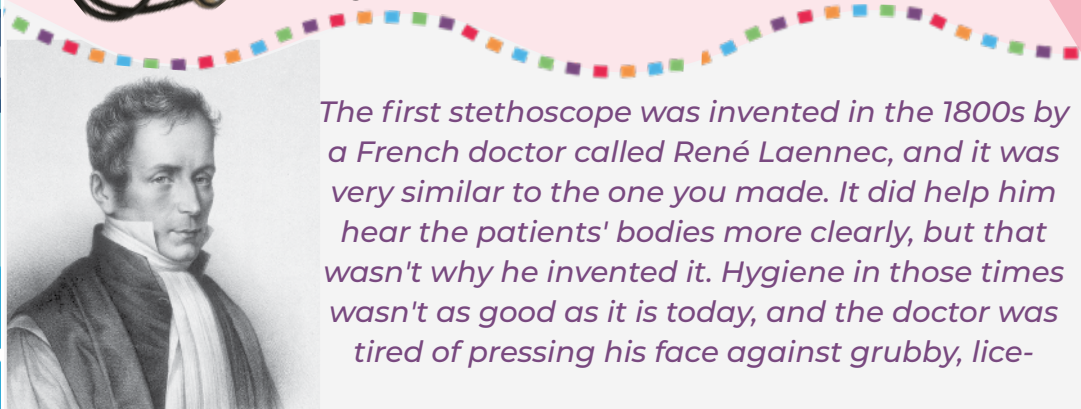
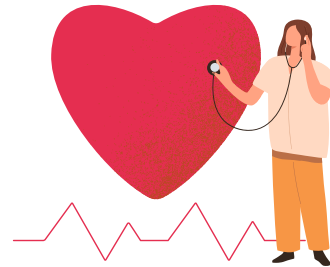
1. First, try just the kitchen roll tube. Place one end of the tube against the left side of your friend's chest and put your ear on the other side. *Can you hear their heart beating?*
2. Next, tape the funnel to one end of the tube.
3. Place the funnel end of the tube against your friend's chest and put your ear against the other end. *Does it sound clearer?*

## What you'll need

- Kitchen roll tube
- Strong tape
- A funnel
- A friend

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You might have seen a stethoscope that looks like this. These are generally used by doctors and nurses to listen to a patient's heartbeat and lung sounds.



The first stethoscope was invented in the 1800s by a French doctor called René Laennec, and it was very similar to the one you made. It did help him hear the patients' bodies more clearly, but that wasn't why he invented it. Hygiene in those times wasn't as good as it is today, and the doctor was tired of pressing his face against grubby, lice-

# Which Exercise Makes Your Heart Beat Fastest?



A human's heart beats an average of 2.5 billion times in its life. You can keep your heart healthy by giving it a workout with exercise. Find out which exercise makes your heart rate highest and gives your heart the best workout with this experiment.

## What to do

1. Take your resting heart rate. Sit still and relax for a couple of minutes, then get a friend to use your homemade stethoscope to count how many times your heart beats in 15 seconds.
2. Multiply this number by 4 using the calculator. This is your resting heart rate. Put this in your results table.
3. Pick 4 different types of exercise. These could include skipping, walking, running, yoga, cycling or dancing. Write them each in your results table.
4. Make a prediction. Which exercise do you think will increase your heart rate the most?
5. Get your friend to time you doing one of the exercises. After five minutes, get them to measure your heart beats again for 15 seconds. Multiple this number by 4 to find your heart rate and add it to your table.
6. Repeat this with the other exercises. Which increased your heart rate the most? Was your prediction correct?

## What you'll need

- Your homemade stethoscope
- A friend
- Some space
- A stopwatch
- A calculator

# Which Exercise Makes Your Heart Beat Fastest?



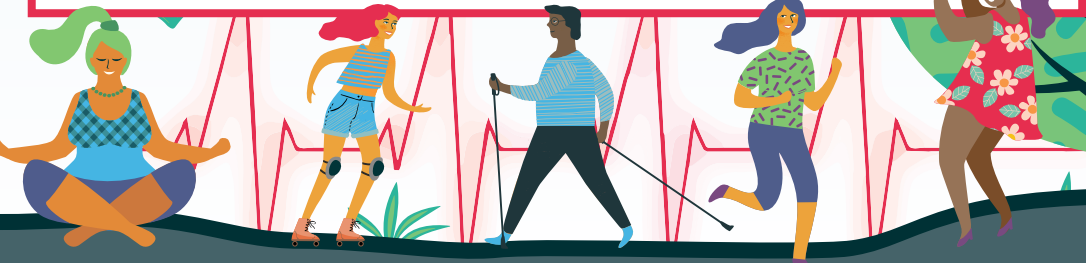
Fill in your results in this table.

Exercise	Heart beats in 15 seconds	Heart rate (beats in 15 seconds times 4)
Resting		

## What is heart rate?

Your heart rate is the number of times your heart beats in 1 minute. It is measured in bpm, which stands for 'beats per minute.'

Your heart pumps blood and oxygen around your whole body. When you exercise, your muscles need more oxygen, so your heart beats faster and your heart rate is higher.



This activity was developed in association with the Cambridge office staff at KPMG



# Get To The Goal!

To get the football to the goal, follow the correct calculations.

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Solutions at the back



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Ever noticed that people tend to smell bad when they're really sweaty? It's not the sweat that's smelling; the smell is due to bacteria on our skin. When you sweat, these bacteria thrive in your warm, wet arm pits and get stinky!



# Workout Wordsearch

Can you find all of the exercise related words in the wordsearch?

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Solutions at the back

N	M	U	A	S	E	L	C	S	U	M	J
H	T	G	N	E	R	T	S	Q	K	U	N
S	O	H	I	S	W	E	A	T	M	I	D
Y	T	L	E	H	F	B	R	P	S	P	P
K	R	R	V	A	T	N	A	G	P	P	E
P	Q	P	E	T	R	A	C	U	O	U	L
H	K	H	M	T	H	T	E	S	R	M	C
D	U	L	H	W	C	F	B	R	T	R	Y
N	U	R	A	M	U	H	F	E	B	A	C
T	H	R	O	W	G	O	W	O	A	W	J
V	E	P	O	C	S	O	H	T	E	T	S
C	O	O	L	D	O	W	N	A	T	T	E

BREATH  
HEARTBEAT  
RACE  
SPORT  
STRETCH  
WALK

COOL DOWN  
JUMP  
RUN  
STETHOSCOPE  
SWEAT  
WARM UP

CYCLE  
MUSCLES  
SKIP  
STRENGTH  
THROW  
YOGA

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# Long Legs And Long Jump

Can people with longer legs jump further?  
There's only one way to find out - experiment!

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## What to do

1. Set up the jumping track. Find a space and put a strip of masking tape on the floor. This is your start line.
2. Choose one person to test first. Ask them to take off their shoes and measure their leg length. Start measuring at their hip bone and finish measuring at the bone on the outside of their ankle. Note down their results on the piece of paper in cm.
3. Get them to stand with their feet together at the starting line. When they are ready, ask them to jump as far as they can!
4. Ask them not to move from their landing space while you measure the distance from the starting line to their feet in cm.
5. Record your results with a cross on the graph.
6. Follow steps 2-5 with the other volunteers.

## What you'll need

- A tape measure
- Masking tape
- Pen
- Piece of paper
- Graph on the next page
- At least three people who are different heights



*Did you know?  
A snow leopard  
can jump further  
than the length  
of a bus!*

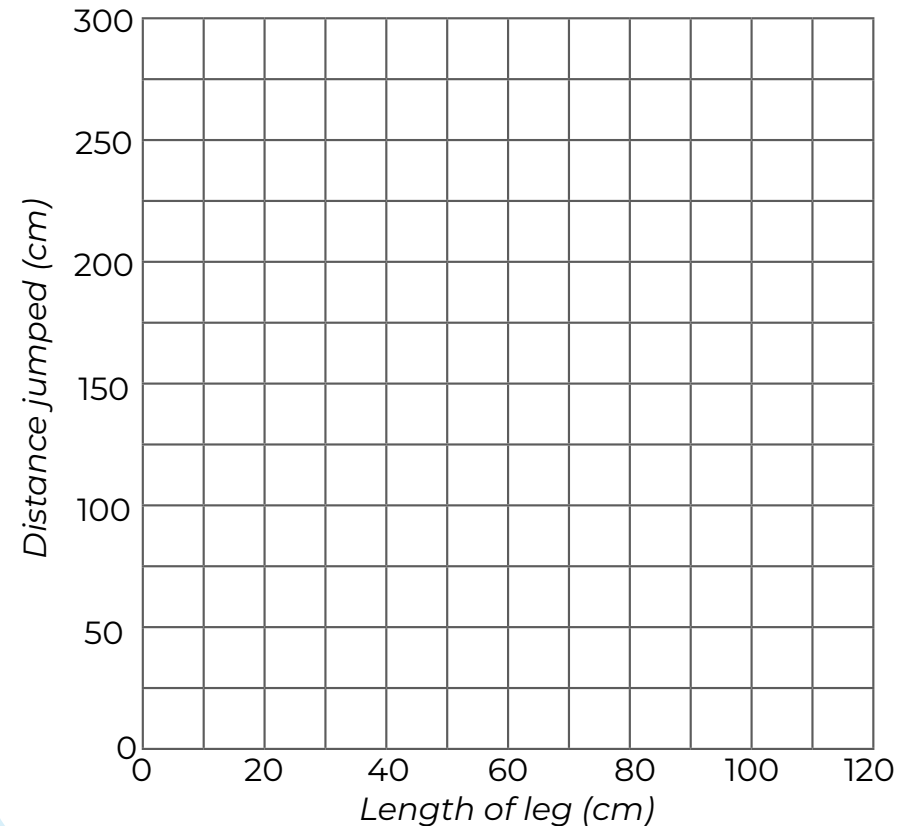
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# Long Legs And Long Jump

Graph your results to find the conclusion. Draw a line between your crosses. Is the line straight, showing a pattern, or does it look random?

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## Distance jumped against leg length



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Is there a pattern? Do the results line up? If the results form a line and the distance jumped gets bigger the longer the leg length, then there is a **positive correlation**. If the results get smaller, there is a **negative correlation**.

It's alright if there is no pattern, or correlation.

**What else could help someone jump far?**

# Skipping For Joy

If you wanted to skip with a rope as fast as possible, would it be better to use a long rope or a short rope? Why?

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## What you'll need

- A large skipping rope, around 3m long
- A stopwatch
- A friend
- A big space to jump

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## What to do

1. Fold your skipping rope in half, stand on the midpoint and pull either side up to half way between your armpit and belly button. Tie knots at this point.
2. Hold the knots and wrap the rest of the rope around your hands. This will be the shortest length of your rope.
3. Get your friend to time one minute and count how many times you can skip. If you mess up, just keep going.
4. Record your results.
5. Readjust the rope handles so that they just reach to your armpits. This is the medium length of your rope.
6. Repeat steps 3-4.
7. Readjust the ropes again so that the handles are at your chin. This is the longest length of your rope.
8. Repeat steps 3-4. What did you find?

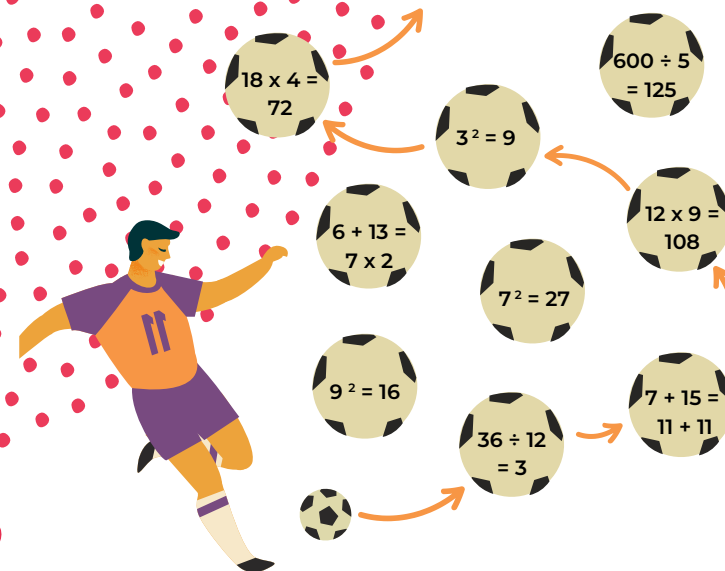
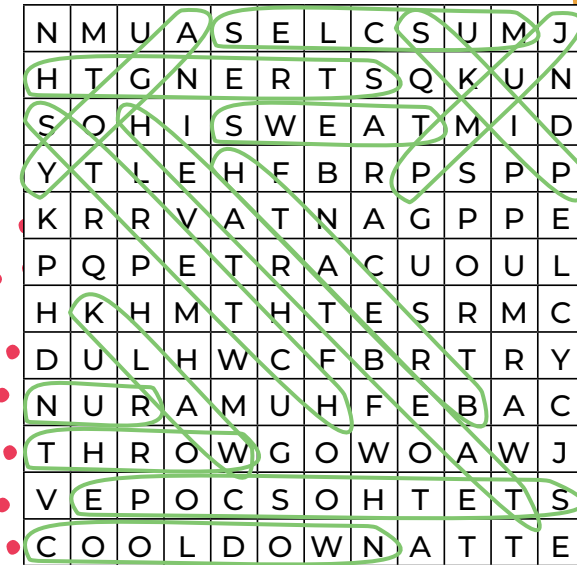
	Small rope	Medium rope	Large rope
Skips			

The longest rope ever skipped was 47m long. That's the length of 5 buses! Do you think that would've been easy or hard?

# Puzzle solutions

If you have any questions or want to send us a photo of your experiments, drop us an email at [openupscience@cambridgesciencecentre.org](mailto:openupscience@cambridgesciencecentre.org)

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