

Revision:
States of matter are

Revision:

which is the state of matter of..

Revision:
which is the state of matter of..



water?

Revision:
which is the state of matter of..



flour?

Revision:
which is the state of matter of..



clay?

Revision:
which is the state of matter of..



helium?

Revision:
which is the state of matter of..



a spoon?

Revision:
which is the state of matter of..



oil?

Revision:

which is the state of matter of..

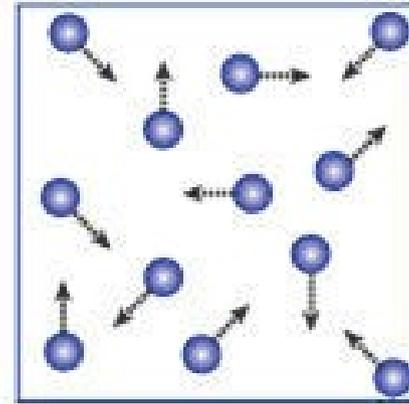
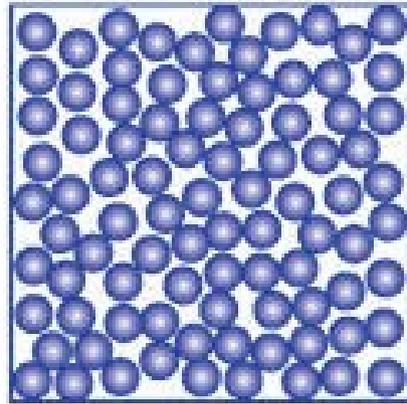
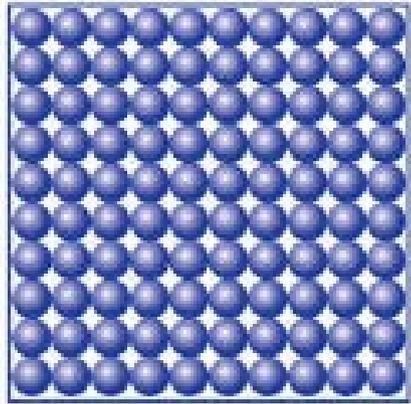


lightning?

Revision:

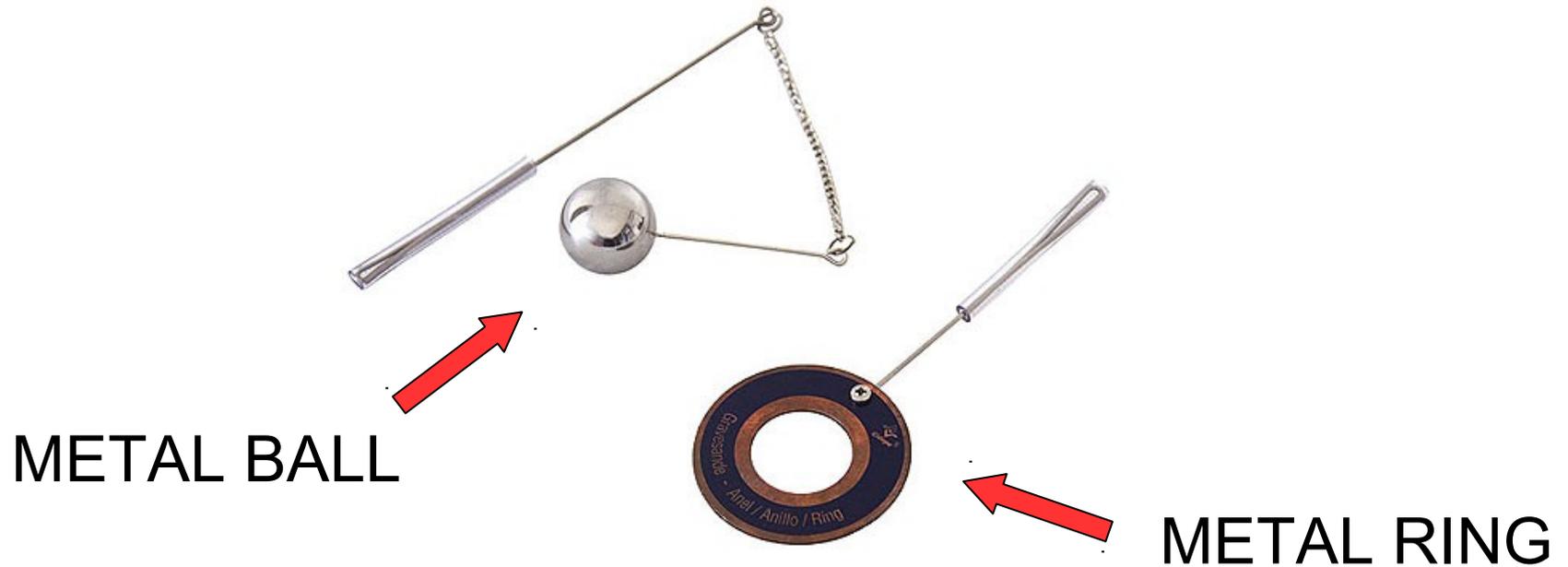
which are the differences in?

STATE



Observation:

Look at the experiment with
Gravesande's Ring



Hypothesise:

What happens to the ball?

NOTHING

IT GETS BIGGER

IT GETS SMALLER

IT GETS HOTTER

IT GETS COLDER

Hypothesise:

What happens to the ring?

NOTHING

IT GETS BIGGER

IT GETS SMALLER

IT GETS HOTTER

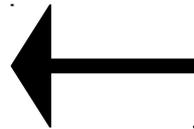
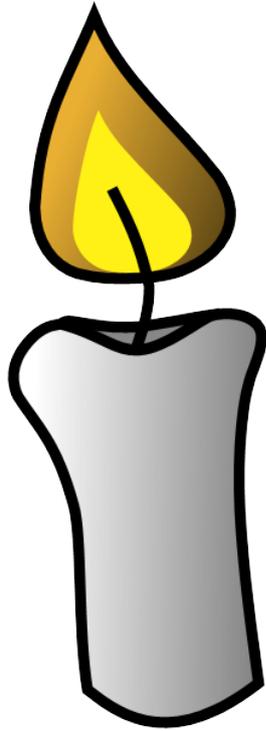
IT GETS COLDER

Hypothesise:

Why?

Hypothesise:

Why?



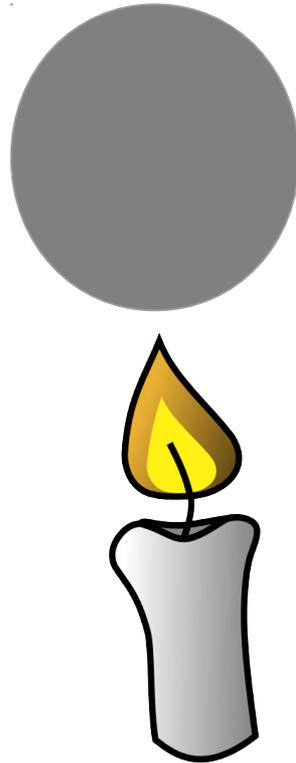
HEAT

is a form of **ENERGY**

Heat the ball



The ball gets
bigger



The **volume**
of the ball
gets ***bigger***

This phenomenon is called

THERMAL EXPANSION

This phenomenon is called

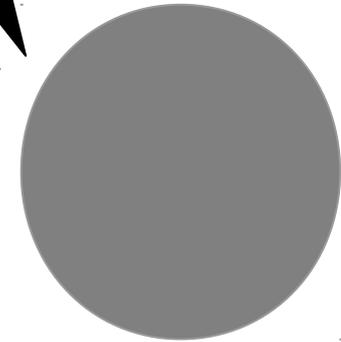
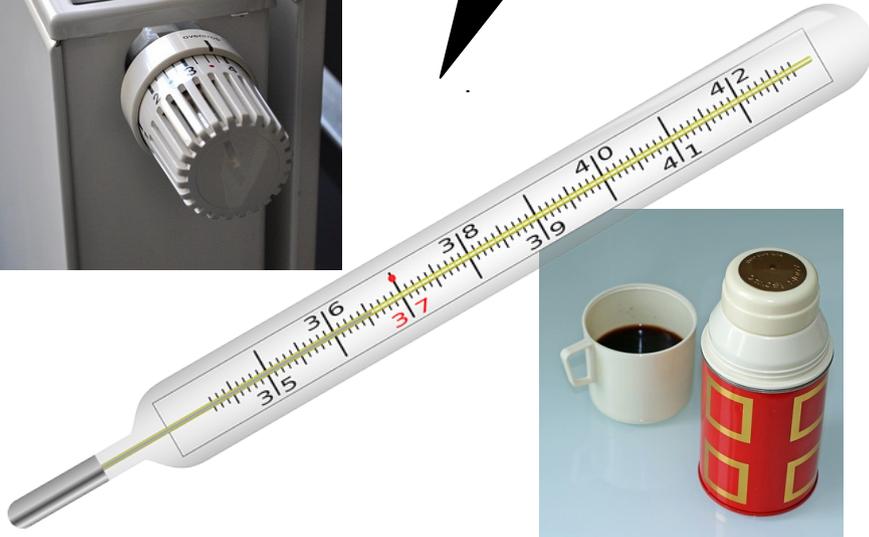
THERMAL EXPANSION



Remembering tricks

This phenomenon is called

THERMAL EXPANSION



Remembering tricks

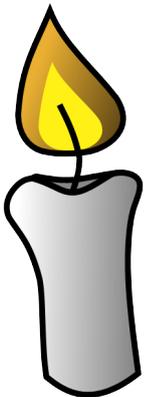
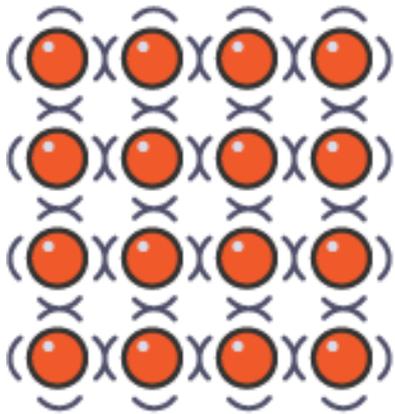
THERMAL EXPANSION

and

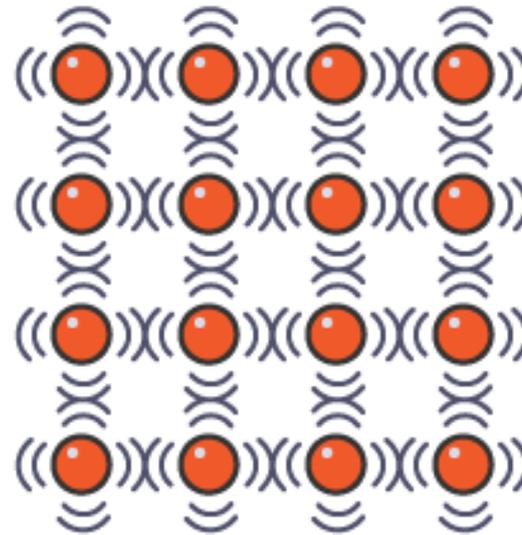
MOLECULES

THERMAL EXPANSION

You heat
an object



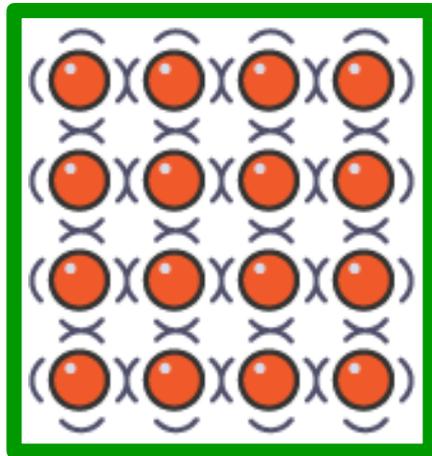
You give **energy**
to molecules



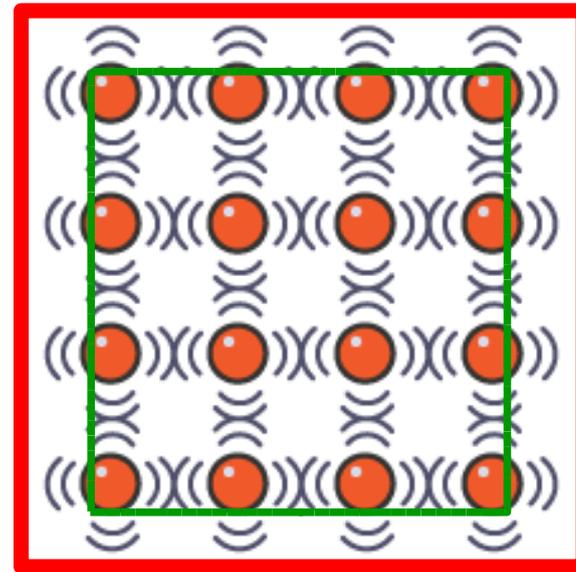
Molecules move
more

THERMAL EXPANSION

Molecules
move more



Molecules occupy
more space



The **volume**
of the object
gets bigger

on your worksheet

Activity 1

work with your partner

Activity 1: understanding the idea

Work with your partner and read the couples of phrases.

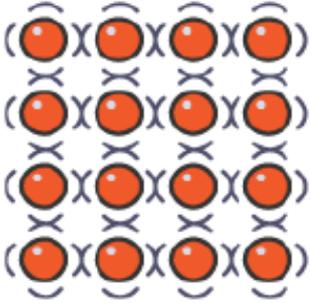
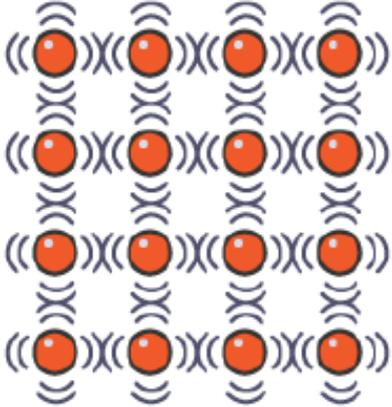
BIGGER VOLUME	SMALLER VOLUME
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MORE ENERGY	LESS ENERGY
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SLOWER MOLECULES	FASTER MOLECULES
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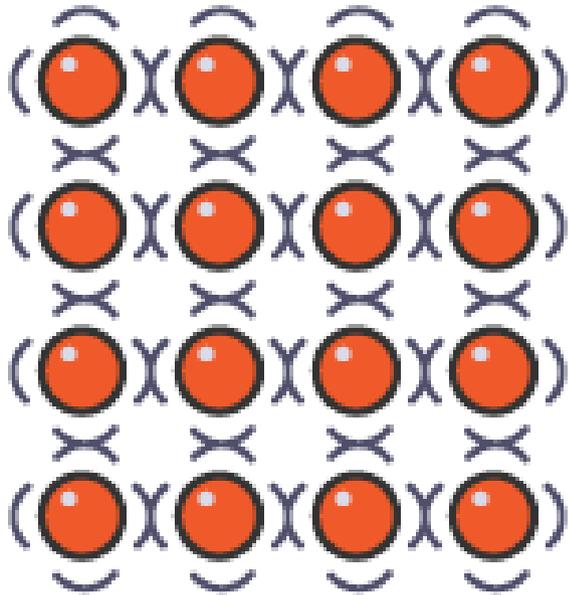
COLD	HOT
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For each couple put each phrase next to the right image.

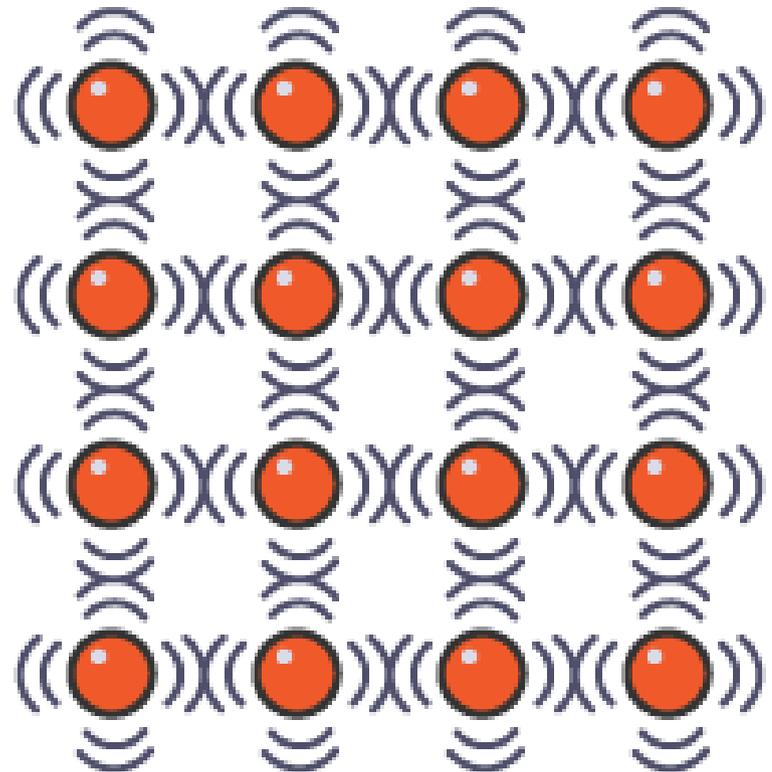
			

Which one has.. ?

BIGGER VOLUME

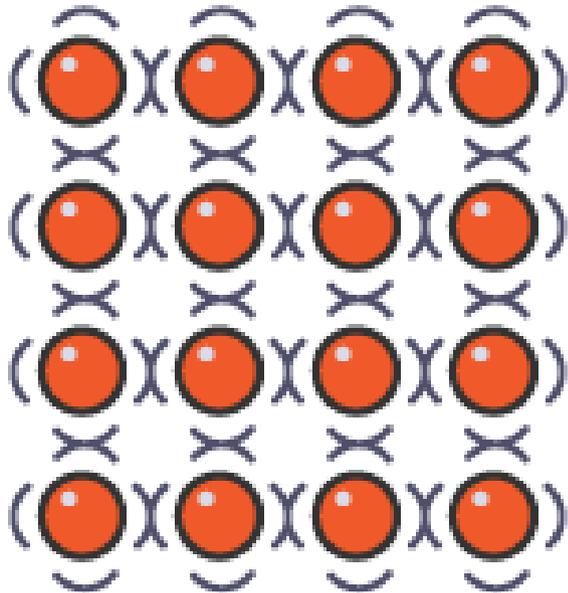


SMALLER VOLUME

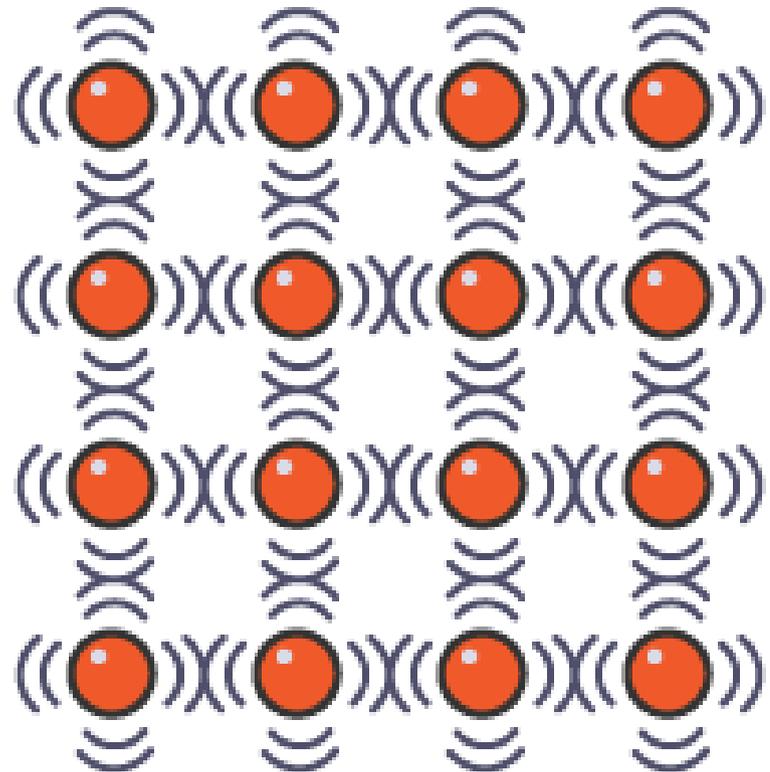


Which one has.. ?

SLOWER MOLECULES

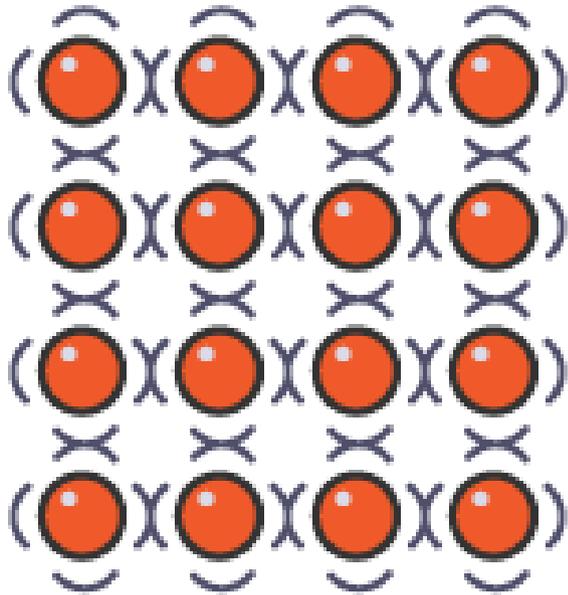


FASTER MOLECULES

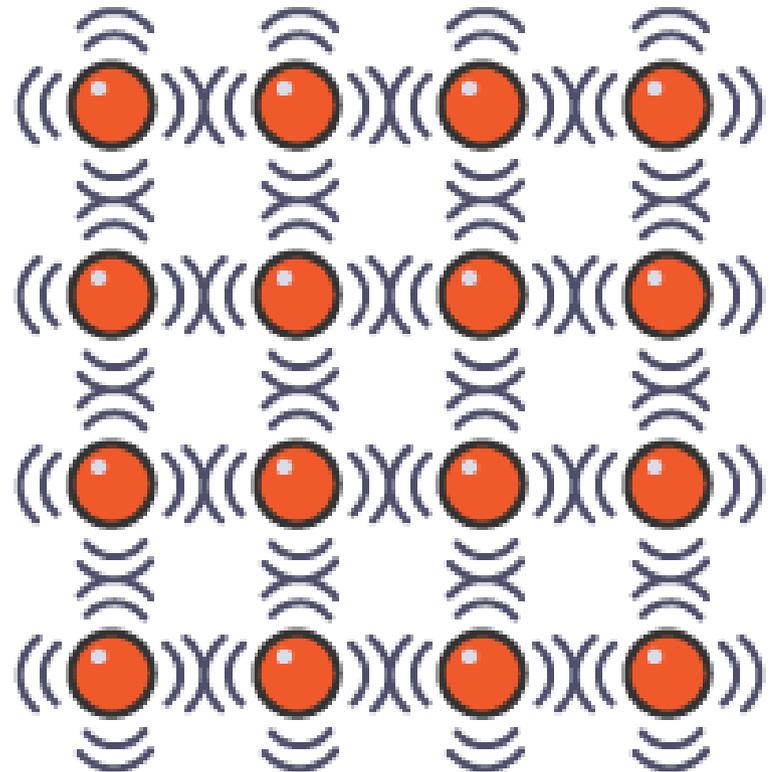


Which molecules have.. ?

MORE ENERGY



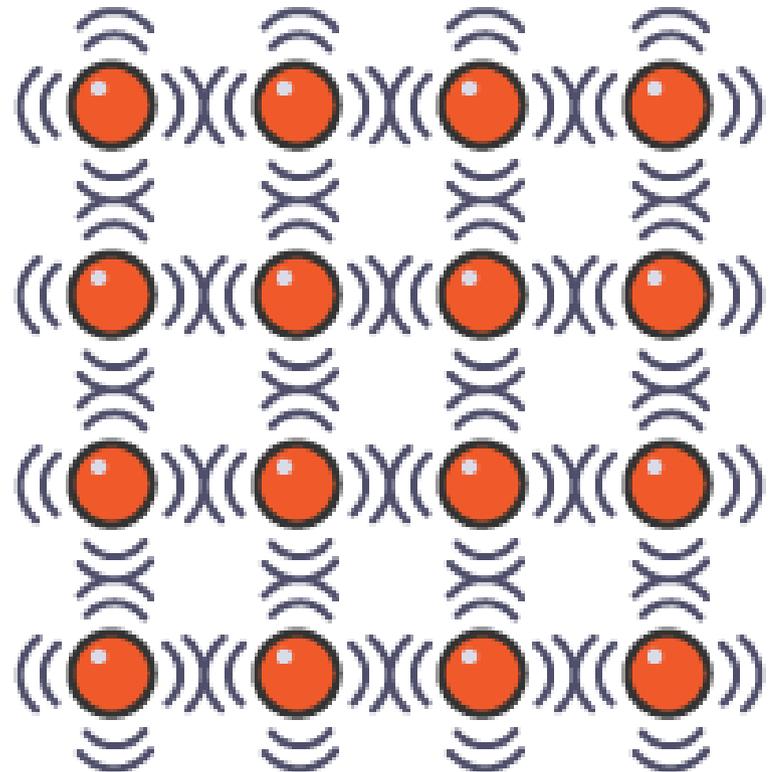
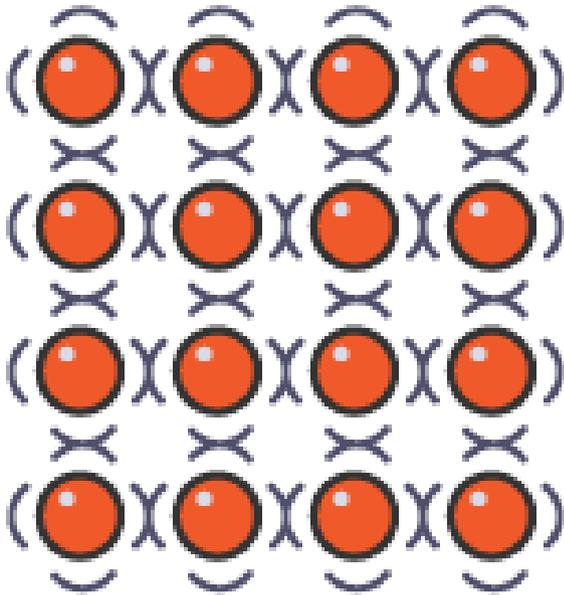
LESS ENERGY



Which one is.. ?

COLD

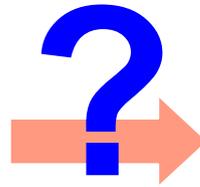
HOT



Hypothesise:

Does thermal expansion happen also in liquids?

Heat some water



The **volume** of the water **gets bigger**

YES

NO

Verify:

Activity 2

follow the instructions on the worksheet to verify your hypothesis.

What about liquids?

GOAL:

observe if thermal expansion happens in liquids.

What about liquids?

MATERIALS:

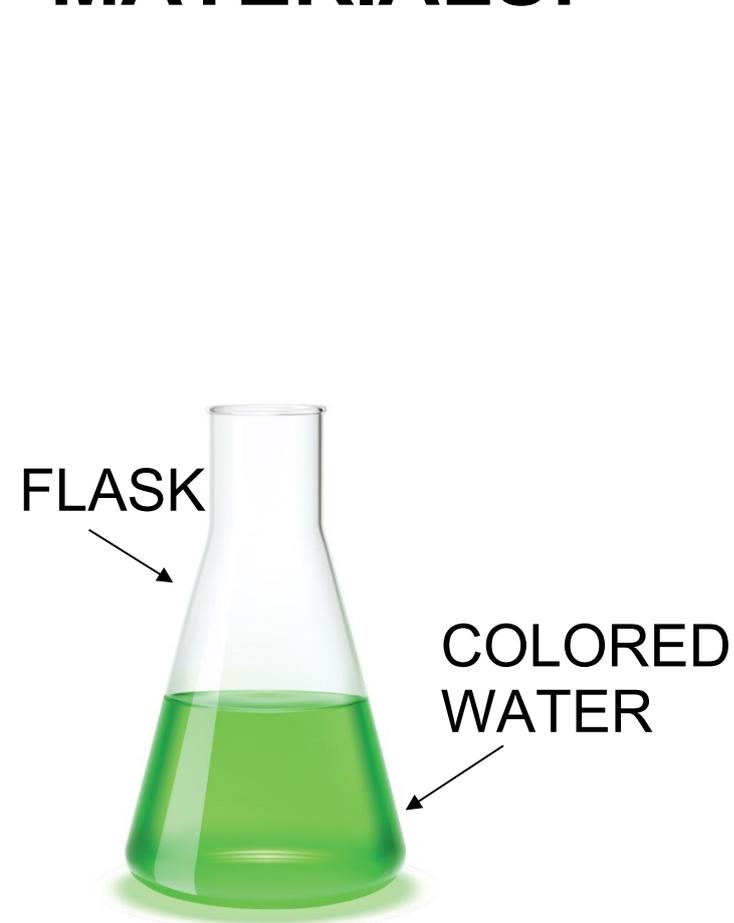


Image from:
<http://goo.gl/1lu4Fv>

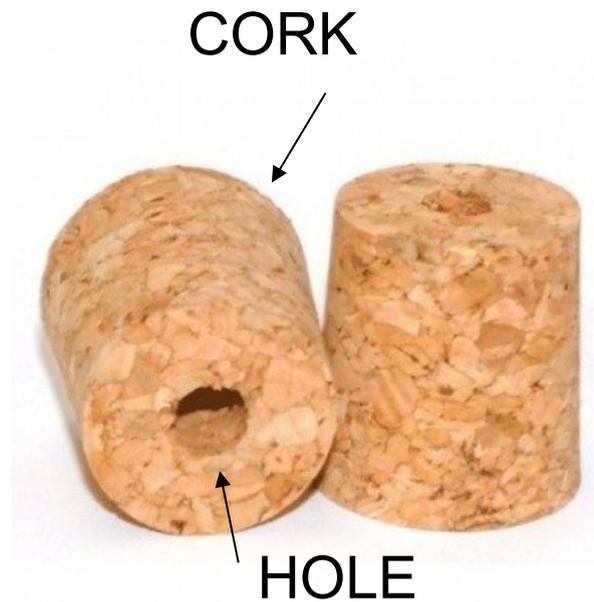


Image from
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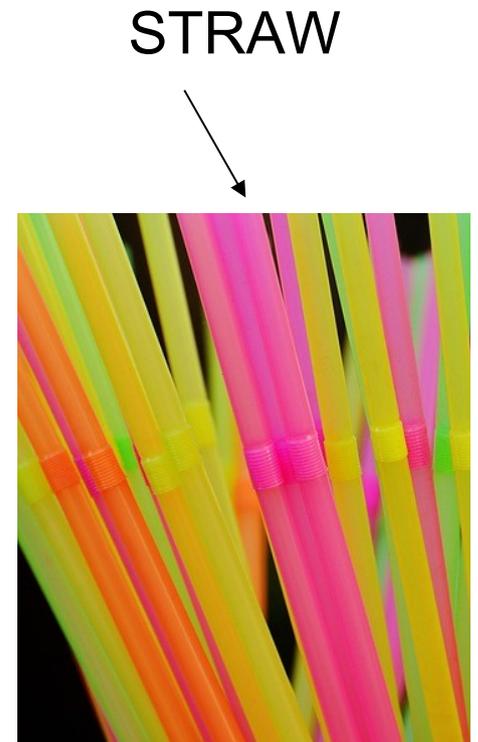


Image from
<http://pixabay.com>

What about liquids?

PROCEDURE:

take the little bottle;

put some liquid inside;

insert the straw in the hole of the cork;

close the bottle with the cork;

plunge the bottom of the bottle in hot water and wait a bit; draw what you see;

plunge the bottom of the bottle in cold water and wait a bit; draw what you see;

What about liquids?

CONCLUSION:

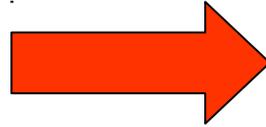
Thermal expansion

in liquids.

happens

doesn't happen

Heat some
water



The **volume**
of water gets
bigger



Activity 3:

Use your new instrument to compare water
in **A**, **B** and **C**.

Activity 3:

Use your new instrument to compare water
in **A**, **B** and **C**.

hotter

colder

Activity 3:

Use your new instrument to compare water

in **A**, **B** and **C**.

hotter

colder

Water in **A** is than in **B**.

Water in **B** is than in **C**.

Water in **C** is than in **A**.

Thermal expansion in real life

longer



shorter

Metal bars in summer are than in winter.

Metal bars in winter are than in summer.

Thermal expansion in real life



image from: <https://goo.gl/mLpBFW>

Thermal expansion in real life

image from: <http://goo.gl/jrXQ1a>

bigger

smaller



In summer the “holes” of the bridge are

In winter the “holes” of the bridge are

Thermal expansion in real life



image from:
<http://goo.gl/wfg7YY>

JAR

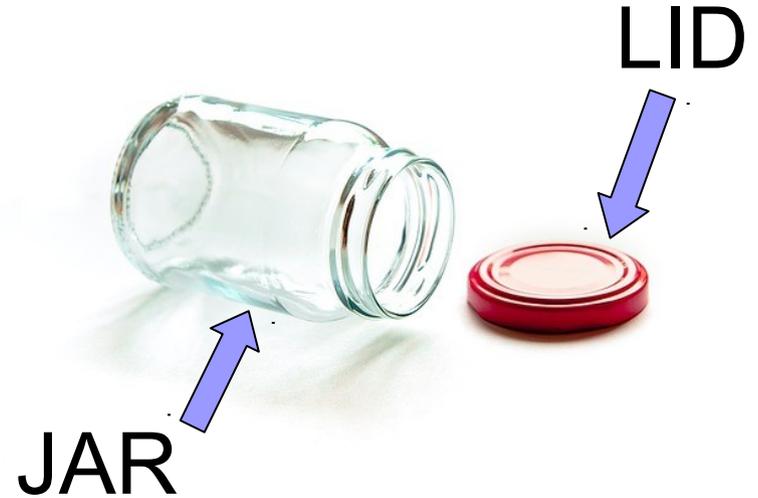
If a jar is difficult to open..

Thermal expansion in real life



JAR

image from:
<http://goo.gl/wfg7YY>



JAR

LID

If a jar is difficult to open..

Put the lid under water!

hot

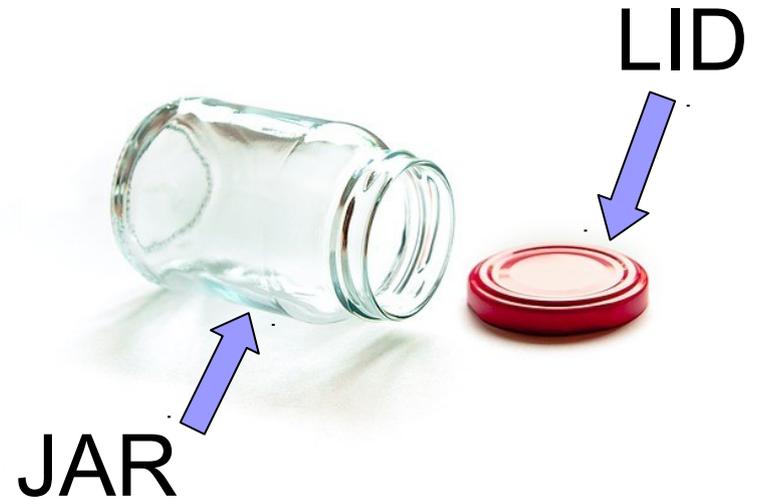
cold

Thermal expansion in our lives



image from:
<http://goo.gl/wfg7YY>

JAR



JAR

LID

If a jar is difficult to open..

Put the lid under .. **hot** ...water!

larger

The lid gets

smaller

Let's revise!



<http://learningapps.org/watch?v=pyqm00fit16>

Homework

- Revise and conclude your **report** of the experiment (activity 2 of the worksheet)
next time give it to the teacher!
- Study what we have done today
- Watch the videos and answer to the questions about thermal expansion in a gas.

Homework 1: <https://edpuzzle.com/media/573f23b4bf63d53841eea097>

Homework 2: <https://edpuzzle.com/media/573f2c15bf63d53841eedf8f>