Ämnesprov, läsår 2013/2014

Physics

Delprov A

Årskurs 6

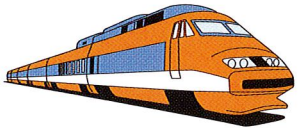
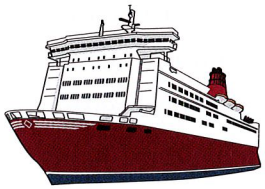
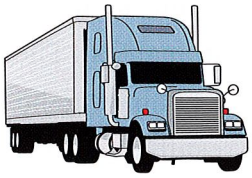
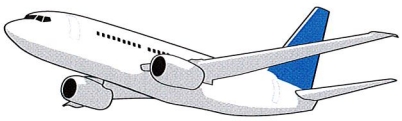
Elevens namn och klass/grupp

Skolverket

The test results summarize your performance on the National test. The mark for the entire term does not have to be in agreement with the test results since the mark is based on all of your performance in the subject and not only on the National test.

1 Transportation

Before doing a school project on *Transportation and the Environment* Kim, Fia, and Nils have to find out more about the transport of fruit. They are interested in how oranges from Italy are transported to Sweden. The fruit may be transported by trains, boats, trucks or planes. The pupils need to decide which mode of transportation to choose. They need to take into consideration that transporting the oranges has to affect the environment as little as possible, but at the same time it must be profitable to sell the oranges.

The pupils have the opportunity to ask no more than three questions to the person being responsible for importing fruit on the Fruit Company.
The pupils discuss which questions to ask the person being responsible for importing fruit.
Here are their suggestions. Read through the questions carefully.

Nils

1. Which mode of transportation produces the least amount of dangerous emissions?

2. Which mode of transportation is the slowest?

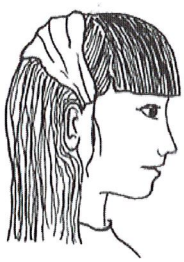
3. Which mode of transportation is the most expensive?

7. How long do the oranges stay fresh when transported?

Kim

8. Which is the most common way to transport oranges?

Fia



4. How much oranges are sold in Sweden each year?

5. What amount of dangerous emissions does each mode of transportation produce per box of oranges?

6. What does it cost to transport at box of oranges with each of the different modes of transportation?

9. How much of the oranges is it possible to sell after having transported them with the different modes of transportation?

a) Your task is to choose **three** questions. The questions should aid the pupils to make a decision about how to transport the oranges.

Do not forget that you need information about how each of the different modes of transportation affects **both the environment** and **the profit**.

I choose the following three questions:

b) **Justify** your choice of questions. Explain why they are important to pose in order to make a decision.

Do not forget:

- to use your **knowledge in science**.
- that you are **not** supposed to answer the questions.

2 | *The Solar system*

What is the structure of the universe? For a long time, people have tried to understand the structure of the solar system and the universe. Our way of describing the solar system is influenced by technology, religion, culture, and science. Read through the information in the sources and look for sources that give information about **technology, religion** and **culture**.

Source 1: With the aid of satellites, people can get another view of the Earth and the other planets in the solar system.

Source 2: The "dwarf planet" Pluto has a moon called Charon. It is almost the same size as Pluto.

Source 3: According to an earlier view held by the Hindus, the Earth is a plate born up by four elephants. The elephants stood on the back of a giant turtle, which swam peacefully in a large lake.

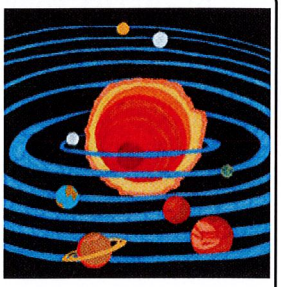
Source 4: The Earth rotates around an axis through the North and the South Pole. It completes one turn per day.

Source 5: The Chaldeans was a civilization living between the estuaries of the Tigris and Euphrates about 2.600 years ago. They thought that the Earth was surrounded by a large sea. Above land and sea there was a dome (like a cheese-dish cover) on which the stars were attached. The dome rested on walls reaching down in the sea.

Source 6: On the planet Mercury, there is a difference of thousand degrees in temperature between night and day.

Source 7: The sun is a million times bigger than the Earth.

Källa 8: According to contemporary science, the sun is at the center of the solar system. The Earth and the other seven planets move around the sun in circle-shaped orbits.



Source 9: It is winter on the part of the globe leaning away from the sun.

Source 10: When the telescope was invented in the beginning of the seventeenth century, scientists could observe the starry sky and discover things that made them change their views about the structure of the solar system. It seemed less likely that the Earth was at the center of the solar system.

Source 11: A fundamental idea of the Christian church is that a deity has created Earth. This idea made people hold on the view that the Earth was at the center of the solar system (the so called geocentric model).

Part 1. Your task is to choose the sources that give information about **how technology** may influence how people describe the solar system, as well as the sources that give information about **how religion** and **culture** may influence how people describe the solar system.

Do not forget that there may be sources **not** giving information about how technology, religion, and culture may influence how people describe the solar system.

a) **Which** sources give information about how **technology** may influence how the solar system is described?

I choose the following sources: .....

b) **Which** sources give information about how **religion** and **culture** may influence how the solar system is described?

I choose the following sources: .....

Part 2. Use the choices of sources you made in **part 1** when doing the tasks below.

Do not forget to use the information provided by the sources.

Justify why you have chosen the sources for **a)** (technology) in **part 1**:

.....

.....

.....

Justify why you have chosen the sources for **b)** (religion/culture) in **part 1**:

.....

.....

.....

Describe how technology and religion/culture **may influence each other**. Remember to use the information provided by the sources.

.....

.....

.....

.....

.....

3 | *Clouds*

In a school the pupils are working with weather as a topic. One of the pupils receives a text about clouds from the teacher. This pupil is supposed to use the text in order to draw a picture, or a series of pictures, explaining how clouds change during a summer's day. The picture is going to be enlarged and hung on the classroom wall, so that all other pupils can look, read, and understand.

Read through the text that the pupils got from their teacher.

Have you noticed that the sand on the beach becomes much warmer than the grass on a warm summer's day? This makes the air close to the sand warm too. Maybe this does not make much of a difference on the beach, but when large areas of land are heated differently, the weather is affected.

The warmest air rises upwards like large bubbles of air. When lifted higher from the ground, the air cools off and cumuli clouds are formed. You can often see them on a warm afternoon in the summer. They have a flat underside, but are puffy on the top and on the sides. It is the large bubbles of air that makes them puffy.

Cumuli clouds look white because the sun shines on them. They are also called "fair-weather clouds" because they are formed when it is beautiful weather. But sometimes they continue to grow until they become dark, powerful rain clouds. Then they are called nimbus clouds or thunderclouds.

At sundown they collapse and are flattened out. They become stratocumulus clouds. Such clouds can be seen at sunset in summer time.

From: "Upptäck väder och klimat" by Pär Holmgren

Your task is to make a suggestion of how to **draw a plain picture, or series of pictures**, showing **how clouds change** on a summer's day.

You also have to write **short texts** (for instance headings and/or captions). Use the information provided by the text.

Do not forget:

- that **all** sorts of clouds need to be in the picture
- that the pictures need to be simple and **plain** (they do not need to look nice)
- to show how clouds **change** during one day
- that headings and captions need to aid in **explaining** the picture.

Here is the paper you will use. You may orient the paper in any way you like.

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MALMÖ HÖGSKOLA
Fakulteten för lärande och samhälle

Ämnesprov, läsår 2013/2014

Physics

Delprov B

Årskurs 6

Elevens namn och klass/grupp

Skolverket

Test results

Your test results are based on the knowledge you have shown in the National Tests.

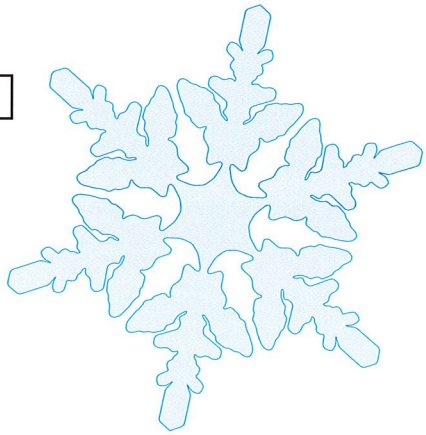
Your term results are not necessarily the same as your test results, as they are based on all the knowledge you have shown in your subjects.

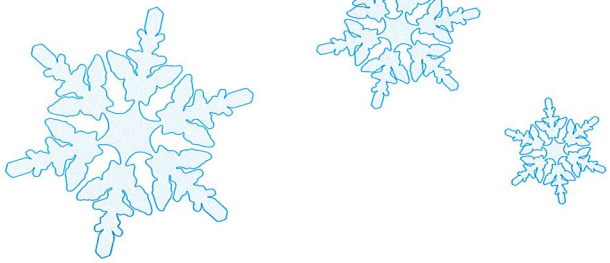
1 Melting snow

The class is working on a theme called "Winter". It's a sunny day in February. The pupils are asked to go outside and find out some things about the snow that has started to melt. If they wish, they are allowed to use a thermometer.

Is it possible to answer these questions **by doing your own investigation? Answer yes or no, with a cross in the correct box!**

		Ja	**Nej**
a.	Does a snowball melt faster in sunshine or shade?	☐	☐
b.	Why is snow white?	☐	☐
c.	How cold is it inside a snowball?	☐	☐
d.	Is it colder inside a large or a small snowball?	☐	☐
e.	What is the name of the world's coldest city?	☐	☐
f.	Is it coldest deep in the snow or on the surface?	☐	☐
g.	Why do snowflakes look like small stars?	☐	☐
h.	How is snow formed?	☐	☐
i.	Does a snowball get warmer or colder if you press it together in your hands?	☐	☐





2 *Investigating weather*

A group of pupils have the task of studying weather for a week.

a) The pupils prepare their work by constructing a table. Help them to think of more things they can investigate about weather. They should be things you can see or measure yourself. **Write your suggestions in the left-hand column of the table.**

	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature					
Cloud					
Sunshine					

b) Anna and Emma have already noted the temperature in the same wind-sheltered place in the schoolyard. They noted the temperature each day the same week. Here are their results:

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Temperatur, Anna	+2	-1	+1	-2	+2
Temperature, Emma	+2	+1	0	-5	+3

Why is it that they get different results? Suggest four reasons that would explain this.

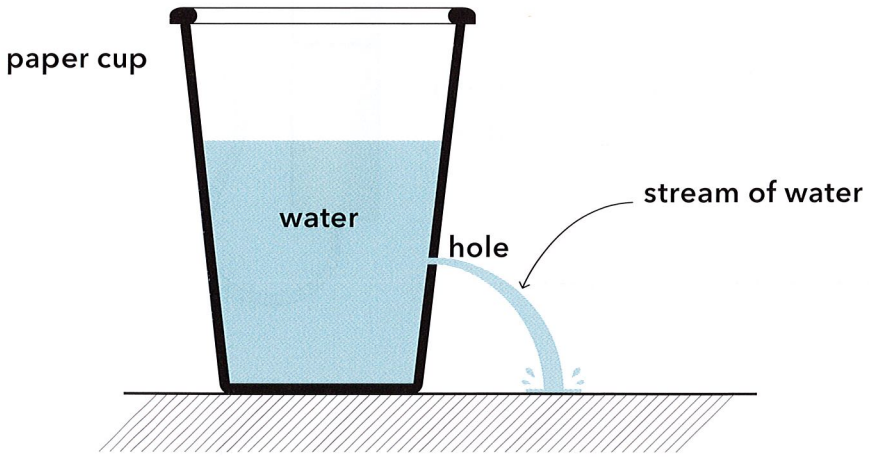
- .....
- .....
- .....
- .....
- .....

3 Measuring time

Philip has been given the task of making a "clock" that shows when three minutes have passed (the correct time for boiling fresh pasta).

He is to put water (or something similar) into a paper cup. He is to make a small hole in the cup so that water runs out very slowly. The water should stop running after three minutes.

He can do a number of trials and do things in various ways, but there is only one sort of cup available. In the first trial Philip does, the water stops running after 2 minutes.



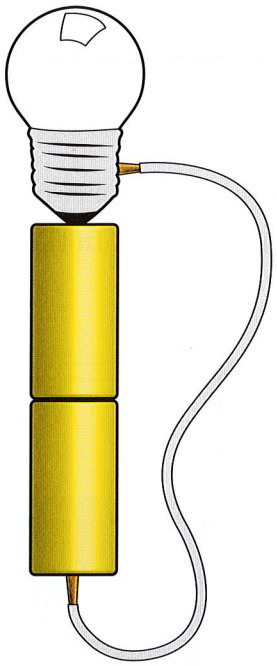
What can Philip change to ensure that the water runs for 3 minutes? There is one suggestion below: give four of your own.

- Smaller hole in the cup
- .....
- .....
- .....
- .....

4 The torch

The pupils in a class are to connect batteries and light-bulbs the same way they are connected in a torch.
Emma and Sara decide to use:

Two batteries
One cord to lead the electricity
One light-bulb



They made a diagram showing how they connected the equipment. They help each other to hold everything in place.

Everything is in good working order, nothing is broken and the batteries are charged, but Emma and Sara's torch does not light up.

- **Suggest 4 reasons why this might happen!**
  You are given two examples first.

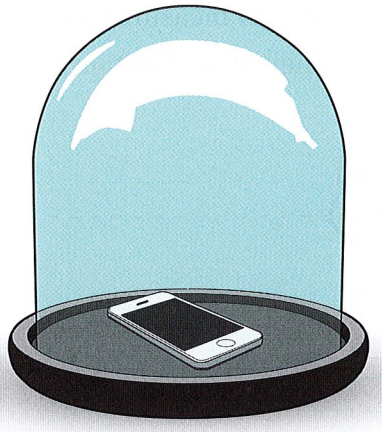
- Poor contact between the cord and the battery
- Poor contact between the cord and the lamp
- .....
- .....
- .....
- .....

Oscar and Philip wonder if you can hear music out in space, where there is a vacuum.

Vacuum = Empty of air, no air is left

Science teacher Maria designs an experiment to investigate this..

Maria puts a mobile telephone inside a bell jar. The telephone is set so that when a call comes through it both vibrates and gives off a ring signal.



Maria then pumps all the air out of the bell jar so that a vacuum is created. You can still see that the telephone vibrates when called, but nothing is heard.

What can you learn from this experiment?
Mark with a cross in each row.

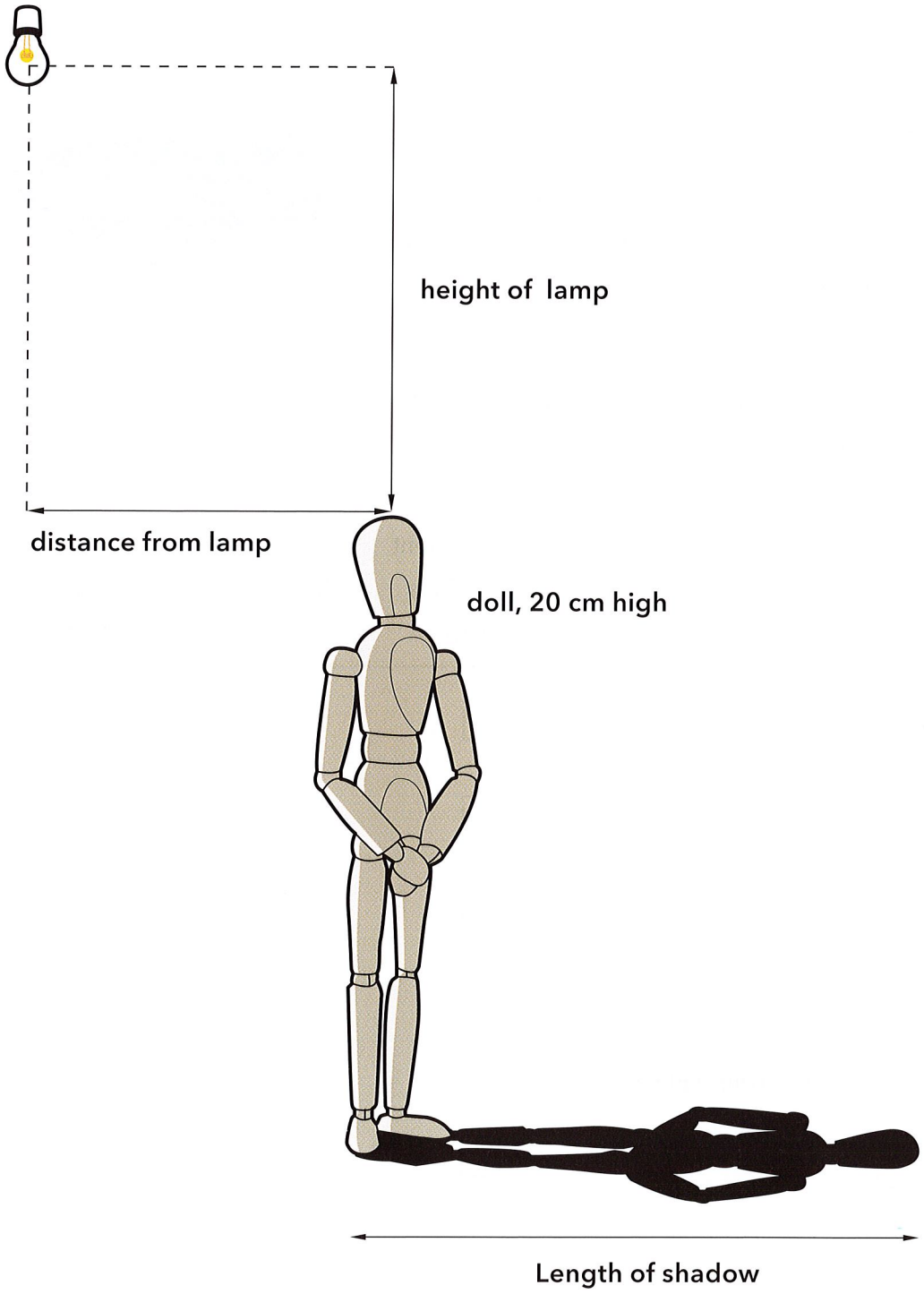
		The experiment shows this is correct	The experiment shows this is incorrect	The experiment provides no answer to this
a.	*Sound* travels faster than light	☐	☐	☐
b.	*Sound* can travel through a vacuum	☐	☐	☐
c.	*Sound* can travel through glass	☐	☐	☐
d.	*Light* can travel through a vacuum	☐	☐	☐
e.	*Light* can travel through glass	☐	☐	☐
f.	*The telephone battery works in a vacuum*	☐	☐	☐

☐☐☐

6 | *The length of a shadow*

Oscar and Emma are putting on a play and find it funny to see how the length of shadows on stage can be changed according to the position of the spotlight. In their science class they are allowed to do an experiment to investigate the length of a shadow.

They put a doll, 20 cm tall, on a table in a rather dark room. They shine a light onto the doll and measure the length of the shadow, from foot to head. They also take note of the height and distance from the lamp **(see figure and table below)**.



RESULTS		
Distance from lamp (cm)	Height of lamp (cm)	Length of shadow (cm)
10	30	7
20	20	20
20	40	10
30	30	20
20	30	d)

What can you learn from this experiment? Put a cross for each question:

a. If the distance from the lamp is the same but the height of the light is increased, then the shadow is...		longer
		unchanged
		shorter

b. If the height of the lamp is the same but the distance from the lamp is increased, then the shadow is...		longer
		unchanged
		shorter

c. If the height of the lamp and distance of the lamp to the doll is the same, the shadow's length is...		longer than the doll
		the same as the height of the doll
		shorter than the doll

d) As you can see, the pupils forgot to measure the shadow on one occasion.
Look at the other results in the table and fill in the approximate result they should have obtained *in the empty box*.

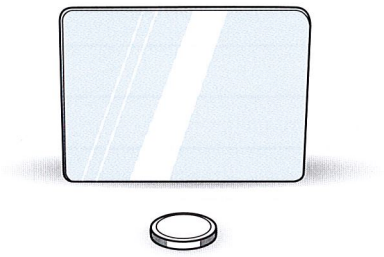
7 | *Reflections*

Now you are to do some experiments where you count reflections.
You need two (small) mirrors and a coin or some other small object.

You are to investigate how many reflections you can see at the same time when you have the mirrors placed in a variety of positions.

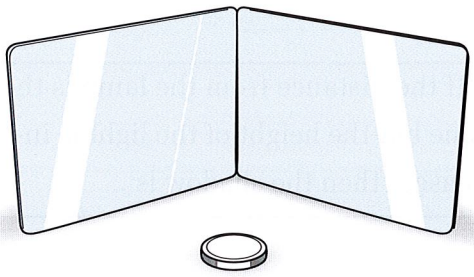
Place the mirrors as the figures and text direct.
(We have erased the reflections from these figures)
Fill in the number of reflections in the boxes. Do not count the real coin.

One mirror



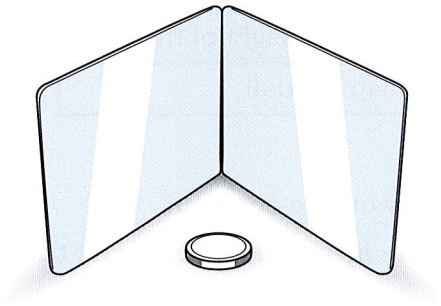
a. Number of reflections: .....

Two mirrors at a shallow angle to each other



b. Number of reflections: .....

Two mirrors at a sharp angle to each other



c. Number of reflections: .....

d. What happens to the number of reflections if you make the angle of the mirrors sharper?

.....

.....

.....

.....

Task 7 executed
(teacher signature)

8 The swing

Sanna and Maryam pass the swings in the schoolyard. They talk about whether one swing would take longer or shorter time if the rope were longer.
They do an investigation. Instead of a person they use some modelling clay, and instead of rope they use string.

With 25 centimetres of string, 10 full swing motions take 10 seconds.

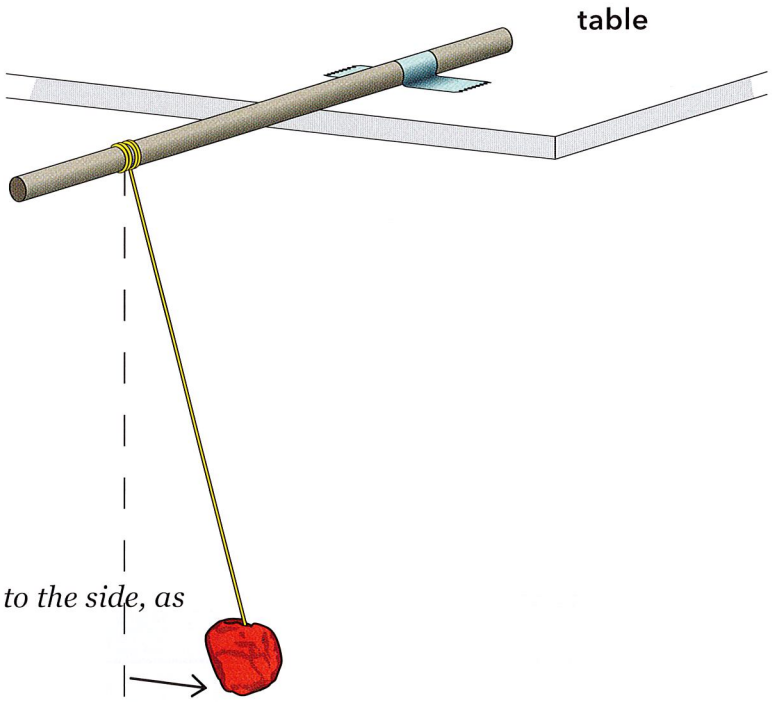
Now you are to do a comparative investigation. Your teacher has prepared a "swing" for you, but now the length of the string is 50 centimetres. You are also given a stopwatch, but you may use your mobile telephone as your timepiece if you wish.

Method (read all the instructions before you begin)

We count the motion back and forth as **one whole** swing.

- Draw the lump of clay about 10 cm to one side.
- Start timing exactly when you release the clay lump.
- Count to **10 whole swings** and record the time

Result: 10 whole swings took _____seconds.



*Draw the clay **about** 10 cm to the side, as shown by the arrow*

Task 8 executed
(teacher signature)

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Physics

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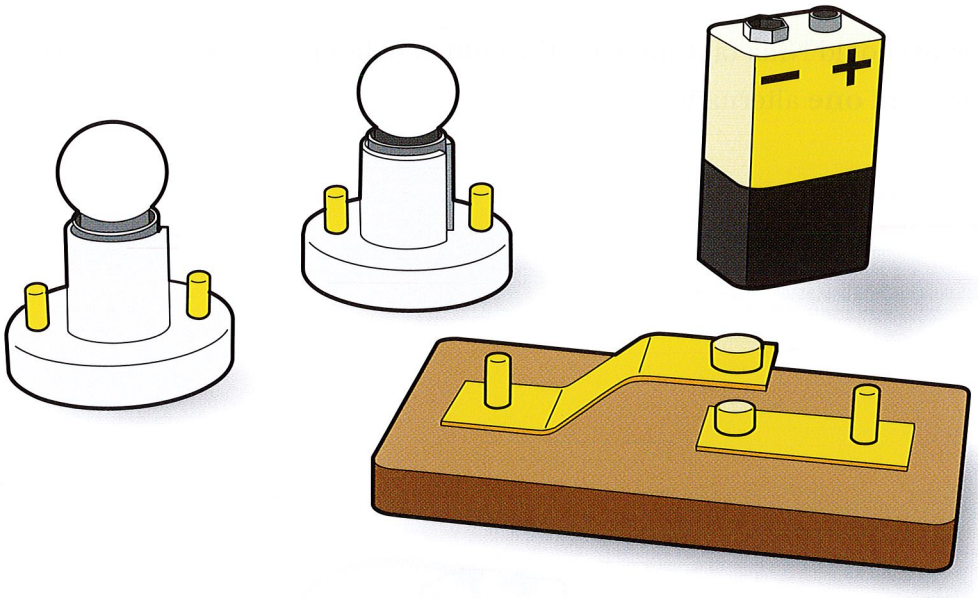
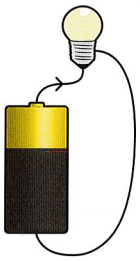
1

Draw wires in the figure so that **both** lamps light up when you press the switch.



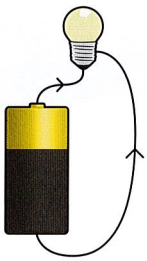
2

Here are four statements about electricity. Which alternative is correct?
Mark **one** alternative.



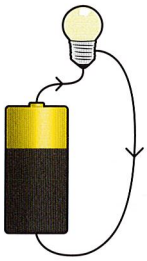
1. ☐

There is no electrical current in the wire connected to the bottom of the battery.



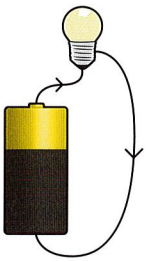
2. ☐

The direction of the electrical current is towards the lamp, in both wires.



3. ☐

The direction of the electrical current is as shown in the picture, but the current is weaker in the wire connected to the bottom of the battery than in the wire connected to the top of the battery.



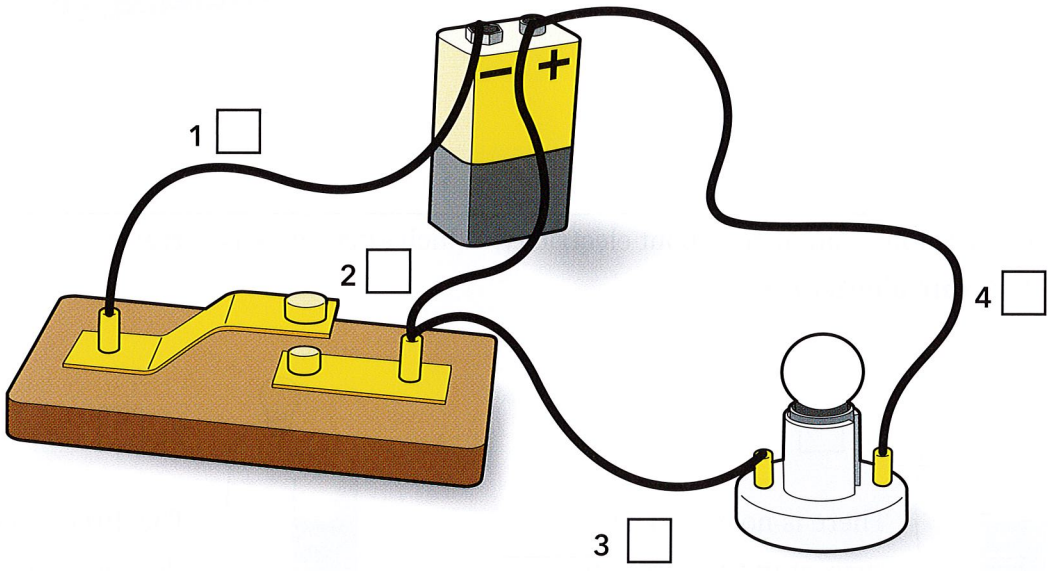
4. ☐

The direction of the electrical currents is as shown in the picture. The current is equally strong in both wires.

3

Nina presses the power switch, but the lamp does not light up. Kim says there is a wire too many in the connection.

Which wire should Nina take away for the bulb to light up when she presses the power switch? Mark **one** alternative.



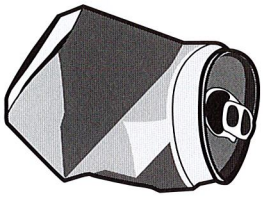
4

Erik is trying out what sticks to a magnet.

a) Tick the **two** objects that stick to the magnet.

☐ iron nail

☐ copper coin



☐ aluminium can

☐ silver ring

☐ pin

☐ plastic dice

b) All objects that are magnetic have something in common. What is it?

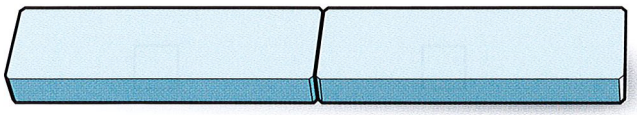
.....

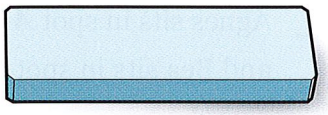
5

A magnet has a north end and a south end.

In the picture you can see three magnets. Two are attracted to each other and the third is repelled.

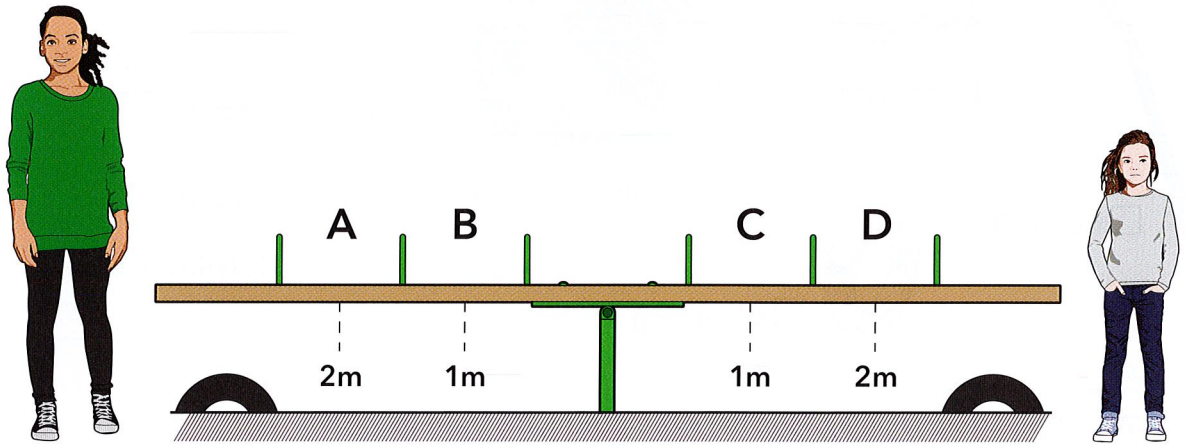
Write N (north) and S (south) at the right place on each of the three magnets.





6

Agnes and Bea are going to play on a seesaw. What will happen during the three different events? Put an X on each line under your choice.



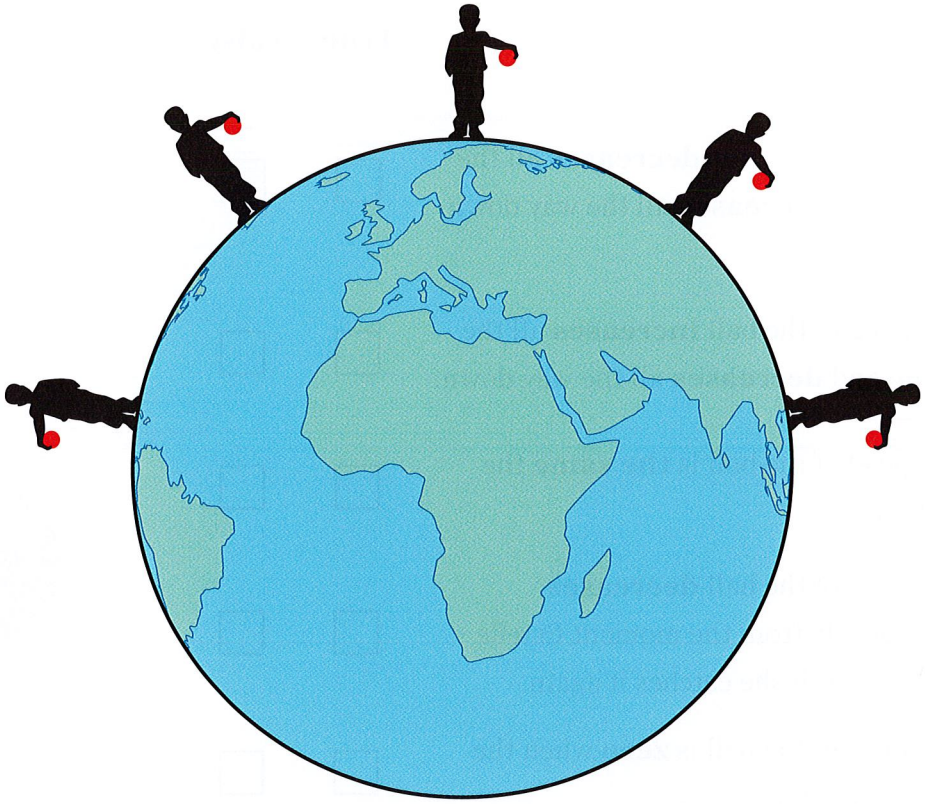
Agnes 50kg **Bea 25kg**

	The seesaw tilts to the left	The seesaw is in balance	The seesaw tilts to the right
1. Agnes sits in spot ***B*** and Bea sits in spot ***C***	☐	☐	☐
2. Agnes sits in spot ***A*** and Bea sits in spot ***C***	☐	☐	☐
3. Agnes sits in spot ***B*** and Bea sits in spot ***D***	☐	☐	☐

7

The picture shows some enlarged people who drop stones in various places on earth.

a) Draw in the picture where each stone will land.



b) Explain why the stones land where you have drawn them.

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8

Estelle throws a ball up in the air and catches it again when it comes down.
Mark true or false for every statement below.

		True	False
a.	The speed of the ball **decreases** all the way up and **increases** all the way down.	☐	☐
b.	The speed of the ball **increases** all the way up and **decreases** all the way down.	☐	☐
c.	The speed of the ball is **the same** the whole time.	☐	☐
d.	The speed of the ball **decreases** continuously from the moment Estelle throws it until she catches it again.	☐	☐
e.	The speed of the ball is **zero** when the ball is at the top.	☐	☐
f.	The speed of the ball is **greatest** when the ball is at the top.	☐	☐
g.	The speed of the ball is **the same** when leaving Estelle's hand as when she catches it again.	☐	☐

9

You can get energy from a number of different sources.
Some energy sources are renewable and others can run out.

For each energy type, mark if it comes from a renewable source or not.

	Renewable	**Non-renewable**
Coal power	☐	☐
Wind power	☐	☐
Gasoline	☐	☐
Nuclear power	☐	☐
Wave power	☐	☐
Oil	☐	☐
Water power	☐	☐
Ethanol	☐	☐
Biogas	☐	☐
Solar energy	☐	☐

☐☐☐

10 When it's cold outside it feels nice to put on a jacket. How does the jacket stop you from feeling cold?

Mark true or false for each statement:

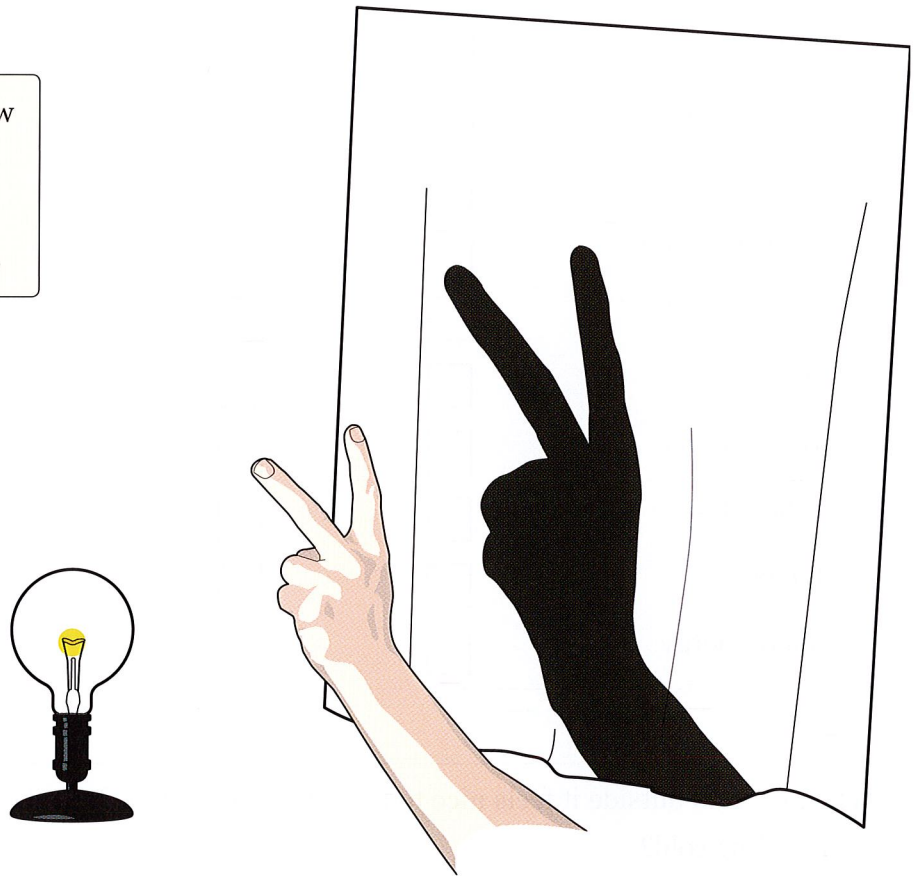
		True	**False**
a.	The jacket gives off heat to the body.	☐	☐
b.	The jacket keeps the cold out.	☐	☐
c.	The jacket maintains the heat from the body.	☐	☐
d.	The jacket lets heat in but does not let heat out.	☐	☐
e.	The jacket warms the body only when the sun shines.	☐	☐

☐☐☐

11 Lisa and Ludvig are planning a shadow play for their younger siblings. In the picture you can see how they make the shadows on a sheet.
Ludvig is surprised that the shadow figure is larger than the hand making it.

a) Draw beams from the lamp that explain the size of the shadow. Use a ruler when you draw.

Remember to draw the beams from the right place on the lamp.



b) How can they make a shadow that is smaller than the one in the picture?
Describe three different ways!

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12

Where can sound travel?

	Yes	No
In the ground	☐	☐
In iron	☐	☐
In the space	☐	☐
In water	☐	☐
In air	☐	☐

☐☐☐

13

A key, a glass of water and a towel have been left behind in a sauna.

The temperature in the sauna is 80 degrees Celsius.

Helping words:
higher temperature
lower temperature
the same temperature

a) What temperature has the key, compared with the temperature in the sauna?

.....

b) What temperature has the water, compared with the temperature in the sauna?

.....

c) What temperature has the towel, compared with the temperature in the sauna?

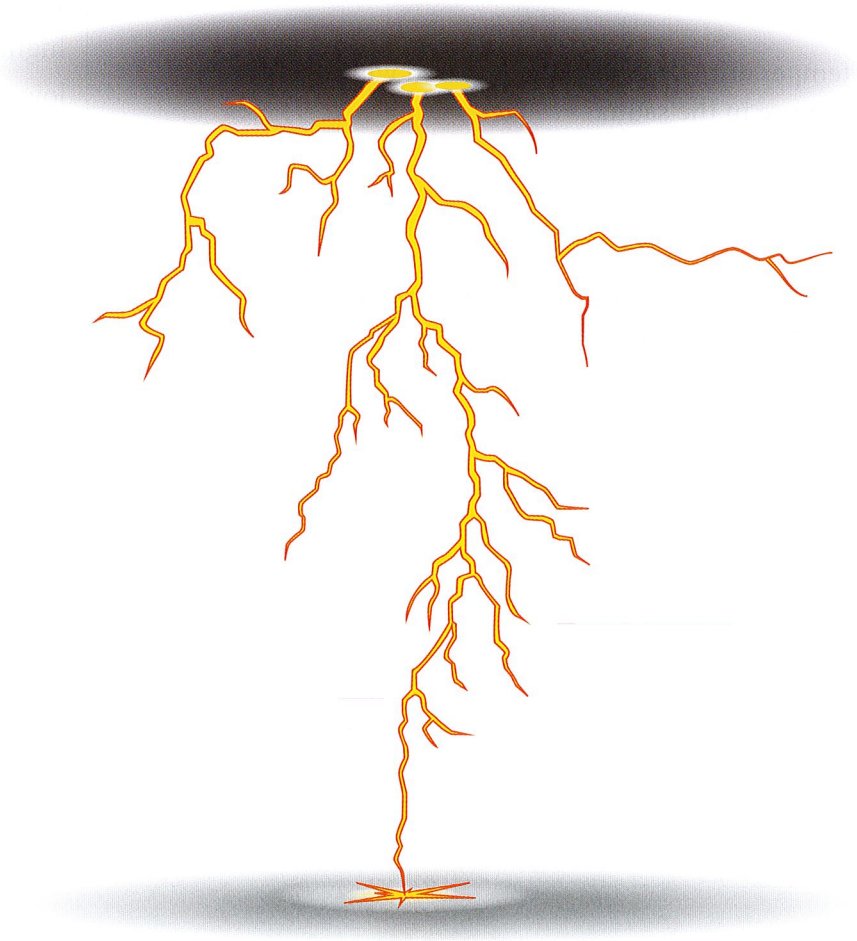
.....

☐☐☐

14

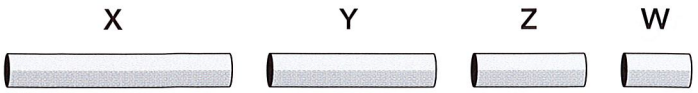
Mark true or false about lightning and thunder.

		True	False
a.	The thunder occurs when the lightning strikes the ground.	☐	☐
b.	You see the lightning before you hear the thunder because the lightning is closer.	☐	☐
c.	You see the lightning before you hear the thunder because the light travels faster than the sound.	☐	☐
d.	You hear the thunder before you see the lightning because the air reduces the speed of the lightning.	☐	☐
e.	The thunder and the lightning occur at the same time in the sky.	☐	☐

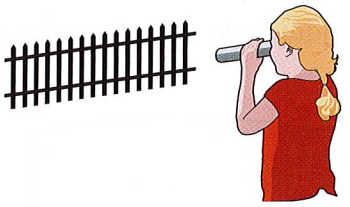


☐☐☐

15



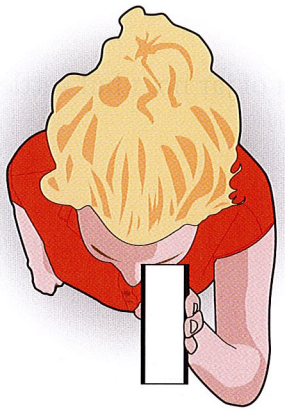
Alli looks at a fence through four different pipes. She sees a different number of posts through the various pipes: 4, 8, 2 or 6 posts



a) Through which of the pipes does she see 6 posts?

Answer: .....

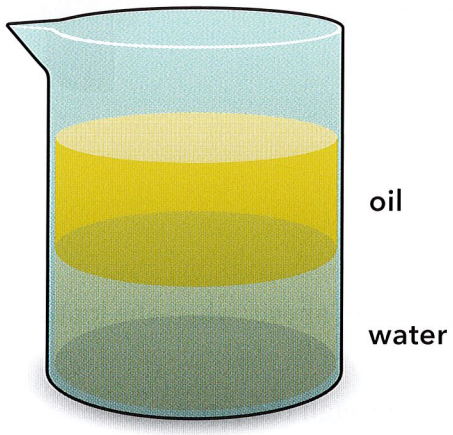
b) In the picture below you can see Alli and the fence from above, when she looks through a fifth pipe.
Draw a diagram to explain how many posts Alli sees through the pipe.



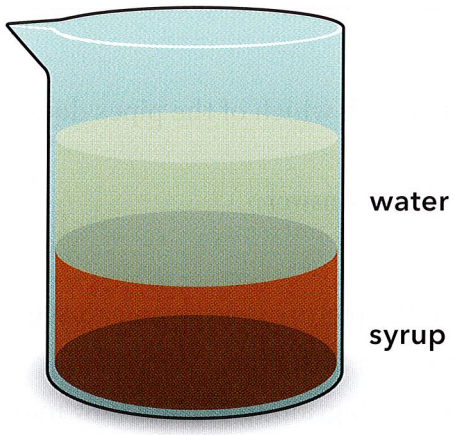
Consider:
Draw carefully with a ruler.
Also draw inside the pipe.

16

Kevin pours water and oil into a jar, and syrup and water in another.
The liquids do not mix with each other but settle as the pictures show.



jar no.1



jar no.2

a) Explain why the water settles **at the bottom** of jar no. 1 but settles **at the top** of jar no. 2.

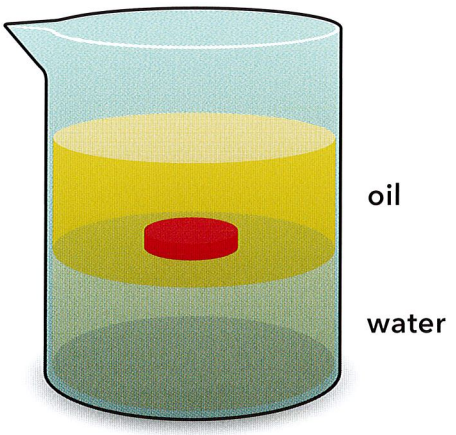
.....

.....

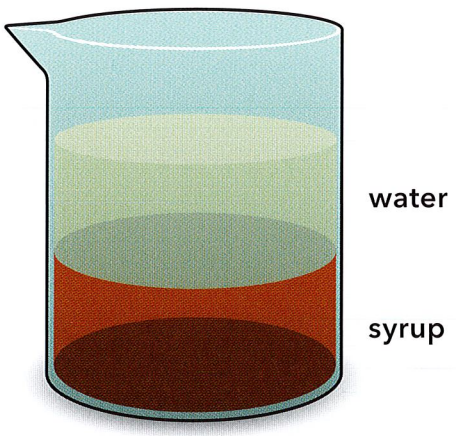
.....

b) Kevin drops a red piece of plastic into jar no. 1.
It settles as shown in the picture.

Draw in jar no. 2 where the plastic piece would settle if he had dropped it there.



jar no.1



jar no. 2

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