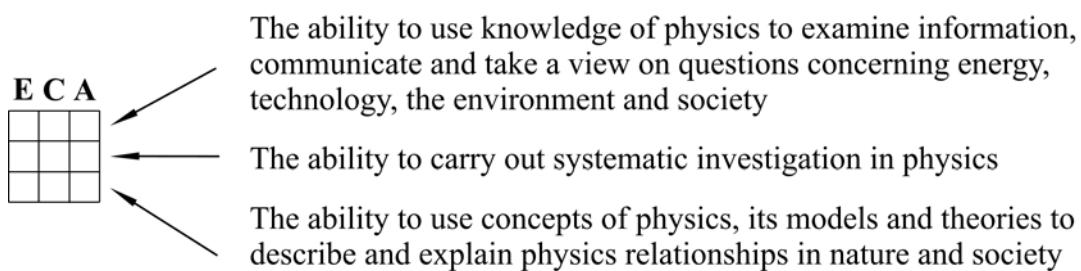


This test will be re-used and is therefore protected by Chapter 17 paragraph 4 of the Official Secrets Act. The intention is for this test to be re-used until 2013-06-30.

NATIONAL TEST IN PHYSICS 2013

The national test gives you a chance to show what you know about physics. On the right of each question you will find a symbol that tells you which of three abilities you can demonstrate in your answer.

The rows in the symbol describe these different abilities.



For each row you will be able to show your knowledge at three different levels: E, C and A.

For example, the table on the right indicates that the question allows you to show that you can use concepts of physics, its models and theories to describe and explain physics relationships in nature and society at two levels: E and C.

Your answers to the questions should be clearly written so that other persons can read your text and understand your meaning. Therefore it is important that you show all your work.

Time allowed: 75 minutes

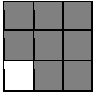
Name: _____

School: _____ Class: _____

Date of Birth: Year _____ Month _____ Day _____

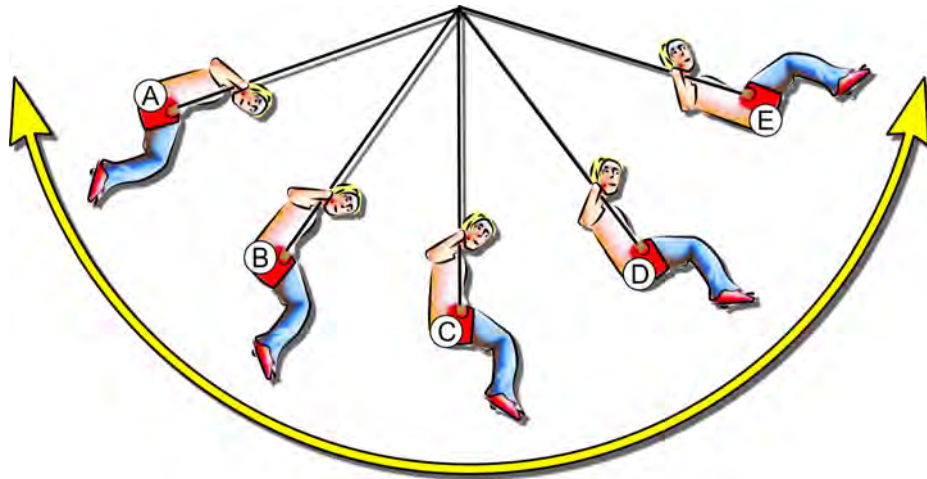
Girl Boy

Your answers must be written on separate sheets of paper, NOT on the question paper. The question paper must be returned to your teacher together with your answers.

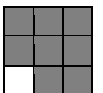


1. The sun is our closest star. From which one of the alternatives **A-E** is a star formed?
- A. An asteroid
 - B. A black hole
 - C. A comet
 - D. A white dwarf
 - E. A gaseous cloud

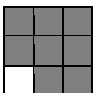
2. The swing functions because of energy transformations. Potential energy is transformed into kinetic energy and the other way around.



In which of the spots **A-E** is the kinetic energy highest?



3. Which one of the alternatives **A-E** is best describing the concept of current?



- A. The amount of electrons passing a conductor per unit of time.
- B. Something which slow down electrons in a conductor.
- C. Something which force the electrons forward in a conductor.
- D. The capacity of the electrons in a conductor to create a magnetic field.
- E. The thermal energy created by electrons in a conductor.

4. On New Year's Eve, Moa is looking at fireworks in the distance. She sees the light from the fireworks before hearing the sound. Explain why.



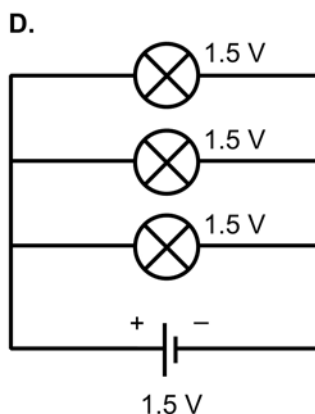
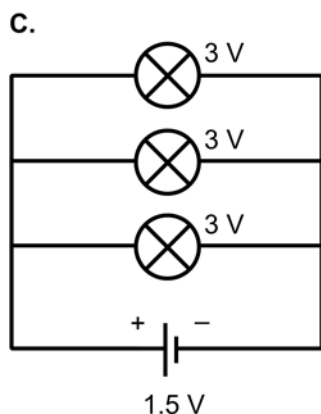
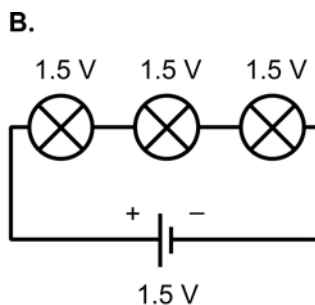
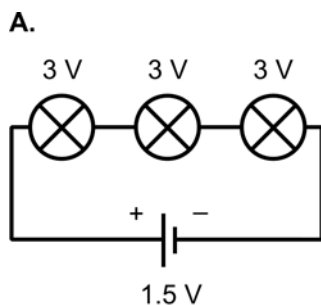
5. Nanotechnology is for instance used to create water-repellent surfaces on clothes and frying pan coatings. Nanotechnology is an application within physics.

Which one of the statements **A-D** is best describing what nanotechnology is?



- A. Nanotechnology is about changing material on the atomic level.
- B. Nanotechnology is about changing compounds' phase.
- C. Nanotechnology is about creating new elements.
- D. Nanotechnology is about creating electrons.

6. Julia is going to put together lighting in a rabbit hutch. The picture shows four wiring diagrams, A-D.



Which wiring diagram **A-D** shall Julia use to make the lamps shine as clear as possible? Motivate.



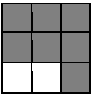
7. Oskar uses the stove, the oven and the dishwasher at the same time. When Oskar also switches on the electric kettle, all devices in the kitchen stop working but the lamps in the living room are still on.

Give **one** explanation to why the devices in the kitchen stop working.



8. Earth has an atmosphere consisting of among other things greenhouse gases. The atmosphere is a prerequisite for the greenhouse effect. Without the greenhouse effect, the average temperature on Earth would be about 35 °C lower than it is today.

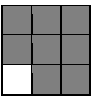
a) Explain the greenhouse effect.



There is an ongoing global warming due to the greenhouse effect having been enhanced beyond the usual effect. More greenhouse gases in the atmosphere enhance the global warming, thereby increasing the mean temperature on Earth.

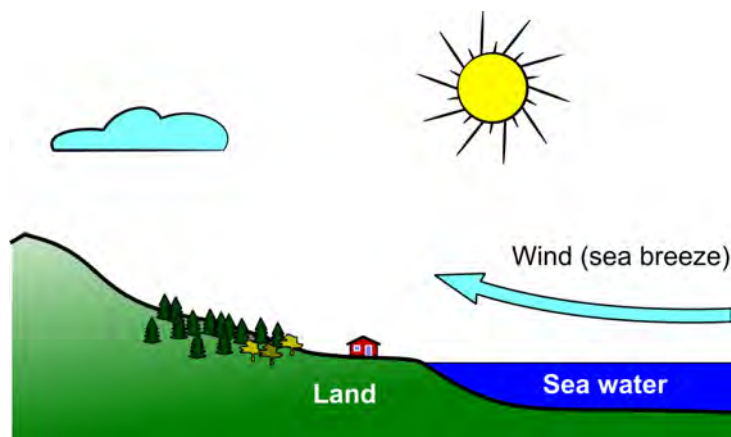
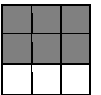
b)

- Give **one suggestion** on something one person can do to decrease emissions of greenhouse gases.
- Describe why this **suggestion** leads to decreasing emissions of greenhouse gases.



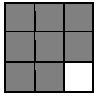
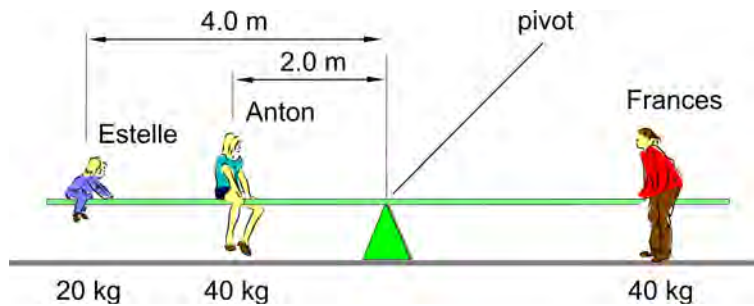
9. A sunny and calm summer morning, Gustav and Athena is sitting outside their cottage by the sea. Gustav says that since the sun is warming, it will soon start blowing from the sea towards land.

Give a physical explanation to why it will start blowing from the sea towards land when the sun is shining.



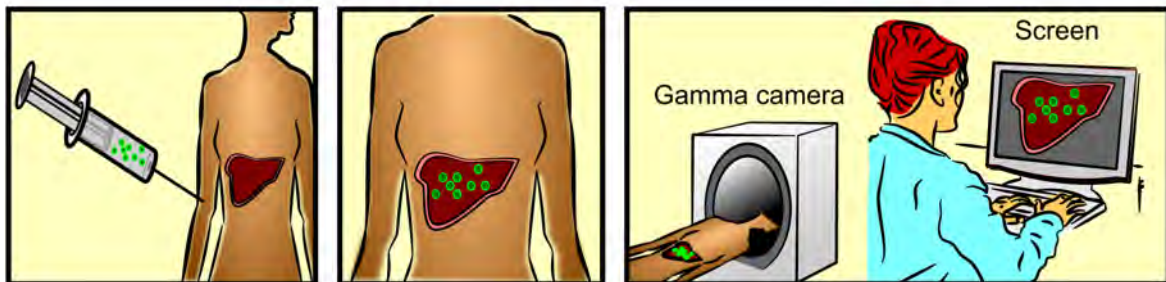
10. Frances is going to swing on the seesaw with Anton and Estelle. Frances wants to have the seesaw in balance. Anton is sitting 2 m from the pivot and Estelle is sitting 4 m from the pivot.

How far from the pivot shall Francis sit to get balance? Motivate.



11. In medical service, an investigation method where you use radioactive substances' properties is used to study inner organs.

The pictures show the investigation method.



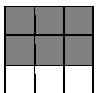
Picture 1
The radioactive substance is injected

Picture 2
Radioactive substance in the liver

Picture 3
Investigation with a gamma camera

For a compound to be called radioactive, it has to have specific properties. These properties can be used in medical examinations. A camera outside the body can create a depiction of an organ inside the body, if the organ contains a radioactive substance.

Explain what happens to the radioactive substance that makes this depiction possible.



12. A generator consists of a magnet and a coil. Since the end of the 19th century we have had benefit from the generator.

- How is a generator used?
- Explain how a generator works.
- Explain how the use of the generator has changed our living conditions.

