



Exam VSBO PKL

**2026**

period 1

Monday May 18

7:30 – 10:00 a.m.

**Physics and Chemistry 1**

This exam includes a work booklet.

Write down all the answers in the work booklet.

This exam consists of 35 questions.

You can score a maximum of 76 points for this exam.

Before each question number, it is stated how many points can be scored with a correct answer.

## Formulas

$$R_v = R_1 + R_2 + \dots$$

$$\frac{1}{R_v} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

$$R = \frac{U}{I}$$

$$P = U \times I$$

$$E_{ek} = P_{el} \times t$$

$$\frac{N_p}{N_s} = \frac{U_p}{U_s}$$

$$s = v_{sound} \times t$$

$$g = 10 \frac{m}{s^2}$$

$$\eta = \frac{P_{efficient}}{P_{added}} \times 100\%$$

$$F = m \times a$$

$$F_z = m \times g$$

$$M = F \times l$$

$$M_{left} = M_{right}$$

$$P = \frac{F}{A} \quad \rho = \frac{m}{V}$$

$$E_k = \frac{1}{2} \times m \times v^2$$

$$v_{avg} = \frac{s}{t}$$

$$W = F \times s$$

$$s = v \times t$$

$$a = \frac{\Delta v}{\Delta t} \quad a = \frac{v_{end} - v_{start}}{t_{end} - t_{start}}$$

$$E_z = m \times g \times h$$

*Stopping distance = reaction distance + braking distance*

Mains voltage:

Island	Mains voltage
Bonaire and Curaçao	127 Volt
St. Maarten, St. Eustatius and Saba	110 Volt

## Physical quantities and units

- 1p 1 There is a thunderstorm. Marlon hears thunder. The volume of the thunder is 120. A unit belongs to the number 120.

→ Which unit is that?

- A hertz (Hz)
- B second (s)
- C decibel (dB)
- D milliampere (mA)

- 1p 2 A battery is shown below.



Part of the text on the battery has been enlarged and is shown above. These enlarged data are numbered 1, 2, 3 and 4.

→ Which number: 1, 2, 3 or 4 indicates the battery capacity?

- A no. 1) EB615268VU
- B no. 2) 2500 mAh
- C no. 3) AA1M412YS/6-B
- D no. 4) 2019.04.12

## Identifying and using physics equipment

- 1p 3 It is pouring rain and there is a lot of thunder. Marlon wants to tell his brother Richel, who lives in the Netherlands, how loud the thunder is via a WhatsApp message.

Four devices are shown below.



With one of these four devices, Marlon can **quickly** and **easily** categorize thunderclaps.

→ Which device is that?

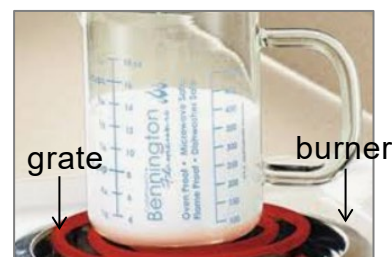
- A speaker
- B microphone
- C sound level meter
- D tuning fork

- 3p 4 Gianni does Physics & Chemistry 1 practical assignments together with Milliard and Rikart. The chart below shows an assignment that the group must complete.

A measuring glass with contents is on a burner.

- The mass of the burner is 830 grams.
- The mass of the measuring glass is 295 grams.
- The contents are a mixture of salt and lime.
- The mass of the salt is 113 grams.
- The mass of the lime is 326 grams.

What is the gravity of the measuring glass with contents?



→ Calculate in newtons, the force of gravity  $F_g$  on the measuring glass with contents.

1p 5 Below is a second assignment that the group must do:

1. Add  $\frac{1}{4}$  liter of water to the mixture.
2. Stir the mixture and then heat it.
3. Heat to 80 degrees Celsius for about 10 minutes. If ten minutes isn't enough, continue heating until the temperature reaches 80 degrees Celsius.

Four items are shown below.



→ Which item must the group **definitely** use to carry out this second assignment?

- A the measuring tape
- B the stopwatch
- C the scale
- D the thermometer

2p 6 Next, the third assignment that the group must complete.

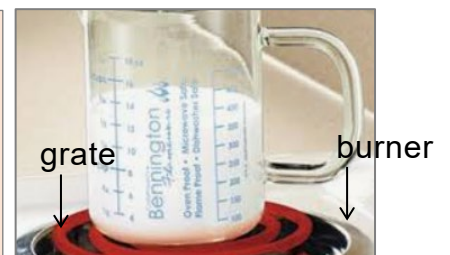
Given is the formula: **pressure = force ÷ area**  
To calculate the pressure of the measuring glass with contents on the burner, you must divide a **force** by an **area**.

A description of the force is:

The **force** is the gravitational force  $F_g$  of the measuring glass with contents.

The **area** is .....


Complete the sentence correctly.



→ Choose the two correct words from the list in the work booklet and use them to correctly complete the sentence in the work booklet.

## Materials and their properties


- 2p 7 In the right column of the table below, five properties of materials are listed.

Properties of materials	Application of material
<ul style="list-style-type: none"> <li>• density</li> <li>• glossiness</li> <li>• sound conduction</li> <li>• expansion and contraction</li> <li>• corrosion resistance</li> </ul>	<p>main body of an airplane</p> 

Iron is stronger than aluminum. For construction of the main body of an airplane, the exterior of an airplane, aluminum is chosen over iron. Two of the five material properties mentioned in the table above, are the two main reasons for that choice.

→ Which are these two material properties?

- 3p 8 The table below shows:
- four types of pipes,
  - six properties of materials.

Type of pipe	Properties of materials	Application of materials
<ol style="list-style-type: none"> <li>1. gas pipe</li> <li>2. water pipe</li> <li>3. drain pipe</li> <li>4. electricity line</li> </ol>	<ol style="list-style-type: none"> <li>1. density</li> <li>2. melting point</li> <li>3. pliable</li> <li>4. heat conduction</li> <li>5. corrosion resistant</li> <li>6. electrical conductor</li> </ol>	<p>house under construction</p> 

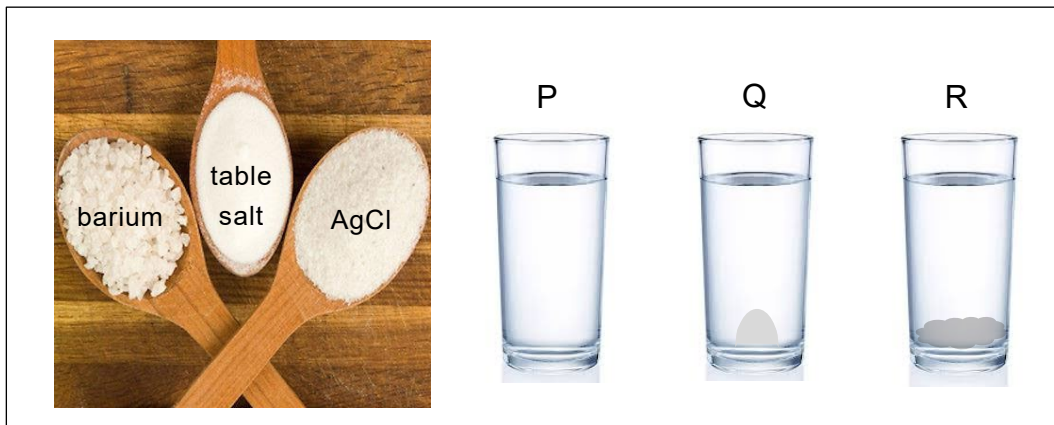
**PVC** and **copper** are both suitable materials for installing various types of pipes.

As an example, in the work booklet there is a sentence in bold about a pipeline and PVC.

→ Complete the three sentences about copper correctly. In each sentence, use **another** material property chosen from the six material properties above.

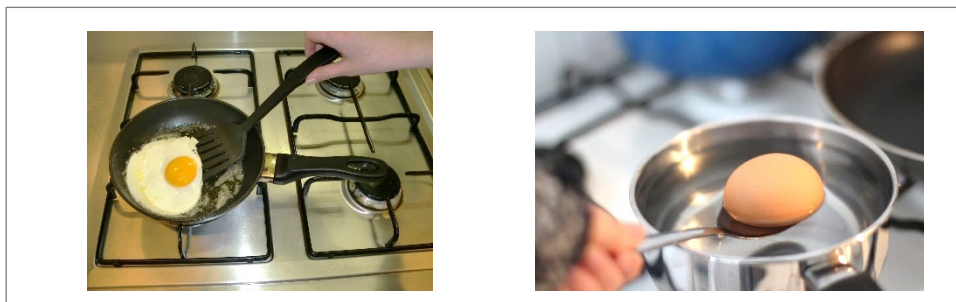
## Processes

- 1p 9 Three spoons with three different types of salt: barium, table salt and AgCl are each placed in a separate glass with water. The mixture is stirred in each glass for 10 minutes. The image below shows the result after 10 minutes of stirring.



→ Which glass has table salt?

- A glass P
  - B glass Q
  - C glass R
- 1p 10 Muriel loves eggs. If she fries an egg for breakfast on Monday, she will boil an egg on Tuesday.



In both cases, boiling and frying, the egg goes through a process before it is ready for consumption.

→ In which case is the process the egg goes through a chemical process?

The egg goes through a chemical process ...

- A when the egg is boiled.
- B when the egg is fried.
- C in both cases, boiling and frying.
- D in neither case, neither boiling nor frying.

## Environmental aspects

- 1p 11 Tjamo and his team work as diggers. They must dig up two bodies from the Alta Noa ground for the justice department. Alta Noa is a piece of land where a lot of **asbestos** was buried in the past.

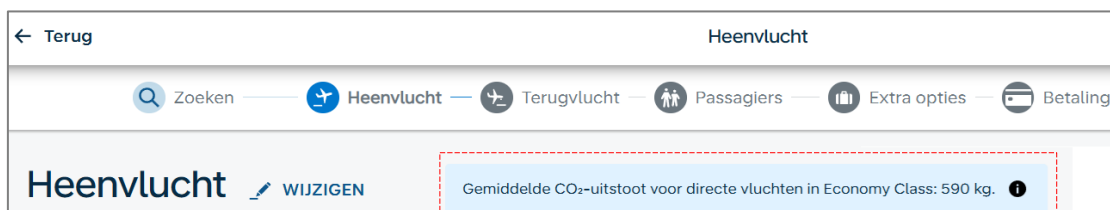


When performing this job, there is one safety measure to consider that is **most essential** for the sake of health.

→ What precaution is that?

- A wearing a lab coat
- B wearing gloves
- C putting on a dust mask
- D wearing safety glasses

- 1p 12 The image below shows part of an airline's web page. The red dotted rectangle contains information about CO<sub>2</sub>.



It says:

“Average CO<sub>2</sub> emissions for direct flights in Economy Class: 590 kg.”

→ What is this information about?

The information is about ...

- A recycling.
- B air pollution.
- C soil pollution.
- D depletion of natural resources.

3p 13 Five different types of raw materials are mentioned below.

***water, cotton, iron ore, petroleum*** and ***wood***

Raw materials can be divided into two types:

**Type 1:** raw materials that can run out after many years.

**Type 2:** raw materials that do not run out after many years.

→ In the work booklet, indicate for each raw material listed, to which category it belongs: Raw material that **does** run out or raw material that **doesn't** run out. Do this with X-marks.

3p 14 Recycling is a method of managing waste responsibly.

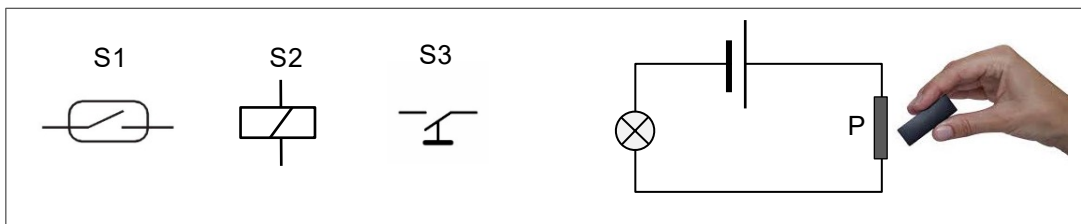
This technique is applied to different types of waste.

The table in the work booklet provides information on methods of managing waste.

→ Write down what these methods of waste management are called.

## Nature and function of electronic components

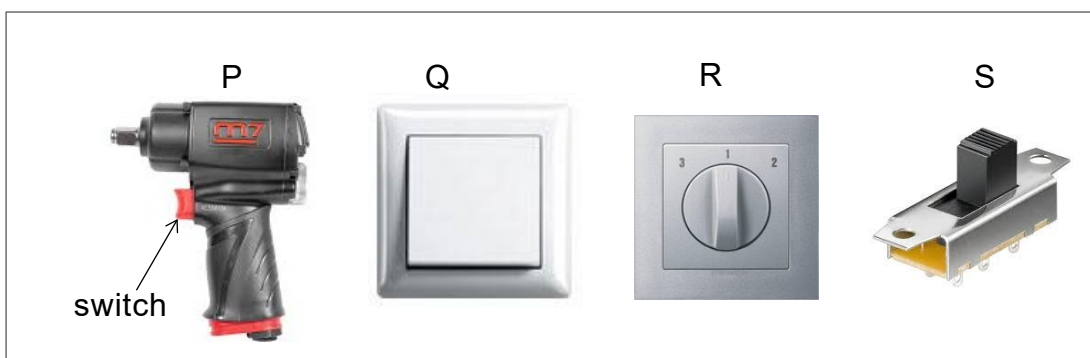
- 2p 15 The image below shows the electrical symbols of three types of switches: S1, S2 and S3.



One of these three switches is installed in a series circuit with a battery and a light bulb. The bulb does not light up. Ruben holds a bar magnet close to switch P. The light goes on.

→ What type of switch is P; is it S1, S2 or S3?  
And what is that type of switch called?

- 1p 16 The image below shows four types of switches.



The following applies to one of these switches:

- Its functioning relies on a spring.
- When the spring is taut, the current passes through.
- When the spring is slack, the current is interrupted.

→ Which switch is that?

The switch in the image is ...

- A P
- B Q
- C R
- D S

- 1p 17 Leroy has built an electrical circuit in which he installed several lights. There is a problem with his circuit. Some lights just go out spontaneously. Leroy tries to find out what the problem is.

The image below shows four types of meters.



Thai gives Leroy advice on which of these meters works **best** for his **investigation**.

→ Which meter does Thai recommend to Leroy?

- A meter 1
- B meter 2
- C meter 3
- D meter 4

## Electrical circuits

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1p 18 Leroy solved the problem by replacing a ground wire on the circuit.

→ What is the function of the ground wire?

In a circuit, the ground wire ensures that **no** ...

- A short-circuit occurs.
- B overload occurs.
- C electrical shock occurs.
- D voltage difference is present.

1p 19 An automatic sliding door is shown in the image alongside. Once Leroy gets close enough to the door, an electric motor (the door motor) will slide open the door.

There is a sensor that ensures that the motor circuit is **closed** at the right time.

→ What applies to the circuit in which the motor is located?

The circuit is ...




- A always closed.
- B open, when the door slides open.
- C closed, when the door is shut.
- D closed, when the door slides open.



## Capacity and electrical energy

- 1p 20 Merugia is going to buy new light bulbs for her house.

The table to the right shows three types of light bulbs that each provide the same amount of light.

incandescent	energy saving	LED
25 W	5 W	2 W
		

Merugia says: “Based on the contents in this table, I would definitely not want the incandescent light bulb”.

→ Name a good reason for Merugia’s decision. The reason must be based on the perspective of physics.

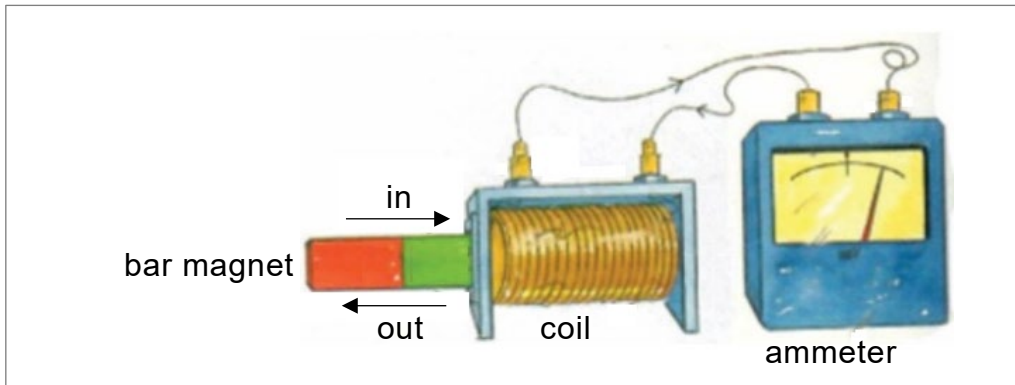
- 2p 21 The table below provides more information about these three types of bulbs.

type of bulb	life span	price (per bulb)
incandescent	1,000 hours	1.10 XCG
energy saving	6,000 hours	4.40 XCG
LED	10,000 hours	6.30 XCG

The LED bulb has the longest lifespan but also the highest price.

→ Show through calculation that the LED bulb is indeed more economical than the energy-saving lamp.

3p 22 The figure below shows a closed circuit of a coil and an ammeter.



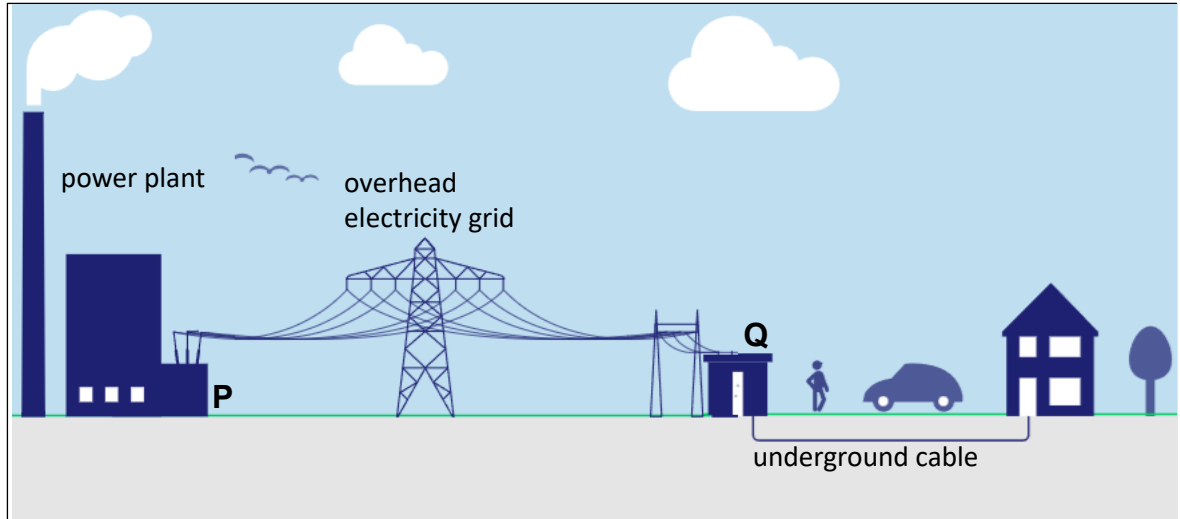
A bar magnet is repeatedly moved in and out of the coil. This causes the ammeter to cut out.

This phenomenon is explained in the box below. In the explanation there are three blank spaces (1), (2) and (3).

By moving the bar magnet back and forth through the coil, the ... **(1)** ... changes which causes a(n) .. **(2)** ... in the ... **(3)** .....

→ Write down the words that belong at (1), (2) and (3).

2p 23 Below is a drawing of long-distance voltage transport.

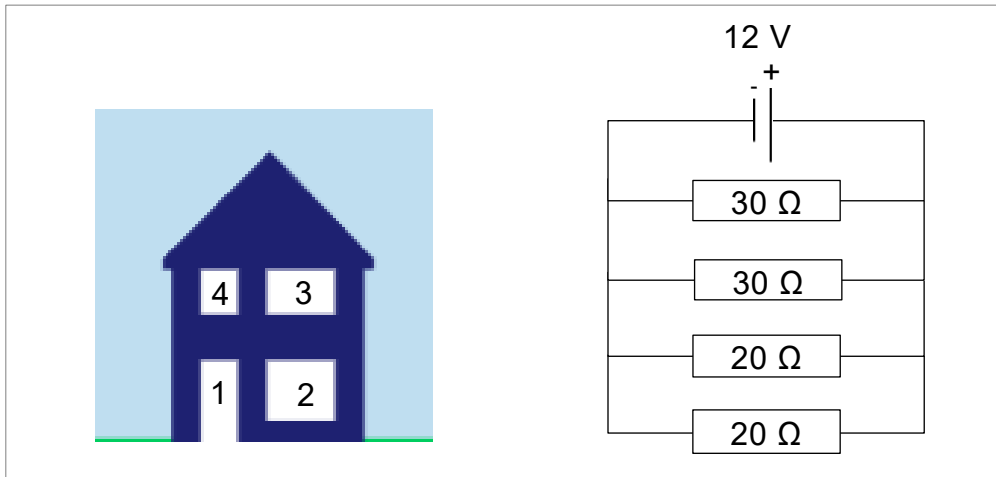


The voltage is generated at the power station. P and Q are transformers.

The work booklet contains statements I and II about the tasks of transformers P and Q. The statements contain **choice words**.

→ In each statement, underline the choice word that makes the statement **true**.

4p 24 Simon's house is shown below.



At night, Simon leaves on four lights. The image above shows the electrical circuit of these four lights.

The lights are connected to a 12-volt battery.

The resistances of the lights are: 30, 30, 20 and 20 ohms.

Given is the formula: 
$$\frac{1}{R_v} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

→ Calculate in ohms the equivalent resistance  $R_v$  of these four lights.  
Write down your calculations.

## Sound

- 3p 25 The picture below shows the so-called Mariana Trench which is a deep valley in the ocean.



From a naval vessel floating above the Mariana Trench, a sound signal is sent to **the bottom** of the trench using sonar.

14.6 seconds later, the reflected signal reaches the ship.

→ Calculate how many kilometers below the ship the bottom of the Mariana Trench is located. Write down your calculation and round off to a whole number.

- 3p 26 The speed of sound is used to measure the depth of the Mariana Trench. The box below shows two statements about the speed of sound. In the statements, (1), (2) and (3) are blank spaces.

I. The sound emitted from the sonar travels through ... **(1)** ... with a speed (velocity) of ... **(2)** ... m/s.

II. This speed (velocity) is greater than the speed of sound through tap water because the ... **(3)** ... of the medium through which the sonar sound travels is greater than that of tap water.

→ Write down what must replace (1), (2) and (3) to make statements I and II **true** statements. Use your Binas information booklet.

- 1p 27 The following are two information sources: source 1 and source 2.  
Source 1 is information on sonar sound and divers.  
Source 2 is a reference to your Binas information booklet.

**Source 1:** Divers exposed to noise from marine sonar may experience health effects. For example: painful hearing damage, dizziness, disorientation and temporary hearing loss.

**Source 2:** The table: **Hearing sensitivity** in your Binas information booklet, provides further information on sound in general.

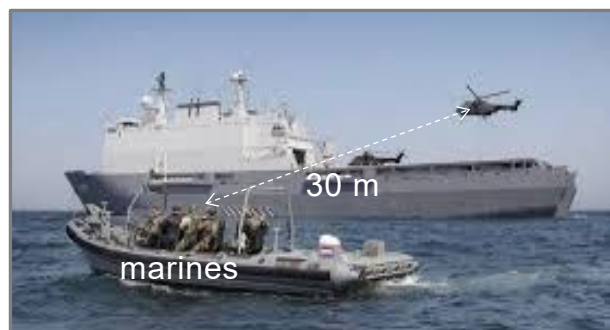
Use source 1 and 2 to answer the following question.

→ What is the sound level of a marine sonar?

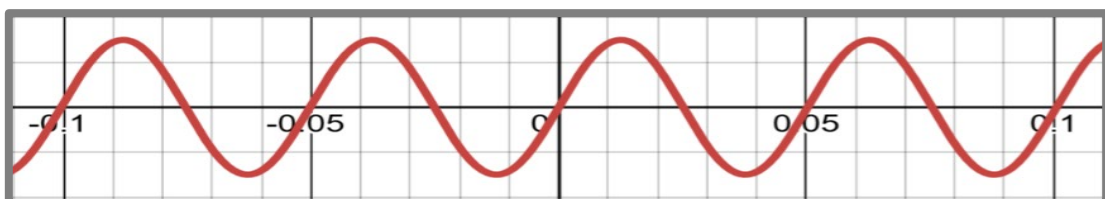
The sound level of a marine sonar is ...

- A between 0 and 80 dB (A)
- B between 90 and 100 dB (A)
- C between 100 and 130 dB (A)
- D above 130 dB (A)

- 3p 28 The marines in the picture alongside hear the rotor noise of the army helicopter from a 30-meter distance.



The oscilloscope image of the rotor noise of the helicopter is shown below.



The oscilloscope is set to 1DIV = 0.01 seconds.

→ Calculate the frequency of the rotor noise of the helicopter.

## Forces

- 3p 29 The picture below shows Melvin using a crowbar to pry out a nail that is firmly stuck.



Arrows 1, 2, 3, 4 and 5 are vector representations of five **different types** of forces.

In the table in the work booklet, numbers 2, 3, 4 and 5 are given. For each force, the effect of the force is also described. The name of force number 1 is **gravity** or force of gravity on Melvin.

→ In the work booklet, write down the names of the forces 2, 3, 4 and 5.

- 3p 30 Below is the formula for calculating the moment of a force.

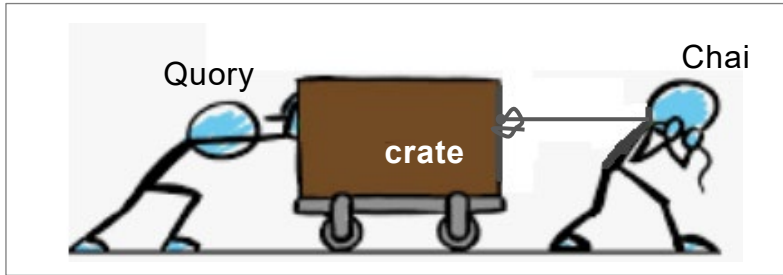
$$\text{moment} = \text{magnitude of the force} \times \text{arm of the force}$$

The **moment** only exists when a force has a levering effect.

In the table in the work booklet, the numbers 1, 2, 3, 4 and 5 of the five forces in the picture above of Melvin and the crowbar are listed. For each force, the effect of the force is also described.

→ In the work booklet, indicate for each force whether it *does* or *does not* have a **moment**. Do this with X-marks.

- 4p 31 The picture below shows how Quory en Chai work together to carry Liliana's moving crate to the truck.



Quory pushes with a force of 225 N.

Chai pulls with a force of 200 N.

Both forces, that of Quory and of Chai, can be added as vectors (as arrows) to the picture above.

In the work booklet pictures 1 and 2 of Quory, Chai and the crate are shown.

→ Do the following:

- 1). In picture 1, draw at the correct spots and in the correct directions, the force of Quory and the force of Chai. Use a force scale of 1 cm = 100 N.
- 2). In picture 2, draw the resultant force (the net force) on the box.

## Type of movement

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- 3p 32 The table below shows the relation of the **speed** in m/s of a moving car and the **time** in seconds.

time (sec)	0	1	2	3	4	5	6
speed (m/s)	0.0	1.5	3.0	4.5	6.0	7.5	9.0

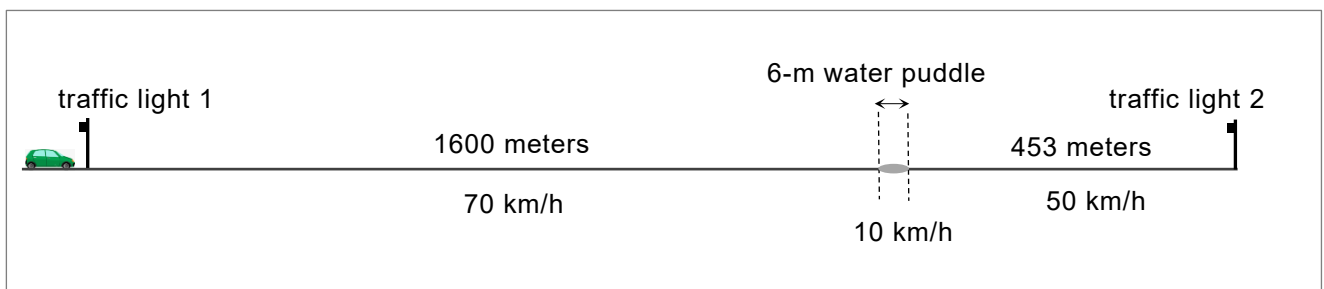
→ Draw the corresponding v-t diagram. Name the axes.

- 3p 33 The motion of the car in question no. 32 is uniformly accelerated. The box below explains why this motion is uniformly accelerated. There are three blank spaces in the explanation, namely:(1), (2) and (3).

The motion is **uniformly accelerated** because every ... (1) ... the ... (2) ... of the car increases with ... (3) .....

→ First study the progression of the numbers in the table at question no. 32 and then fill in blank spaces (1), (2) and (3) to render the explanation **complete** and **correct**.

- 3p 34 The following is a drawing of a car driving from traffic light 1 to traffic light 2. There is a 6-meter puddle of water along the way. This image is not drawn to scale.



Some details of this car trip are:

- For the first 1600 meters, the speed is constant and equal to 70 km/h.
- Followed by, drive 6 meters through the water puddle at a constant speed of 10 km/h.
- Drive the last stretch of 453 meters at a constant speed of 50 km/h.

Given is the formula:

$$\text{time} = \text{distance traveled} \div \text{average speed}$$

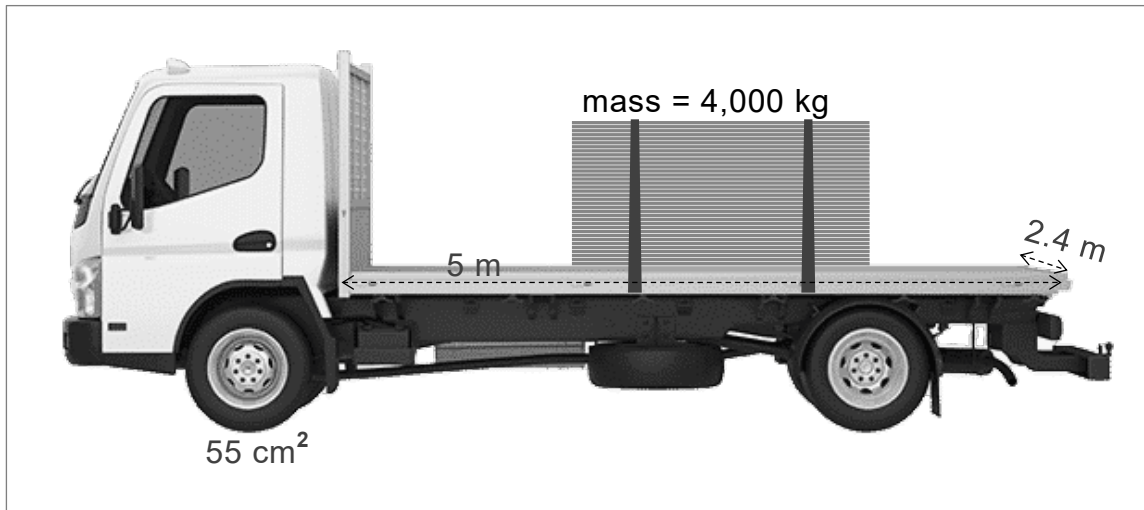
→ In how many minutes did the car travel from traffic light 1 to traffic light 2?

Use the calculation steps below, write down your calculations and round to one decimal.

Calculation step	Description
1.	Calculate the driving time in hours from traffic light 1 to the water puddle.
2.	Calculate the driving time in hours through the water puddle.
3.	Complete the rest of the calculations necessary.

## Pressure

5p 35 A flatbed trailer is shown below.



- The mass of the flatbed trailer is 70,500 kg.
- This flatbed trailer runs on 6 equal tires.
- The contact area of one tire of the flatbed trailer with the road surface is 55 cm<sup>2</sup>.

There is a stack of planks on the bed of this flatbed trailer.

- The length of the bed of this flatbed trailer is 5 m.
- The width of the bed of this flatbed trailer is 2.4 m.
- The mass of this stack of planks is 4,000 kg.

Given is the formula:

$$\text{pressure} = \text{force} \div \text{area}$$

This flatbed trailer and the stack of planks on it exert pressure on the road surface.

→ Calculate this pressure in N/m<sup>2</sup>. Write down your calculations and round off to a whole number.