Exam VSBO PKL

2025

Period 1
Tuesday, May 20
7:30 – 10:00 a.m.

Physics & Chemistry 1

This exam includes a work booklet

Write down all answers in the work booklet.

This exam consists of 35 questions.
You can score a maximum of 79 points for this exam.
Before each question number, it is stated how many points can be scored with a correct answer.

Formulas

$R_v = R_1 + R_2 + ...$

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

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

$P = U \times I$

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

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

$s = v_{sound} \times t$

$g = 10 \; {}^{m}\!/_{s^2}$

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

$F = m \times a$

$F_z = m \times g$

$M = F \times l$

$M_{left} = M_{right}$

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

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

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

$W = F \times s$

$s = v \times t$

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

$E_z = m \times g \times h$

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

3p **1** Jenny says: “I like shopping, but what I do find annoying are all those units such as **oz**, **ml** and **Hz** on the packaging and on appliances.”

For instance:
The bottle of cooking oil reads: **936 ml**.
The bag of sugar reads: **75.9 oz**.
The hair dryer reads: **50 Hz**.
Jenny knows 1 oz = 28.35 grams.

→ Enter the correct numbers in the work booklet. Where necessary, round off to two decimals.

2p **2** At home, Jenny searches Amazon for sound equipment.

Below are the details of two items that she is interested in.

1). Amazon.com: Earbud & In-Ear Headphones - 100 to 103 dB.

2). 100-watt speaker - Audio & HiFi.

Jenny wants to know the meaning of “**dB”** and “**watt**”?
In the work booklet, there are two sentences about this with choice words.

→ In the work booklet, underline the choice words that give the correct meanings.

3p **3** Roël works in the lab. He orders the necessary instruments and equipment. It is important for Roël that the instruments and equipment that he orders are **corrosion resistant**.

Six materials are mentioned in the table in the work booklet.

→ In the work booklet, indicate which materials are **corrosion resistant**. Do this with X-marks.

2p **4** Roël has to order a new vacuum cooler for the warehouse.
Three coolers are shown below. One made of aluminum, one of steel and one of copper. Roël must choose one of the three.

aluminum

steel

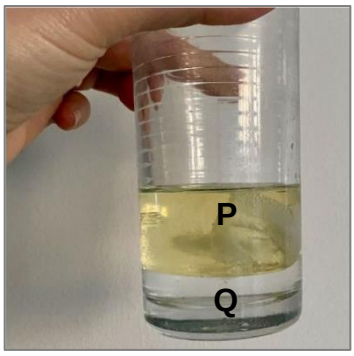
copper

Roël chooses aluminum for two reasons.
Reason 1 is an advantage of aluminum over **steel**.
Reason 2 is an advantage of aluminum over **copper**.

These two reasons, 1 and 2, are NOT the same.

→ In the work booklet, write down for both 1 and 2, such an advantage.

2p **5** Carvin pours 100 ml of water and also 200 ml of olive oil into a drinking glass. He then stirs the two liquids together for 1 minute.
Next, he places the glass on the table.
1 hour later, he picks up the glass from the table and sees that the liquids do not mix. They are separated into P and Q as shown in the image to the right.



→ Which liquid is P and which is Q and why are they separated as they are?

Physical process or chemical reaction?

3p **6** The bottle of the chemical product shown alongside has a safety symbol, the pictogram.

I and II below show two sentences with blanks (1), (2) and (3). The sentences are about the meaning of the pictogram.

I. This symbol warns users of the potential danger of… (1) … when storing, transporting or using the chemical product.

II. It is important to take the right precautions, such as guarding against contact with … (2) … and … (3) … .

→ Write down what must be written at (1), at (2) and at (3). Choose from the list of words in the work booklet.

3p **7** The pictures below show four phenomena.

melting ice

from wood to charcoal

evaporating seawater

rusting iron

Some phenomena are called physical processes.
Other phenomena are chemical reactions.

In the table in the work booklet, these four phenomenon's are mentioned.

→ In the work booklet, indicate for each phenomenon, whether it is a **physical process** or a **chemical reaction**. Do this with X-marks.

5p **8** *The Equalizer* is one of Denzel Washington's famous films.

In the beginning of the film, a train rides through the mountains of Turkey. Denzel is on the train.
The iron rail is a medium through which the sound of the train travels.

Behind the mountains, Crovic listens to the iron rail to hear if the train is coming. At the moment, the train is 12 km away from Crovic.

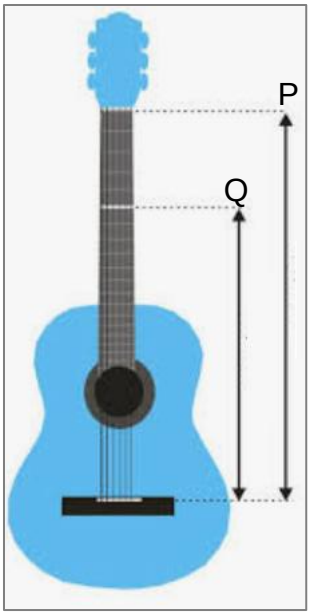
→ How long does it take the sound to travel through the iron rail and arrive where Crovic is. Write down your calculation ordered as here below and round off to a whole.

Step 1: Use your Binas-information booklet to find the velocity of sound through iron.

Step 2: Convert the distance into meters.

Step 3: Use the formula:
distance = velocity × time (s = v × t)

1p **9** In the image alongside, the letters P and Q indicate two different lengths of a string.



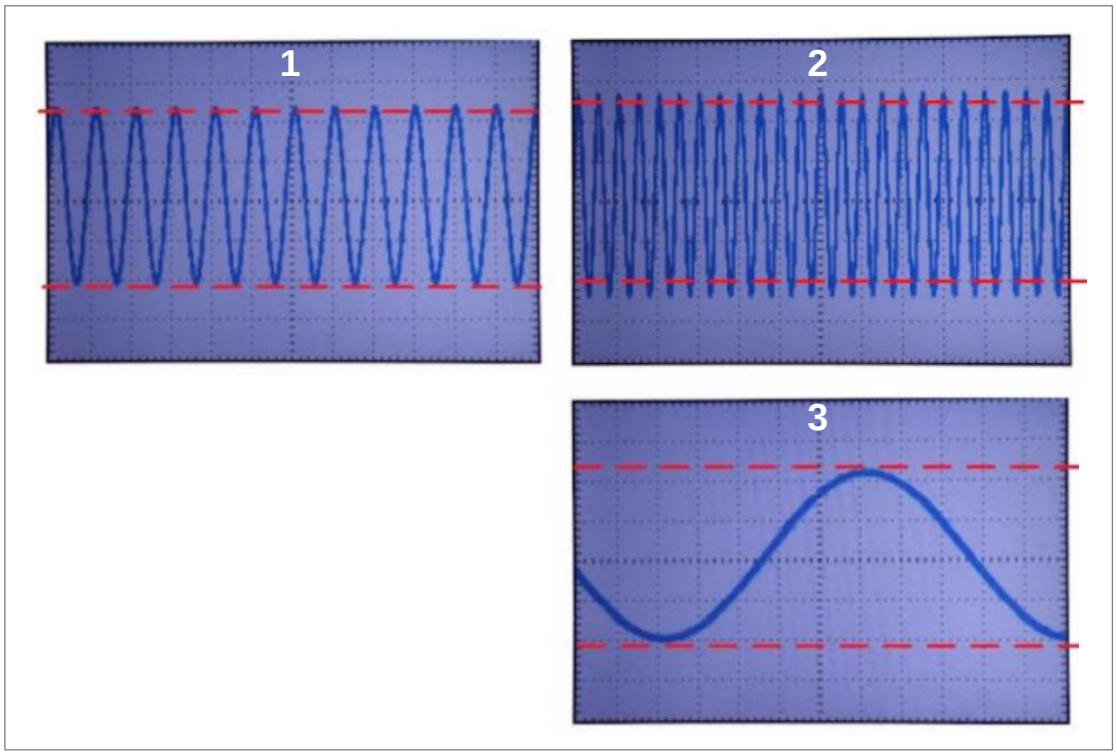
Below, are two statements about the length of a string.

I. The length determines the frequency.
II. The length determines the amplitude.

→ What applies to these statements?

A only statement I is true.
B only statement II is true.
C both statements are true.
D both statements are false.

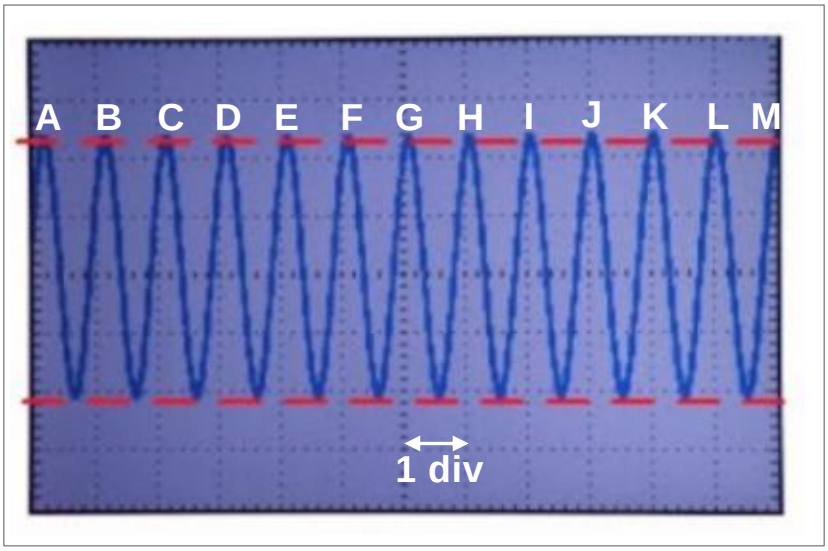
1p **10** Three oscilloscope images 1, 2 and 3 are shown below.



The frequencies of these three sound waves are:
1 MHz, 10 MHz and 20 MHz.

→ Match these three frequencies with the correct oscilloscope images in the work booklet.

2p **11** Below, an oscilloscope image of a wave is shown.



The letters A to M indicate the peaks of this wave.
One period of this wave is from letter A through B.
The oscilloscope is set to 1 div is 0.5 second.

Given is de formula: $f = \frac{1}{T}$

→ Calculate the frequency of this wave in hertz.
Write down your calculation.

2p **12** If you live on Curaçao or Sint Maarten, you will recognize the images below.

Rigo on his motorcycle and the tracks on the road surface, which are left behind after a "fever" stunt by Rigo to get attention.

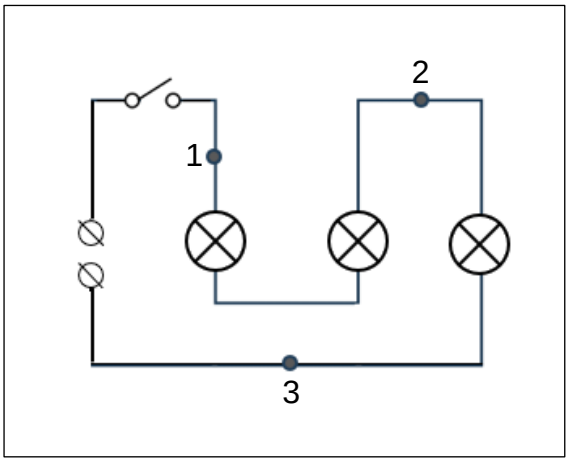
During this “fever” stunt by Rigo, there was a sound level of up to 115 dB in the ears of local residents.

→ Use your Binas information booklet and fill in, in the work booklet, all the correct information regarding this sound level caused by the “fever”.

2p **13** Sharina's teacher tells her to use only one fuse and protect the circuit shown alongside so that all three lightbulbs are protected.

She must decide for herself at which location or locations she can do this.

→ In the work booklet, indicate with X-marks, what applies to each location 1, 2 and 3.



1p **14** Sharina knows that the installation of her house contains a device Q. Device Q works as follows:

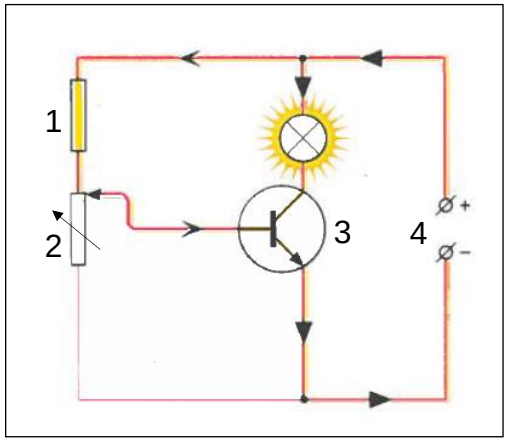
1. Q measures the current entering the house.
2. Q measures the current leaving the house.
3. Q calculates the difference.
4. If the difference is greater than 30 mA, Q switches off the current within 0.2 seconds.

→ Which device is Q?

A ground
B main fuse
C group fuse
D earth leakage circuit breaker

2p **15** Shown here is a circuit for the operation of a dimmer.

→ Write down the name of each of the components 1, 2, 3 and 4.



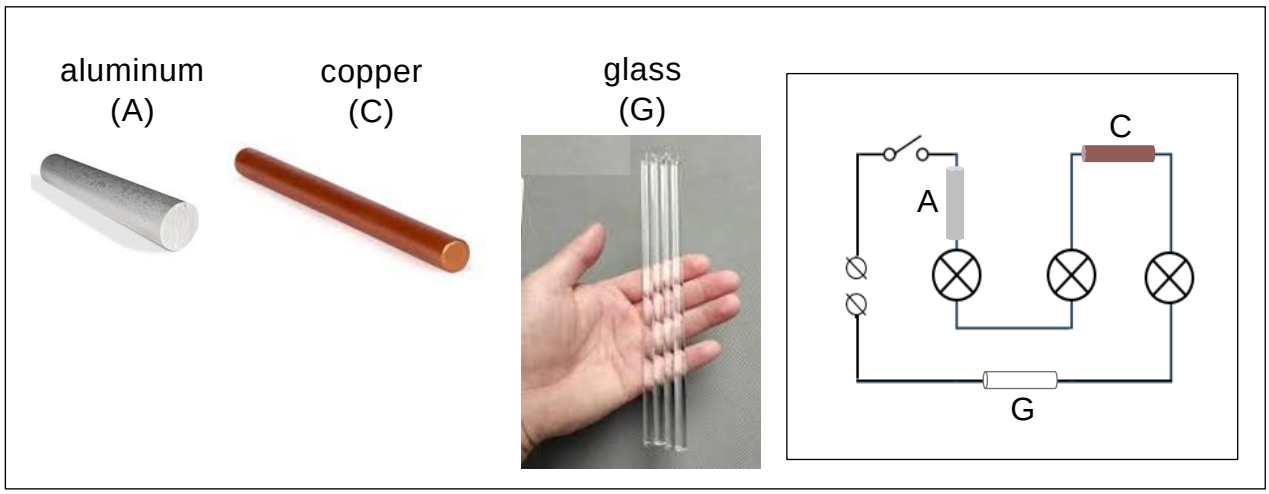
1p **16** One of the four components 1, 2, 3 and 4 is a device used for regulating the intensity of the light, namely: more light or less light.

→ Which number does this device have?

A number 1
B number 2
C number 3
D number 4

Electrical circuits

2p **17** Shari has an aluminum rod (A), a copper rod (C) and some glass rods (G).



Shari makes the electrical circuit above in which she has connected three rods, one of each type.
Shari applies power to her circuit and she closes the switch.
The lightbulbs do not come on. The work booklet explains why not.

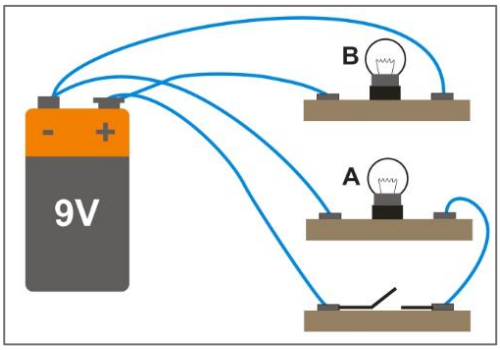
→ Complete the explanation in the work booklet. Fill in the correct words. Choose from the words given in the list.

3p **18** In the work booklet there are two unfinished drawings of electrical circuits.
1). A series connection of one battery and four lightbulbs, and
2). a parallel connection of one battery and four lightbulbs.

→ Complete both drawings in the work booklet.

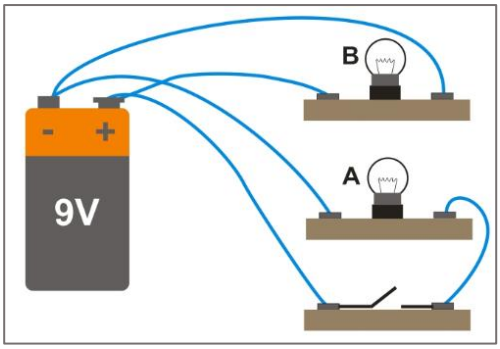
2p **19** An electrical circuit is shown below.
The switch is closed.
Lightbulb A is lit.
Lightbulb B is not lit.

In the table in the work booklet, three technical issues are listed.



→ In the work booklet, indicate which technical issue **is** and which **is not** a probable cause for lightbulb B's failure to light up. Do this with X-marks.

2p **20** The problem with this circuit has been fixed. The switch is closed. Both lightbulbs are lit. The resistance of each lightbulb is measured.
Lightbulb A measures 30 ohms.
Lightbulb B also measures 30 ohms.
The resistance of the switch is 0 ohms.



→ Calculate the measure of the **current** through lightbulb A in amps. Write down your calculation.

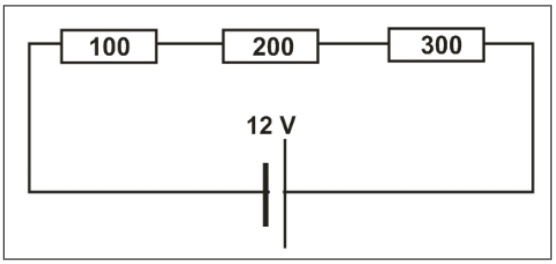
3p **21** Below, two formulas for equivalence resistance are given:

$R_{eq} = R_1 + R_2 + \ldots\ldots\ldots$ **and** $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots\ldots$

Examine the circuit above carefully and determine whether it is a series or a parallel circuit.

→ Calculate the measure in ohms of the **equivalence resistance**. Write down your calculations.

1p **22** The drawing of an electrical circuit is shown below.



The circuit contains:
- a 12-volt voltage source,
- a 100-ohm resistor,
- a 200-ohm resistor,
- and a 300-ohm resistor.

The current is 0.02 ampere.

Radjun must calculate the power supplied by the voltage source and write down the calculation.

→ Which of the calculations below must Radjun write down?

A power = 12 ÷ 0.02 = 600 watts
B power = 12 × 0.02 = 0.24 watts
C power = 12 ÷ 600 = 0.02 watts
D power = 12 × 600 = 7200 watts

4p **23** Erickson's computer has a power of 235 watts.
Erickson turns his computer on every morning and he turns it off in the afternoon.
In the morning, the computer goes on at 8:30.
In the afternoon, the computer goes off at 16:30.

Given is the formula: E = P × t.

→ Calculate in **kWh** the amount of energy Erickson's computer uses in one day.

3p **24** Erickson works at home in an air-conditioned room. His air conditioner is broken. He's going to buy a new one.
Erickson's demands for the new air conditioner are:

- capacity must be 12,000 BTU or more,
- the air conditioning must be economical in energy consumption, and
- the air conditioning must continue to work properly for a long time, for about 8 to 10 years.

The table below shows data for three air conditioners.

given	air conditioner 1	air conditioner 2	air conditioner 3
capacity:	12000 BTU	12000 BTU	18000 BTU
power:	3.7 KW	3.7 KW	5.3 KW
warranty on the motor:	5 years	7 years	7 years
price:	ANG 740.-	ANG 1155.-	ANG 975.-

→ Which air conditioner is more economical for Erickson in the long run? Explain why.

1p **25** The image below shows a transformer as seen from the inside.

The number of windings of the primary coil is 1000.
The number of windings of the secondary coil is 500.

In the work booklet there are two statements about this transformer. There are choice words in each statement.

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

2p **26** In the box below, there is a statement about the operation of a solar panel. In the statement, at the blank spaces (1), (2) and (3), three words have been left out.

> A solar panel consists of a number of … (1) … that are connected in series. When sunlight falls on the solar panel, each solar cell converts … (2) … into … (3) … .

In the work booklet, there is a list of choice words.

→ Write from the list, the correct words for (1), (2) and (3), so that the statement becomes a true statement.

2p **27** Liliana just loves to cook a pot of soup. While cooking, heat transfer takes place. Three forms of heat transfer are: ***convection***, ***conduction***, and ***radiation***.

In the work booklet there are two statements about heat transfer.

→ At the end of each statement, write down the form of heat transfer that takes place and that makes the statement a true statement.

2p **28** Every 15 minutes Liliana adds ingredients to the pot.

For Physics & Chemistry 1, Shana must keep track of the **time** and the **temperature** of the contents of the pot and take that data to school.

The table below show the data that Shana has kept.

time (in minutes)	5	10	15	20	25	30	35
temperature (in °C)	45	66	82	71	80	87	73

time (in minutes)	40	45	50	55	60	65	70
temperature (in °C)	78	86	75	83	95	100	100

→ Study the data in the table and write down in the work booklet, the correct fill-ins for the blank spaces (1), (2), (3) and (4).

3p **29** Shana heats a quantity of milk with an immersion heater. The immersion heater has a capacity of 75 watts.

The temperature-time diagram of this heating process is drawn in the work booklet.

→ Use the diagram to calculate how much heat was used to bring the milk to the boiling point. Write down your calculation.

Forces

2p **30** Force of gravity plays a role in a tug-of-war match. In addition to the force of gravity, three other types of forces also play a role.

In the image above, all three of these other types forces are also present.

→ What are these **three other types** of forces? Write down the names of those three other types of forces.

1p **31** The picture below shows how Tjoy uses a torque wrench to loosen a nut.

In the picture, Tjoy has drawn two equal forces F_1 and F_2.
F_1 is Tjoy's force on the torque wrench.
F_2 is the force of the torque wrench on the nut.

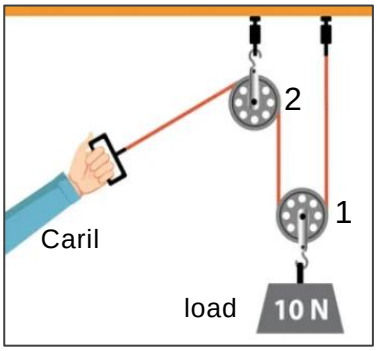
→ What is true for F_1 and F_2?

For F_1 and F_2 it is true that …

A F_1 is less than F_2.
B F_1 is equal to F_2.
C F_1 is greater than F_2.

3p **32** Caril uses two pulleys to raise a load.
The force of gravity working on the load equals 10 newtons.
Pulley 1 is a loose pulley (suspended pulley).
Pulley 2 is fixed to the ceiling (fixed pulley).

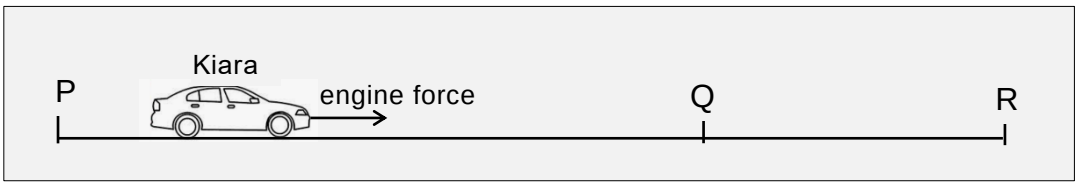
In the work booklet there are statements about this situation.



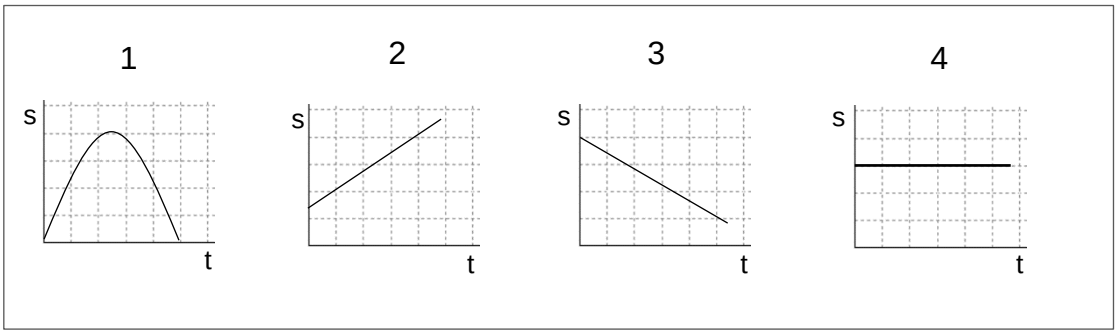
→ For each statement, indicate whether the statement is **true** or **false**.

Kiara's car

1p **33** See the drawing below.



Kiara drives for 5 minutes on road PQ at a constant speed of 80 km/h. Here below, four s-t diagrams are drawn.



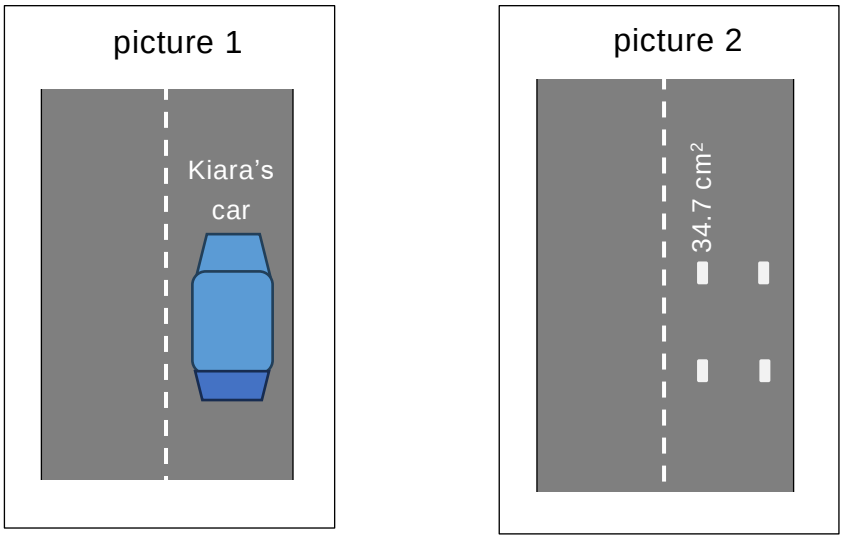
→ Which drawing is of the motion of Kiara's car between points P and Q?

A drawing 1
B drawing 2
C drawing 3
D drawing 4

4p **34** When Kiara Arrived at point Q, the engine of the car just suddenly stopped running. A sudden shut down. The car continued to roll for 2 minutes but came to a full stop at point R. On the QR stretch, the movement was NOT uniform.

→ Add the numbers and the name of the vertical-axes and then draw the v-t diagram from point P to point R.

3p **35** Picture 1 here below is a view from above of Kiara's stationary car.



Kiara had her car towed away.
Thereafter, the situation in figure 2 became present.

In picture 2 you can see four white stains. Each stain is from one tire of the car and each stain has an area of 34.7 cm^2.
The car's mass is 1250 kg.
The car exerted pressure on the surface of the road.

Given is de formula: $P = \frac{F}{A}$

→ Calculate in N/cm^2 the pressure that the car exerted on the surface of the road. Round off to one decimal.