ALEBTONG COMPREHENSIVE SECONDARY SCHOOL

P.O.BOX 1090, LIRA (U)

Competency based curriculum TERM II 2024

S.3 PHYSICS

Duration 2 hours.

Instructions

- ✓ This paper consists of two section A and B.
- ✓ Answer all items in section A and any one item from section B

Section A

Item 1

A group of hikers is planning a multi-day backpacking trip in the mountains. They are concerned about the effects of high altitude on their bodies and want to understand how atmospheric pressure changes as they gain elevation.

Given:

- Atmospheric pressure decreases as altitude increases.

- The average atmospheric pressure at sea level is approximately 101.3 kPa (kilopascals).

Tasks

a) What is the approximate atmospheric pressure at the summit of a 5,000-meter (16,400-foot) mountain?

b) How would the decrease in atmospheric pressure affect the hikers' ability to breathe at high altitudes?

c) What are some of the potential health concerns the hikers may face due to the lower atmospheric pressure at high altitudes?

Item 2

A researcher is studying the water consumption patterns of a small town. The town's water utility provides data on water usage, but the units used are inconsistent, making it difficult to analyze the data.

Given:

- The water utility reports water usage in litrees (*l*) for daily usage and in cubic cubic centimeters (cm^3) monthly billing.

- The researcher needs to compare the daily and monthly water usage data to identify patterns and trends.

Tasks:

a) How would you convert the daily water usage from litrees (*l*) to cubic cubic centimeters (cm^3) if in a month 2500*l* of water was used?

b) 2. Assuming the daily water usage is constant throughout the month, calculate the monthly water usage in cubic centimeters based on the provided daily usage litres.

c) Explain the importance of unit conversions in this scenario and how they help the researcher analyze the water usage data effectively.

d) How many litres of water is needed to fill the tank of mass 140kg given the density of the tank, $1000kgm^3$.

Section B

Item 3

Mr Muyise wishes to use a block and tackle system to move 7bags of cement each of mass 50kg up a tall building he is constructing. The pulley system he hopes to use consists of three pulleys in the fixed block and 2 pulleys in the movable block. His friend Mabeere advised him to use pulley system that is 90% efficient, so as to reduce the amount of energy will be lost (wasted by the machine). Juma, one of his loved workers was to carry 5 buckets of sand each of mass 6.5kg and decided to use the stairway. He had to climb 25 stairs each of height 10cm in one minute.

Task.

(a) Sketch the pulley system mr. Mabeere hopes to use indicating all the forces

(b) Explain to Mr. Muyise how he can ensure that the pulley system has the efficiency of 90%.

(c) Find out how much energy Mr. Muyise must apply so as to move the cement up the building

(d) if Juma had to carry one bucket of sand at a time, find the power expended in carrying the stand along the stairs

Item 4

A renowned business man wishes to construct a three floored flat house. He wishes to install a tank of water that can supply water at a pressure of about 56000pa to every floor. One day on a windy day as he was inspecting the interior of the upper most floors, the iron sheets were blown off and he claimed that the engineer has not tightly fixed those iron sheets well.

(take the density of water=1000kg/m^3, acceleration due gravity=10m/s^2)

Task.

Using your knowledge of physics

(a) Advise the business man on what he can do to ensure that the tank can supply the water at the required pressure

(b) To what height should the water in the tank be to achieve the pressure he wants?

THE END