



Subject: Grade 10 Physical Sciences

Topic: Physical Sciences: Term 1 - Mini-exam

Total: 14 Marks

1. true

2 marks

Explanation:

With the **switch open**, resistor R_1 is connected in series to the circuit and R_2 is not part of the circuit. The total current of $1,5\text{ A}$ is only flowing through resistor R_1 .

When the **switch is closed**, R_2 is now connected in parallel to R_1 . The **total resistance** in the circuit **decreases**, because another pathway is available for charges to move through.

Current is inversely proportional to resistance ($I \propto \frac{1}{R}$) if the voltage remains constant.

Therefore the current increases and the reading on the **ammeter** also **increases**.

2. false

2 marks

Explanation:

The potential difference between the points PQ gives the potential difference across the $12\ \Omega$ resistor.

In a parallel arrangement, each resistor is connected directly across the two terminals of the battery. **This means that both terminals of each resistor are at the same potential as the two terminals of the battery.**

Therefore the **potential difference between points PQ is equal to 10 V and not 5 V.**

3. false

2 marks

Explanation:

Amplitude is the maximum displacement from the **equilibrium position**. Therefore if the distance from crest to trough is 30 cm , then the **amplitude** would be 15 cm .

There are $2,5$ waves shown on the diagram, but the distance (D) only represents 2 complete waves. The 84 cm represents the distance between two waves, therefore a wavelength would be 42 cm .

The statement is **incorrect**.



4. false

2 marks

Explanation:

Time taken to hear echo 1:

$$v = \frac{d}{t}$$

$$340 = \frac{110 \times 2}{t} \quad (\text{distance must be doubled for the echo})$$

$$t = 0,65 \text{ s}$$

Time taken to hear echo 2:

$$v = \frac{d}{t}$$

$$340 = \frac{165 \times 2}{t} \quad (\text{distance must be doubled for the echo})$$

$$t = 0,97 \text{ s}$$

The difference in time that the echoes were heard is:

$$\begin{aligned} \text{difference in time} &= 0,97 - 0,65 \\ &= 0,32 \text{ s} \end{aligned}$$

5. true

2 marks

Explanation:

Sphere B is attracting sphere A.

Sphere B is **positively charged**, therefore **sphere A** must be negatively charged. Opposite charges attract.

Sphere A will have an **excess of electrons**, because it is negatively charged.

6. true

2 marks

Explanation:

Pitch refers to how high or low a sound is perceived and loudness refers to how hard or soft a sound is perceived.

Sound wave A has a higher amplitude than sound wave B, therefore sound A is **louder** than B.

Sound wave A represents 1,5 waves in the time interval and wave B represents 2,5 waves in the time interval. The frequency of wave A is lower and therefore wave A has a **lower pitch** than wave B.

7. true

2 marks

Explanation:

The two compressions and three rarefactions represents 2,5 complete waves. The distance between the two waves is 1,378 m.

$$\begin{aligned}\therefore \lambda &= 1,378 \div 2,5 \\ &= 0,5512 \text{ m} \quad (\text{multiply by } 1\,000) \\ &= 551,2 \text{ mm}\end{aligned}$$

Total: 14 Marks