TEST2-AQA-8464P2H-QP-JUN25 - Student Feedback (Mastery)

Student: Test User

Overall Score: 40/70 (57.1%)
Grade: 7-7
Grade boundaries: Grade boundaries 2024-26 · AQA · Higher
Assessment Tier: Higher

AI Study Review
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Master it. This sheet focuses on the questions where you lost the most marks. Study the worked example, then complete the practice tasks in the spaces provided - they get a little harder each time.

Q4.3 · Magnetism and electromagnetism

You scored 0/5

Question

The student replaced the straight wire with a loop of wire on an axle so the loop could rotate, connected to a battery and a switch. Figure 6 shows the apparatus: a loop of wire between a N pole magnet (left, near side A) and a S pole magnet (right, near side B), on an axle, connected to a battery via a switch. When th

What you wrote (transcription)

Based on the image provided, there are no formal answer lines visible for Question 4.3, but the student has added handwritten annotations around the diagram in Figure 6:

- Above "Side A", the word **opposite** is written with an arrow pointing to the left.
- On the right side of the page, written diagonally downwards: **electric magnet**
- Below that, also written diagonally downwards: **current attract**

The magnetic forces on the loop begin
to rotate when the switch is closed as it
sends current through the loop of wire
and causes the axle to become induced.
due to this this makes th

Where it went wrong

You wrote fragmented ideas such as 'current attract' and 'electric magnet' rather than explaining the motor effect. The rotation is caused by the interaction between the permanent magnetic field and the magnetic field created around the wire, which produces equal and opposite forces on opposite sides of the coil.

Worked example

1. Current passing through the wire creates a **magnetic field** around the loop.
2. This magnetic field interacts with the **permanent magnetic field** between the magnet poles.
3. Because current flows in **opposite directions** along side A and side B, the magnetic forces act in **opposite directions** on each side.
4. One side experiences an **upwards force** and the other experiences a **downwards force** (determined by Fleming's left-hand rule), creating a **turning moment** that rotates the loop.

Your turn (each task gets a little harder)

Identify **Fill in the blanks**

Complete the explanation of the electric motor effect:

1. A current flowing through a coil produces a _____ magnetic field.
2. This interacts with the magnetic field of the _____ magnets.
3. Since current travels in _____ directions on opposite sides of the coil, the resulting magnetic forces act in _____ directions, causing rotation.

opposite | temporary | permanent | parallel | induced

State **Fill in the blanks**

According to Fleming's left-hand rule, if the magnetic field points from North to South (left to right) and the current in side A flows into the page, the magnetic force on side A acts in the _____ direction, while the force on side B acts in the _____ direction.

Explain **Your turn**

Explain why a rectangular coil carrying an electric current begins to rotate when placed inside a uniform magnetic field.

Predict **Challenge**

A student notices that after turning 90° to the vertical position, the loop stops rotating continuously and just oscillates. Explain why the loop stops turning at the vertical position, and suggest what component must be added to keep it rotating in the same direction.

Q2.2 · Forces

You scored 3/6

Question

As a safety measure, the speed limit on the road was reduced. Explain how the safety of road users is affected by: the condition of the brakes and tyres; reduced speed. You should refer to thinking distance and braking distance.

What you wrote (transcription)

The condition of brakes and tyres affect the safety of the road as if you have older more worn out tyres, going round a bend or changing direction there is less grip and friction on the tyres meaning the car could spin. Also if the brakes are older then breaking and stopping your car will take longer and mean that slowing down and the breaking distance increases making the road not as safe. The reduced speed will help the safety as this means that the thinking distance is quicker as you are going slower and can react more quickly due to you not moving as quick meaning less incidents occur.

Where it went wrong

You wrote that lower speed makes 'thinking distance quicker', confusing reaction time with thinking distance. A driver's reaction time does not change with vehicle speed, but at a lower speed the vehicle travels a shorter distance during that reaction time.

Worked example

1. **Thinking distance** is calculated as $\text{speed} \times \text{reaction time}$. Driver reaction time is unaffected by speed, but at a lower speed, the car travels a **shorter distance** while reacting.
2. **Braking distance** is directly linked to kinetic energy ($E_k = \frac{1}{2}mv^2$); reducing speed significantly **decreases braking distance**.
3. **Worn tyres and brakes** reduce friction with the road and brake discs, which **increases braking distance**.
4. Lowering the speed limit reduces the **total stopping distance** ($\text{thinking distance} + \text{braking distance}$), greatly improving road safety.

Your turn (each task gets a little harder)

Identify **Fill in the blanks**

Complete the statements about stopping distance:

1. Stopping distance is equal to thinking distance plus _____ distance.
2. Reducing vehicle speed decreases thinking distance because the car travels less distance during the driver's _____ .
3. Worn tyres have less grip, reducing _____ between the tyres and the road.

braking | friction | reaction time | acceleration | momentum

State **Fill in the blanks**

A driver has a reaction time of $0.8\ \text{s}$. When driving at $30\ \text{m/s}$, the thinking distance is $\text{Thinking distance} = 30 \times 0.8 =$ ___ m. If the speed is reduced to $20\ \text{m/s}$, the thinking distance becomes $\text{Thinking distance} = 20 \times 0.8 =$ ___ m.

Explain **Your turn**

Explain how reducing vehicle speed limits from $40\ \text{mph}$ to $30\ \text{mph}$ affects both thinking distance and braking distance.

Compare **Challenge**

A car is driven on a wet road with worn tyres versus a dry road with new tyres. Compare how these two scenarios affect thinking distance, braking distance, and the overall risk of collision.

Q6.2 · Forces

You scored 3/6

Question

Figure 8 shows a speed-time graph for the athlete for the whole triathlon (Swim: ~1.5 m/s from 0 to 500 s; Cycle: rises to 7.5 m/s at 500 s then falls linearly to 6.2 m/s at ~1900 s; Run: drops to ~4 m/s at ~1900 s then curves down to ~2.2 m/s at ~2800 s). The cycling part of the race was on a straight road. The work d

What you wrote (transcription)

work done = force x distance

[scribbled out ($speed = \frac{D}{T}$)] distance = speed x time

$7.5 - 6.2 = 1.3\ m/s$

[scribbled out (500~)] $1800 - 500 = 1300\ s$

$1.3 \times 1300 = 1690\ m$

$1690 \times 110,000 =$ [scribbled out (185900,000)]

$110,000 = f \times 1690$

$110,000 \div 1690 = 65.0887574 = 65.N$

Mean forward force = 65 N

Where it went wrong

You found the difference between the initial and final speeds ($7.5 - 6.2 = 1.3\ \text{m/s}$) instead of the mean speed, and read the time interval as $1300\ \text{s}$ instead of $1900 - 500 = 1400\ \text{s}$. Distance is calculated using mean speed multiplied by time.

Worked example

1 Determine the time taken from the graph: $\text{time} = 1900\ \text{s} - 500\ \text{s} = 1400\ \text{s}$.

2 Calculate the **mean speed**: $\text{mean speed} = \frac{7.5+6.2}{2} = 6.85\ \text{m/s}$ (or calculate the area of the trapezium under the graph).

3 Calculate the **distance travelled**: $\text{distance} = \text{mean speed} \times \text{time} = 6.85\ \text{m/s} \times 1400\ \text{s} = 9590\ \text{m}$.

4 Rearrange $W = F \times d$ to calculate **mean force**: $F = \frac{W}{d} = \frac{110\,000\ \text{J}}{9590\ \text{m}} \approx 11.5\ \text{N}$ (or 11 N to 2 s.f.).

Your turn (each task gets a little harder)

Identify **Fill in the blanks**

Complete the steps for finding mean speed and distance from a linear speed-time graph:

1. For a speed changing linearly from u to v, the mean speed is calculated as $\text{mean speed} = \frac{u+v}{__}$.
2. The distance travelled is the total _____ under the speed-time graph.
3. The relationship between work done, force, and distance is $\text{Work done} = \text{force} \times __$.

2 | area | distance | gradient | time

State **Fill in the blanks**

A runner steadily decelerates from $8.0\ \text{m/s}$ to $4.0\ \text{m/s}$ over a time of $200\ \text{s}$. The mean speed is $\text{mean speed} = \frac{8.0+4.0}{2} = __\ \text{m/s}$, and the total distance travelled is $\text{distance} = __ \times 200 = __\ \text{m}$.

Explain **Your turn**

A cyclist decelerates uniformly from $10\ \text{m/s}$ to $6\ \text{m/s}$ over a time period of $300\ \text{s}$. The work done by the forward force during this time is $72\,000\ \text{J}$. Calculate the mean forward force exerted by the cyclist.

Evaluate **Challenge**

A student calculates the distance travelled from a non-linear velocity-time graph by simply averaging the initial and final velocities: $\frac{u+v}{2} \times t$. Explain why this method introduces a systematic error for curved graphs, and describe a more accurate method to determine distance from a curved graph.