# Physical Setting/Physics

Name _____ Date _____

**SESSION 1**

## Get the slope and the area

A cart's velocity increases linearly from 2 to 8 m/s in 3 s. Draw a velocity-time graph. Find acceleration and displacement and show which feature of the graph gives each quantity.

Start here if you were away. Mark the two endpoints and include units on both axes.



**SESSION 2**

## Compare net and individual forces

A 5 kg sled pulled horizontally has a 24 N pull and an opposing 9 N friction force on level ground. Draw its free-body diagram and find acceleration. Predict the acceleration if the pull stops while the sled still moves forward and friction stays at 9 N.

Start here if you were away. Set positive in the original direction of motion.

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**SESSION 3**

## Use a parallel-circuit check

Two resistors of 6 Ω and 3 Ω are connected in parallel across an ideal 12 V source. Find branch currents and total current. Infer equivalent resistance and check whether its size is sensible.

Start here if you were away. In parallel, each branch has the source voltage.

**SESSION 4**

## Follow light at a boundary

Light travels from air (n = 1.00) into glass (n = 1.50) at 30° to the normal. Use $n_1 \sin \theta_1 = n_2 \sin \theta_2$. Calculate the refracted angle and indicate whether the ray bends toward the normal. Explain the direction using speed.

Start here if you were away. Sketch and label the normal before any angles.

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SESSION 5

## Translate an energy-level change

An atom changes from −2.0 eV to −5.0 eV. Is a photon emitted or absorbed? Find its energy in eV and J, then its frequency. Use 1 eV = $1.60 \times 10^{-19}$ J and h = $6.63 \times 10^{-34}$ J·s.

Start here if you were away. Place both levels on a vertical energy scale.

SESSION 6

## Link graph, work and speed

A spring-force magnitude grows linearly from 0 to 12 N over compression of 0.20 m. Determine the energy stored. It launches a 0.40 kg cart on a level surface. Find ideal launch speed and explain a measured speed of 2.0 m/s.

Start here if you were away. Sketch force magnitude versus compression. Label the triangular area.