A spring with two energy routes

Mechanical energy | constructed spring data

Instructional alignment Standard 4 / 4.1

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. $E=(1/2)kx^2=1.0$ J.

2. The triangular graph area is $(1/2)(0.10)(20)=1.0$ J.

3. Force grows during the stretch. Final force times distance uses the maximum force for the entire interval.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Treating a variable force as constant at its final value. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Double the extension and compare force and stored energy factors.

Related public evidence

PHYS_LEG_2026_06_76 | public question

Official mapping for that example

PHYS_LEG_2026_06_75 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

A circuit with a carried result

Electrical energy | constructed series circuit

Instructional alignment Standard 4 / 4.1

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. R=6 ohms, I=2 A, P=24 W.

2. The first error is total series resistance. Using 3 gives 4 A and 48 W consistently.

3. Read the exact rating guide. Where a criterion permits consistent carry-through, a later step may receive credit despite the original error. This card does not set official scoring policy.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Penalizing every later use of one error without reading the task-specific scoring criteria. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Change the circuit to parallel and recalculate the equivalent resistance before judging the work.

Related public evidence

PHYS_LEG_2026_06_76 | public question

Official mapping for that example

PHYS_LEG_2026_06_75 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

A ray measured from which line?

Wave behavior | constructed refraction model

Instructional alignment Standard 4 / 4.3

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. sin(theta2)=sin(30)/1.50=1/3, so theta2 is about 19 degrees.

2. It bends toward the normal as it enters the higher-index medium.

3. Then theta1=60 degrees, giving theta2 about 35 degrees. The given reference line matters.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Substituting an angle to the surface as though it were to the normal. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Reverse the path and explain how the reciprocal geometry supports the original result.

Related public evidence

PHYS_LEG_2026_06_81 | public question

Official mapping for that example

PHYS_LEG_2026_06_80 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

The vector survives the calculation

Motion and forces | constructed momentum

Instructional alignment Standard 4 / 5.1

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. p_i=6 and p_f=-2 kg m/s; delta p=-8 kg m/s.

2. F_avg=-8/0.5=-16 N, or 16 N west.

3. Velocity includes direction. Using 1-3 ignores the reversal and understates the change.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Dropping signs when motion reverses. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Keep both velocities eastward and compare the result.

Related public evidence

PHYS_LEG_2026_06_85 | public question

Official mapping for that example

PHYS_LEG_2026_06_84 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

A photon between two levels

Modern physics | constructed energy-level model

Instructional alignment Standard 4 / 5.3

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. The released energy is 3.0 eV=4.80e-19 J.

2. f=E/h is about 7.24e14 Hz.

3. Level labels use a chosen zero. The emitted energy is the positive magnitude of the atom's decrease.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Using the final level energy alone as the photon energy. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Reverse the transition and state the required absorption energy.

Related public evidence

PHYS_LEG_2026_06_65 | public question

Official mapping for that example

PHYS_LEG_2026_06_64 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

The charge-distance comparison

Fields and interactions | constructed electrostatic model

Instructional alignment Standard 4 / 5.1

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. The force becomes one quarter of the original magnitude.

2. Opposite charges attract along the line joining them; the forces on the pair have equal magnitude and opposite directions.

3. The point-charge approximation or a sufficiently symmetric distribution must apply. Other nearby charges can add forces.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Applying inverse distance instead of inverse-square distance. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Double one charge at the same time as distance and compare the new force to the original.

Related public evidence

PHYS_LEG_2026_06_85 | public question

Official mapping for that example

PHYS_LEG_2026_06_84 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed