Physical Setting/Physics

Original exam A, full-length form B and three-week preparation

Why these demands were selected

The five public June forms each have 85 scoring slots. June 2026 includes a spring graph, point charges, photon emission, a roller-coaster energy situation, a circuit and a light ray crossing an interface. Several numbered slots share one underlying prompt.

No public January or August form in this series in the five-year window. The engine supplies June descriptions and abstains from a seasonal estimate. A restricted administration is never treated as a zero.

Released forecast example **State design / administration guidance**

Original exam A

Four sets, 8 multiple-choice and 4 written responses. Suggested time: 35–50 min; adjust to local conditions. Each selected response earns one local point. Each written response earns one local point per numbered criterion on the key. Maximum 17 local points. Accept defensible alternative reasoning. Allow consistent follow-through where the local criterion assesses a new operation; annotate the originating error.

Full-length form B

Use the intact linked 2026-06 official booklet except 79. The insert preserves one response position and its maximum credit. Report the original-component subtotal and replacement result separately. State conversion charts are specific to the unmodified state form. Record prior exposure if students have used the released booklet in preparation.

Preparation and feedback

Use the six Studio sessions, then one new retrieval check per week. Use Form A as an independent transfer check after preparation. Form B is optional for full-length rehearsal. On return after absence, students can start with the re-entry line on the current week’s sheet. After testing, return to the first unsupported step in the student’s reasoning.

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Questions 1–6 • One point per selected response.

1 A • −2.0 m/s²
The change in velocity divided by time is (2 − 8)/3 = −2.

2 C • −4.0 N
F = ma = 2(−2) = −4 N.

3 Written response / 2 local points
1. Displacement = (8 + 2)/2 × 3 = +15 m because velocity remains positive.
2. ΔK = ½(2)(2² − 8²) = −60 J because the cart slows. Accept an equivalent calculation from work.

4 D • 2 A
The branch has 18 V across it, giving 18/9 = 2 A.

5 C • It stays the same.
The intact branch still has the full ideal battery voltage.

6 Written response / 3 local points
1. The 6 Ω branch carries 3 A and total current is 2 + 3 = 5 A.
2. R equivalent = 18/5 = 3.6 Ω.
3. Power = 18 × 5 = 90 W. When reviewing, record a consistent downstream use of an earlier value separately.

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Questions 7–12 • One point per selected response.

7 B • 27°
arcsin(sin 40°/1.40) ≈ 27°.

8 A • Frequency
The frequency is set by the source and remains continuous at the boundary.

9 Written response / 2 local points
1. $v = c/n = 2.14 \times 10^{8}$ m/s.
2. Show rays on opposite sides of the boundary, incident at 40° and refracted at about 27° to the same perpendicular normal, bent toward that normal.

10 D • 5.0 eV
The atom loses 5 eV; the emitted photon carries positive energy.

11 B • −1.0 → −3.0 → −6.0 eV
Two downward transitions can emit two photons, one at each step.

12 Written response / 2 local points
1. $E = 5(1.60 \times 10^{-19}) = 8.00 \times 10^{-19}$ J and $f = E/h \approx 1.21 \times 10^{15}$ Hz.
2. The two-step route emits 2 eV and 3 eV, totaling the direct photon's 5 eV; the individual photons have different frequencies.

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Replacement scoring and retrieval-check keys

Form B replacement / 79 / 1 credits maximum

Award one local point for a transmitted ray continuing downward and right, closer to the normal, with the 31° angle shown against the normal. A clearly labeled schematic is acceptable on this teacher-authored insert.

Public scoring materials for base form

Week 1 / retrieval check

Velocity changes from +4 to +10 m/s in 2 s. Compare acceleration and displacement for uniform acceleration.

+3 m/s² and +14 m, from slope and signed area respectively.

Week 2 / retrieval check

Across 12 V a branch draws 0.50 A. Find branch resistance and power.

24 Ω and 6 W.

Week 3 / retrieval check

A photon carries 3.0 eV. Is that photon energy positive or negative when emitted? Explain.

Photon energy is positive; the emitting atom undergoes a negative energy change.

Department follow-up

PHYS_LEG-C1 Recognize equivalent energy methods

What quantity does the area represent? How do N·m and joules relate?

PHYS_LEG-C2 Trace a carried-forward circuit result

Using your own resistance, show how you would calculate current. What changes if the resistance value is supplied?

PHYS_LEG-C3 Measure refraction from the normal

Mark zero on the protractor where it meets the normal. Which line is the reference for this angle?

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Use the independent exam only after practice, or document the order if using it diagnostically.

Which preparation sessions lead into each exam set?

A1 · Braking on a level track / Studio session(s) 1,2

A2 · A circuit on the bench / Studio session(s) 3

A3 · Refraction at a flat surface / Studio session(s) 4

A4 · Excited atoms and emitted light / Studio session(s) 5,6

Likely reading of a partial response to investigate

A ray angle is measured from the surface. Have the student draw the normal and label the reference angle before using a formula.

Bridge rehearsal / worked feedback

A cart slows uniformly from 5 to 1 m/s in 2 s. Does negative acceleration imply negative displacement?

No. Acceleration is -2 m/s² but mean velocity is $+3$ m/s and displacement is $+6$ m.

How to choose the next round

If the model or source was misread, return to the matching prep set and ask for a new representation. If the computation or claim is correct but support is missing, request one neutral explanation and give a parallel independent check. Keep the independent result separate from prompted work.