Use the passage below to answer questions 7–8.

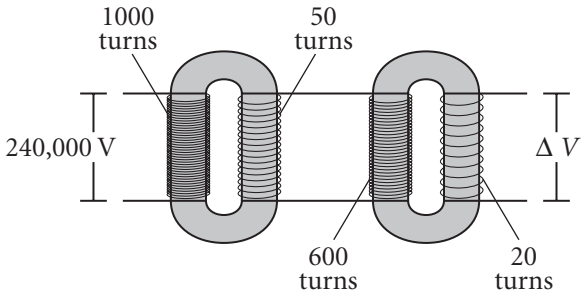
A pair of transformers is connected in series, as shown in the figure below.

7. From left to right, what are the types of the two transformers?

A. Both are step-down transformers.
B. Both are step-up transformers.
C. One is a step-down transformer; and one is a step-up transformer.
D. One is a step-up transformer; and one is a step-down transformer.

8. What is the output potential difference from the secondary coil of the transformer on the right?

F. 400 V
G. 12 000 V
H. 160 000 V
J. 360 000 V



9. What are the particles that can be used to describe electromagnetic radiation called?

A. electrons
B. magnetons
C. photons
D. protons

10. The maximum values for the current and potential difference in an ac circuit are 3.5 A and 340 V, respectively. How much power is dissipated in this circuit?

F. 300 W
G. 600 W
H. 1200 W
J. 2400 W

SHORT RESPONSE

11. The alternating current through an electric toaster has a maximum value of 12.0 A. What is the rms value of this current?

12. What is the purpose of a commutator in an ac generator?

13. How does the energy of one photon of an electromagnetic wave relate to the wave's frequency?

14. A transformer has 150 turns of wire on the primary coil and 75 000 turns on the secondary coil. If the input potential difference across the primary is 120 V, what is the output potential difference across the secondary?

EXTENDED RESPONSE

15. Why is alternating current used for power transmission instead of direct current? Be sure to include power dissipation and electrical safety considerations in your answer.

Base your answers to questions 16–18 on the information below.

A device at a carnival's haunted house involves a metal ring that flies upward from a table when a patron passes near the table's edge. The device consists of a photoelectric switch that activates the circuit when anyone walks in front of the switch and of a coil of wire into which a current is suddenly introduced when the switch is triggered.

16. Why must the current enter the coil just as someone comes up to the table?

17. Using Lenz's law, explain why the ring flies upward when there is an increasing current in the coil?

18. Suppose the change in the magnetic field is 0.10 T/s. If the radius of the ring is 2.4 cm and the ring is assumed to consist of one turn of wire, what is the emf induced in the ring?

Test TIP Be sure to convert all units of given quantities to proper SI units.