**PHYSICS 2021 - 22 February 9, 2022**

**Today’s Agenda (Day 104)**

1. HOUSEKEEPING ITEMS

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1. HOMEWORK CHECK:

 🡪 Ch 22 & 23 Vocabulary

1. CLASS ACTIVITY

🡪 CONT’D: Practice Problems – Section 22.2

HOMEWORK:

* READ: Chapter 2 – Current Electricity
* STUDY: Chapter 22 Test

<http://glencoe.mheducation.com/sites/0078807220/student_view0/self-check_quizzes.html>

Chapter 22 – Current Electricity

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| --- | --- | --- | --- |
| Electric current | Electric circuit | Resistor | Superconductor |
| Conventional current | Ampere | Parallel connection | Kilowatt-hour |
| Battery | Resistance | Series connection |  |

Chapter 23 – Series and Parallel Circuits

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Series circuit | Voltage divider | Short circuit | Circuit breaker |  |
| Equivalent resistance | Parallel circuit | Fuse | Ground-fault interrupter | Combination series-parallel circuit |

REMINDERS:

* TEST: Chapter 22 🡪 February 10

**PHYSICS 2021 - 22 SECTION REVIEW**

**CH 22 PRACTICE PROBLEMS**

Section 22.1 – Circuits and Charges

1. A car battery causes a current through a lamp and produces 12 V across it as shown in Figure 4. What is the power used by the lamp?



1. What is the current through a 75-W lightbulb that is connected to a 125-V outlet?
2. The current through a lightbulb connected across the terminals of a 125-V outlet is 0.50 A. At what rate does the bulb transform electrical energy to light? (Assume 100 percent efficiency.)
3. The current through the starter motor of a car is 210 A. If the battery maintains 12 V across the motor, how much  electrical energy is delivered to the starter in 10.0 s?
4. A 75-V generator supplies 3.0 kW of power. How much current can the generator deliver?
5. A flashlight bulb is rated at 0.90 W. If the lightbulb produces a potential drop of 3.0 V, how much current goes through it?
6. A circuit is changed so the potential difference across a motor doubles and the current through the lightbulb triples. How does this change the motor's power?
7. Draw a circuit diagram to include a 60.0-V battery, an ammeter, and a resistance of 12.5 Ω in series. Draw arrows on your diagram to indicate the direction of the current.
8. Draw a circuit diagram showing a 4.5-V battery, a resistor, and an ammeter that reads 85 mA. Show the direction of the current using conventional rules, and indicate the positive terminal of the battery
9. Add a voltmeter to measure the potential difference across the resistors in the previous two problems. Label the voltmeters.
10. Draw a circuit using a battery, a lamp, a potentiometer to adjust the lamp’s brightness, and an on-off switch.
11. An automobile panel lamp with a resistance of 33 Ω is placed across the battery shown in Figure 11. What is the current through the circuit?



1. A 75-W lamp is connected to 125 V.

a. What is the current through the lamp?

b. What is the resistance of the lamp?

1. Joe states that because R = ΔV /I, if he increases the voltage, the resistance will increase. Is Joe correct? Explain.
2. A circuit has 12 Ω of resistance and is connected to a 12-V battery. Determine the change in power if the resistance decreases to 9.0 Ω.
3. A circuit transforms 2.2×103 J of energy when it is operated for 3.0 min. Determine the amount of energy it will transform when it is operated for 1 h.

Section 22.2 – Currents

1. A 15-Ω electric heater operates on a 120-V outlet.

a. What is the current through the heater?

b. How much energy is used by the heater in 30.0 s? c. How much thermal energy is liberated in this time?

1. A 39-Ω resistor is connected across a 45-V battery.

a. What is the current in the circuit?

b. How much energy is used by the resistor in 5.0 min?

1. A 100.0-W lightbulb is 22 percent efficient. This means that 22 percent of the electrical energy is transformed to radiant energy.

a. How many joules does the lightbulb transform into radiant energy each minute it is in operation?

b. How many joules of thermal energy does the lightbulb output each minute?

1. The resistance of an electric stove element at operating temperature is 11 Ω.

a. If 220 V are applied across it, what is the current through the stove element? b. How much energy does the element transform to thermal energy in 30.0 s? c. The element is used to heat a kettle containing 1.20 kg of water. Assume 65 percent of the thermal energy is absorbed by the water. What is the water’s increase in temperature during the 30.0 s?

1. A 120-V water heater takes 2.2 h to heat a given volume of water to a certain temperature. How long would a 240-V unit operating with the same current take to accomplish the same task?
2. An electric space heater draws 15.0 A from a 120-V source. It is operated, on the average, for 5.0 h each day.

a. How much power does the heater use?

b. How much energy in kWh does it consume in 30 days? c. At $0.12 per kWh, how much does it cost to operate the heater for 30 days?

1. A digital clock has a resistance of 12,000 Ω and is plugged into a 115-V outlet.

a. How much current does it draw?

b. How much power does it use? c. If the owner of the clock pays $0.12 per kWh, how much does it cost to operate the clock for 30 days?

1. An automotive battery can deliver 55 A at 12 V for 1.0 h and requires 1.3 times as much energy for recharge due to its less-than-perfect efficiency. How long will it take to charge the battery using a current of 7.5 A? Assume the charging voltage is the same as the discharging voltage.
2. A car engine drives a generator, which transfers electrical energy to the car’s battery. The headlamps use the energy stored in the car battery to produce light. List the forms of energy in these three operations.
3. A hair dryer operating from 120 V has two settings, hot and warm. In which setting is the resistance likely to be smaller? Why?
4. Why would an electric range and an electric hot-water heater be connected to a 240-V circuit rather than a 120-V circuit?
5. A consumer uses 3098 kWh in 29 days. The utility company charges $0.077592 per kWh for the electricity plus $0.029998 per kWh for the distribution of the electricity. What is the consumer’s electric bill for the 29 days?
6. Resistance and Power A toaster is connected to the circuit shown in Figure 18.

a. What is the resistance of the toaster?

b. At what rate does the toaster transform energy?

