LESSON MAKER PRO

Power in Play

Find and compare power in direct current circuits.

HIGH SCHOOL · P.6.b

P.6.b "Obtain, evaluate, and communicate information regarding the relationship among voltage, current, and power for direct current circuits."

NAME _____ DATE _____

THE POWER RULE

In a direct current circuit, power in watts equals voltage in volts times current in amps: P = V x I. To find current, use I = P / V. To find voltage, use V = P / I.

WORKED EXAMPLE

A circuit has a voltage of 18 V and a current of 3 A. What is its power?

1. Use P = V x I.
2. Substitute: P = 18 x 3.
3. Calculate: P = 54 W.

Answer: 54 W

PRACTICE 6 problems

1 A circuit has a voltage of 12 V and a current of 4 A. Find its power.

ANSWER _____

2 A circuit has a voltage of 9 V and a current of 5 A. Find its power.

ANSWER _____

3 A circuit uses 60 W of power at 10 V. Find its current.

ANSWER _____

4 A circuit uses 80 W of power with a current of 4 A. Find its voltage.

ANSWER _____

5 A circuit uses 56 W of power with a current of 7 A. Find its voltage.

ANSWER _____

6 A circuit's voltage rises from 11 V to 22 V while its current stays at 2 A. What is its new power, and how does that compare with its original power?

ANSWER _____

APPLY IT Show your work

1 Two phone charging modes use the same current of 2 A. Normal mode runs at 5 V, and fast mode runs at 12 V. How many more watts does fast mode use?

WORK SPACE

ANSWER _____

2 A desk LED strip needs 24 W from a 12 V direct current supply. An adapter can provide up to 1 A at 12 V. Find the strip's required current and decide whether this adapter can power it at its rated power.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Use the device specifications in the table. A friend claims that the device with the higher voltage must use more power. Calculate each device's power and explain whether the claim is correct.

DIRECT CURRENT DEVICE SPECIFICATIONS

Device	Voltage (V)	Current (A)
Camping light	20	1
Gaming console dock	12	4

WORK SPACE AND ANSWER

Power in Play

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A circuit has a voltage of 12 V and a current of 4 A. Find its power.	**48 W**
2	A circuit has a voltage of 9 V and a current of 5 A. Find its power.	**45 W**
3	A circuit uses 60 W of power at 10 V. Find its current.	**6 A**
4	A circuit uses 80 W of power with a current of 4 A. Find its voltage.	**20 V**
5	A circuit uses 56 W of power with a current of 7 A. Find its voltage.	**8 V**
6	A circuit's voltage rises from 11 V to 22 V while its current stays at 2 A. What is its new power, and how does that compare with its original power?	**44 W; it is twice the original power of 22 W.**

PART 2 · APPLY IT

1. **14 W more** Normal mode uses 5 x 2 = 10 W, and fast mode uses 12 x 2 = 24 W. The difference is 24 - 10 = 14 W.
2. **2 A; no, the adapter's 1 A limit is too low.** The strip requires I = P / V = 24 / 12 = 2 A. That exceeds the adapter's 1 A limit.

CHALLENGE

The camping light uses 20 W, and the gaming console dock uses 48 W. The claim is false: the dock has a lower voltage but uses more power because its current is higher.

Accept equivalent statements that include correct units. For comparison questions, require both the calculation and the conclusion.