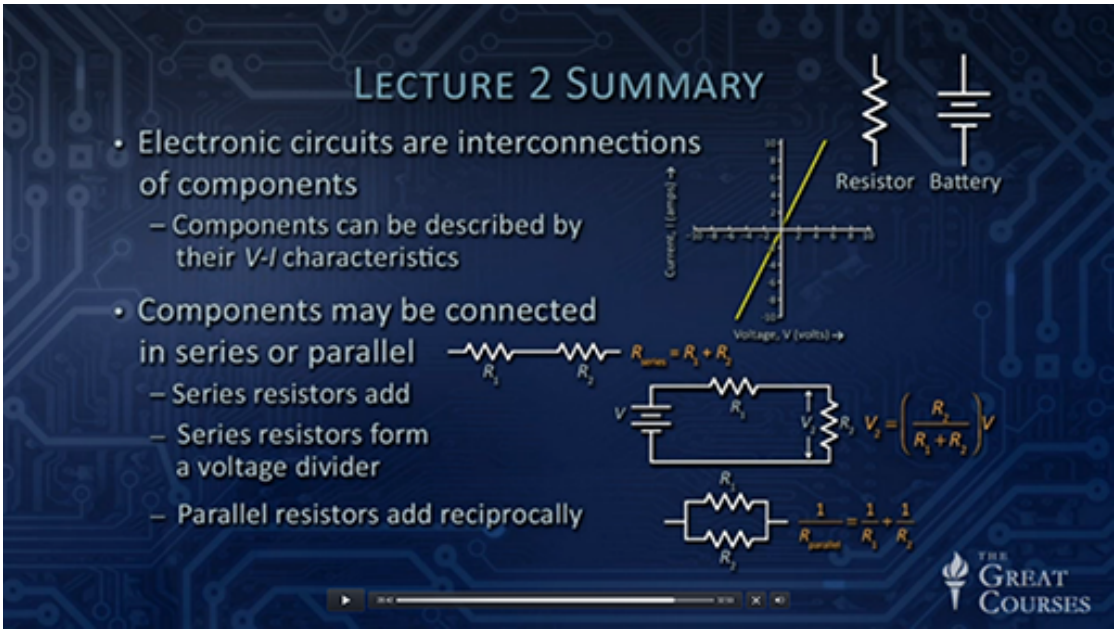
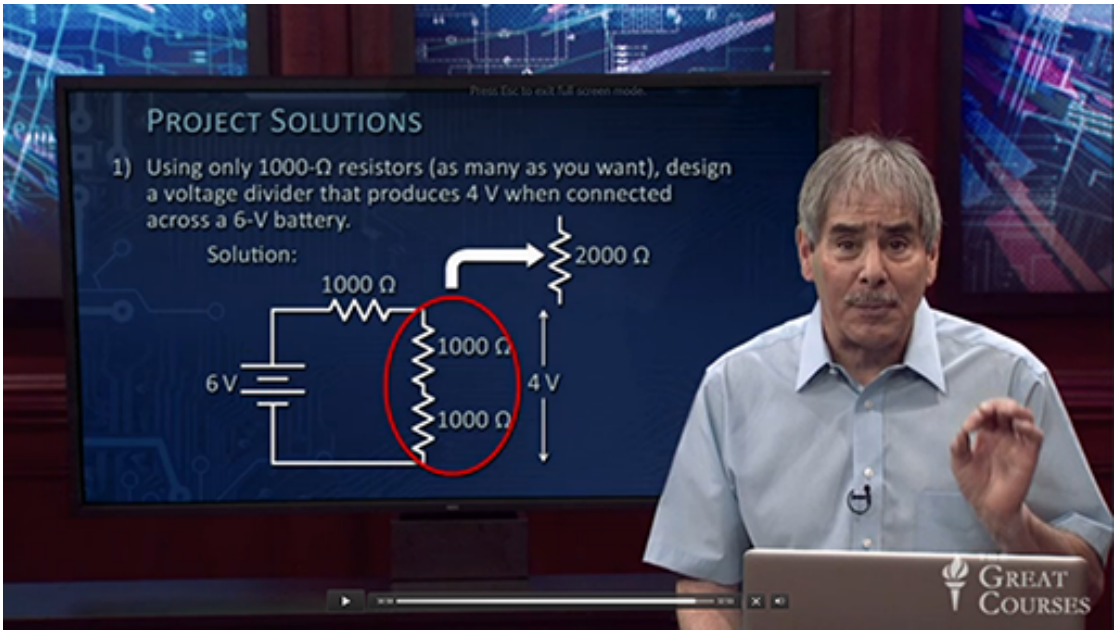
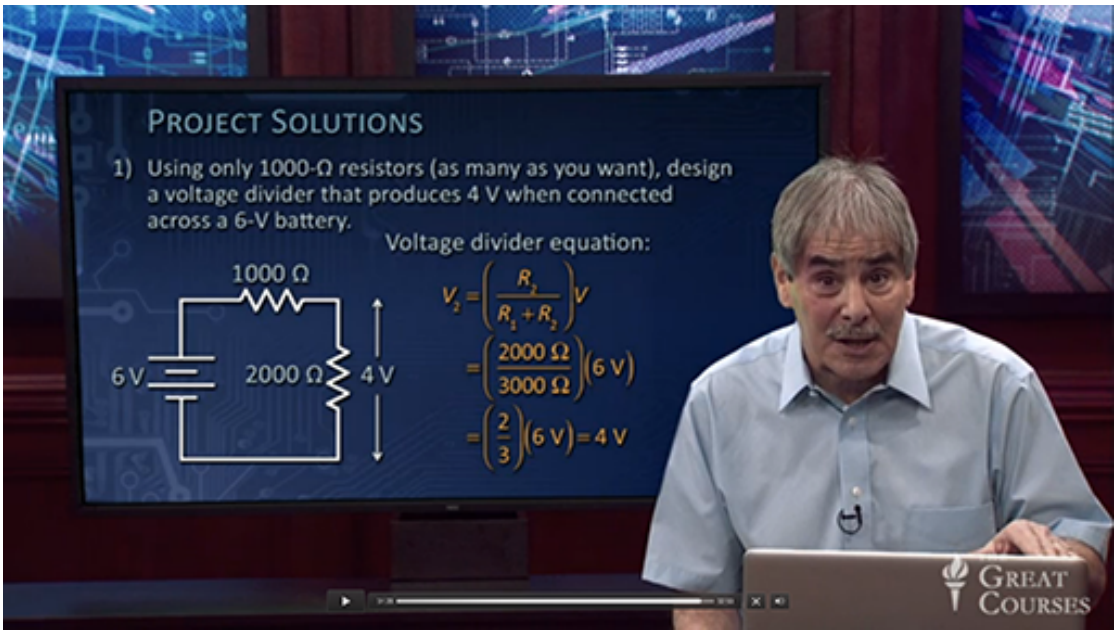
Electronics (Great Courses)

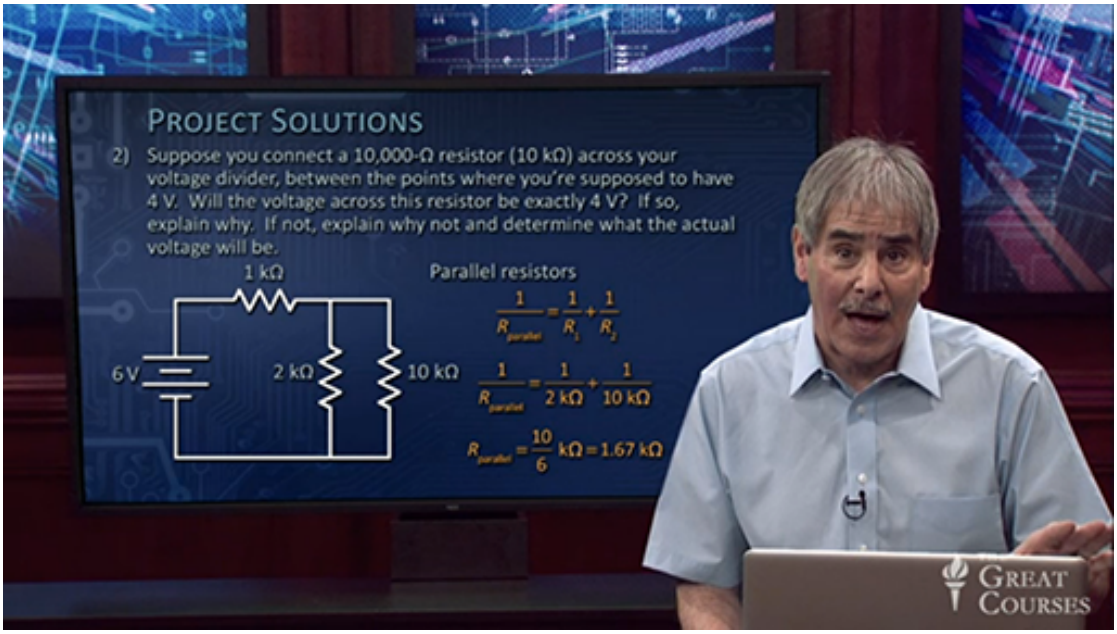
Lecture 2



Project




PROJECT SOLUTIONS
1) Using only 1000-Ω resistors (as many as you want), design a voltage divider that produces 4 V when connected across a 6-V battery.
Voltage divider equation:
1000 Ω
6 V
2000 Ω
4 V
$V_2 = \left(\frac{R_2}{R_1 + R_2}\right) V$
$= \left(\frac{2000\ \Omega}{3000\ \Omega}\right)(6\ \text{V})$
$= \left(\frac{2}{3}\right)(6\ \text{V}) = 4\ \text{V}$
GREAT COURSES


PROJECT SOLUTIONS
2) Suppose you connect a 10,000-Ω resistor (10 kΩ) across your voltage divider, between the points where you're supposed to have 4 V. Will the voltage across this resistor be exactly 4 V? If so, explain why. If not, explain why not and determine what the actual voltage will be.
1 kΩ
6 V
2 kΩ
10 kΩ
Parallel resistors
$\frac{1}{R_{parallel}} = \frac{1}{R_1} + \frac{1}{R_2}$
$\frac{1}{R_{parallel}} = \frac{1}{2\ \text{k}\Omega} + \frac{1}{10\ \text{k}\Omega}$
$R_{parallel} = \frac{10}{6}\ \text{k}\Omega = 1.67\ \text{k}\Omega$
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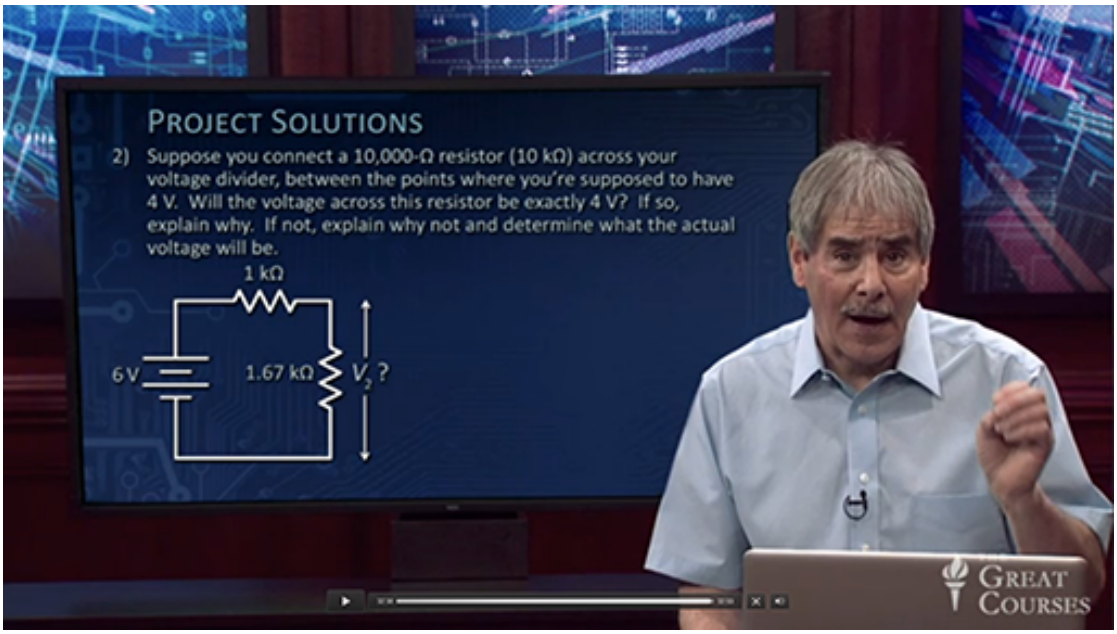
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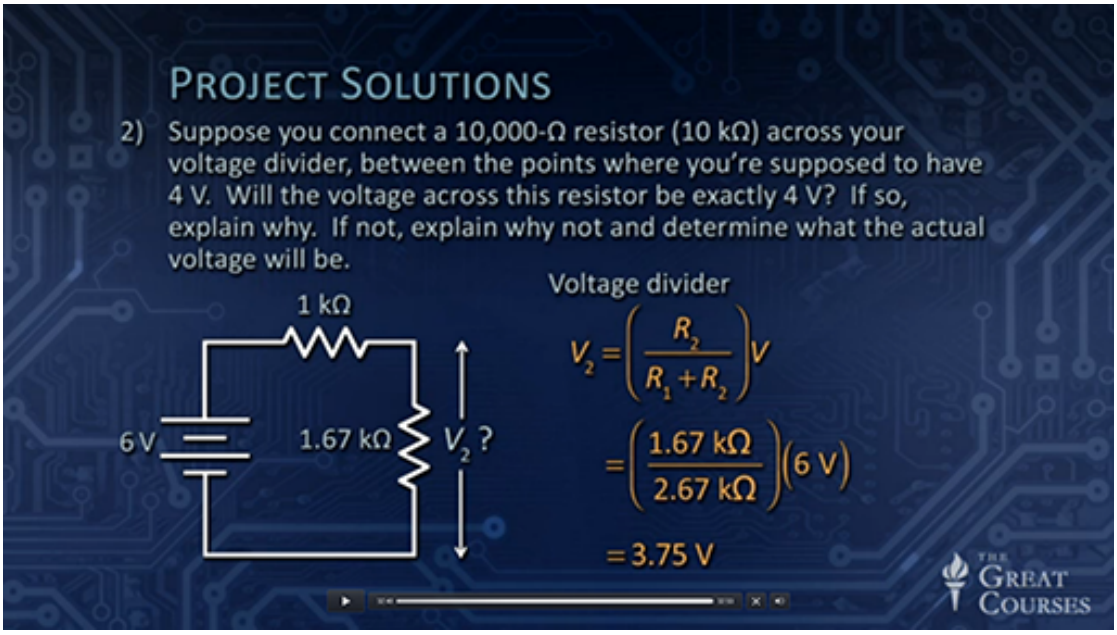
1 kΩ
6 V
1.67 kΩ
V_2 ?
GREAT COURSES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1 kΩ
6 V
1.67 kΩ
V_2 ?
Voltage divider
$V_2 = \left(\frac{R_2}{R_1 + R_2}\right) V$
$= \left(\frac{1.67\ \text{k}\Omega}{2.67\ \text{k}\Omega}\right)(6\ \text{V})$
$= 3.75\ \text{V}$
THE GREAT COURSES