Resistance (30:51)

Define opens and shorts in terms of resistance.

Describe how a switch influences the fundamental on or off state of a circuit.

Identify the consequences of an electrical circuit presenting no opposition to high voltage.

Draw a high side and low side switching arrangement. Compare and contrast the two switching arrangements.

Differentiate between conductors and insulators.

Define conductance. Identify the units of conductance.

Identify the properties that define the resistance of an object. In terms of these properties define a conductor with high resistance. In terms of these properties define a conductor with low resistance.

Algebraically manipulate the resistance formula to solve for resistivity given known resistance, cross sectional area, and length.

Algebraically manipulate the resistance formula to solve for cross sectional area given known resistance, resistivity and length.

Algebraically manipulate the resistance formula to solve for length given known resistance, resistivity, and cross sectional area.

Calculate the resistance of an aluminum bus bar with the following properties:

WIDTH = 6cm = .06m = 60mm
HEIGHT = 25cm = .025m = 25mm
LENGTH = 2m
$\rho_{Al} = 2.65 \cdot 10^{-8} \Omega m$

Identify the two formulas used to determine the area of a circle.

Calculate the resistance of a copper wire with the following properties:

LENGTH = 20m
DIAMETER = 15mm
$\rho_{Cu} = 1.68 \cdot 10^{-8} \Omega m$

Calculate the resistance of a copper bus bar with the following properties:

WIDTH = 5cm
HEIGHT = 2.7cm
LENGTH = 1.5m
$\rho_{cu} = 1.68 \cdot 10^{-8} \Omega m$

Calculate the resistance of an aluminum wire with the following properties:

LENGTH = 3km
DIAMETER = 8mm
$\rho = 2.65 \cdot 10^{-8} \Omega m$

Identify the basic relationship of wire gauge number, wire thickness, and resistance.

Use the wire table to determine the resistance of 200m of 12-gauge copper wire.

Use the wire table to determine the resistance of 600m of 18-gauge aluminum wire.

Use the wire table to determine the length of 6-gauge copper wire that has a resistance of 2Ω.

Gauge	Diameter (mm)	Copper Ω/1000m	Aluminum Ω/1000m
0000	11.7	0.16	0.25
000	10.4	0.20	0.32
00	9.27	0.26	0.39
0	8.25	0.32	0.50
1	7.35	0.41	0.63
2	6.54	0.51	0.79
3	5.83	0.65	0.99
4	5.19	0.81	1.3
6	4.62	1.3	2.0
8	4.12	2.1	3.2
10	3.67	3.3	5.0
12	3.26	5.2	8.0
13	2.91	6.6	10
14	2.59	8.2	13
16	2.31	13	20
18	2.05	21	32
20	1.83	34	53
22	1.63	52	80
24	1.45	88	133