Year 10 Adv Science HW NAME: _____

Calculating electricity 15a

Ohm's law states that, for an electric conductor, the resistance measured in ohms is calculated by dividing the potential difference measured in volts by the current measured in amps.

Electric power measured in watts is calculated by multiplying the potential difference measured in volts and the electric current measured in amps.

If 1000 watts of electric power are used over 1 hour, 1 kilowatt-hour of energy has been used. The electricity supplier charges ~~one tenth of a dollar, or 10 cents~~ at 25 cents, for each kilowatt-hour of electric energy used.

1 Join each word in the left column with its corresponding abbreviation in the right column by connecting them with a ruled line. One example has been done for you.

Abbreviation	Word
	ohms
	volts
	amps
	watts
	hour
	kilowatt-hour
	dollar
	resistance
	potential difference
	current
	power
	energy
	time
	resistance formula R =
	power formula P =
	energy formula E =
	cost formula cost =

Abbreviation
$
kWh
h
W
A
V
Ω
P
t
E
I
V
R
E × h × $0.10
P × t
I × V
V / I

Don't draw lines!

Write the answer on the far left, thanks!

Calculating with Ohm's law $V = IR$

NB: Cost = 25 cents/kwh
Voltage (if not stated = 240V)

2 Find the answers to the following problems. The first example has been done already.

a An electric radiator is connected to mains electricity. It draws 5 A of current on its low setting. How high is its resistance?

Working out:
Information: potential difference U = 240 V current I = 5 A resistance R = ?
Formula: R = V / I
Substitution: R = 240 V / 5 A
Calculation: 240 / 5 = 48
Answer: The resistance of the heater measures 48 Ω.

Here is a handy hint: Cover the unknown quantity in the triangle to see how to find it.

b A television set uses 0.5 A. Calculate its resistance. _____

c A small toaster has a resistance of 60 Ω. Calculate how much current it uses. _____

d A tiny radio has a resistor in its circuitry that measures 1200 Ω and draws 0.005 A. How much potential difference does its battery provide? _____

e Show your answers in the table below.

Appliance	Potential difference (V)	Current (A)	Resistance (Ω)

Calculating power and cost

Cost @ 25 cents / kWh Voltage 240 V

First, develop your own equations for power P, energy E and cost C, using potential difference U, current I, time t and rate r.

P = VI (Watts) E = P × t (must be in kiloWatts, t in hours) C = E × r

Now use the units: W, kWh, $, V, h. (what are they?)

W = kWh = $ = V = h =

a A hair drier uses a current of 1.25 A. What is its power? _____

b How much does it cost to run the hair drier for half an hour? _____

c A vacuum cleaner uses a current of 3 A. What power does its motor provide? _____

d It takes you 2 hours to clean the whole house with the vacuum cleaner from part c. How much electric energy are you using and how much does that energy cost?

e A kettle uses a power of 1.2 kW for a time of 6 minutes. How much does that amount of energy cost?

f Can you find the size of the current that the kettle in part e uses?

g A clothes drier is rated as 2.4 kW. How much energy does it use in 1 h and what current does it draw?

h How much does it cost to run the drier in part g for 2 h?

Problems at home

4 Kim's family is ready to go on holidays: the bags are packed, the lights are turned out and the children are strapped into their seat belts. Because her science class is covering the topic of