Essential Pre-Uni Physics C1.3

A Level

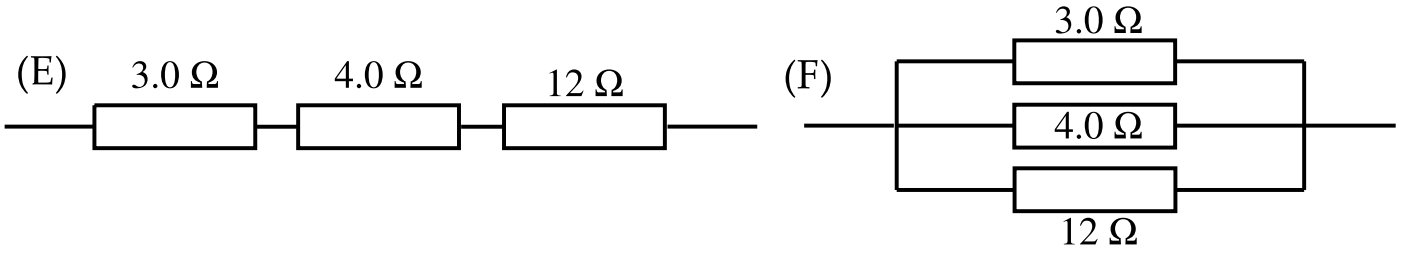

Figure 1: Two different resistor arrangements

Part A Combination (E)

What is the resistance of combination (E)? Answer to 2 significant figures.

Part B Combination (F)

What is the resistance of combination (F)? Answer to 2 significant figures.

Essential Pre-Uni Physics C1.7

A Level

Complete the questions in the table.

Length / m	Wire thickness	Resistivity / $\Omega\,\mathrm{m}$	Resistance / Ω
15000	$1.0\,\mathrm{cm}$ diameter	1.5×10^{-7}	R

What is the resistance R? Please provide your answer to 2 significant figures

Gameboard:

STEM SMART Physics 50 - Revision - Electricity

Essential Pre-Uni Physics C2.3

A Level

Data:

- Magnitude of the charge on the electron = $1.60 \times 10^{-19}\,\mathrm{C}$

Alpha particles have twice the charge of an electron. What is the current caused by a radioactive source which emits 3000 alpha particles per second, to 3 significant figures?

Gameboard:

STEM SMART Physics 50 - Revision - Electricity

Essential Pre-Uni Physics C5.7

GCSE C C C
A Level C C C

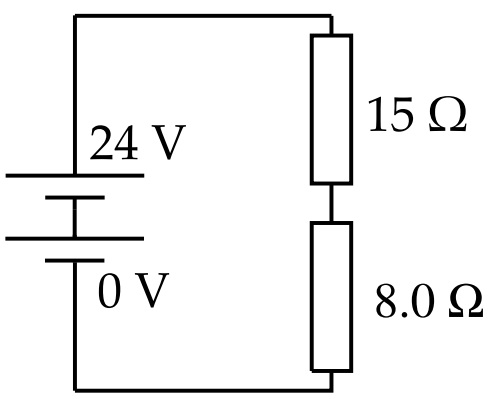

Figure 1: Circuit diagram

The $8.0\,\Omega$ resistance in this circuit is a loudspeaker (the battery represents the amplifier). The other resistor is replaced with a variable resistor which can take the values between $0\,\Omega$ and $30\,\Omega$, and is used as a volume control. This volume control changes the voltage across the speaker.

Part A Minimum voltage

a) What is the minimum possible voltage across the speaker?

Part B Maximum voltage

b) What is the maximum possible voltage across the speaker?

Gameboard:
STEM SMART Physics 50 - Revision - Electricity

Essential Pre-Uni Physics C6.4

A Level

C C C

A high-resistance voltmeter is connected in parallel with a portable battery used to start cars. Before the car is connected, the meter reads $12.4\,\mathrm{V}$. When the car is connected, and a $64\,\mathrm{A}$ current is flowing, the meter reads $11.5\,\mathrm{V}$.

Part A E.m.f. of the battery

What is the e.m.f. of the battery to 3 significant figures?

Part B Internal resistance of the battery

What is the internal resistance of the battery?

Gameboard:

STEM SMART Physics 50 - Revision - Electricity

Current Division 9.3

A Level

How much current flows through a $330\,\Omega$ resistor which is connected in parallel with a $68\,\Omega$ resistor which is carrying $40\,\mathrm{mA}$ by itself?

Gameboard:

STEM SMART Physics 50 - Revision - Electricity

Power in a Potential Divider 10.4

A Level

This question is about the circuit described in the notes page, also shown below.

An $\epsilon = 12\,\mathrm{V}$ battery has an internal resistance $r = 4.0\,\Omega$. Fill in the missing entries in the table below.

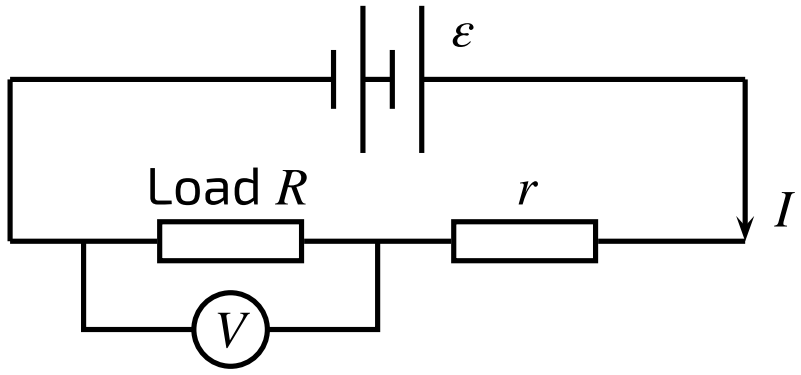

Figure 1: A voltage source with an internal resistance r.

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
0.10	(a)	(b)	(c)	(d)
2.0	(e)	(f)	(g)	(h)
4.0	(i)	(j)	(k)	(l)
6.0	(m)	(n)	(o)	(p)
50	(q)	(r)	(s)	(t)

Part A Find V (a)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
0.10	(a)	(b)	(c)	(d)

Find V (a).

Part B Find I (b)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
0.10	(a)	(b)	(c)	(d)

Find I (b).

Part C Find P (c)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
0.10	(a)	(b)	(c)	(d)

Find P (c).

Part D Find efficiency (d)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
0.10	(a)	(b)	(c)	(d)

Find the efficiency η (d).

Part E Find V (e)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
2.0	(e)	(f)	(g)	(h)

Find V (e).

Part F Find I (f)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
2.0	(e)	(f)	(g)	(h)

Find I (f).

Part G Find P (g)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
2.0	(e)	(f)	(g)	(h)

Find P (g).

Part H Find efficiency (h)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
2.0	(e)	(f)	(g)	(h)

Find the efficiency η (h).

Part I Find V (i)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
4.0	(i)	(j)	(k)	(l)

Find V (i).

Part J Find I (j)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
4.0	(i)	(j)	(k)	(l)

Find I (j).

Part K Find P (k)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
4.0	(i)	(j)	(k)	(l)

Find P (k).

Part L Find efficiency (l)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
4.0	(i)	(j)	(k)	(l)

Find the efficiency η (l).

Part M Find V (m)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
6.0	(m)	(n)	(o)	(p)

Find V (m).

Part N Find I (n)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
6.0	(m)	(n)	(o)	(p)

Find I (n).

Part O Find P (o)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
6.0	(m)	(n)	(o)	(p)

Find P (o).

Part P Find efficiency (p)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
6.0	(m)	(n)	(o)	(p)

Find the efficiency η (p).

Part Q Find V (q)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
50	(q)	(r)	(s)	(t)

Find V (q).

Part R Find I (r)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
50	(q)	(r)	(s)	(t)

Find I (r).

Part S Find P (s)

$R\,/\,\Omega$	$V\,/\,\mathrm{V}$	$I\,/\,\mathrm{A}$	$P\,/\,\mathrm{W}$	**Efficiency η**
50	(q)	(r)	(s)	(t)

Find P (s).

Part T Find efficiency (t)

$R \,/\, \Omega$	$V \,/\, \mathrm{V}$	$I \,/\, \mathrm{A}$	$P \,/\, \mathrm{W}$	**Efficiency η**
50	(q)	(r)	(s)	(t)

Find the efficiency η (t).

Gameboard:

STEM SMART Physics 50 - Revision - Electricity

Power in a Potential Divider 10.5

A Level

Use your answers to question 10.4 to state the value of r/R which gives the greatest load power P for given, fixed values of ϵ and r.

Gameboard:

STEM SMART Physics 50 - Revision - Electricity

Power in a Potential Divider 10.6

A Level

Use your answers to question 10.4 (or other reasoning) to state the value of r/R which gives the greatest efficiency for given values of ϵ and r.

Gameboard:

STEM SMART Physics 50 - Revision - Electricity

Power in a Potential Divider 10.9

A Level

Calculate the voltage, current and power for each of the resistors in the circuit in **Figure 1**.

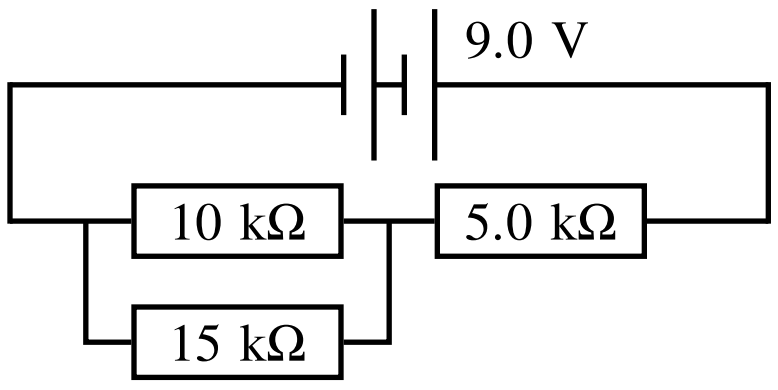

Figure 1: A circuit.

Part A $R = 10\,\mathrm{k\Omega}$

What is the voltage across the $10\,\mathrm{k\Omega}$ resistor?

What is the current through the $10\,\mathrm{k\Omega}$ resistor?

What is the power dissipated by the $10\,\mathrm{k\Omega}$ resistor?

Part B $R = 15\,\mathrm{k\Omega}$

What is the voltage across the $15\,\mathrm{k\Omega}$ resistor?

What is the current through the $15\,\mathrm{k\Omega}$ resistor?

What is the power dissipated by the $15\,\mathrm{k\Omega}$ resistor?

Part C $R = 5.0\,\mathrm{k\Omega}$

What is the voltage across the $5.0\,\mathrm{k\Omega}$ resistor?

What is the current through the $5.0\,\mathrm{k\Omega}$ resistor?

What is the power dissipated by the $5.0\,\mathrm{k\Omega}$ resistor?