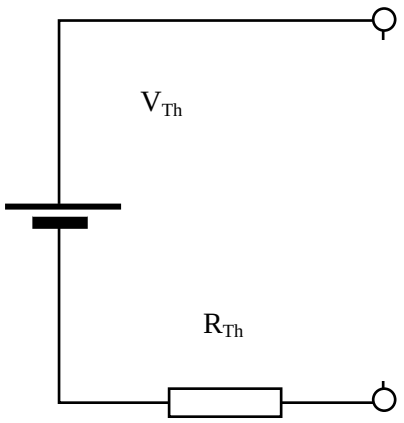
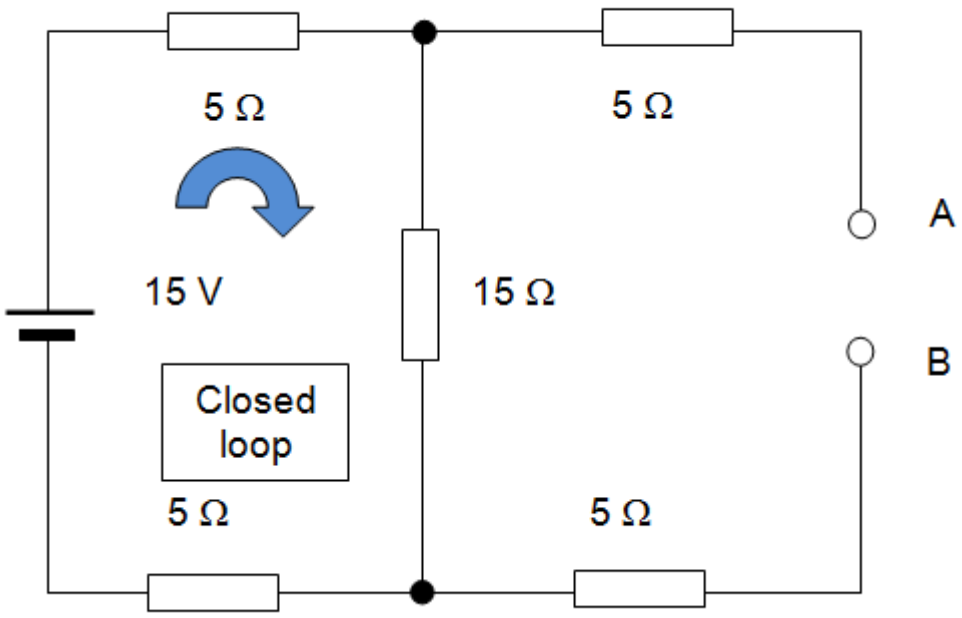
Self Test Answers

1.	(a)	Leon Thévenin proposed a rule that enabled electrical engineers to simplify complex power supplies. In the space below, write down the rule and draw a circuit that shows the rule	**4.4**	*(3)*
	All circuits, however complex...			
	…can be treated as:			
	…a simple perfect battery…			✓
	…in series with a resistor.			✓
				✓
	(b)	The circuit below is being used as a source of voltage. 	**4.4**	
	(i)	Show that the Thévenin voltage across AB is 9 V	**4.4**	*(2)*
	R_T in closed loop = 5 + 15 + 5 = 25 ohms			✓
	$V_{Th} = (15 \div 25) \times 15$			
	$V_{Th} = 0.6 \times 15 = 9$ V (QED)			✓

	(ii)	Calculate the Thévenin resistance.	**4.4**	*(3)*
	$R^{-1} = 10^{-1} + 15^{-1} = 0.167$			✓
	$R = 0.167^{-1} = 6$ ohms			✓
	$R_{Th} = 5 + 6 + 5 = 16\ \Omega$			✓
	(c)	A 10 ohm resistor is now placed across the gap AB.	**4.4**	
	(i)	Calculate the current across the 10 ohm resistor.		*(2)*
	$R = 10 + 16 = 26$ ohms			✓
	$I = 9 \div 26 = 0.35$ A			✓
	(ii)	Calculate the voltage across the 10 ohm resistance.		*(2)*
	$V = IR = 0.35 \times 10$			✓
	$I = 3.5$ V			✓
	(d)	How is Norton's theorem used to model a complex source?		*(2)*
	Norton sources are constant current sources…			✓
	…in parallel with a resistor.			✓