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9I Energy and electricity...How electricity transfers energy

level 5
level 6
level 7

starter one

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Look at the four devices below: Consider the games console. It has a 'power rating' of 100 watts and uses 100 joules of electrical energy every second. Calculate how long each device could be powered using the energy contained in a single chocolate bar, which is 500 kilojoules or 500,000 joules of chemical energy:

Click mouse to reveal answer

	Console (100W)	Laptop (150W)	Dyson (500W)	Washer (3000W)
Diagram				
	100 joules per second	150 joules per second	500 joules per second	3000 joules per second
Calc.	*Work out how long this device would take to use 500,000 joules of electrical energy ?*	*Work out how long this device would take to use 500,000 joules of electrical energy ?*	*Work out how long this device would take to use 500,000 joules of electrical energy ?*	*Work out how long this device would take to use 500,000 joules of electrical energy ?*

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Answer:

	Console (100W)	Laptop (150W)	Dyson (500W)	Washer (3000W)
Diagram				
	100 joules per second	150 joules per second	500 joules per second	3000 joules per second
Calc.	*Time taken: 500,000J/100J = 5000 seconds or 83.3 minutes*	*Time taken: 500,000J/150J = 3333.3 seconds or 55.5 minutes*	*Time taken: 500,000J/100J = 1000 seconds or 16.6 minutes*	*Time taken: 500,000J/100J = 166.6 seconds or 2.77 minutes*

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starter two

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Consider a 100 watt light bulb. This bulb uses 100 joules per second of electrical energy and transfers 30 joules per second into light energy and the rest into heat energy. Only the light energy is useful. Work out how many joules each bulb uses in 1 minute: (60 seconds)

Click mouse to reveal answer

	1 watt bulb	60 watt bulb	100 watt bulb	150 watt bulb
Diagram				
Notes	A one watt light bulb uses only 1 joule per second. *Work out how many joules this light bulb uses in one minute ?*	A sixty watt light bulb uses 60 joules per second. *Work out how many joules this light bulb uses in one minute ?*	A 100 watt light bulb uses 100 joules per second. *Work out how many joules this light bulb uses in one minute ?*	A 150 watt light bulb uses 150 joules per second. *Work out how many joules this light bulb uses in one minute ?*

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Answer:

	1 watt bulb	60 watt bulb	100 watt bulb	150 watt bulb
Diagram				
Notes	A one watt light bulb uses only 1 joule per second. *Number of joules: 1J x 60s =60J*	A sixty watt light bulb uses 60 joules per second. *Number of joules: 60J x 60s = 3600J*	A 100 watt light bulb uses 100 joules per second. *Number of joules: 100J x 60s = 6000J*	A 150 watt light bulb uses 150 joules per second. *Number of joules: 150J x 60s = 9000J*

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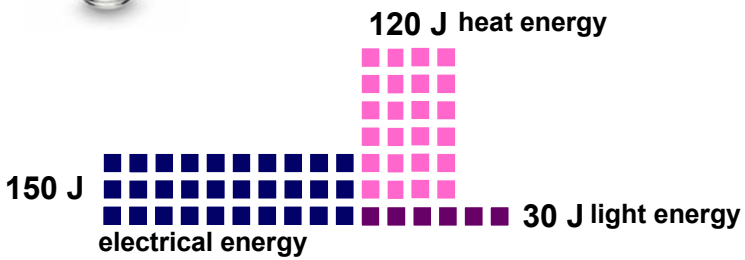
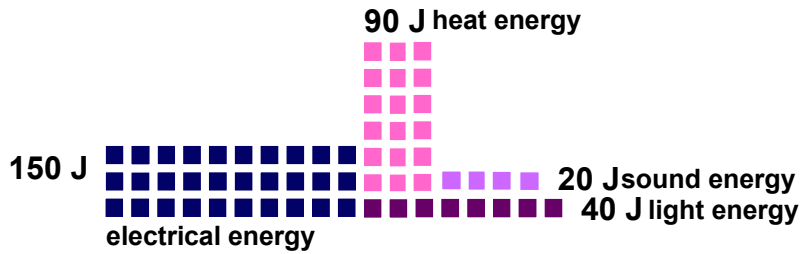
Look at the two devices below: Consider the light bulb. It runs on 150 watts (150 joules per second) and transfers 30 joules per second into light and the rest into heat. This energy transfer can be shown as a diagram. Complete the sentence for each device:

Click mouse to reveal answer

	150 watt light bulb	150 watt laptop computer
Diagram	 	 
	Complete: **A light bulb converts 150 joules of e_____ energy into 30 joules of light energy and 120 joules of h___ energy. This heat energy is wasted to the surroundings.**	Complete: **A laptop converts 150 joules of electrical energy into 40 joules of l____ energy, 20 joules of sound energy and 90 joules of h____ energy. Only the l____ and sound energy are useful.**

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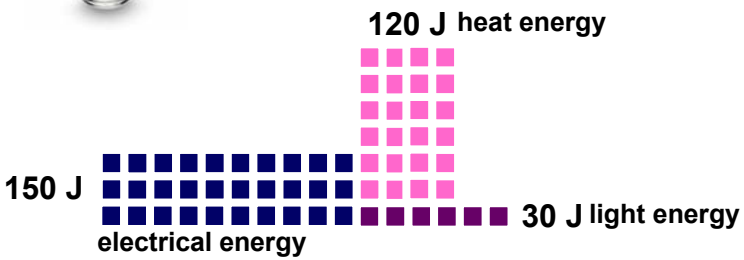
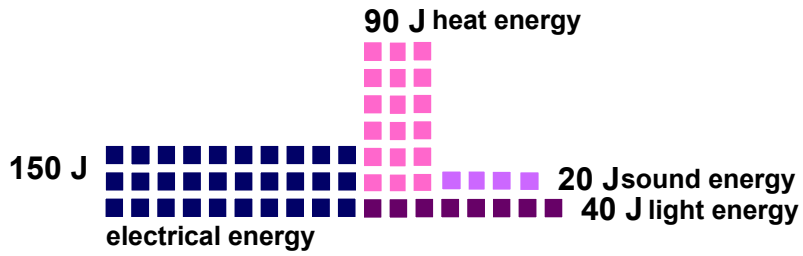
Answer:

	150 watt light bulb	150 watt laptop computer
Diagram	 	 
	Answer: **A light bulb converts 150 joules of electrical energy into 30 joules of light energy and 120 joules of heat energy. This heat energy is wasted to the surroundings.**	Answer: **A laptop converts 150 joules of electrical energy into 40 joules of light energy, 20 joules of sound energy and 90 joules of heat energy. Only the light and sound energy are useful.**