Performing Calculations on Kilowatt hours (kWh)

What are kilowatt hours and why do we need them?

Kilowatt hours are packages of electrical energy that are used on electricity bills. The reason they are used is if the power company was to put the actual number of joules of electricity used on the bill the customer would have to deal with very large figures. The bigger numbers become the more awkward they are to deal with and not everyone is good with numbers. So to make it easier to handle the amount of electricity used they express the energy in kWh which means smaller numbers.

To help understand what a kWh is think of it this way

1 kWh = this is the amount of electricity that a 1kw appliance would use if it ran for 1 hour.

Performing calculations with kwh

Eg a 20W bulb is used for a total of 2 hours 40min throughout the day. How many kWh are used by the bub after a week? If the power company charges 14c for every kWh used how much will it cost to run the bulb for a week?

Step 1 express the time given in the question in hours only

If any part of the time mentioned in the question is in minutes we need to convert that part to hours (divide it by 60) and then add that to any hours given in the question.

The bulb ran for 2 hour 40min. We need to express the 40 min part in hours.
To do that we use $\dfrac{\text{Time in mins}}{60 \text{ min}}$ which is $\dfrac{40 \text{ min}}{60 \text{ min}} = 0.667$ hours

So the total number of hours is 2 hours + 0.667 hours = 2.667 hours in a day

Step 2 if the question mentions a certain time period (in weeks or months) and we don't have the number of hours in that time period calculate the overall number of hours that the appliance is running for in that period of time.

Here we're asked for the week. In one day it runs for 2.667 hours. There are 7 days in one week so the total number of hours the bulb is on during the week is

(2.667 hours per day) x 7 days = 18.669 hours it runs during the week.

Step 3 if the wattage of the appliance isn't in kW divide the watts by 1000

So our 20W bulb in kW is $\dfrac{20}{1000} = 0.02$kW

Step 4 then figure out how many kWh it uses over the whole time period by multiplying the kW of the appliance by the answer from step 2.

18.669 hours x 0.02kW = 0.37338 kWh in the week

Step 5 Finally to get the cost of running the appliance for this time multiply the kWh by the cost given in the question.

The cost for 1 kWh is 14c. So the cost of running the bulb for 1 week is

14c x 0.37338 = 5.22732c