Battery powered tools come in a variety of configurations. How much energy does each of the following battery packs store?

Brand	**Voltage**	**Capacity**	**Batteries**
Ryobi	40 V	6.0 A h	2
EGO	56 V	7.5 A h	1
Greenworks	60 V	4.0 A h	2
Kobalt	80 V	6.0 A h	1

Battery powered tools come in a variety of configurations. How much energy does each of the following battery packs store?

The key here is to look at the units: Current is just charge/time, so

$$1\,\mathrm{A\,h} = (1\,\mathrm{C/s}) \times 3600\,\mathrm{s} = 3600\,\mathrm{C}.$$

Similarly, $1\,\mathrm{V} = 1\,\mathrm{J/C}$, so

$$(1\,\mathrm{V}) \times (1\,\mathrm{A\,h}) = (1\,\mathrm{J/C}) \times (3600\,\mathrm{C}) = 3600\,\mathrm{J}$$

Thus the energy stored in the 2 Ryobi batteries is

$$U = (40\,\mathrm{V}) \times (6.0\,\mathrm{A\,h}) \times 2$$
$$U = (40\,\mathrm{J/C}) \times (6.0\,\mathrm{A\,h}) \times \left(\frac{3600\,\mathrm{C}}{1\,\mathrm{A\,h}}\right) \times 2 = \boxed{1\,728\,000\,\mathrm{J}}$$

Another way to express the result is in terms of power and time. Recall that power $P = IV$ = energy/time, in Watts. Thus $P * t$ gives energy. It is often convenient to express the time in hours and the power in kilowatts.

$$1\,\mathrm{kW\,h} = (1000\,\mathrm{J/s}) \times (3600\,\mathrm{s}) = 3\,600\,000\,\mathrm{J}$$

Thus you could also express the energy stored in the 2 Ryobi batteries as

$$U = (40\,\mathrm{V}) \times (6.0\,\mathrm{Ah}) \times 2 = (480\,\mathrm{W}) \times (1.0\,\mathrm{h}) = \boxed{0.480\,\mathrm{kW\,h}}$$

Brand	**Voltage**	**Capacity**	**Batteries**	**Energy (J)**	**Energy (kW h)**
Ryobi	40 V	6.0 A h	2	1 728 000 J	0.480 kW h
EGO	56 V	7.5 A h	1	1 512 000 J	0.420 kW h
Greenworks	60 V	4.0 A h	2	1 728 000 J	0.480 kW h
Kobalt	80 V	6.0 A h	1	1 728 000 J	0.480 kW h