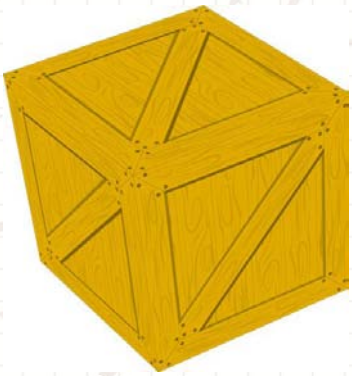
Lesson 1: Problems (Resource 1.6)

Supplementary or homework problems

1 The team has several crates of provisions containing computer and surveillance equipment and food supplies.



We need keep them as dry as possible. They need to be stacked so that the exposed sides and top of the stack have minimum contact with the warm damp air.

There are 5 crates to stack. Each crate is a 1 m by 1 m by 1 m cube.

- How can we stack them?
- How many of the 1 m by 1 m square faces will be exposed to the air?
- What if there are 10 crates?
- We are scheduled for a supply drop in a week that will double the crates. How can we stack them?
- If we need to move the camp and set up somewhere else, is there another way to stack them whilst keeping the exposed surface area to a minimum?

2 **Energy consumption** over *h* hours by an appliance of *w* watts is $\frac{wh}{1000}$ kilowatt hours (kWh).

So a 280 watt laptop used for 3 hours uses $\frac{300 \times 4}{1000} = \frac{1200}{1000} = 1.2$ kWh of electricity.

The energy use of a number of household appliances is given in the table

http://www.carbonfootprint.com/energyconsumption.html

A Think of a normal day in your home – about how much energy do you think you use?

B What do you think would be the same about your use of energy at the base camp?

What would be different about your use of energy usage at the base camp?

C A typical $10m^2$ solar panel produces around 1500kWh electricity per year.

A typical 2 m diameter wind turbine produces about 500kWh electricity per year.

Assuming that these figures would also apply at your base camp, what appliances would you use there? Which would you not use there?

D How would you balance your electricity usage through the day?