

Lesson 1: Establishing base camp

Narrative

A team of 12 environmentalists is on a secret mission to investigate illegal logging. A small advance group has just landed in a clearing in the middle of a dense rainforest. They have glimpsed from the air the headquarters of Log Inc and its outbuildings, the terrain they are now in and some of its main features. The area is remote and not well charted so their map is only an outline. The group now needs to work out the best place for base camp taking account of what they know about the terrain.

Problems

Main problem

The group works out what they can tell about their surroundings from the map and what they will need to do first. They decide where the team will set up their base camp and the factors that they need to consider. After overhearing a walkie-talkie conversation between some of Log Inc's workers, they glean extra information about the area and review their decisions about the best place for base camp.

Supplementary or homework problems (optional)

- 1 When the whole team arrives they must decide how to stack their crates of provisions to ensure that they are kept dry and that the exposure of the sides and top of the stack to the warm damp forest air is minimised.
- 2 The team considers their likely use of energy in the rainforest for their daily living and work and how to provide it.

Skills required

In this lesson or the homework pupils will:

- solve problems involving the conversion of units and make sensible estimates of measures, including compound units, in everyday situations
- use coordinates and find the midpoint of a line segment, given the coordinates of its end-points
- calculate volumes and surface areas of cuboids.

Rainforest resources

- 1.1 Video clip: (2 minutes) Opening film – a team of environmentalists is about to arrive in the rainforest on a mission to gather evidence for a report to the UN. The advance group must determine where the team will set up base camp.
- 1.2 A4 resource sheet: a map of the forest area marked in squares (print one per pupil)
- 1.3 A slide: a map of the forest area with additional information added
- 1.4 Audio clip: (90 seconds) Walkie-talkie conversation between Log Inc workers revealing important features of the terrain not shown on the team's map
- 1.5 Optional slides: clues from the walkie-talkie conversation, with a table of distances on the map in actual miles and kilometres

Review

- 1.6 Optional A4 resource sheet of supplementary or homework problems (if you are using one of the problems for homework, print one copy per pupil, otherwise print several copies to use as needed in the lesson)
- 1.7 A slide: the map of the forest area, including the extra information revealed in the walkie-talkie conversation
- 1.8 Video clip: (45 seconds) The team sets off through the dense forest but, before too long, they realise they are being followed! But by whom?

Other resources

For pupils: rulers, compasses, calculators. For Supplementary or homework problem 1 (optional), computers and spreadsheet software. For Supplementary or homework problem 2 (optional), interlocking cubes to represent crates.

Main activity

You might like to use the website references in the introduction to these notes, in particular rainforests.mongabay.com/defor_index.htm, to help you to set the scene.

Show **Resource 1.1**, a two-minute video clip of the advance group arriving.

Give out **Resource 1.2**, an A4 copy of the map, one per pupil, then show **Resource 1.3**, a slide of the map of the forest with hot spots of extra information to be added to their maps. Point out the scale (1 cm represents 80 m) and the direction of north (the bottom of the map). You may need to remind the class that 5 miles is about 8 km. Check that pupils can use the grid system and compass points by asking them for the positions and directions of a few features, then ask:

- What can we tell about the land from the map? What do we need to do first?

Establish that their first job is to set up base camp. Split the class into groups of about four. Tell them that they will work in the same groups throughout the case study, often as two pairs who then join forces. Ask the groups to decide where they are going to set up base camp and to think about the factors that they will need to consider. Listen in on the subsequent group discussions, drawing the attention of the class to pertinent, interesting or well-considered ideas.

Once the groups have come to a preliminary decision, play **Resource 1.4**, a 90-second audio clip of a walkie-talkie conversation between the Log Inc HQ and their guards, mentioning points about the terrain not marked on the map: a kennel for guard dogs, a guard checkpoint, a spring, a waterfall, a cave and crocodiles. You may need to play the clip a second time, pausing at intervals so that the groups can mark the extra information on their maps, or if pupils need to see the clues, show the first slide of **Resource 1.5**. They will then need to review their decisions about the best place for base camp. You could if you wish move one person from each group into a different group at this point to justify their decision.

Differentiation

If pupils need help in identifying and using the map scale of 1 cm to 80 m, discuss and complete the table of information on the remaining slides of **Resource 1.5**.

If time allows, or if any groups quickly reach a sensible decision on where to position the base camp, ask them to do one of the supplementary problems on **Resource 1.6**.

Bring the whole class together to discuss and justify their decisions. Use **Resource 1.7**, a slide of the map including all the new features, to support the discussion. There is no single 'right place' for base camp but some decisions are likely to be better justified than others. Some factors to take into account are, for example, the distance to fresh water, communication opportunities, flat ground for erecting tents, suitable places for energy generators and for storing crates of provisions, safety, distance from the Log Inc's HQ and keeping undetected.

To round off, play **Resource 1.8**, a 45-second video clip. The advance group sets off through the dense forest to find Log Inc's HQ. Soon they realise they are being followed. But who is it?

Optional homework

Ask pupils either to complete work started in class or to do a remaining problem from **Resource 1.6**.

Solutions: Lesson 1

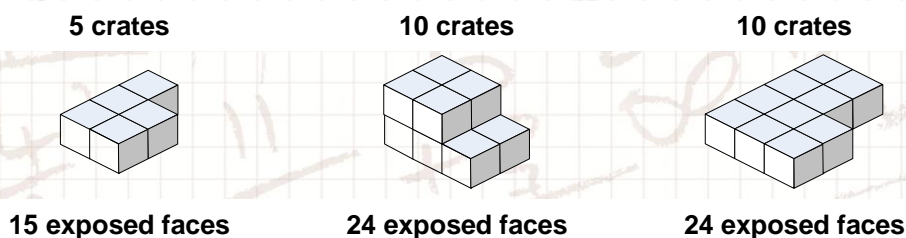
Main problem

There is no 'right answer' for the location of base camp but it is important that pupils can justify their decision in terms of the factors that affected it (for example, the distance to fresh water, communication opportunities, flat ground for erecting tents, a suitable place for energy generators and storage of crates of provisions, safety, distance from the Log Inc's headquarters and remaining undetected). They should record their final decision on the map as they will need this for the supplementary problem.

Supplementary or homework problems on Resource 1.6

- It helps if pupils have some interlocking cubes to work with. They will probably find that, if they discount the surface area in contact with the ground, keeping shapes flat but compact produces the smallest surface area and making tall thin towers produces the largest. Challenge them to explain why this is the case. Other questions to ask are:
 - Does the number of exposed square faces increase or decrease when you move one 'crate'?
 - What is the best way to count the exposed faces? (e.g. systematically round the sides in turn and then the faces on top)

The smallest surface area for 5 crates is 15 m^2 and for 10 crates is 24 m^2 .



- A spreadsheet would be useful to model figures for energy consumption.

This could result in a table as below. (This assumes that washing is done in the springs or river and that cooking is done over fires.)

Appliance	Watts)	Hours per day	kWh	No. of items	Total (kWh)
lamp	100	2	0.2	4	0.8
mobile phone charger	20	0.5	0.01	12	0.12
camera charger	40	0.5	0.02	4	0.08
laptop charger	60	1.5	0.09	12	1.08
TOTAL					2.08

- The energy produced by the generators is :

Solar panel: $1500/365 = 4.1 \text{ kWh per day}$

Wind turbine: $500/365 = 1.4 \text{ kWh per day}$

The team could manage with 2 wind turbines.

- After consideration the groups may decide, for example, to bring candles for lighting and fewer laptops to reduce their energy consumption to 1.4 kWh per day .