



Rangers

Mixing Chemicals: Waldo's Weedkillers

Lesson objective

Students demonstrate their skills reading and following instructions, measuring liquids and ratios, and working as a team member to perform a task associated with the role of a Ranger.

Lesson overview

Students mix a mock poison (prepared by the teacher) by following the instructions on the chemical label to treat a weed that has been found in the school grounds. Throughout the activity, students take on one of three roles: grounds person, safety officer or environmental officer.

Classroom organisation

Students work in small groups, and require sufficient space to complete the activities outlined below.

Resources

Pre-activity preparation

Printing

- Printed poison labels (see included Label document)

Other

- Glue
- Unlabelled bottles to make simulated poison bottles more than 100ml (one per group)
Your school's science area may be able to assist you in lending plastic bottles (check that they don't mind you attaching labels). Alternatively, use a non-food bottle thoroughly rinsed out, such as a detergent bottle.
(Preferably not cordial as students may be tempted to drink it and this would not model appropriate behaviour in this context)

Supplied in Kit

- Three pieces of butchers paper or A3 paper
- Water and food colouring (blue is recommended)

Activity

Printing

- Printed, double-sided worksheet - one per student



- ❑ Printed extension activity worksheet (student worksheet 2) on the classification of weeds: General Mixed Weed/Woody Weeds – one per group

Other

- ❑ Newspaper and plastic bags to dispose of containers at the end of the activity
- ❑ Several backpack sprayers (or something similar if available), or buckets (one per group)

Supplied in Kit

- ❑ A selection of measuring containers with various amounts (up to 100 ml) and graduations to enable measurement to the nearest 10 ml or smaller.
- ❑ Plastic disposable gloves

Preparation

1. Glue labels onto bottles
2. Add water and food colouring to bottles (blue is recommended)
3. Label each sheet of butcher's paper with one of the following titles per sheet: **Grounds Person Checklist**, **Safety Officer Checklist**, and **Environmental Officer Checklist**
4. Liaise with the school grounds person/agricultural department regarding an area of your school grounds to simulate the application of weedkiller

Lesson description

The time guides have been provided for this activity to ensure it is completed in 45 min and may be lengthened or shortened as required by the teacher.

Introduction (10 min)

1. Students form groups of 3-4 students (2 min)
2. Each student receives a worksheet (1 min)
3. Students read through the group task (2 min)

The Teacher (5 min)

1. Checks students understand the scenario
2. Shows students the area to which the weedkiller will be applied
3. Identifies the type of weed to be treated



4. Indicates the location of the weedkiller and backpack sprayers (or equivalent)
5. Explains the three key roles and asks students to allocate roles within their group

(If there is a limited number of backpack sprayers or poison bottles adjust the groups to fit the resources)

Activity (30 min)

1. Each student reads the Waldo's Weedkiller Application Guide on their worksheet and highlights any information they see relevant to their role (3-4 min)
2. Teacher may suggest: "You have three minutes to think of two questions / activities / outcomes that need to happen in relation to your role. For example if you're a Grounds Person, you will need to know what type of weed you will be treating"
3. Teacher then asks all Safety Officers to come together and make a common checklist on the A3 paper. Each Safety Officer then copies the common checklist onto the second page of their worksheet and returns to their group. The Environmental Officers and Grounds Persons also come together as above and make a list relevant to their activities. (5-6 min)
4. Give students a clear finishing time: "The activity needs to be completed by HH:MM" and write this on the board
5. Groups complete the task including clean up (20 min)

Evaluation (5 min)

1. Students reflect on how well the instructions were followed. Were there any deviations, if so, why?
2. Teacher provides feedback to the class about how they worked in their groups as a team and followed instructions. Teacher concludes the lesson by reinforcing the importance of working together and carefully reading and following directions on chemical labels for safety to self, others and the environment.

Optional activity

The student worksheet provides additional questions that students can do individually or in a group to further consolidate their reading comprehension and understanding of mixing rates.

Waldo's Weedkiller – **answers** to extension activities

1. What can you use this weedkiller for?

Waldo's Weedkiller kills weeds and unwanted grasses in private and public use situations. The types of weeds include general mixed weeds and woody weeds.



2. When is the best time to use a weed killer on your garden?

Apply when weeds are actively growing. For best results on perennial weeds treat after flowering. Treat woody leaves from flowering to leaf fall (Jan-May). DO NOT spray plants bearing edible berries.

3. When you apply the weedkiller, is it ok for the chemical to run off the leaves?

No.

4. What should you do if you accidentally apply the weedkiller to the wrong plant?

Hose with water immediately to reduce injury to plant.

5. What should you do when disposing of the empty container of Waldo's Weedkiller?

Dispose of empty container by wrapping in paper, placing in a plastic bag and putting in the garbage.

6. What types of weeds are treated at a rate of 12ml per 1L of water?

Woody weeds

7. How many litres of water would you add to 24 ml of Waldo's Weedkiller if you were treating woody weeds?

The rate for woody weeds is 12 ml per 1 L of water. We need to keep the amounts in proportion. To get 24ml we must double 12 ml ($12 \text{ ml} \times 2 = 24 \text{ ml}$). The water needs to be doubled as well ($1 \text{ L} \times 2 = 2 \text{ L}$).

You would need to use 2 L of water with 24 ml of Waldo's Weedkiller when treating woody weeds.

8. You are applying Waldo's Weedkiller to a perennial weed. At what rate would you mix it?

5 ml per 1 L of water.

9. How many millilitres of Waldo's Weedkiller do you need to use when adding it to 5 litres of water? Show your answer on the measuring container provided

25 ml of Weedkiller.





Challenge

What amount of water would you need to add to two litres of Waldo's Weedkiller to ensure it was mixed correctly to treat general mixed weeds?

[For general mixed weeds, use the rate of 5 ml of Waldo's Weedkiller per 1 L of water (as written on the label). Start by calculating how many 5 ml portions of weed killer are required to make a 2 L quantity. Remember $2\text{ L} = 2000\text{ ml}$. So, $2000 \div 5\text{ ml} = 400$ which means we will be able to use 400 portions of 5 ml from 2 L of Waldo's Weedkiller.

Enlarge both amounts proportionately using the application rate of 5 ml of Waldo's Weedkiller per 1 L of water,

so, $5\text{ ml} \times 400 = 2000\text{ ml}$ (2 L) of Waldo's Weedkiller
and $1\text{ L} \times 400 = 400\text{ L}$ of water]

2 L of Waldo's Weedkiller requires 400 L of water and makes 402 L of the mixture.