NOTES TO TEACHERS

CHAPTER 11, TECH 1

Part 1

- It is a good idea to check on students' work once they reach Step 5 of "Procedure."
- When correcting students' layouts, you may find the Transparency "Answer key to TECH 1 – Parts 1 and 2" useful.

Part 2

Figure A:

- At Step 5, check to see if students are using the combination square correctly. You may refer them to page 65 in the Toolbox if they need help.

Figure B:

- Make sure students thoroughly understand the concepts of diameter and radius before they attempt to draw their circles.
- When correcting students' layouts, you may find the Transparency "Answer key to TECH 1 – Parts 1 and 2" useful.

Part 3

Figure C:

- Make sure students can distinguish between radius and diameter before drawing their circles.
- For students who are having trouble getting started on their figures, you might suggest that they start by drawing a 70 cm $\times$ 70 cm square with its centre at the intersection of the square's centre lines.
- When correcting students' layouts, you may find the Transparencies "Answer key to TECH 1 – Part 3, Figures C and D" and "Answer key to TECH 1 – Part 3, Figure E" useful.

CHAPTER 11, TECH 2

- When this lab is finished, make sure you have allowed for a space to store the prisms. They are the objects students will draw during TECH 3.
- When correcting layouts, you may find the Transparencies "Answer key to TECH 2 (isometric projection)" and "Answer key to TECH 2 (oblique projection)" useful.

CHAPTER 11, TECH 3

- This lab was designed for use with standard word processing software.
- If students have difficulty in becoming familiar with computer-aided drawing, it is suggested that the steps in Part 1 be done as a class by projecting the software window onto a screen.
- You may prefer to work at the master workstation in a computer lab, where you can demonstrate instructions step by step.
- When correcting layouts, you may find the Transparency "Answer key to TECH 3" useful.

CHAPTER 11, TECH 4

- You may check that the objects students create match their layouts by comparing the objects to models you have previously prepared yourself. Build these models from wood or polystyrene foam so that they will be as sturdy as possible.
- Isometric plotting paper is provided to help students lay out their objects in perspective before constructing them.

- It is preferable to choose modelling clay that does not harden for the following reasons:
  - It is easily worked; students may use moulds to shape blocks.
  - It is reusable and has a long shelf life.
  - It is inexpensive.
  - It can be reshaped; students may correct their mistakes.
- You may replace modelling clay with a block of soap since soap is quite easy to cut with a retractable utility knife. On the other hand, inexact measurements cannot be corrected and the blade may leave nicks in the soap. Also, soap residue can make the lab floor very slippery. You can help to prevent accidents by providing table coverings and several brooms.
- Polystyrene foam is a third option because it is fairly easy to work with. For this lab, a dense, thick foam is best. There are two drawbacks to polystyrene foam, however; it is not recyclable and is a major pollutant.
- Advise your students to choose wooden dowel of 10 mm (3/8 inch) Ø that has already been sharpened to a point at one end for making holes in objects A and B.
- In order to visualize objects in this lab in three dimensions, orthogonal projections are included in the answer key for pages 25–27.

CHAPTER 11, TECH 5

- Doorknobs were chosen for this lab because they are lightweight and easy to take apart and reassemble.
- Instead of buying doorknobs, you may be able to find some at scrap yards or at school.
- Try to avoid doorknobs with locks. These will be harder to portray in a layout.
- Make sure you stress that students need to dismantle and reassemble doorknobs with great care: parts on these objects are easily damaged.

CHAPTER 11, TECH 6

- In order to achieve the same results as those shown in the answer key, you will need a hex nut of standard dimensions.

CHAPTER 11, TECH 7

- If the mitre boxes for your lab are different from the one shown for this activity, draw the model you have.
- To enrich this activity, you may ask students to create a multiview projection of the mitre box and do the dimensioning themselves.
- Questions 3 and 4 in "Reflecting on your observations" focus on tolerance, a concept that is not included in the Science and Technology program for First Year of Secondary Cycle Two; you will find it in First Year of Secondary Cycle Two's Applied Science and Technology program.

CHAPTER 11, TECH 8

- Ask students to bring in egg cartons from home. So that each student isn't required to supply multiple cartons, you may have students work in teams of four; in this way, each student will need to provide only one carton for the team.
- Students may find it difficult to picture sectional views. To help them, try doing the first sectional view as a class.
- You may ask students who are skilled at technical drawing to create their own layouts of their sectional views.

CHAPTER 11, TECH 9

- Drawing schematic diagrams may result in varying images for one and the same object. This is why you may choose one of several approaches to creating design plans and technical diagrams for the paper punch. The diagrams provided in this lab should allow students to become familiar with the conventional symbols for drawing schematic diagrams.
- Answers may differ from those provided in the answer key depending on the model of paper punch you choose for this lab.
- You may suggest that students who are more at ease with this type of drawing create their own design plans and technical diagrams rather than filling in those provided.
- Students will need to have mastered the following concepts (set out in the Science and Technology program for Secondary Cycle One) in order to accomplish this lab's tasks:
  – types of motion
  – basic mechanical functions (links, guides)
  – motion transmission and transformation mechanisms

  If needed, you may do support activities related to these concepts (see "Support activities, Cycle One"): these should help to re-activate students' skills. You may also find pages 383–394 and pages 396–398 in the *Observatory* student book useful.

CHAPTER 11, TECH 10

- Drawing schematic diagrams may result in varying images for one and the same object. This is why you may choose one of several approaches to creating design plans and technical diagrams for the manual eggbeater. The diagrams provided in this lab should allow students to become familiar with the conventional symbols for drawing schematic diagrams.
- Answers may differ from those provided in the answer key depending on the model of manual eggbeater you choose for this lab.
- You may suggest that students who are more at ease with this type of drawing create their own design plans and technical diagrams rather than filling in those provided.
- Students will need to have mastered the following concepts (set out in the Science and Technology program for Secondary Cycle One) in order to accomplish this lab's tasks:
  – types of motion
  – basic mechanical functions (links, guides)
  – motion transmission and transformation mechanisms

  If needed, you may do support activities related to these concepts (see "Support activities, Cycle One"): these should help to re-activate students' skills. You may also find pages 383–394 and pages 396–398 in the *Observatory* student book useful.

CHAPTER 12, TECH 11

- Make sure you choose very thin metal plates all the same thickness. Electrodes would be suitable for this lab, for example.
- You may use the same metal plates for succeeding classes, but if they are re-used many times, they may break more easily.

CHAPTER 12, TECH 12

- It is recommended that you choose metal plates of identical thickness. You may wish to obtain electrodes and cut them into the required squares.
- It is best to use fresh materials for each class. In this way, students will not be able to observe the results of preceding classes.
- To make an effective guide for the falling nail, make sure the plastic tube's inner diameter is slightly larger than the diameter of the nail head.

CHAPTER 12, TECH 13

- It is recommended that you choose metal plates of identical thickness. You may wish to obtain electrodes and cut them into the required squares.
- The classification of hardness of materials may vary depending on the condition of the materials you choose.
- To ensure a fibreboard panel of optimum hardness, choose high-density fibreboard (HDF). Or, you may opt for a sample of floating flooring.

CHAPTER 12, TECH 14

- You may ask each student to bring in a certain number of plastic objects displaying recycling codes. You may group all these objects, then mix and number them to prepare 10 objects for each team.
- Polyvinyl chloride (PVC) is the most difficult type of plastic to find because it is seldom used for packaging or food containers. You may be able to find it, however, in containers for chocolate spread, honey and spices. Although PVC is mostly used in certain types of cladding for houses, plumbing pipes, window frames, etc., these products rarely display recycling codes.
- This lab is an appropriate time to discuss recycling. Before you do so, research the recycling practices for each municipality served by your school.

CHAPTER 12, TECH 15

- To help students understand the concept of components, show them the table annexed to these notes "Appendix to TECH 15 – Components to study in technical objects." This table illustrates the components studied in this lab. It can be used to help students grasp what is expected of them.

CHAPTER 12, TECH 16

- It may be useful to set up workstations where you can group objects. This will reduce the number of objects that need to be brought in for this lab.
- You may choose objects other than those listed in "Materials." If you do, however, make sure that each new object contains the same type of link as the object it replaces.
- Make sure that eyeglasses used for this lab have mobile nose pads involving rotational motion around several axes.
- Make sure that your dimmer switch has a push button for turning on and off the electrical circuit. If it does not have this feature, students may be unable to detect the sliding rotating link.

CHAPTER 12, TECH 17

- Make sure the salad spinner has a crank mechanism and not a pull cord.
- Students will need to have mastered the following concepts (set out in the Science and Technology program for Secondary Cycle One) in order to accomplish this lab's tasks:
  – types of motion
  – mechanisms for motion transmission and motion transformation

  If needed, you may carry out support activities related to these concepts (see "Support activities, Cycle One"): these should help to re-activate students' skills. You may also find pages 383–394 and pages 396–398 in the *Observatory* student book useful.

CHAPTER 12, TECH 18

- Because there are several models of manual eggbeater, their gears may not all have the same number of teeth. If this is the case, results will vary.

CHAPTER 12, TECH 19

- Below are some suggestions for materials to test:
  - wood: dowel or stick
  - rubber: rubber tubing used in science labs
  - copper, aluminum, nickel chromium: electrical wires
  - porcelain: porcelain plate
  - glass: glass tubing used in science labs
- Encourage use of the switch. In this way, students will not leave the circuit closed for long periods. Opening the circuit decreases the risk of damage to circuit components.

CHAPTER 12, TECH 20

- For the wood, you may choose 1 in $\times$ 6 in pine.
- To reduce the number of errors, you may check the layouts done by students on the game board (after Step 13 for the game board manufacturing process sheet) and on the dowel (after Step 11 for the playing pieces manufacturing process sheet).
- You can avoid having students all doing the same step at the same time by asking some to begin with the game board while others start with the playing pieces. You also may ask some students to do Steps 23–24 (machining the game board) before they do Steps 21–22.
- Before the lab, set the pad on the belt/disc sander to 45°. For added safety, stress that students must use the proper side of the disc for creating bevelled edges.
- You may ask students who are quick workers to improve the aesthetics of their game board with paint or other products.
- Set up a few drill presses with 6-mm drill bits and set the depth stop to 10 mm for the holes in the game boards.

Rules for playing "Fox and Geese"

This game appears to have been invented in Europe during the Middle Ages.

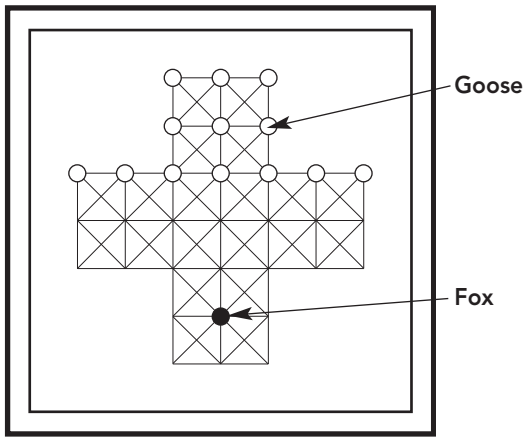
Game setup

1 game board and 14 playing pieces (1 black fox and 13 red geese).

Preparation

One player takes the geese and the other player takes the fox.
The playing pieces should be set out as shown below.

Start positions



Goals

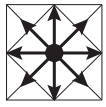
For the fox, the goal is to eat as many geese as possible without being surrounded by them.
For the geese, the goal is to succeed in surrounding the fox, hemming her in so that she has no avenue of escape.

Game sequence

The fox plays first, then each player takes a turn.

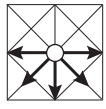
The fox can move in all eight directions.

Movement of fox



The geese cannot move backward. This means they can move in only five directions.

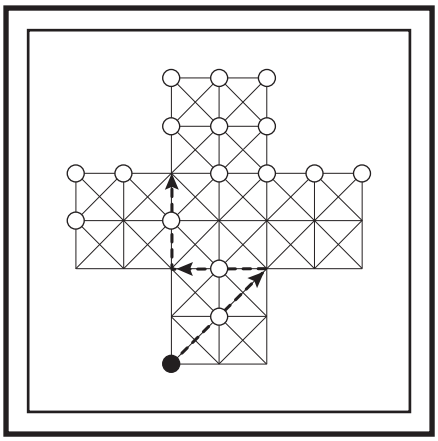
Movement of geese



The fox can eat a goose by jumping over it in a straight line (as in checkers). Once eaten, a goose is eliminated from the board.

The fox can string jumps together and eat more than one goose.

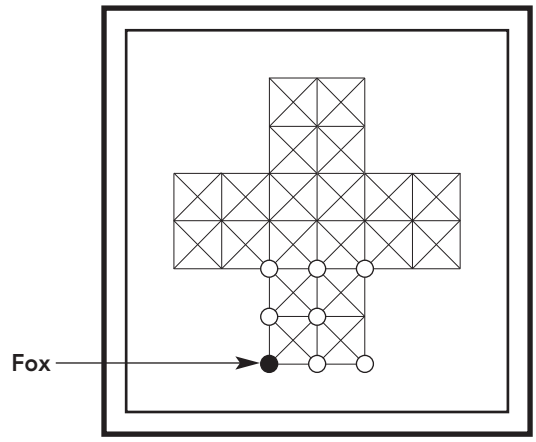
Example of fox jumps



End of game

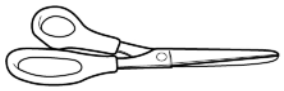
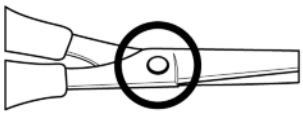
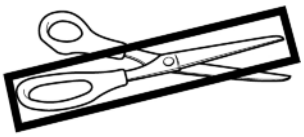
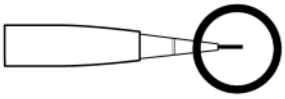
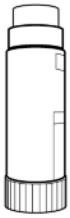
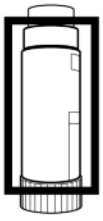
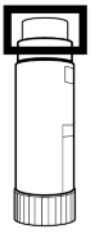
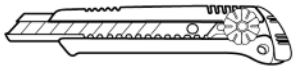
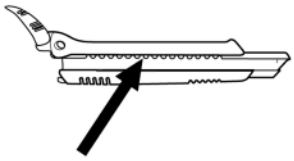
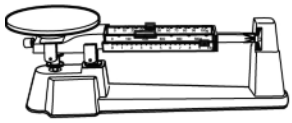
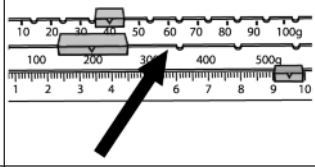
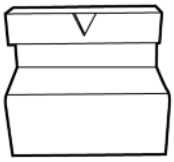
The fox wins when she succeeds in eating seven geese. The geese win if they succeed in hemming in the fox so she cannot move. In the example shown below, the geese win.

Example of end of game



Appendix to tech 15

Components to study in technical objects

Technical object	Illustration of object	Guide	Guided part
Scissors			
Mechanical pencil			
Glue stick			
Retractable utility knife			
Beam balance			
Hot glue gun