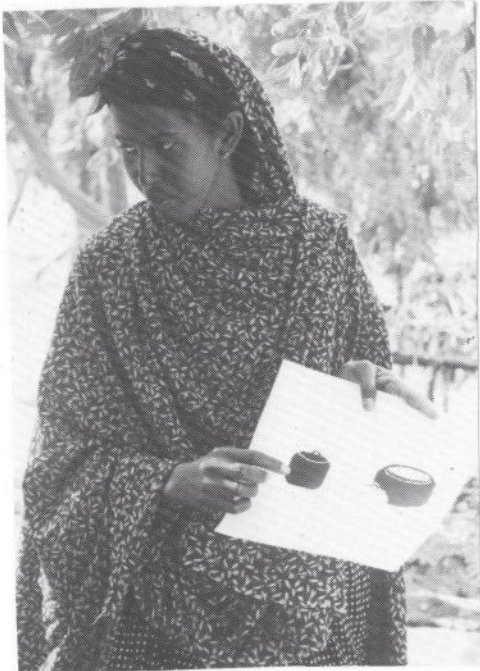
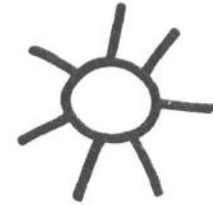


**SOLAR COOKERS INTERNATIONAL
TRAINERS MANUAL**



TEACHING SOLAR COOKING

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This Trainers Manual was developed by and for solar cooks who are trained according to Solar Cookers International Guidelines and Standards. This booklet is the East Africa version as of 1998, and continues to improve with continuing input from trainers and others.

This guide is based on three refugee projects in Kenya and Ethiopia and a national project in Zimbabwe as well as experience collected from hundreds of individuals and grassroots groups promoting solar cooking worldwide. Key partner agencies include the U.N. High Commission for Refugees (UNHCR), Lutheran World Federation, GTZ, a German technical development organization and the U.N. Educational, Scientific and Cultural Organization (UNESCO), the Development Technology Centre of the University of Zimbabwe, the Hlekweni Training Centre, the Epworth Grassroots Women's Group, and the Ministry of Transportation and Energy in Zimbabwe. These were supported by private donations and grants from the Setzer Foundation, the Humanitarian Services of the Church of Jesus Christ of Latter Day Saints, the Jules and Doris Stein Foundation, Atkinson Foundation, The Richard and Rhoda Goldman Fund, Alternative Gifts International, Cottonwood Foundation, UNHCR and UNESCO. In these projects women from Sudan, Somalia, Ethiopia, Congo, Uganda, Rwanda, Burundi, and Zimbabwe have found solar cooking useful.

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ABOUT S.C.I.

Solar Cookers International (SCI) is an educational nonprofit, tax-exempt corporation founded in 1987 to spread solar cooking to benefit people and environments worldwide.

SCI is an international promotes information exchange through conferences and publications, develops educational materials and teaching tools, promotes research, provides consultation, and conducts occasional, demonstration field projects. For more information contact:

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SOLAR COOKING

Trainers Manual

I. Solar cooking basics

- 1. Why solar cook?**
- 2. What you need**
- 3. Differences in food preparation and Pasteurizing water and milk**
- 4. How to set up**
- 5. Differences in cooking time**
- 6. Other helpful ideas**

II. Learning exchanges to spread solar cooking

- 1. Workshop**
- 2. Home visit**
- 3. Group meeting**
- 4. Ongoing support**

III. How to make a cookit

IV. Recipes - from local solar cooks

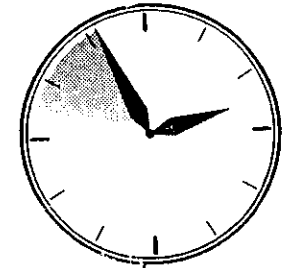
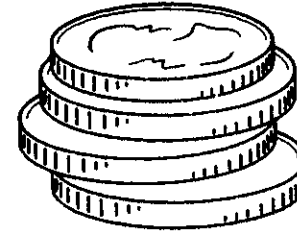
1. Solar cooking basics

1. Why Solar Cook?

1. IT SAVES MONEY AND TIME

Sunshine is free. You need no other fuel when the sun is shining.

You need other fuel only for evenings, cloudy days and for warmth when weather is cold.



2. IT IS SAFER, HEALTHIER

When you solar cook there is **no fire** to cause burns or blow out of control.

Solar cooking **reduces smoke** which causes eye and lung disease

No fuel is needed to Pasteurize milk and water to **reduce water-borne diseases**.

Gentle cooking temperatures **save vitamins and flavor**.

Little or no fuel is needed to cook nutritious foods that require long hours of cooking (beans, maize).



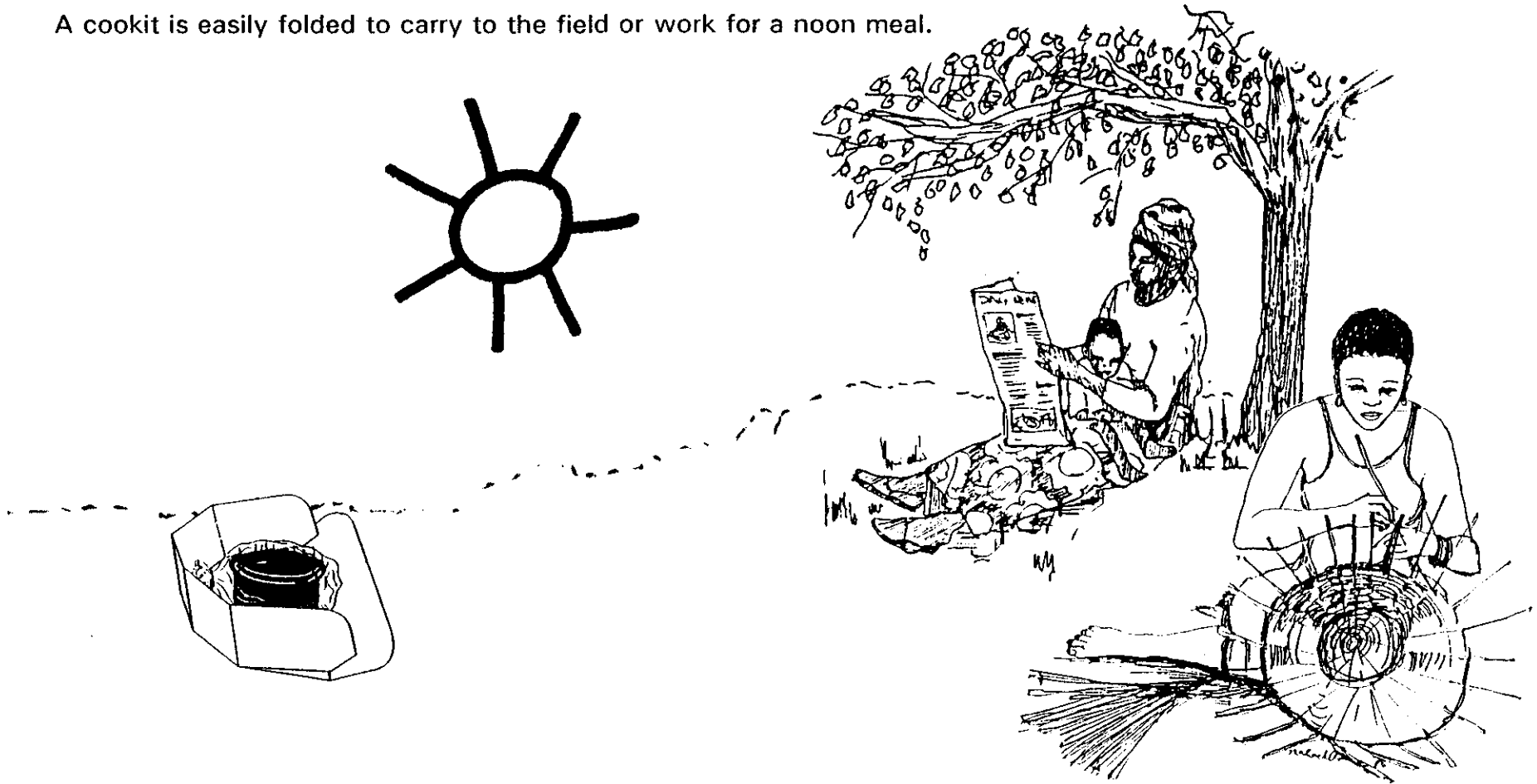
3. IT IS CONVENIENT AND CLEAN

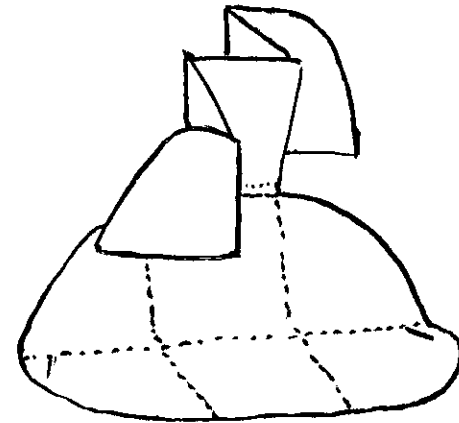
When solar cooking you don't need to stir or watch - food doesn't burn.

You don't need to make and tend a fire on hot, sunny days.

There is no soot on pots, on clothes, or in the kitchen. Pots are easy to clean, inside and out.

A cookit is easily folded to carry to the field or work for a noon meal.



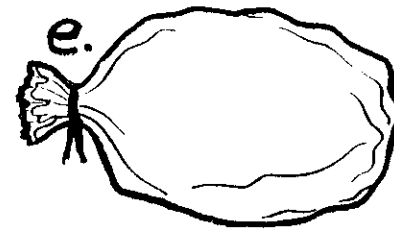
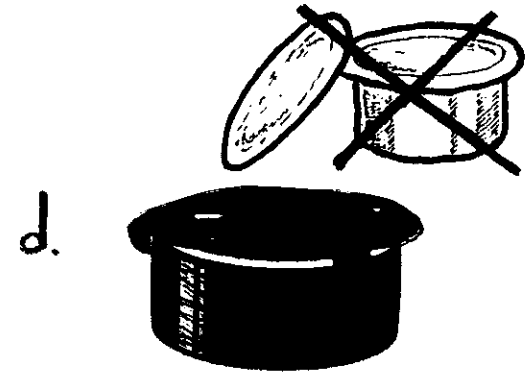
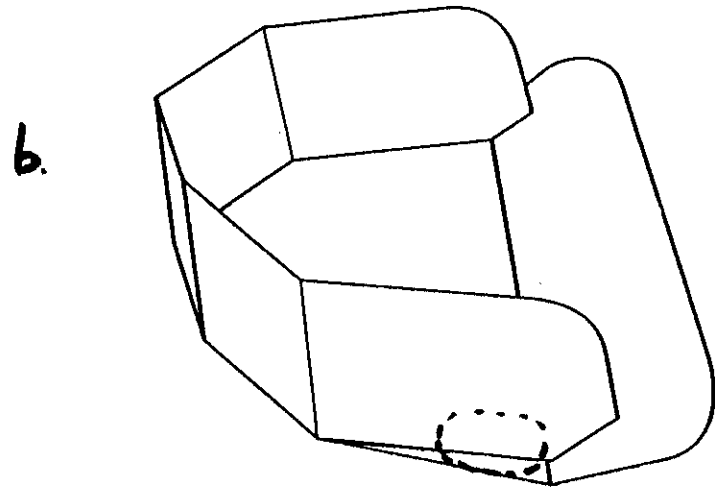
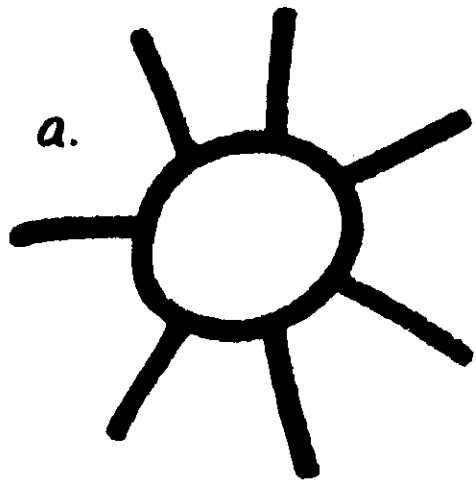


1. Solar Cooking Basics for solar cookit.

2. What you need

- a. **A sunny place**
free from wind and shadows
where food will be safe.
- b. **A reflector**
to catch extra sunlight
- c. **Three big stones**
to hold the reflector on windy days.
- d. **A black pot with black lid**
to absorb sunlight and heat food
- e. **A clear plastic bag and**
- f. **A pot rest***
to hold heat around pot.

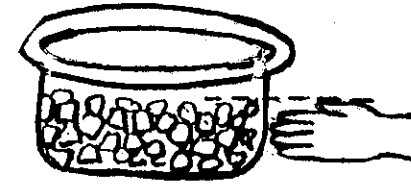
* Make a ring 2-3 cm thick by twisting two old cloths or plastic bags to make a short rope, then tie the two ends together.



1. Solar Cooking Basics (cont.)

3. Differences in food preparation

- a. Food in the pot should be no deeper than a **hand-width**.
Wide, shallow pots are best.



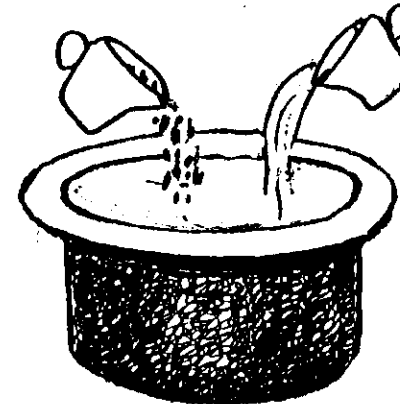
- b. **Dried grains, beans, rice:**

Heat together with water and cook without stirring.

Rice: Put 1 measure of water
to 1 measure of rice.

Maiz meal: Put 2 measures
or less of water
to 1 measure of maiz meal.

Presoaked beans: Add water so
it is just a little above the beans.

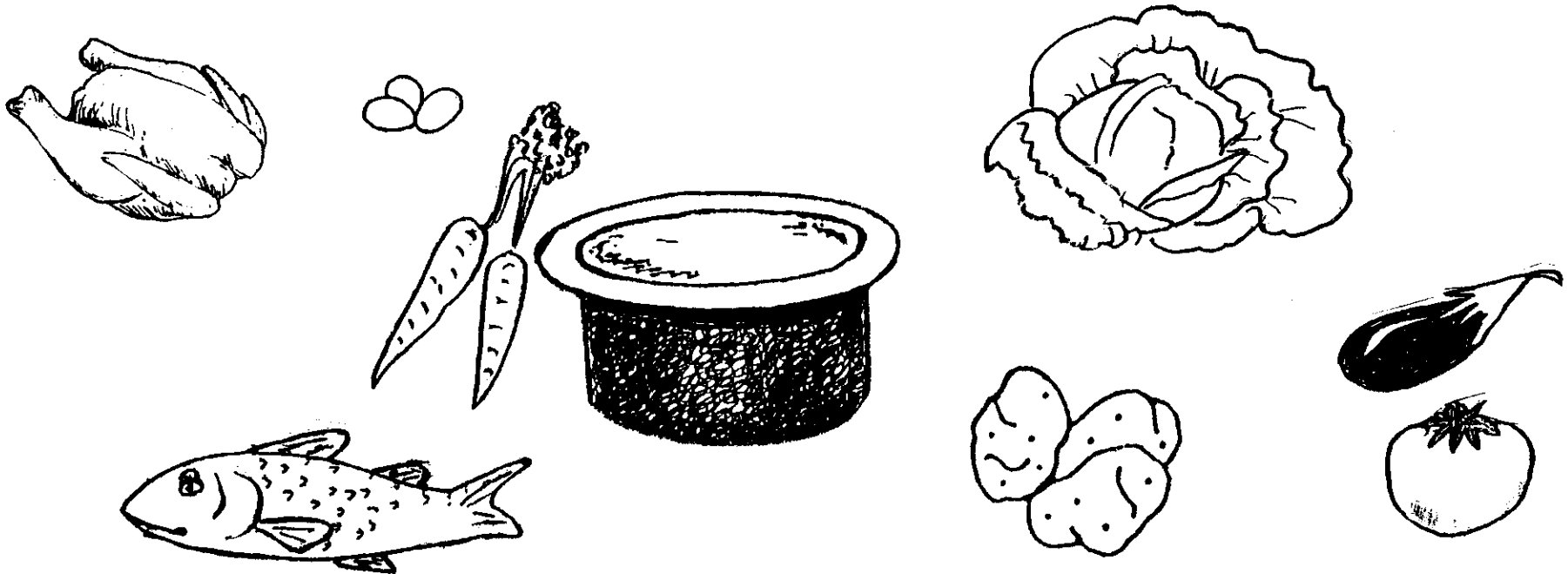


- c. **Pastas:** Heat water first, then add pasta and return to solar cooker for about 15 minutes

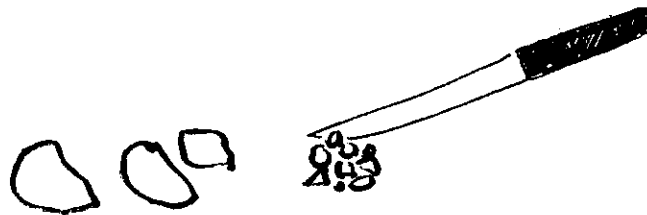
1. Basics, 3. Differences in food preparation (cont.)

d. Fresh meats and vegetables:

Add little or no water. They cook in their own juices.



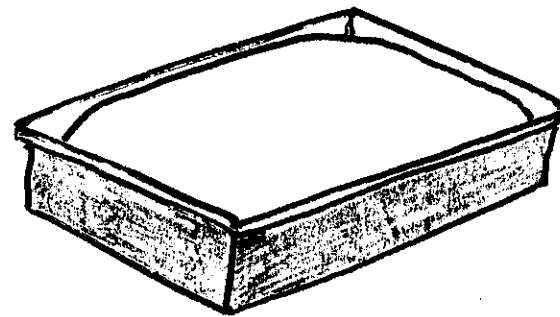
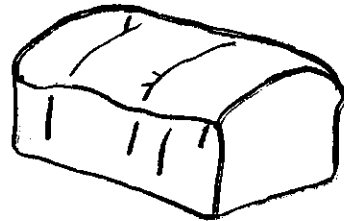
Foods cook faster
if cut into small pieces.



1. Basics, 3. Differences in food preparation (cont.)

e. Breads and cakes:

Bake in dark, covered pots **the middle of day** when the sun is strongest -- from 2 hours before midday to 2 hours past midday.



Chewy desserts such as cookies come out better than crispy ones.

Solar cooking is **NOT** good for flat breads (tortillas, chapatis, njera, pan cakes, etc.) or deep-fried foods or pastries with bottom crusts.

f. Tea: Use only half as many tea leaves.

1. Basics, 3. Differences in food preparation (cont.)

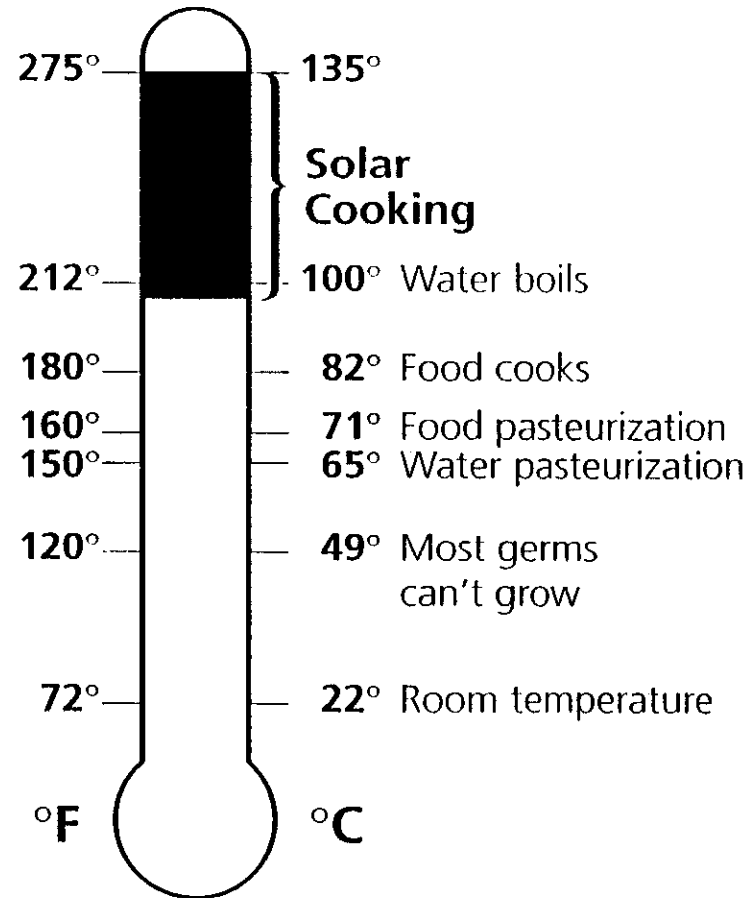
g. PASTEURIZING WATER AND MILK

Water and milk touched by animals and dirty hands can spread diarrhea, cholera, TB, giardia, hepatitis, typhoid, and other diseases.

Heating water and milk in a solar cooker kills disease organisms.

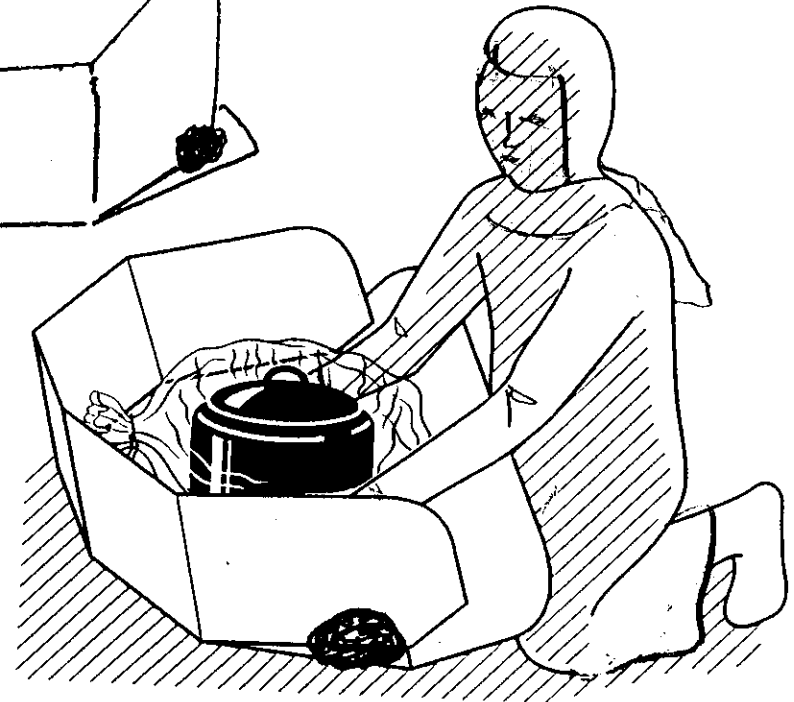
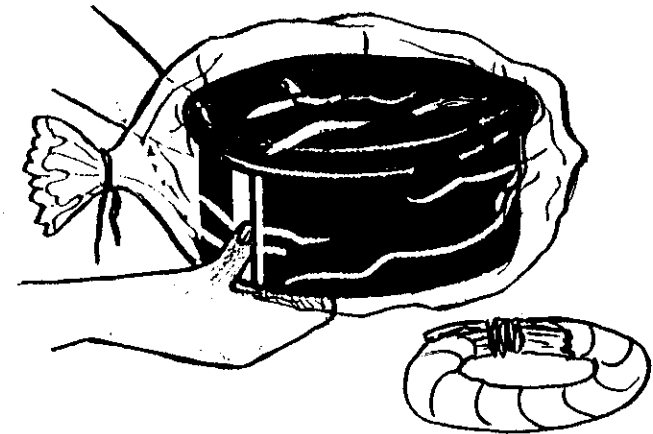
Heat 1 hour per liter. For example, heat 1 liter one hour, 2 liters two hours, 4 liters four hours in the middle of the day.

Flavor is better because the milk and water don't need to boil and milk won't burn.



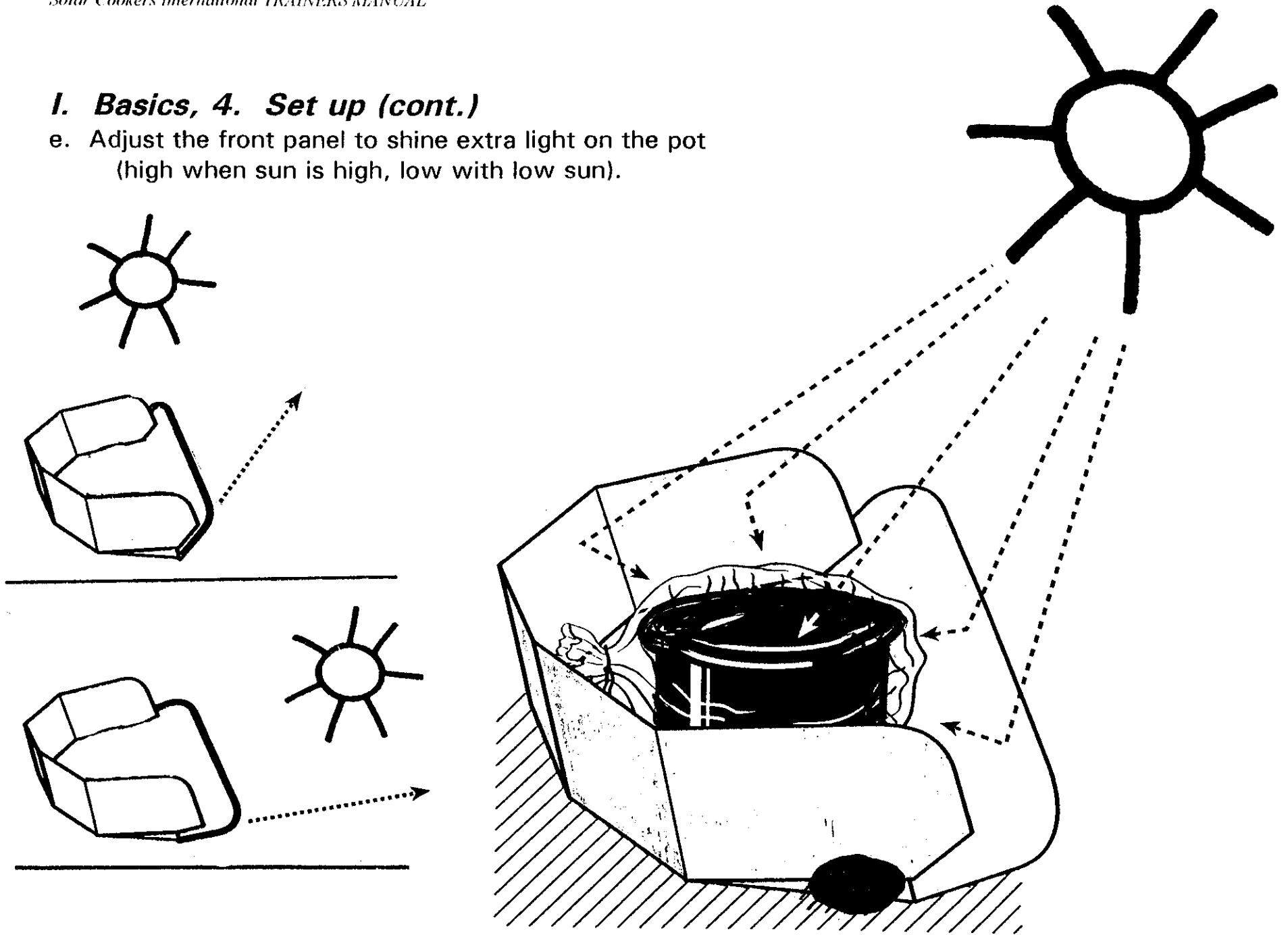
1. Basics, 4. Set up

- a. Put pot of food into a plastic bag and close bag with string or tuck open end under the pot. Leave a little air in the bag so the bag mostly doesn't touch the pot lid. Place on pot holder.
- b. Set up cookit and aim toward sun so shadows are behind the sides and under the front.
- c. Put a rocks behind each side wall and under the front reflector.
- d. Stand in front of reflector to block the sun and glare. Place pot and pot rest in the middle of the reflector.



I. Basics, 4. Set up (cont.)

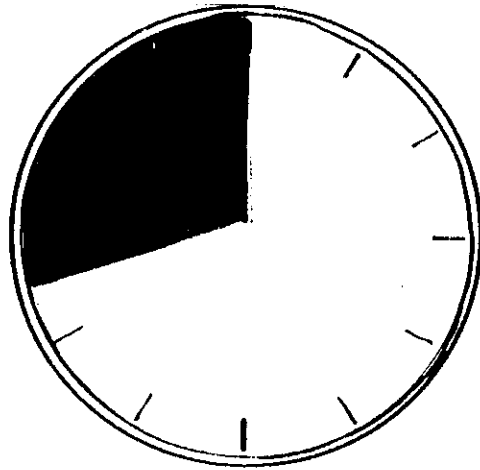
e. Adjust the front panel to shine extra light on the pot (high when sun is high, low with low sun).



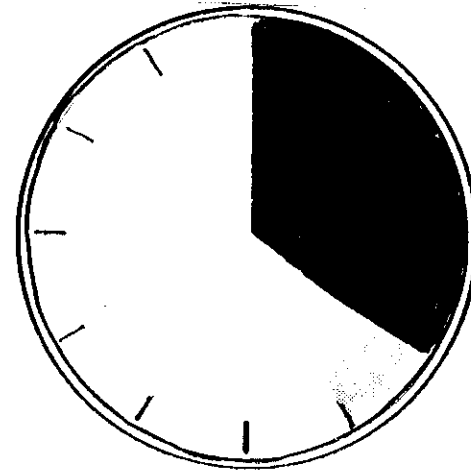
1. Basics, 5. Differences in cooking times

a. Slow, gentle cooking takes several hours. Plan ahead.

Start the noon meal in early morning.



Start the evening meal by early afternoon.



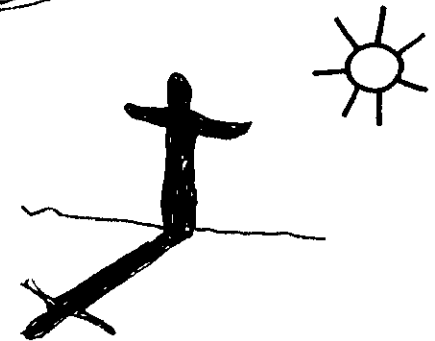
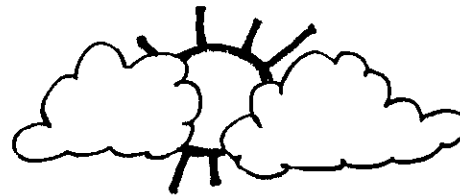
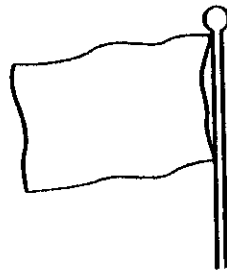
b. Cooking time is **faster in the middle of a hot, sunny day without wind**

Food cooks **slower** when:

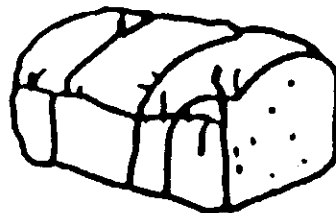
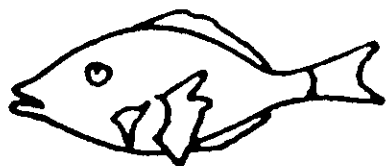
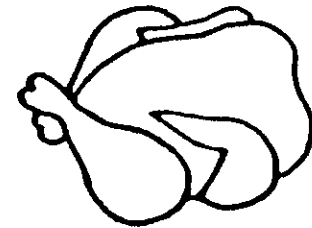
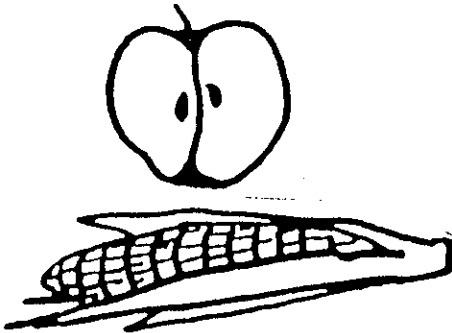
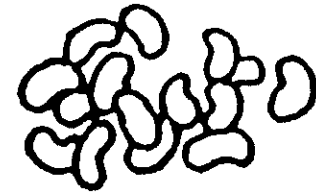
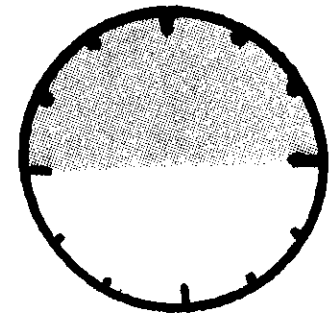
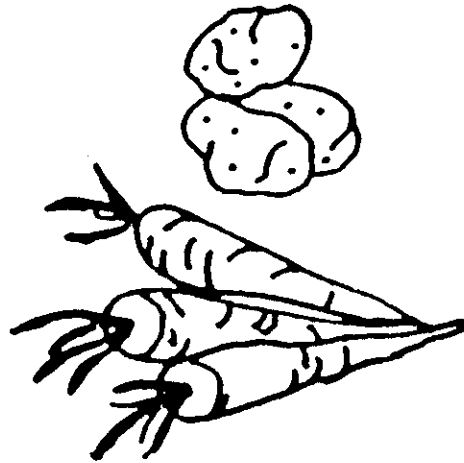
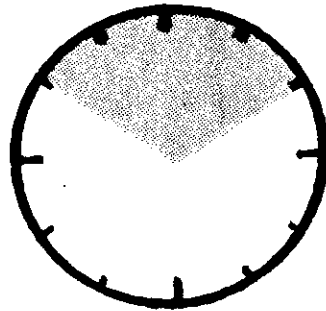
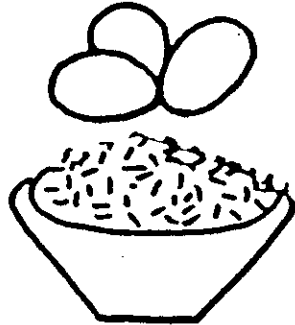
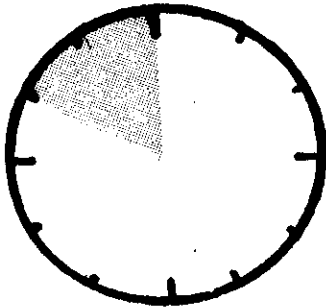
the **sun is low** in the sky, so **shadows are longer** than objects

clouds cover the sun part of the time

there is strong wind



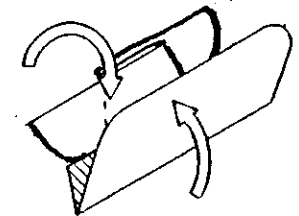
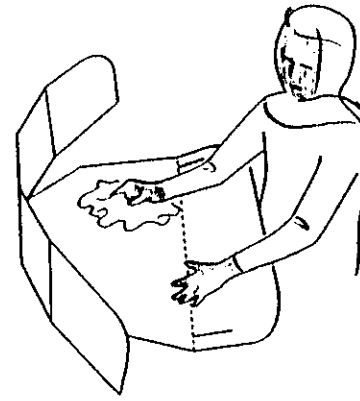
Sample cooking times for 4 kilos (9 pounds) of food on a sunny day:



1. Basics, 6. Other helpful ideas

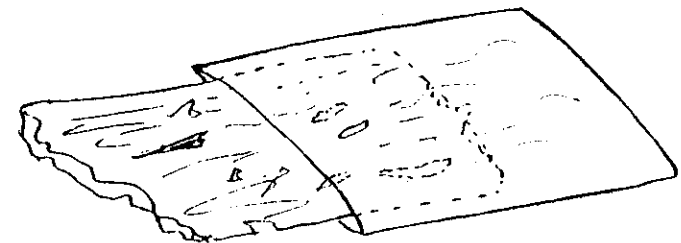
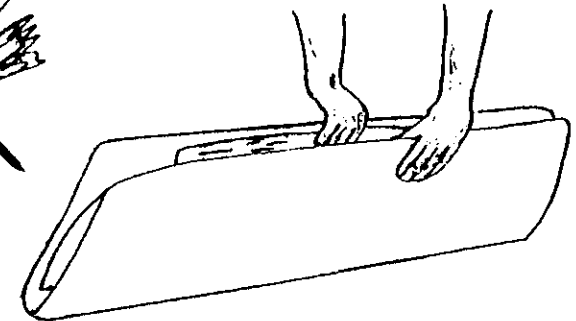
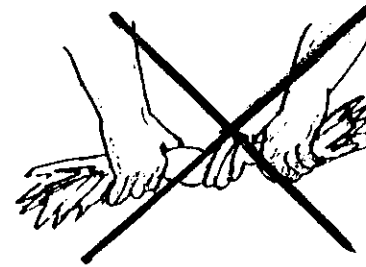
REFLECTOR

- a. After use wipe reflector gently, fold flat.
- b. Store reflector in a safe place away from moisture and animals.
If it gets very wet, keep flat with shiny side down until it is dry so it keeps its shape.



PLASTIC BAG

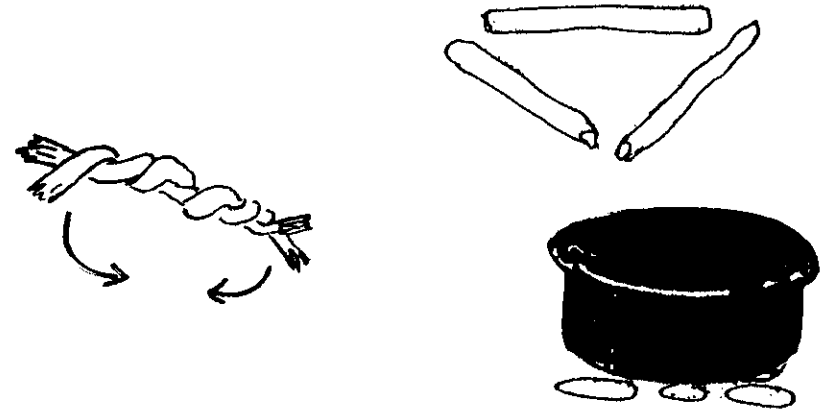
- c. After use, air-dry bags or wipe gently.
DO NOT WRING.
Store bags flat inside cooker.
Protect from sharp objects.
- d. The bags get brittle from sunlight and heat and will get small tears after several uses, but with care bags may be used about 10-15 times. Two torn bags, one inside the other, are as good as one new bag



I. Basics, 6. Other helpful ideas (cont.)

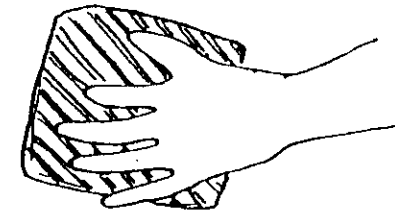
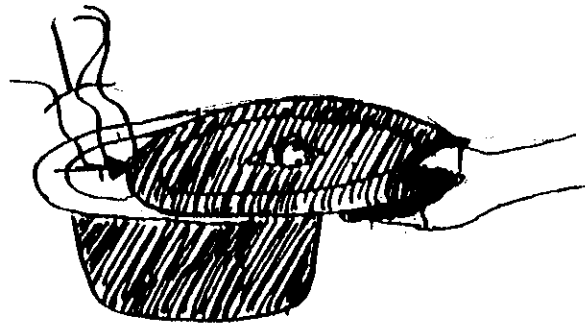
POT REST

- e. If you don't have cloth for a pot rest, use 3 small, smooth sticks or stones under the pot. Twist old, torn cooking bags into pot holders.



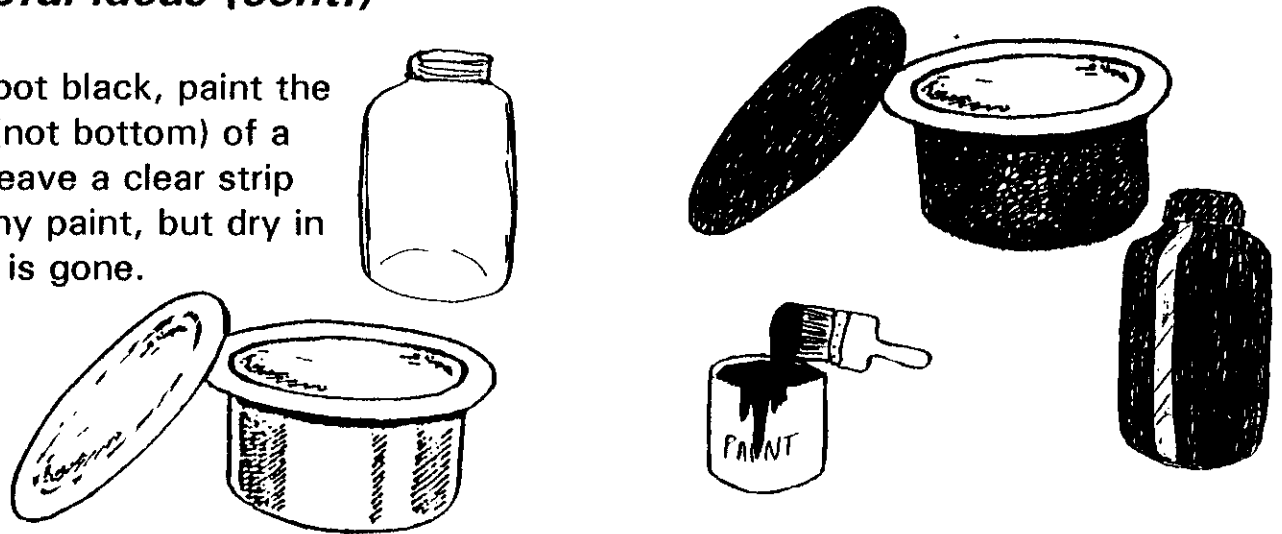
POT

- f. POTS GET HOT! Use a pot holder to protect your hands from hot pots. Avoid steam burns when checking food: slide lid toward you so steam goes away from you.

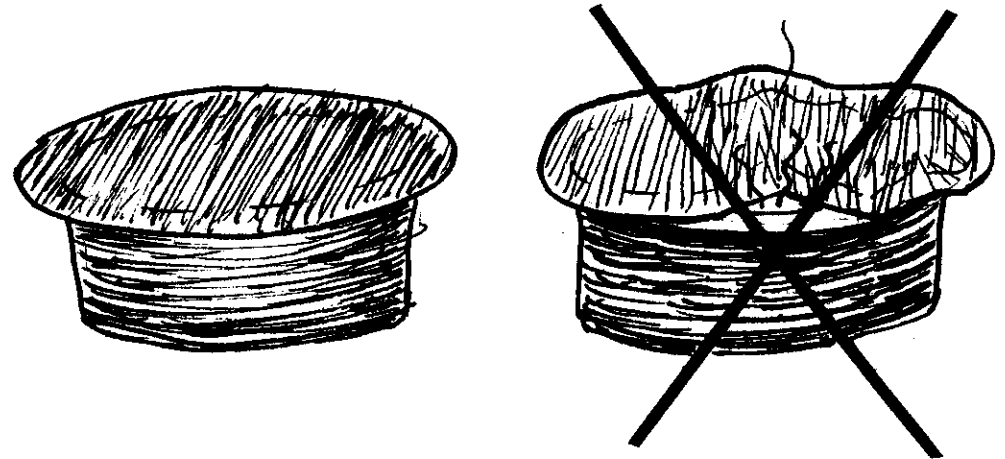


I. Basics, 6. Other helpful ideas (cont.)

- g. **PAINT A POT:** To make a pot black, paint the top of the lid and the sides (not bottom) of a pot or glass jar. With jars, leave a clear strip to see food cooking. Use any paint, but dry in the sun until the paint smell is gone.



- h. **TIGHT LID:** Food cooks faster when lid fits tight and pot is thin metal or glass. If lid is bent so heat escapes, try to flatten it.



- i. **WORRY ABOUT FOOD?** If you worry about leaving food unattended outside, here are some solutions by other solar cooks:
- one person watches several cookers
 - some people cook on a flat roof
 - some build a sunny secure enclosure.

II. Learning Exchanges

Solar cooking is best learned through four kinds of two-way learning exchanges:

Participative workshops,

home visits,

a group meeting one or two weeks later,

and ongoing feedback and encouragement.

Workshops - OUTLINE

A. Set up demonstration

B. Prepare food

(These are done before introductions to teach the importance of starting early.)

C. Introductions

D. Cover main points

1. Why solar cook?
2. What you need and
3. Differences in food preparation for solar cooking
4. How to set up

E. Sample food or tea

LUNCH BREAK

F. Fill in workshop form, asking each: name, cooking fuels used now, goal for solar cooking

G. Cover other main points

5. Differences in time it takes to cook foods
6. Other helpful ideas

H. Review

I. Discuss possible problems and home visits, and set time and place for next group meeting,

J. Closing - Share goals, distribute supplies, and celebrate

Workshops - PREPARATIONS

Participants bring:

- A reason to try solar cooking
- A willingness to actively participate
- Traditional cooking experience to compare with solar cooking
- Leadership skills to be nurtured.

Trainers bring :

- Solar cooking experience and enthusiasm
- Skills to draw out others' questions and experience
- The supplies:** Use local foods and materials as much as possible.

Cover each important point at least three times during the workshop - explain, later ask questions to review, and before ending, review all points again by having each participant explain at least one diagram to the others.

Workshops - PREPARATIONS (cont.)

SITE: Find a quiet, pleasant **site** with both **sunny** and **shady** areas.

Schedule times and locations convenient to women.

Arrange translators and child care if needed.

PARTICIPANTS: Recruit 8-15 cooks from the **same neighborhood**.

Describe the workshop (usually 1 day), home visit and half-day meeting a week later.

Ask each to bring a cup and eating utensils for their own use.

SUPPLIES: Be sure all supplies are at the workshop site.

- * For each family: a reflector, 2 bags, and a black pot (or paint to darken one)
- * Registration form and pencil
- * Supplies for food preparation: cups, large spoons, a sharp knife, basin or bowl, soap, cloths
- * 2 or 3 local foods, seasonings, and tea
- * Water
- * Diagrams + trainers manual

The workshop

A. Set up demonstration: As women arrive ask the first two to help set up a demo:

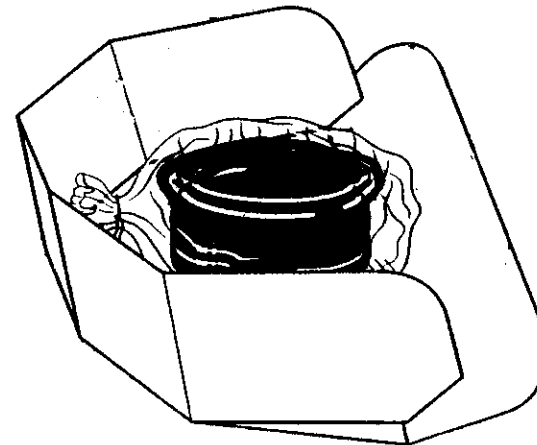
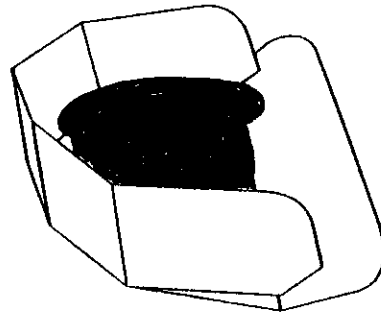
Teach them to set up two cookers

Fill 3 black pots with equal amounts of cool water (about 2 cups)

Put first black pot **on the ground** in the sun

Put the second inside a plastic bag OR in a reflector (NOT BOTH)

Put the third in a bag on a pot holder in a reflector.



B. Food preparation:

Assign others as they arrive to work in pairs to prepare the food for cooking.

Coach them on the specific differences for solar cooking for each food they prepare.

As each food is ready to cook, have the two who set up demos teach the others how to set up reflectors, put the pots on pot holders and adjust front reflector so there is a shadow underneath.

The workshop (cont.)

C. Introductions(in shaded area)

- Trainers introduce themselves and tell why they like to solar cook.
- Participants introduce themselves and tell why they want to try solar cooking.
- Trainers tell how the project started and the plans for the day.
- Decide length of noon break - 1 or 2 hours.
- Invite questions and comments.

D. Teach and discuss the basics #1 - 4

Basic #1 Why solar cook?

Ask each one to say why they want to learn how to solar cook. Make a list.

Add other reasons, using diagrams.

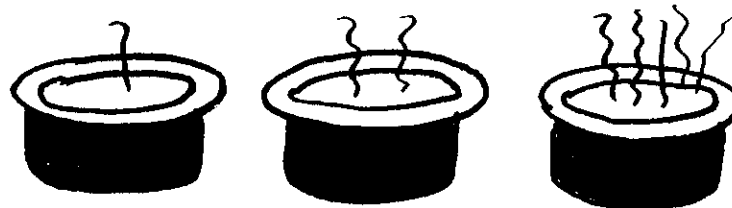
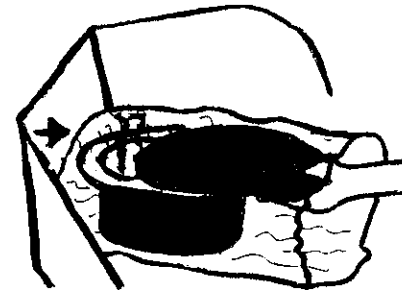
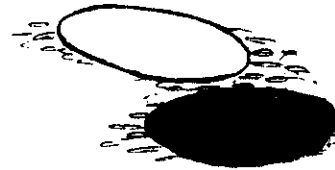
Basic #2 Setting up a solar cooker

Ask those you taught earlier (A above) to demonstrate how to set up a cookit with stones, pot, bag and pot rest.

The workshop (cont.)

Basic #2 What you need to solar cook

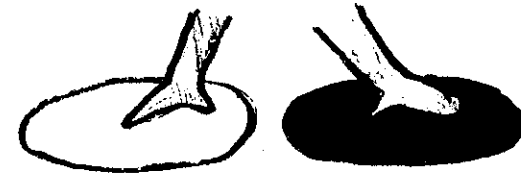
- Go outside to the 3 pots with water
- Place two lids on the ground nearby one shiny side up and the other black side up.
- Open one of the pots, showing how to avoid steam: pull lid toward you.
- Have others open the other two pots.
- Each person feels the water in the 3 pots to compare them.
Which is hottest?
Which is least hot?



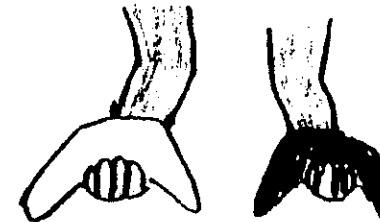
The workshop (cont.)

Basic #2 What you need (cont.)

- Now have each one touch the two lids, shiny and dark.
Ask them which is hotter and why?
(dark colors absorb sunlight).



- If it isn't windy, have a volunteer close her eyes and hold out her hands.
Put a white cloth on one hand, a black one on the other.
Ask her which feels warmer.
Then each of the others try it.



- **INSIDE DISCUSSION:** Move back to shaded area
Ask them to explain why some water was hotter than others.
- Use diagrams to review What you Need and the purpose of each.

Mid-morning break

REVIEW Basic # 2, What you Need: Ask them to explain the purpose of each, using diagrams
REVIEW Basic #4, Set up: Ask someone to demonstrate to the others

The workshop (cont.)

D. Teach and discuss the basics #1 - 4 (cont.)

#3 Basic Differences in food preparation:

- Ask the women who prepared the food in the morning to describe differences in preparation for solar cooking, compared to fire cooking.
- Others add any differences they have noticed.
- Use diagrams to cover other differences by food groups

E. Taste the results:

Check food or tea that is solar cooking. If it is ready each one samples it.

If it is not ready, continue cooking until after noon break.

NOON BREAK - 1 or 2 hours as decided by group

Sample food now if it was not ready before noon break.

Is it cooked?

Does it taste right? If not discuss how to adjust next time.

The workshop (cont.)

F. Fill in the Group Form for each woman as she returns:

- her name
- how much cooking fuel she uses per month (what kinds, how much, does she buy or gather?)
- what her goal is for solar cooking

The illustration shows a hand holding a pencil, writing on a grid form. The form contains handwritten text in a non-Latin script, likely Sinhala. At the top, it says 'UNACR/SCI - AISHA' and 'MASHRUWA SOLARKA'. Below that, there is a diagram of a solar cooker with various parts labeled: 'MAGACA', 'TOANAM', 'RANA', 'BACHA', 'BAYA', 'SANT', 'INLIT', 'CO', 'KUNU', 'LANTU'. The diagram is a simplified representation of a solar box cooker with a glass cover and a cooking pot inside. Below the diagram, there are several rows of empty grid lines for writing. At the bottom of the form, there is a section with the text 'TABABARAYAA SHA', 'LAKOLANKA GURU', 'DIBASTOYIRCA', 'XALKA', and 'WAYKALE'.

REVIEW Basic #3 Differences in food preparation: Have women each take a diagram and explain to the others.

Others add comments

Then trainers add comments.

The workshop (cont.)

G. Cover basics #5 - 6

Basic #5 Differences in cooking times - use diagrams

Ask questions to check women's understanding, e.g. "Will cooking be faster or slower if---."

Basic #6 Other helpful ideas - Discuss, using diagrams

REVIEW all Basics:

#1. Ask 2 people to do a short pantomime: One acts the work needed to gather, carry and cut wood, start a fire, keep it going, watch and stir the food, and cough from the smoke. The other, a solar cook, sits and smiles while the food cooks.

#2. - 6. Participants take turns explaining a diagram.

H. Wrap - up:

- Encourage and discuss ideas and opinions, including possible problems with solar cooking
- Discuss home visits
- Set time and place for a group meeting. Invite each to bring new foods to try solar cooking then.
- Ask each to try solar cooking 4 foods and to report their families' opinions at the group meeting.

11. Closing:

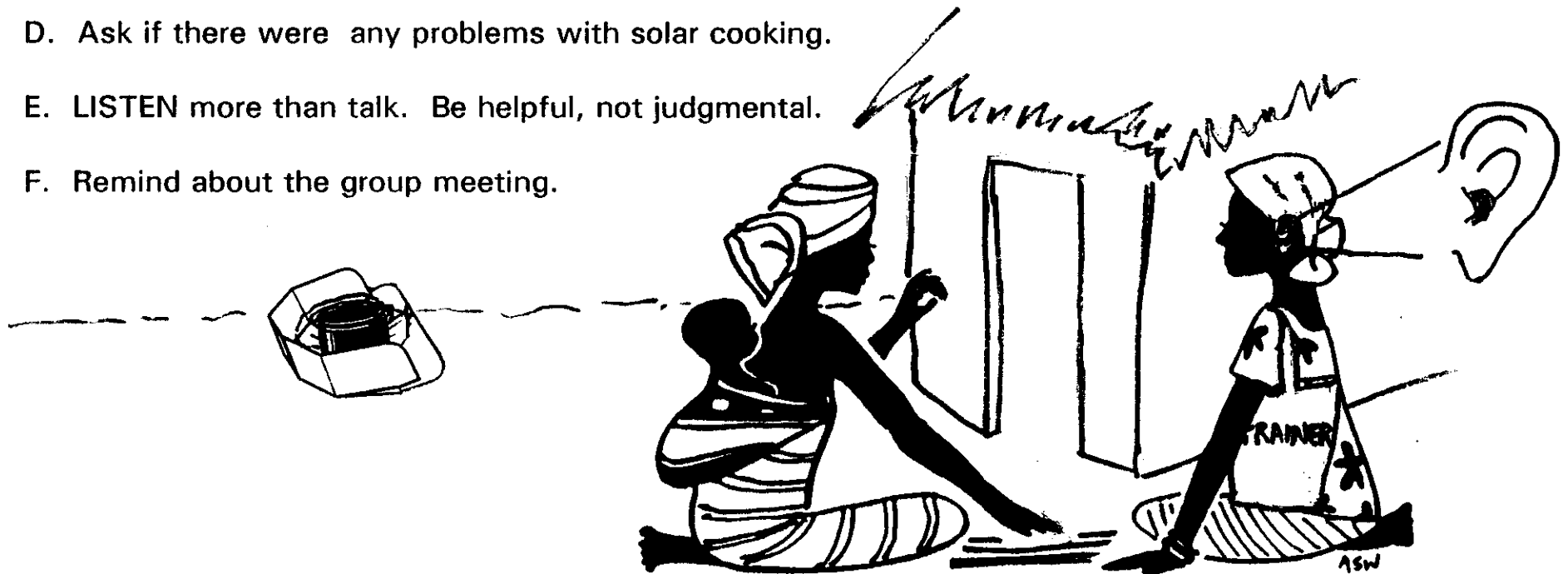
- Ask each to tell her goals for solar cooking at home (e.g. save money, save work, save time)
- Present to each a reflector and 2 plastic bags (and a black pot with lid?) Celebrate with a song.

II. Learning exchanges (cont.)

2. Home visits

A few days after the workshop a trainer visits each home to:

- A. Check there is a good place to solar cook - no shade, protected from wind, no worry about food security
- B. Record what foods each has tried.
- C. Ask, "What did the family say about the solar cooked food?"
- D. Ask if there were any problems with solar cooking.
- E. LISTEN more than talk. Be helpful, not judgmental.
- F. Remind about the group meeting.



II. Learning exchanges (cont.)

3. Group meeting About one week after the workshop

- A. If women brought foods to solar cook, put them out.
- B. Have each tell what their families said about the solar cooked food.
- C. Discuss problems mentioned in home visits, and encourage group problem-solving.
- D. Review: Have individuals in the group explain diagrams to each other.
- E. Ask each to review his/her own goals for solar cooking. Do they still seem doable? What will they do to achieve their goals?
- F. Ask the group to decide whether to meet again.



II. Learning exchanges (cont.)

4. Ongoing support

New solar cooks need ongoing encouragement and a source of replacement supplies. Therefore, trainers also:

- Get, transport, and account for **supplies**.
- **Set an example:** solar cook frequently, including when away from home during the day for work.
- Arrange solar cooking **demos** in public gathering places to answer questions and recruit new people for workshops.
- Keep careful **records** of activities, observations and supplies.
- **Expect results:** meet with other trainers regularly to discuss observations and solve problems.

IV. HOW TO MAKE A SOLAR COOKIT

This size cooks one pot of food for 6 - 8 people. It folds flat to about 1/3 meter square. For larger families, make a larger cookers, or several this size.

Materials:

Carton board piece 0.9 x1.2 m (3x4 feet)

Aluminum foil to cover 1 side

Glue diluted 1:1 with water

Knife to cut cardboard

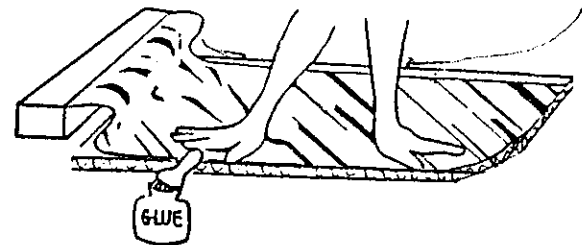
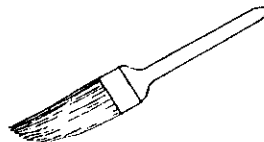
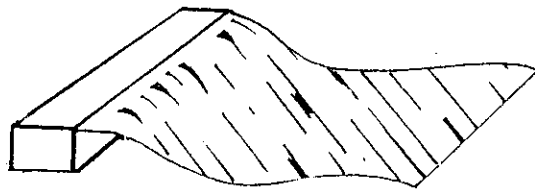
(optional: wax to melt and paint on back side to protect from moisture)

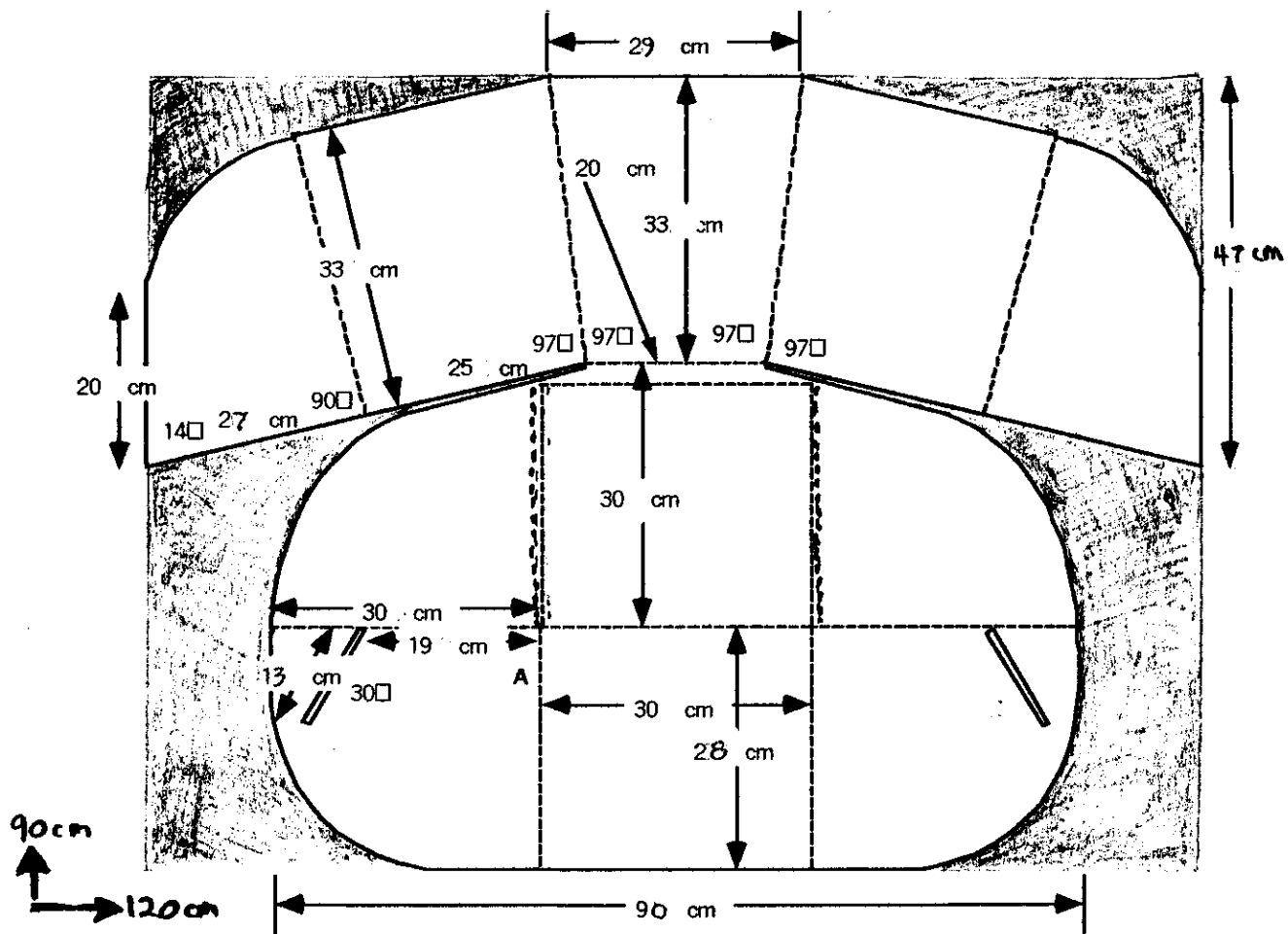
1. Cut and fold as shown.

Make the slots narrow so they fit snugly to hold up the front panel.

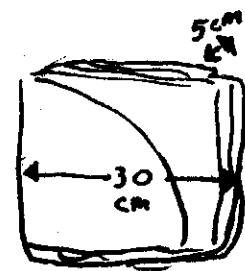
To make clean straight folds in carton board, make a crease along the line with a blunt edge such as a spoon handle, then fold against a firm straight edge.

2. Spread glue on aluminum foil and smooth onto one side of the carton board. Leave flat until dry.





----- fold lines



V. RECIPES - to be added in each region by local solar cooks

This Trainers Manual was developed by and for solar cooks who are trained according to Solar Cookers International Guidelines and Standards. This booklet is the East Africa version as of 1998, and continues to improve with continuing input from trainers and others.

This guide is based on three refugee projects in Kenya and Ethiopia and a national project in Zimbabwe as well as experience collected from hundreds of individuals and grassroots groups promoting solar cooking worldwide. Key partner agencies include the U.N. High Commission for Refugees (UNHCR), Lutheran World Federation, GTZ, a German technical development organization and the U.N. Educational, Scientific and Cultural Organization (UNESCO), the Development Technology Centre of the University of Zimbabwe, the Hlekweni Training Centre, the Epworth Grassroots Women's Group, and the Ministry of Transportation and Energy in Zimbabwe. These were supported by private donations and grants from the Setzer Foundation, the Humanitarian Services of the Church of Jesus Christ of Latter Day Saints, the Jules and Doris Stein Foundation, Atkinson Foundation, The Richard and Rhoda Goldman Fund, Alternative Gifts International, Cottonwood Foundation, UNHCR and UNESCO. In these projects women from Sudan, Somalia, Ethiopia, Congo, Uganda, Rwanda, Burundi, and Zimbabwe have found solar cooking useful.

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ABOUT S.C.I.

Solar Cookers International (SCI) is an educational nonprofit, tax-exempt corporation founded in 1987 to spread solar cooking to benefit people and environments worldwide.

SCI is an international promotes information exchange through conferences and publications, develops educational materials and teaching tools, promotes research, provides consultation, and conducts occasional, demonstration field projects. For more information contact:

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