

Section F: FIRES AND COOKING WITH FIRE

- BY MING BERKA

FIRE SAFETY

Building a fire in the wilderness is a privilege which comes with responsibilities. Even when fires are permitted, you must take precautions not to inadvertently start a forest fire, or scar the landscape with unsightly evidence of old fires.

1. Use an existing fire pit where available but if there isn't one, or the existing fire pit is in an unsafe place:
 - Choose a spot 8' to 10' from low hanging branches and nearby bushes. If there is a strong wind, build the fire even farther from combustible materials / branches.
 - Build a fire on top of gravel or dirt. If that isn't possible, clear the area of combustible debris such as sticks, grass or moss
 - Don't build a fire against a log.
2. Build a fire-ring out of rocks (if possible) to keep the fire contained. Keep the fire less than 20 cm across and 20 cm high.
3. Tie hair back and keep scarves / ponchos from dangling near the fire. Watch out for sparks.
4. Don't allow anyone to fool around with fire, such as pointing a burning stick at someone. No running or jostling near the fire.
5. Don't put your shoes on the fire ring. By the time you feel the heat, the bottom / soles of your shoes could be ruined.
6. Always have a pail of water beside a fire. One bucket of water may not be enough to extinguish a fire, but it may keep it from going totally out of control.
7. Never use water on grease fires so keep a bucket of sand, a box of baking soda or salt near the cooking area to smother the flames. You can also smother the fire with a pot lid.
8. Use pot holders that are heat resistant on all sides (e.g. silicone mitts). Many household oven mitts are heat resistant only on one side, and the other side is made of flammable material.
9. Make sure the pots and pans are level and steady. Greasy foods that spill over can cause big flare-ups.
10. Never use liquid fire starters, especially on a fire that seems to have died down, as a hidden spark can cause a big flare-up.
11. If a person is on fire, pour water on them, and /or smother the fire with a blanket. If there's nothing to smother the fire with, get the person to roll on the ground.

BUILDING A FIRE

For a fire to ignite and then continue to burn, it needs:

- A spark = from a match, a lighter, magnifying glass, etc.
- Fuel = dry leaves, dry seaweed, various sizes of wood, dry animal dung, briquettes, etc.
- Air (Oxygen)

1. Before you light the match, gather enough fuel so the fire doesn't go out while you're looking for more fuel.
 - A. **Tinder** – a bundle (basketball size) of material that will catch on fire easily when the match is lit – dry leaves, moss or lichen, wood shavings, paper, cardboard, lint, old crayons, cotton balls and Vaseline, candle ends, home-made fire starters (see below), etc.
 - B. **Kindling** – split wood about the size of chopsticks or fingers, or up to 1" sticks from fallen branches
 - C. **Fuel** – from small sticks (about the size of 2 fingers) up to split logs and unsplit logs
2. Pile the pieces neatly up-wind from the fire (direction of wind → wood pile → fire) so that sparks aren't blown into the wood pile. If it's raining, you must keep the tinder and kindling dry or else the fire may not light or will not stay lit. Once the fire is burning well, even wood wet with rain will burn, but until then, keep all the firewood dry.
3. Place the tinder at the bottom and place the kindling loosely around in a tipi shape. If you're using paper, bunch it up into a ball, as a flat sheet might fly out of the fire.
4. Flames travel up, so light the tinder from the bottom. Ensure the kindling is placed loosely around the tinder so that the fire has lots of air. When the fire is lit, feed it with more kindling and then small pieces of wood until the fire is burning on its own.
5. A fan (cardboard or some newspaper) is very useful to add oxygen and help the flames to spread, especially when the wood is not very dry. Fan gently when the fire is just starting, but fan more vigorously when the fire needs more oxygen.
6. Never leave a fire unattended when it is burning or when it has died down but the wood or coals are still smouldering. Stop putting new wood on the fire well before you want to leave. Keep pushing all the partially burned pieces together so that all the pieces will be burned up.
7. If you cannot wait for all the coals to turn to ash, sprinkle water on the fire to cool it off first. Pouring water on a hot fire might make rocks explode – which is why at Camp Olave's Friendship Circle, you are asked to use sand.
8. When the fire has cooled a bit, gently pour water on it until it is out completely. Check to be sure. You should be able to put your hand on the site for a minute.
9. For no trace camping, scatter the ashes, unburned pieces of wood, and rocks over a large area. Scatter some dirt over the campfire site.

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If a match doesn't stay lit

- Protect your flame from the wind. Stand with your back to the wind and / or use your other hand to protect the lit match. Use rocks as wind breaks.
- Kneel closer to the tinder. Shorten the distance between the match and the tinder.
- Try holding the match-head down a little to get the flame to burn the match stick itself first before trying to light the tinder.

If a fire does not burn well, maybe it's because

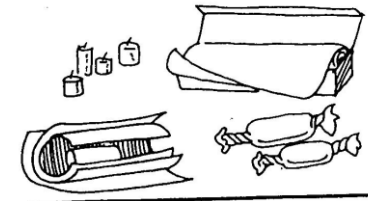
- You went from tinder to large pieces too fast. Larger pieces cannot be added until the smaller pieces have burned and created a small bed of coals. If paper is your only tinder, the flames may burn out without igniting the wood.
- The wood is too green. If a stick bends but doesn't snap in two, it hasn't been dead long enough.
- The wood is rotten. Rotten wood is crumbly and will produce a lot of smoke but not enough heat to cook with.
- The fire was built in a hollow in the ground where it doesn't get enough airflow.
- The wood is too far apart (not enough support for each other).

FIRE STARTERS

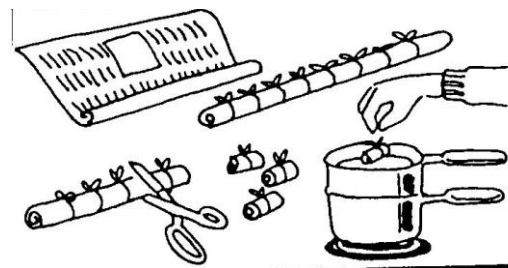
In addition to using natural fire starters like dry leaves, tiny twigs, moss, wood shavings, etc., you can also use home-made fire starters such as lint from dryers, wax, cotton balls caked with Vaseline, crayons, and ends of candles.

You can also make fire-starters (4 examples below) ahead of time to ensure that your fire always lights regardless of the weather. If using paraffin wax, never melt it directly on a source of heat. Make a double boiler out of a tin can (bend one side for make a pouring spout) and put it in a pot of water.

Candle kisses – Wrap a small piece of candle in wax paper squares or newspaper and twist the ends.



Newspaper roll – Roll a double page of newspaper tightly. Tie it firmly every 2" to 3" (5 to 8 cm) and cut between the ties. Dip pieces into melted paraffin wax. Let dry and pack into a plastic bag.



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Charcoal eggs – Put charcoal briquettes in each cardboard egg compartment and pour on some melted paraffin. Additional charcoal briquettes can be added when the fire is going well.



Fuzz stick – take a dry stick (e.g. cedar) and use a knife to whittle curly-cues all around it. The curly-cues catch on fire quickly and therefore the stick burns. Be sure to point the knife blade away from you.



ADD COLOUR TO YOUR FIRE

Make your campfire festive by adding some colourants. (But do not cook or roast marshmallows over these flames.)

Colour	Chemical
Carmin	Lithium Chloride
Orange	Calcium Chloride (a bleaching powder)
Yellowish Green	Borax
Blue	Copper Chloride
Purple	Potassium Chloride

Colour	Chemical
Red	Strontium Chloride
Yellow	Sodium Chloride (table salt) or Sodium Carbonate
Green	Copper Sulphate
Violet	3 parts Potassium Sulphate 1 part Potassium Nitrate (salt peter)
White	Magnesium Sulphate (Epsom Salt)

You can add colour by:

- Adding colourants onto the flames directly
- Soaking logs in an alcohol solution of colourants
- Soaking logs in a water solution of colourants and allowing it to dry
- Preparing pinecones, sawdust, or cork with added colourants

Adding Colourants to Pine Cones, Sawdust or Cork

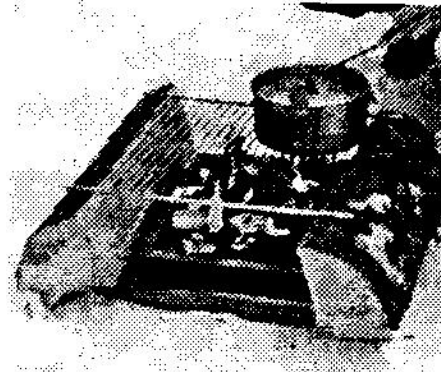
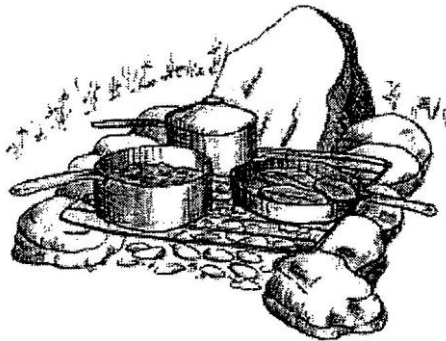
1. Pour water in a bucket and add colourants until you can't dissolve any more. (For sawdust, add some liquid glue so that pieces will stick together.)
2. Add the pinecones, sawdust or cork and mix well.
3. Let the mixture soak for several hours or over night.
4. Spread the pieces out to dry.
5. Store in a paper or mesh bag.

Or buy a bag of ready-mixed five colourants from Canadian Tire.

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FIRE PERIMETER

Build a U-shaped perimeter using large rocks, and/or green logs. Place them so that the cooking grill can rest easily on the rocks. If there is a lot of wind, put a flat rock at the back of the fire to cut the wind. The flat rock will also act as a chimney and draw the smoke up and away. If there are not enough big rocks, you can use green logs, but these must be kept wet.



SOAP THE POT

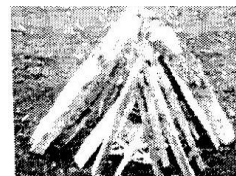
Smear liquid detergent all over the outside of the pot to prevent it from becoming permanently black and sooty after using it on an open fire. When washing the pot, some of the detergent will get washed off, so re-soap the pot before putting it on the fire again. If you put the pot into a pan of washing water, the black may come off the pan, and instantly make the wash water black (and stain the dish).

FIRES FOR COOKING

Almost any food that you can cook at home on the stove, in the oven, in the microwave oven, or on the BBQ can be done over a fire. The challenge of cooking at camp is not because you're cooking outdoors, but rather because of other factors, such as not being used to making food for a larger number of people or adverse conditions such as rain, lack of running water, absence of counter space, mosquitoes, etc.

To get the best results when using a fire to cook, here are some hints:

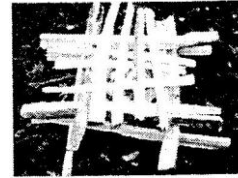
- **For quick heating** – place the wood in tipi style. Concentrate the heat where you need it. Replenish often with small sticks.



Tipi Style Fire

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- **For long burning fires** – Build a log cabin style fire. On top of a fire that's going well already, put several logs side by side, and then put the next layer perpendicular to the first layer. Keep adding layers of logs perpendicular to the previous layer.

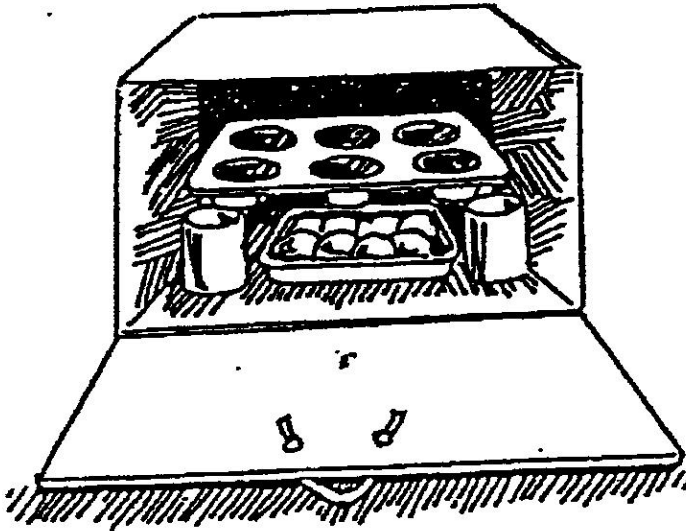


Log Cabin Style Fire

- **A fire that's still building up strength** (uneven heat due to flames) is best for boiling water or cooking foods with liquids which can be done in a pot on a grate or a pot suspended over the fire from a tripod. For example: soups, stews, vegetables, potatoes, and leftovers that can be reheated with steam.
- **When the fire is steady and hot**, it's best for frying and grilling. Watch your cooking. Food can go from raw to charred quite rapidly.
 - a. On a stick – hot dog wieners, shish-kebob, bannock, meat loaf on a stick (wrapped in foil)
 - b. On a grill – steaks, pork chops, chicken pieces, roasted vegetables (pepper, tomato, zucchini, etc.)
- **When the fire is down to coals**, it's best for toasting and cooking foil-wrapped food, burlap wrapped sandwiches, corn on the cob or bannock, and of course roasting marshmallows. See the next section for recipe ideas.



BOX OVEN



To make a box oven you will need:

- 1 strong, undamaged heavy duty cardboard box (e.g. copy paper box with a separate lid)
- 1 roll of 18" wide heavy duty tin foil
- Heat resistant duct tape.

1. Trim and discard the sides of the lid.
2. Orient the box so it's sitting on its side (landscape) for more oven space.
3. Tape the lid to the box to create a hinged door for the oven (either like a microwave door or an oven door— your preference).
4. Cover the outside of the box once with foil, with the shiny side of the foil facing the box.
5. Cover the inside of the box and the door with the shiny side facing into the box to reflect the heat. Repeat with a second layer. Be extra careful with corners. If a tear happens, make a patch with tin foil and/or with heat resistant duct tape. Any exposed parts, even pin-hole size, not well-covered with foil may flare up. For this reason, making a "door handle" is optional.
6. Overlap the foil at least 3 cm on the outside whenever possible so it can be taped on the outside with heat resistant duct tape.
7. Lean a log on the door to keep the door closed while baking.
8. Place 6 layers of tin foil (shiny side up) on the bottom of the box where the hot briquettes will sit. If food spills over, the top layer of foil can be replaced, making clean up easy. The extra layers of foil will also reduce heat loss to the ground.
9. Cleaned, repaired, and stored properly, a box oven can be used over and over again.

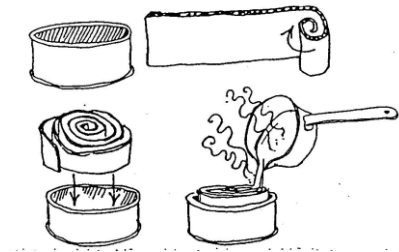
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HOW TO USE A BOX OVEN

To use a box oven you will need:

- 2 aluminium loaf or square pans – depending on the shape of your baking dish. Place a layer of sand (or kitty litter) in the pans to help prevent the briquettes from burning through the pans.
 - 4 tin cans of the same height, filled with a few pebbles or sand for stability
 - 1 rectangular cake rack – as large as possible that would fit inside the box oven
1. Place 10 to 12 briquettes in one pan and light them as you normally would (outside the box oven). **One briquette = about 40° F.** and since most recipes call for 350° you actually only need 9 briquettes to start with. However if you need the oven for more than 30 minutes (including time for pre-heating), you will need to transfer more hot briquettes into the pan in the oven.
 2. Place the tin cans in the 4 corners of the oven. Place the cake rack on top.
 3. The briquettes are ready to use when they are almost all white – which takes about 30 minutes (or faster with some fanning). Transfer the hot briquettes into the pan that's going into the oven.
 4. Pre-heat the oven if you like. Add the food and close the oven door. Lean a piece of log on the door to keep it closed.
 5. Don't check the food too often because each time you open the door, heat will escape, and the food may not cook / bake evenly, but do watch for burning.

BUDDY BURNERS



- Cut strips of corrugated cardboard to the height of a (clean) tuna can. Put a used birthday candle or a piece of string in the middle for a wick, then roll the strips tightly to the width of the can and place them inside. Pour melted paraffin wax over the cardboard until almost full.
- **To Make a Cover:** Cut a rectangle of cardboard much bigger than the tuna can and wrap it with foil. If the buddy burner is burning too hot, put this foil-wrapped cover part way over the buddy burner. Put this cover completely over the buddy burner to extinguish the fire when you're done cooking, so that the buddy burner can be used at another time.
 - Never cook directly over a buddy burner because the smoke is black and sooty. This is also the reason not to use a pot lid or a pot itself to extinguish the flames of a buddy burner.
 - Use the buddy burner only in a place where there is good ventilation.

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TIN CAN STOVES



To make a tin can stove, you need a large #10 tin can (e.g. 3 lb coffee can).

1. Use a triangular punch can opener and punch about 6 holes on the round side of the can both at the top and at the bottom.
2. If the lid on one end is not already off, take it off.
3. Cut a rectangle (about 2 ½ "x 3") out of one side with a pair of tin snips.
4. If you are going to fry foods, put a piece of tin foil on the top surface so that you don't have to wash the surface of the can stove each time.

Fuel for a tin can stove can be a Buddy Burner or a small wood fire.

WAYS TO USE THE TIN CAN STOVE

You can fry / grill / cook:

- Bacon or sausages
- Bannock
- Eggs
- Foil-wrapped sandwich
- Grilled cheese sandwich
- Ham pockets
- Hamburger
- Pork chop or steak
- Quesadilla
- Tacos
- Wieners

You can heat up / boil:

- Hot soup
- Canned stew, ravioli, etc.
- Water for hot drinks
- Wieners

RECIPES

COOKING ON FIRE

COOKING WITH FOIL

There are many foods that you can wrap in tin foil and cook on the fire. Please keep in mind:

- The amount of time it takes to cook depends on whether the foil wrapped food is sitting completely on hot coals or just a part of the food is.
- It usually takes about 24" of foil to cook one meat patty, so this is a relatively expensive way to cook, and not good for the environment.
- The advantage is that you can prep the food ahead of time and taken on a hike. You don't need to dirty pots. The meals can also be individualized.
- Today's tin foil can burn up in a hot fire, so put the shiny side in. To slow down the burning, gently crease the foil, and then gently un-crease the foil before putting food on it.
- Because used tin foil is usually crumpled when done, it would take a LOT of fuel to burn it up, so it is recommended that you take used foil home to dispose of it. However you should store this garbage in your vehicle so it doesn't attract animals or birds that can choke on pieces of foil.

Hobo Lunch

1. Put some slices of potatoes, carrot, onion (optional) and a hamburger patty on a piece of 12" long heavy duty tin foil. Season the food.
2. Roll it up like a bedroll – towards the middle and the ends as well. Wrap the foil patty in a small piece of wet newspaper, and another piece of foil.
3. Place on hot embers in the fire.
4. Turn it after 10 minutes. You might be able to cook the patty with only one layer of heavy duty foil.

Burlap Lunch

1. This method will only warm up the food, so if using meat, use only ready-to-eat meat.
2. Fill your sandwich bun or English muffin with filling – meat, cheese, salami, etc and wrap it in heavy duty foil and then a piece of waxed **burlap*** (10" to 12" square).
3. Cook on hot coals in the fire or light it on fire on gravel. When the burlap has been burned away, the cheese should be melted.

* **Burlap** – Cut burlap into 10" or 12" squares, dip in melted wax, and hang on a clothes line to dry.

Banana Boat

1. Make 2 parallel cuts about $\frac{3}{4}$ " apart along the length of the banana. Peel back the narrow strip of peel, keep one end attached to the banana.
2. Scoop out a bit of the pulp and add some mini marshmallows and chocolate chips. Put the peel back in place.
3. Wrap a piece of foil around the banana and place it on hot coals for about 5 to 10 minutes.

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MEALS IN A BAG

- Use medium weight zip-lock baggies.
- Boil a wide pot of water and keep it simmering.
- Don't let the bag touch the rim of the pot or else the bag will melt.
- The number of baggies that can be cooked at the same time depends on the width of the pot.
- The length of time it takes will depend on the amount of food in the baggie. You can take it out and mush the food around while wearing an oven mitt and return the baggie to the water.
- Some foods can be customized for each individual's taste.
- Single portions of macaroni and cheese, stew, chilli, spaghetti and pasta can be frozen before camp and used as ice packs until defrosted or needed.
- This is also a great way to use up left-overs or to cook the last meal before leaving camp so you won't have much washing up to do.

Omelette in a Bag

1. Prepare some shredded cheese, chopped vegetables and meat.
2. In a baggie, each girl can assemble her own omelette ingredients along with 1 or 2 eggs and some salt and pepper.
3. Squeeze out the air and seal the baggie. Mash everything around. Place in a pot of boiling water.

Tacos in a Bag

1. Cook up 1 lb of ground beef and drain the excess fat.
2. Mix in 1 pkg of Taco seasoning mix.
3. Keep the taco chips in their bag and crush them all up.
4. Prepare and set out some shredded lettuce, grated cheese, chopped tomatoes, salsa and sour cream. Give each girl a baggie, and have her add spoonfuls of the items she wants.

COOKING FOOD ON A STICK

- Traditional wieners or marshmallows on a stick
- Assemble your own shish-kebobs using cooked meat cubes, breaded chicken sticks and vegetables. Brush each stick with BBQ sauce if they want.

Wiener Octopus



1. Slit 1/3 of the wiener lengthwise into 4 and do the same on the other end.
2. Spear a shish-kebob stick carefully in the middle of the uncut portion.
3. As the wiener cooks, the slit portions will curl back.

S'Mores

1. Roast a marshmallow on a stick over hot coals.
2. Place it between chocolate-coated digestive biscuits. (You can also do it the traditional way - put a square of chocolate between 2 graham crackers and add the roasted marshmallow.)

COOKING ON THE FIRE

Cooking on the fire for a whole patrol may be challenging for younger campers, but it is fun for individuals to cook their own food. Also girls can add what they want into their "pot".

The pot can sit on a grate over the fire, be suspended from a gadget (e.g. tripod) over the fire or it can sit directly in the fire. Extra care must be taken when stirring the food or removing the pot from the fire – especially when there are several pots in the fire at the same time. The side of the pot sitting closest to the fire may cook (or burn) faster, so more stirring may be needed. You will need 1 or 2 pot holders (fire protected on both sides) for each fire.

Tin Can Casserole (per person)

1. In a 397 ml (14 oz) can, put in ¼ pound of extra lean ground meat (broken up), ¼ cup of Minute Rice, ¼ cup of frozen or fresh chopped vegetables, 1 tsp onion soup mix and ½ cup of water. Mix everything up.
2. Cover the can with a piece of tin foil (lid) and mix the food up frequently to avoid burning.

RECIPES TO USE IN THE BOX OVEN

Orange Cake (in hot coals or in the box oven)

1. Cut the oranges in half and scoop out the pulp (eat it immediately or put it in a fruit salad).
2. Pour cake mix batter into the orange 2/3 full.
3. If cooked on coals – wrap the orange in heavy duty tin foil (leave space at the top). If using a box oven, bake them for about 20 minutes.

Mini Pizzas (in the box oven)

1. Use half a pita pocket or half an English muffin.
2. Spread some pizza sauce (or meatless pasta sauce) on the bottom, and add toppings.
3. Bake in the box oven for 10 to 15 minutes.

Pineapple Upside-down Cake (in the box oven)

1. Wash 4 tuna cans out well (in the dishwasher). Grease them.
2. Put a pineapple ring in each, and put 1 tbsp of brown sugar and 1 tbsp of butter on top of each.
3. Mix the cake mix (single layer cake mix) as usual, and pour it in the 4 tuna cans. Fill only 2/3 full as the cake mix will expand as it cooks.
4. Bake in the box oven for 35 to 40 minutes.

Fruit Crumble (in the box oven)

1. Pour 1 can of pie filling into a square cake pan (or 3 c fresh apple slices sprinkled with cinnamon)
2. In a mixing bowl, melt 1/3 cup of butter.
3. Add 2/3 cup of oatmeal + 2/3 cup of flour + ½ cup brown sugar
4. Mix well, and spread over the fruit.
5. Bake in the box oven for about 30 minutes or until bubbly hot.

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FUN DESSERTS

Worms in Dirt

1. Put ¼ pkg of instant chocolate pudding, 1 tbsp of chocolate cookie crumbs and 2 to 3 gummy worms in a sandwich baggie.
2. When ready to use, add ½ cup of milk in each baggie and shake well.
3. Cut a small corner out of bottom of the baggie and squeeze the pudding out to eat.

Home-Made Ice Cream

1. In a small baggie put in ½ cup of half and half cream. Add 1 tsp of sugar and ¼ tsp of vanilla. Make sure the baggie is completely sealed.
2. In a large freezer strength baggie, put in 2 tbsp of rock salt (pickling salt will do) and some crushed ice.
3. Put the smaller baggie inside the bigger baggie. Shake or toss for about 15 to 20 minutes. (You might want to wear mittens for this bit.) Be careful to wipe the salt off the smaller baggie before opening it.

OTHER RESOURCES

1. <http://www.youtube.com/watch?v=0Ucth8bDMcs> - Washington Girl Scouts' video shows several kinds of fire-starters, and how to make one kind in detail.
2. <http://www.girlscoutspirit.com/2010/10/how-to-make-fire-starters.html> how to make lint and egg carton fire starters in pictures (not a video).