
1st
PLACE


Hot Potato
Hot Potato
EARTH


Hot Potato
Hot Potato
Procedure
Chart & Data
Collected
Background Information
Materials
EARTH

Hot Potato, Hot Potato

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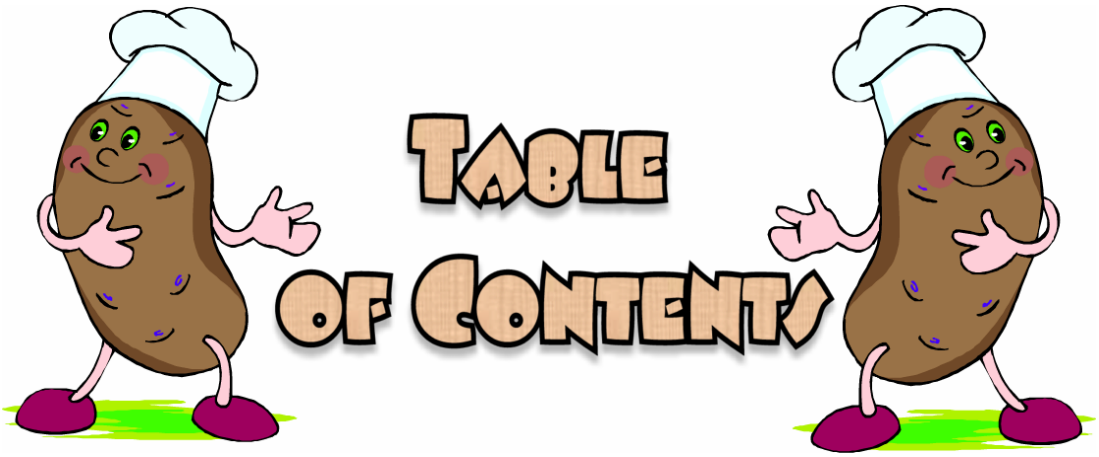


Hot Potato, Hot Potato

My science project was exploring if the winter sun was capable of cooking a baked potato. I first needed to construct a solar oven. I researched, by reading several books and looking at several websites on solar ovens. The design I created would fall under the “box style” category.

The solar oven I created was almost entirely made from items found around home. A wheeled cooler with the lid broken made a perfect starting point. Some left over metal flashing screwed onto the long sides of the cooler then curved around, duct taped and trimmed along the top created the funnel effect. I glued aluminum foil to the interior of my oven and the flashing to encourage the sun’s radiation to enter my oven. The only item that had to be purchased was a piece of glass to fit the top of the oven. The interior of my solar oven and the lightweight aluminum pan (use to place food in) was painted black (to prevent all the light rays that had been collect from bouncing out).

Once several adjustments were made, I was ready to give the sun a workout. I took three room temperature potatoes (a cling wrapped, aluminum wrapped and a unwrapped potato of equal weight of 6 oz.) and placed a food thermometer into the center of each one. I placed each one into the solar oven with the food thermometer in a readable position. I placed the glass panel on top, recorded the beginning temperature of 64º (F) degrees for each of the potatoes and a 38º (F) outdoor temperature at 8:20am.

Within one hour the **unwrapped plain potato** was first to reach 100º degrees F and would continue to climb in temperatures and hold the lead for 4 hours. But would finish in last place with an interior temperature of 170º degrees F (a 97º degree increase)

The **potato wrapped in aluminum foil** had a slow start for the first 4 hours and would take a lengthy climb up to 178º degrees F (a 114º degree increase). The foil wrapped potato was cooked by 3pm but not to the perfection that the cling wrapped potato would reach.

The **cling wrapped potato** would stay at 180º degrees F for several hours peaking at 190º degrees F before dropping back and maintaining around 184º degrees F. By 3pm the hot potato was soft and ready to eat. The cling wrapped potato had the extra assistance from the moisture not being able to escape from the cling wrap. The cling wrapped potato had an amazing climb of 126º F degrees, which was just hot enough to prove my hypothesis and provide me with something delicious to eat.

The outside temperatures on a sunny February 28, 2004 only climbed from 38º F to a high of 54º F. The wind would breeze from 10 to 14 MPH from the north all day. The chilly temperatures did not affect the sun’s rays from cooking.

According to potatohelp.com a baked potato is baked when it reaches an interior temperature of 200º to 210º degree F. Household ovens and solar ovens must have different degrees of completion.

I look forward to using my mobile solar oven to cook and experiment further. I see the sun’s rays in a whole new light now.

Background Information:

Collectively taking ideas from solar books and many websites my parents and I created my own unique design for a solar oven. Created was a mobile solar oven made almost entirely from things around the house. A wheeled cooler that had its lid broken off made the perfect starting point. The only thing we could not find around the house to fit was a piece of glass, needed for insulation. I had to make several adjustments to make my solar oven a workable one, before I could begin baking my potatoes.

Problem:

Could a Homemade Solar Oven cook a potato with the winter's sun radiation?

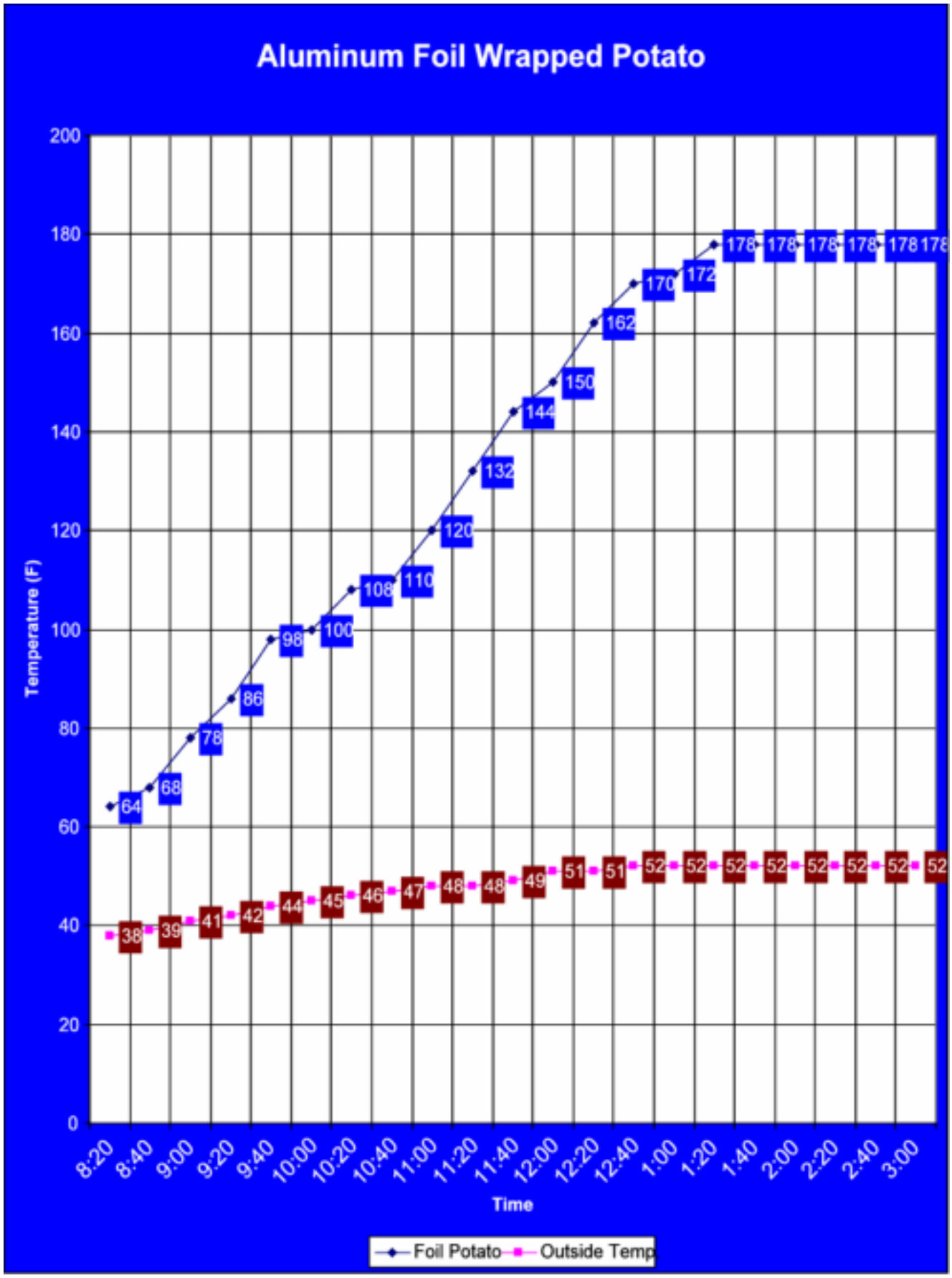
Hypothesis:

I wanted to see if the winter sun's direct and indirect rays were capable of baking a potato. I believe with the sun's radiation, I could bake a potato with my homemade mobile solar oven.

1. A cooler with lid removed
2. Metal Flashing
3. Heavy Duty aluminum foil
4. Aluminum ½ pan painted black
5. Black spray paint
6. 2 inch Wood strips used for flashing support
7. Duct Tape
8. Poly-fill
9. Foam board
10. Tape
11. Screws for flashing
12. Glass cut to fit top of solar oven
13. Outdoor thermometer
14. Food thermometer
15. Clock
16. Baking Potatoes
17. Digital Camera
18. Glad Cling Wrap (or like product)
19. Glue

1. **Build a box style solar oven with glass topper (see the Making of the Mobile Solar Oven)**
2. **Locate location in yard in full view of the sun**
3. **Find three potatoes of equal weight.**
4. **Wrap one potato with aluminum foil and stick a food thermometer in it to the center**
5. **Wrap one potato with plastic cling wrap and stick a food thermometer in it to the center**
6. **Take one potato and stick a food thermometer in it to the center (no wrapping of any kind)**
7. **Remove glass lid and place three potatoes into solar oven (make sure the thermometers are placed in a position that can be read with out removing lid)**
8. **Replace the glass lid back on top.**
9. **Record the outside temperature, sky conditions and the temperature of each potato**
10. **Repeat procedure step 9 every 20 minutes throughout the daytime. Also when recording the temperatures, check to see if your oven is still in good location to collect the direct and indirect sun rays. Project will need to be shifted toward the sun 3 to 4 times during the day.**

Time	Plain Potato	Cling Wrap Potato	Foil Potato	Outside Temp.	Sky Conditions	Wind Speed & Direction
8:20	64	64	64	38	Clear	
8:40	68	70	68	39	Clear	
9:00	84	82	78	41	Clear	NNE 14
9:20	100	92	86	42	Clear	
9:40	110	104	98	44	Clear	
10:00	112	106	100	45	Clear	N 14
10:20	120	110	108	46	Clear	
10:40	130	120	110	47	Clear	
11:00	140	130	120	48	Clear	N 14
11:20	152	144	132	48	Clear	
11:40	162	158	144	49	Clear	
12:00	170	168	150	51	Clear	N 10
12:20	170	176	162	51	Clear	
12:40	170	180	170	52	Clear	
1:00	170	182	172	52	Clear	N 15
1:20	170	190	178	52	Clear	
1:40	162	184	178	52	Clear	
2:00	162	182	178	52	Clear	N 10
2:20	162	184	178	52	Clear	
2:40	160	184	178	52	Clear	
3:00	161	184	178	52	Clear	N 12


Aluminum Foil Wrapped Potato
Temperature (F)
Time
Foil Potato
Outside Temp
200
180
160
140
120
100
80
60
40
20
0
8:20
8:40
9:00
9:20
9:40
10:00
10:20
10:40
11:00
11:20
11:40
12:00
12:20
12:40
1:00
1:20
1:40
2:00
2:20
2:40
3:00
64
68
78
86
98
100
108
110
120
132
144
150
162
170
172
178
38
39
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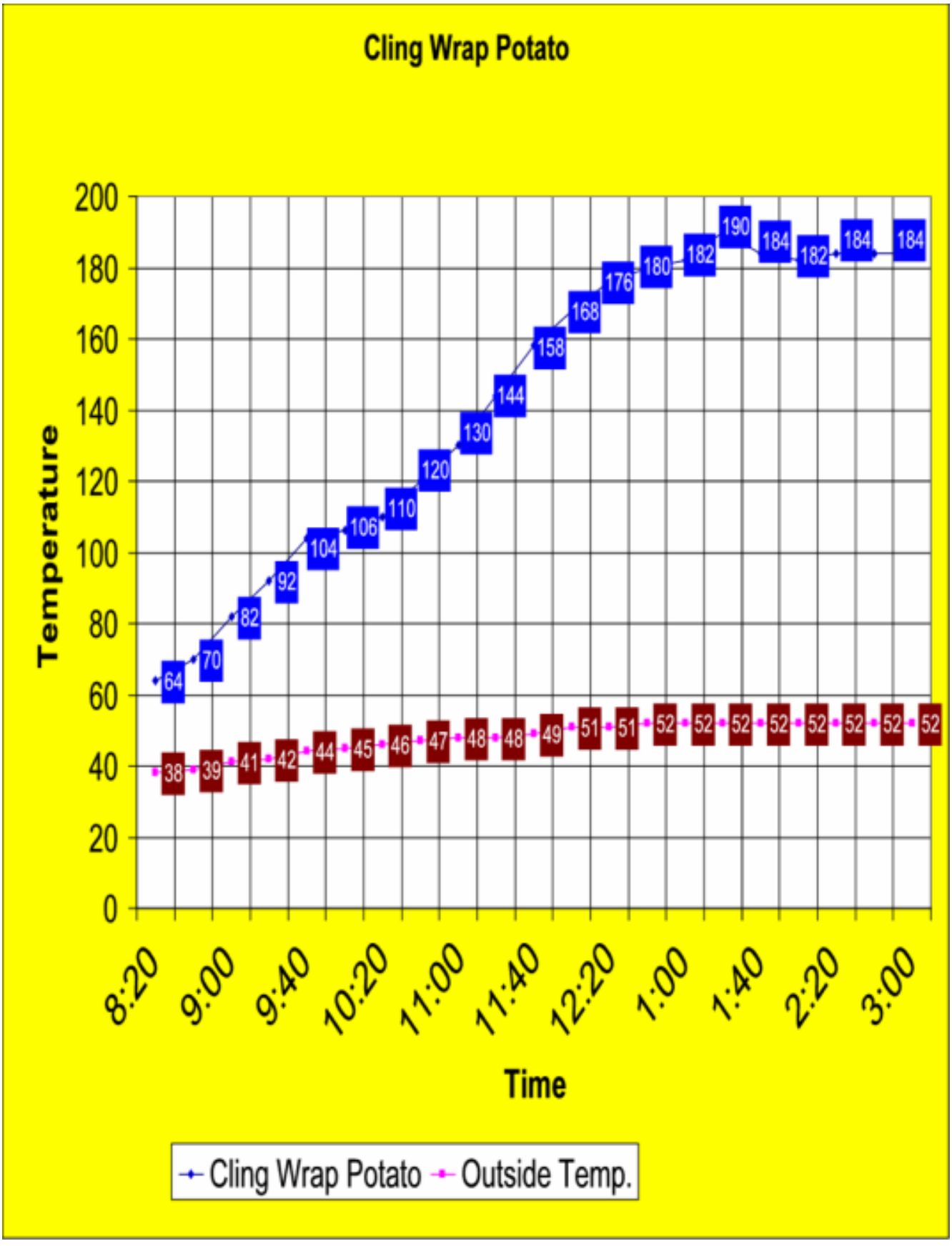
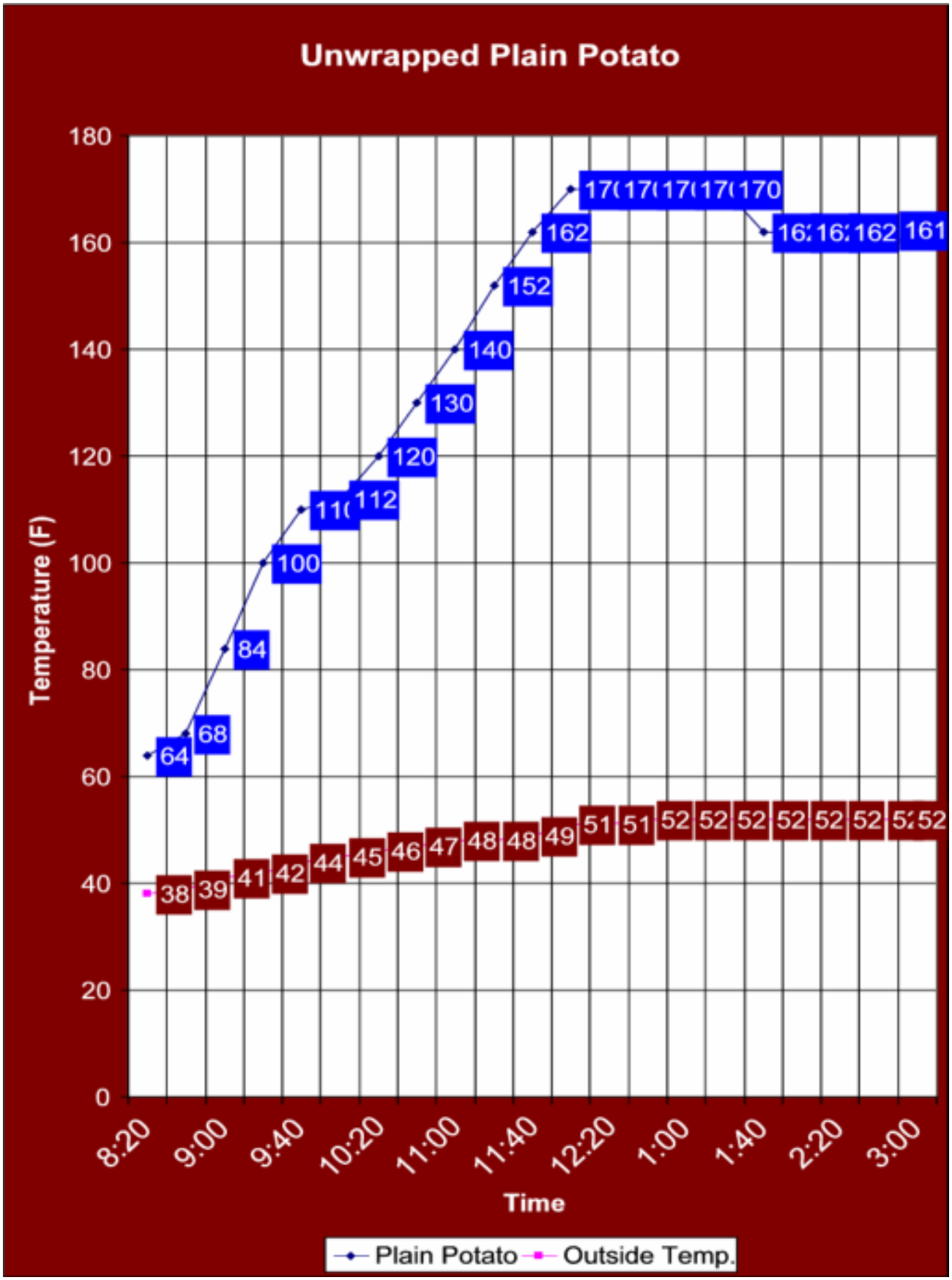
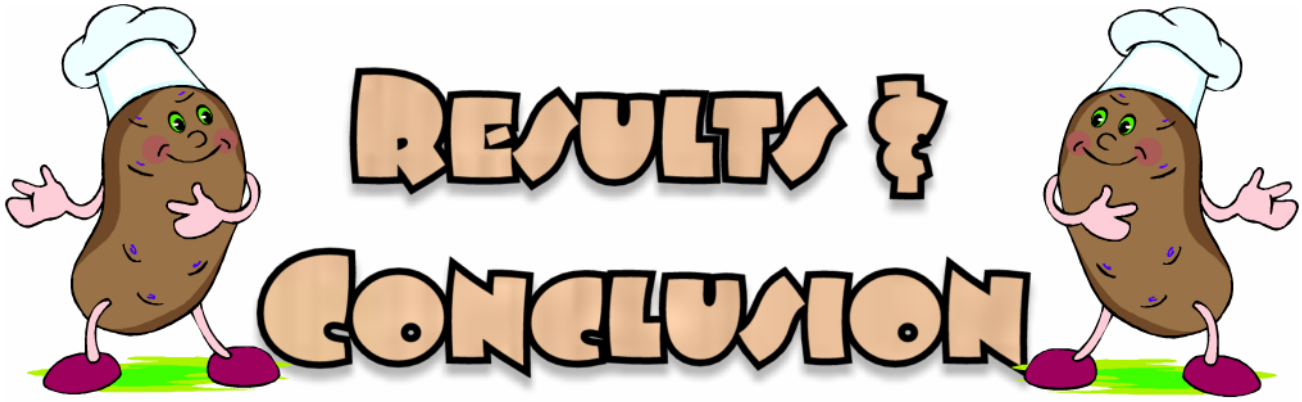
52


Cling Wrap Potato
Temperature
200
180
160
140
120
100
80
60
40
20
0
64
70
82
92
104
106
110
120
130
144
158
168
176
180
182
190
184
182
184
184
38
39
41
42
44
45
46
47
48
48
49
51
51
52
52
52
52
52
52
52
52
8:20
9:00
9:40
10:20
11:00
11:40
12:20
1:00
1:40
2:20
3:00
Time
Cling Wrap Potato
Outside Temp.


Unwrapped Plain Potato
Temperature (F)
180
160
140
120
100
80
60
40
20
0
8:20
9:00
9:40
10:20
11:00
11:40
12:20
1:00
1:40
2:20
3:00
Time
64
68
84
100
110
112
120
130
140
152
162
170
38
39
41
42
44
45
46
47
48
48
49
51
51
52
52
52
52
52
52
52
Plain Potato
Outside Temp.



The **unwrapped plain potato** rose 97º degrees during the 6 hours and 40 minutes that was examined. The plain potato had a starting temperature of 64º degrees F. and topped off at 170 degrees. 170º degrees was not hot enough to make a soft hot baked potato.

The **aluminum foil wrapped potato** had a temperature increase of 114º degrees F. The potato was baked by the end of the 6 hours and 40 minutes but not as “well done” as the cling wrapped potato. The potato could not be held long because it was one HOT POTATO.

The **cling wrapped potato** had an amazing 126º degree F increase during the experiment. The cling wrapped potato reached 190º F. The cling wrapped potato kept in the moisture that was trying to escape, as the oven increased in temperatures. The HOT POTATO was cooked to complete perfection in both taste and texture. The outside temperatures on a sunny February 28, 2004 only climbed from 38º F to a high of 54º F. The wind would breeze from 10 to 14 MPH from the north all day. The chilly temperatures did not affect the sun’s rays from cooking.

As a result, I conclude that I have proved that the sun’s direct and indirect radiation is capable of baking a baked potato in my homemade mobile solar oven

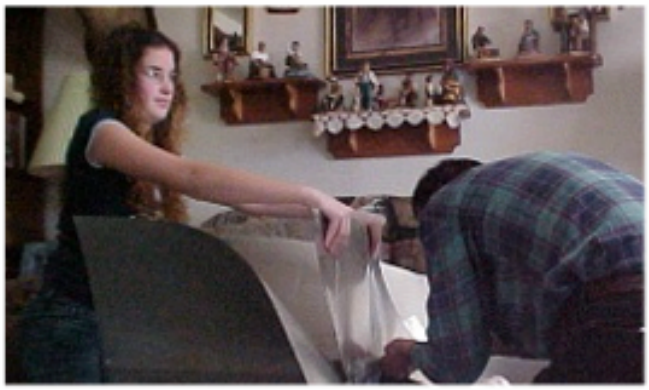
References:

1. Solar Cooking Naturally by Sunlight Works
2. Sunlight Works Solar Science by Sunlight Works
3. Solar Living Source Book by John Schaeffer
4. Blue-Ribbon Science Fair Projects by Maxine Haren Iritz
5. www.solarcooking.org
6. www.potatohelp.com

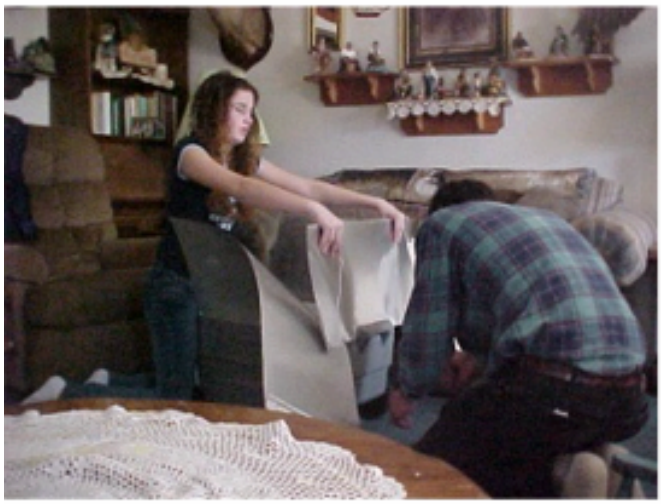
Acknowlegements:

I would like the Currituck County library for ordering solar books listed above for me to check out. I would like to thank Mr. Tom at www.solarcooking.com looking over my project and giving me very useful advice. I would like to thank the Coleman family for looking at pictures of my solar oven and sending me an email of acceptance on my ingenious use of their Coleman wheeled cooler. I would like to once again thank Mrs. Wood for her love of science and her ability to spread a love for science. I would like to thank my eighth grade science teacher Mrs. Sawyer for having faith in my science project this year. And of course my mom and dad for assisting and putting up with me during the science project time of year.

The Making of the "Homemade Mobile Solar Oven"

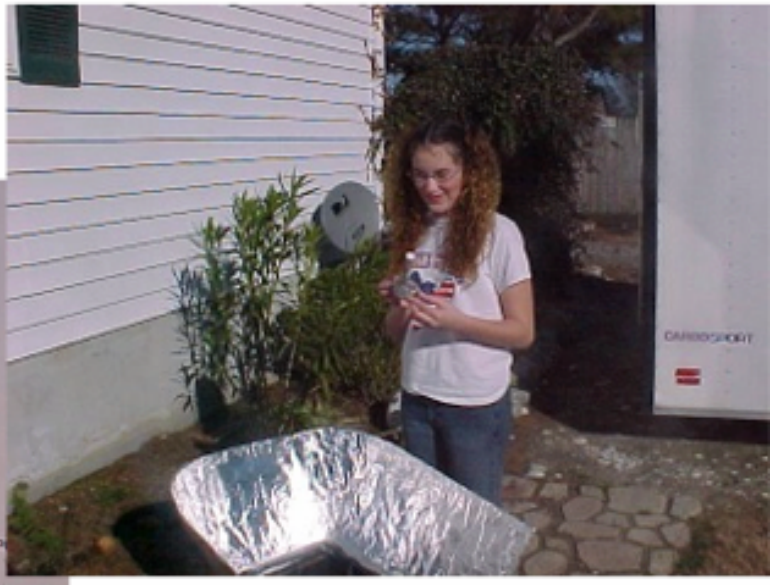


1. Cut two strips of metal flashing 18 inches longer than cooler
2. Line the flashing evenly with the end of the cooler with handle.
3. Screw the flashing along the two long ends of your cooler
4. Take the two end pieces and tape them together with duct tape
5. Trim the top of the flashing so it is even on the top all the way around
6. Duct tape 2 in wood strips along top and sides of flashing for support from the wind



7. Stuff poly-fill in bottom of wheeled cooler until even
8. Cut out board to fit new bottom of cooler and cover with foil
9. Duct tape inside and outside along the flashing for added support
10. Spread glue on flashing and interior of cooler, stick on aluminum foil
11. Measure glass and have cut for the top
12. Spray paint interior under the glass and aluminum pan black
13. Catch a sunny day and let the sun cook for you

By 3pm, I was eating a hot potato
Baked perfectly with the winter sun
in my homemade mobile solar oven



Recording of temperatures took place every twenty minutes.