



Pathfinder Honour: Trainer's Notes

Candle Making



Instructions to Trainers / Instructors of this Honour

Thankyou for being involved with this Honour. These notes have been developed to assist in teaching / instructing this honour. We recognise that there is much more information available and we are grateful that you should share your expertise.

Please remember that Honours are designed to develop our Pathfinders in many ways; their interests, their knowledge and their relationship with their Saviour and Creator. Your enthusiasm and creativity will have a huge impact on those doing the honour.

To complete an Honour, the following (where applicable) must be completed satisfactorily:

- Physical and Practical Requirements.
- Honour Workbook
- Honour Assessment Sheet. (*On SPD Honour Website but Leader's level access is required*)

Additional Reference Material

"Candle Making" by Terence McLaughlin.

Acknowledgements

Trainer's Notes compiled by Karl Aldridge Victoria Conf, March 2007

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Hint: Before Starting

Start melting your wax about 30 minutes before your club meeting starts. Cut your wax into chunks if it comes in a large sheet. Also, another source of wax is to use old candles that you no longer wish to use; for instance, your induction candles that have burned to the point you don't want them anymore. Instead of buying the colours to colour the white wax, you can use Crayola Crayons. Crayola are the best that I have found. Some other brands do not melt like the Crayola brand does.

IMPORTANT: Take appropriate care with hot wax and heating appliances.

REQUIREMENT 1. Make at least five of the following:

- a. Free-form sand candle
- b. Layered coloured candle
- c. Candle made in a mould
- d. Ice candle
- e. Dipped candle
- f. Dribble-wax candle
- g. Perfumed candle
- h. Pair of beeswax candles

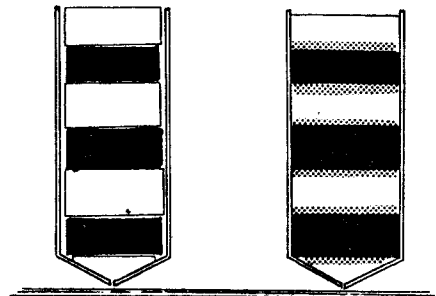
Free-form sand candle

This candle can either be made in a bucket of sand or on a trip to the beach. Use wet sand and form the sand in any shape you wish. Pour the liquid wax into the mould and let it cool and harden. Take the wax out of the mould. Make a hole in the wax with a hot skewer and insert a metal core wick and pour some wax around the wick to hold it in place.

Layered coloured candle

For this candle, use a round or square metal mould at least 12.5 cm high. You can use a litre-sized milk carton. Slip the wick through the bottom of the mould and secure it. Then make the wick tight by tying it around a pencil which is put across the top of the mould. The colour choice for this candle is as varied as your imagination. You should have at least three different colours, perhaps alternating colours. Pour each colour and let it harden before pouring the next colour.

Your layered candles do not have to have horizontal stripes only: you can tilt the mould by resting it on a block of wood or a book and fill it up with layers of wax set at different angles. For another variation, rough layered candles can be made by placing slabs of wax, roughly the size of the mould, piled one on top of another (left-hand sketch). The mould is then put in hot water until they run together (right-hand sketch).



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Candle made in a mould

Many different moulds can be obtained at local hobby stores. The moulds are prepared by covering the insides with a light layer of vegetable oil. Kitchen Canola Spray is ideal. Next, the wick is secured in one of the halves with masking tape. Before putting the two halves together, be sure there is a hole in the bottom of the mould to pour the wax through.

Put the two halves together and secure the two sides and bottom with masking tape. Completely cover all three edges with the masking tape. Now put clothes pegs all the way around the mould as far in as possible and close together as possible. Be especially careful to secure the place where the wick comes through the top of the mould. Support the mould upside down between two bricks. Pour in the hot wax and let it cool. As the wax cools, it will shrink, so have some extra wax handy to fill the depression that is formed.

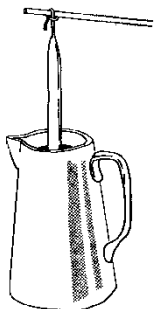
Ice candle

This is a technique for making mysterious and fascinating holes and caverns in the conventional-shaped candle. You need a wick that is already heavily waxed. It is necessary to use the heavily waxed wick because otherwise water could get into the threads of the wick and prevent proper burning of the finished candle. Its use ensures that the centre of the candle is solid - an 'ice-hole' round the wick could lead to very irregular burning. You can do this yourself by dipping, or use a ready-made small candle. If you dip a candle yourself, leave enough of the wick to thread through the hole of a metal mould or, if you are using a ready-made commercial candle, melt off some of the wax at the top to give you enough wick to thread through.

With the wick in position, place the mould in the freezer of your refrigerator, or as near as you can get to it. While it is chilling, melt your wax and keep it at 88°C. Crush some ice cubes so that you have irregular-shaped pieces of ice, and drop the crushed ice into the chilled mould. Most of the ice will stick round the sides of the mould. Be careful not to use chunks that are too small or too large. The small ones will melt too fast and the wax will not harden around them. If the chunks are too large there will not be enough wax in the mould to hold it together after it has hardened.

Pour the wax into the mould quickly, and place the mould immediately in cooling water. When it is quite cold, turn out your candle. You will find that the ice has melted, leaving holes all around the outside of the candle and an interesting and beautiful effect is created because of the glow of light that shines all through it as it is burned.

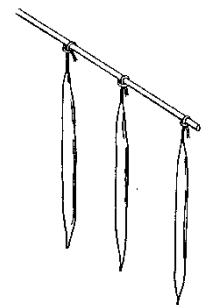
Dipped candle



Pour and let harden a core candle of any colour.

Hold the candle by the wick and dip it quickly into wax of a contrasting colour. The core candle should be dipped into and out of the hot wax very quickly.

After pulling the core out of wax, let it dry before dipping it again. If the core is left in the hot wax too long, it will melt.



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Dribble Wax Candle

Use a core candle and slowly drip wax of a contrasting colour over it.

Burning a candle that will drip over a bottle can make another interesting candle. After the bottle is about covered with the dripped wax, put a regular candle in the top of the bottle and burn it like a regular candle.

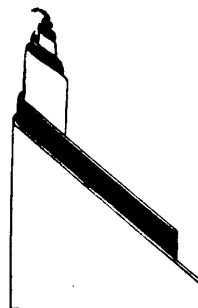
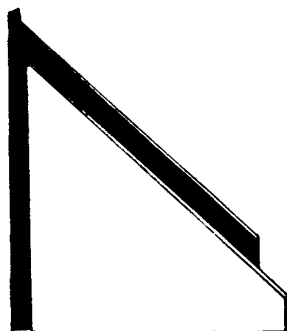
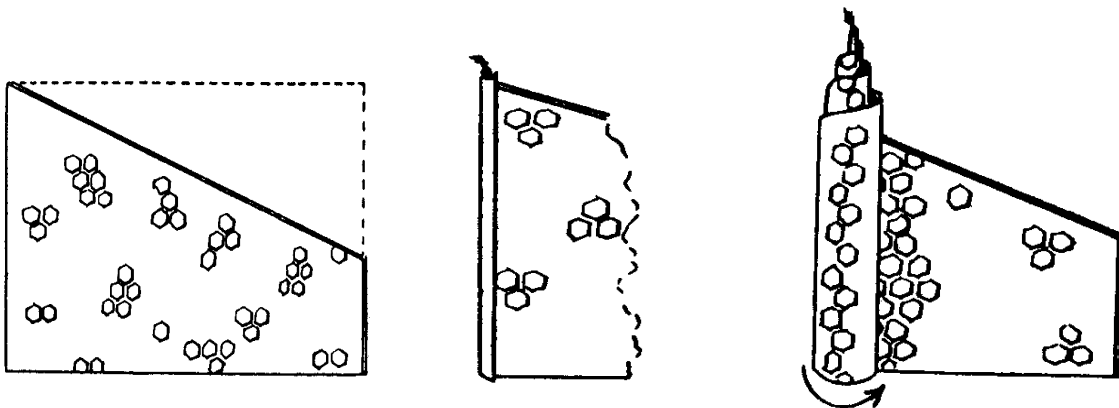
Perfumed candle

Many different scents can be obtained when you get other candle supplies. Add the scent while the wax is melting in your double boiler.

Pair of beeswax candles

Take a sheet of beeswax and cut it diagonally. Place a piece of wick about 2.5 cm longer than the shortest side of the triangle. Place the wick on this side of the beeswax. Start rolling the beeswax from this edge. The other side of the 90 degree angle should be kept straight as you roll the beeswax.

If you use two sheets of wax in contrasting colours you can make a striped tapered candle.



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REQUIREMENT 2. Know two kinds of wax used for candle making and their uses.

Paraffin

Paraffin is a mixture of the solid hydrocarbons of the paraffin series and varies with somewhat wide limits in its hardness, melting point, and colour according to the source from which it has been derived and to the degree with which colouring matter and softer bodies of similar composition have been separated.

The most desirable paraffin is one that will not become plastic at comparatively low temperatures. Wax can be too high in melting point as well as too low. The low melting point can be compensated for by the addition of stearin. Too high a melting point wax, such as 57-60°C, used alone in a temperate climate would give rise to a difficulty in lighting, particularly in cold weather. The flame dies down to such a point that it goes out before the wax to keep it alight can be melted. At the second attempt to light it is even worse than the first unless a flame is applied to the wax to melt it.

As regards to low melting point material, the maximum summer temperature should be considered. Also the nature of the wax and the addition of stearin should be considered. The main advantage of adding stearin to paraffin is the fact that it adds very greatly to stability when subjected to undue heat, such as in the tropics.

Beeswax

Beeswax is characterized by a peculiar semi-glistening lustre with a waxy feeling. Beeswax is granular in appearance and is soft enough to be cut with the finger-nail and brittle enough to break when bent or struck. The melting point is usually around 51-60°C, and they are lighter than water. The illuminating power of beeswax is between the stearin and paraffin waxes.

REQUIREMENT 3. Know size of wicking, and which one will burn properly in each particular candle.

A good wick for most poured candles is a 1/0 square braid wick. This is also known as a medium square braid. A smaller wick is used for very small candles. And of course, a larger wick for larger candles.

The following table will be a guide to selecting wicks for your candles. (The numbers refer to standard wicks made of three bundles of strands plaited together. For example, 3/14 means three bundles of 14 strands each plaited together.) This table has been taken from the book "Candle Making" by Terence McLaughlin.

Average diameter of candle	WICKS TO SELECT FOR			
	Paraffin Wax (normal burning)	Beeswax (normal burning)	Paraffin Wax (hollow)	Beeswax (hollow)
½ in (13mm)	3/6	3/10	3/4	3/6
1 in (25mm)	3/10	3/20	3/6	3/14
1 ½ in (38mm)	3/14	3/24	3/10	3/20
2 in (50mm)	3/20	3/30	3/14	3/24
2 ½ in (63mm)	3/24	3/35	3/20	3/30
3 in (75mm)	3/30	3/40	3/24	3/35
4 in. (100mm)	3/35		3/30	3/40
> 4 in (100mm)	3/40		3/35	3/40

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'Hollow' burning is allowing a large candle to burn with a small wick so that a hollow is formed as the wax is consumed, and finally the glow of the flame is seen through a shell of wax. It is not usually possible to make a candle burn in this way to produce a hollow deeper than about 5 – 5 ½ ins (12cm – 14cm)

REQUIREMENT 4. When should a metal core wick be used?

It can be used in candles that are in glass containers or put into a candle after the candle has hardened. It is also easier to use in free form sand candles. You use a hot ice pick, or metal skewer, to make a hole for the wick in hardened candles, then pour some wax in around the wick to hold it in place.

REQUIREMENT 5. Know the safety techniques of candle making.

- a. Always use a low flame or heat
- b. Never leave melting wax unattended
- c. Always melt wax over boiling water in a double boiler, not directly on burner.
- d. Don't let candle wax boil
- e. Have baking soda handy to put on any fire that may start. – Never use water to put out a wax fire.

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ADDITIONAL INFORMATION: FAULTS

Odd and unexpected things happen to every candle maker at times, and occasionally a candle turns out with serious faults. This is not a disaster in itself, but it is always better to know what went wrong so that you can avoid it happening again.

The following tips may assist you in the odd occasions when candles don't turn out the way they should.

Faults in Dipped Candles

Candle has a lumpy surface or little spots like pimples.

Cause: Candle has been dipped too cold at some point in the process. Probably the wax was allowed to cool too much.

Remedy: Melt some wax the same colour as the outside layer of the candle, heat to 93°C and re-dip candle until outside layer is smooth.

Candle cracks while it is being rolled or twisted.

Cause: Candle has been allowed to cool too much before rolling or twisting, or possibly has been allowed to hang up too long between layers, so that the inside is colder than the outside.

Remedy: If the crack is very bad (i.e. the wax actually flaking away) re-melt and start again. If the cracks are just internal ones and the candle is still complete re-dip in hot wax the same colour as the outside layer, at about 93°C until the candle is pliable. If you can only hear it beginning to crack you can often save it by immersing it in water at about 54°C and keeping it there until it becomes pliable.

Candle flame spits when burning.

Cause: Water has got into the wick during dipping.

Remedy: Sometimes you can get rid of the water by pouring out the melted wax from the well under the wick and the water may go with it. If this does not work, re-melt and start again. Always try to make sure that wicks are thoroughly waxed before you dip candles in water.

Scum or dirty marks form on the candle while it is being dipped.

Cause: impurities in the water, corrosion of the melting vessel, or dirty wax re-melted. (You may have re-melted an unsuccessful candle and got some black bits from the wick mixed up with the wax.)

Remedy: Ladle off scum from the surface of the melted wax and raise the temperature to about 93°C. Then re-dip to clean up the candle surface.

Faults in Moulded Candles

Wax leaks out of base of mould during pouring.

Cause: Wick has come unfixed or the hole for the wick is too large.

Remedy: Use mould seal or modelling clay to fill the gap. Quite often, when you fit a well-waxed wick into a mould, it seems securely fixed just because of the wax on it. When you pour in hot wax, however, the wax on the wick melts and it comes loose in the hole. This is a particular problem with metal and other rigid moulds - rubber moulds tend to grip the wick better.

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Pits in surface of candle.

Cause: Air bubbles in the mould, or moisture left in the mould after washing.

Remedy: There is no way to remedy this fault except by covering the surface over with paint, or hammering, and similar processes. Always tap the mould several times to release air just after the wax has been poured, and always make sure that the mould is clean and dry before you use it.

Scaly marks on the surface of the candle.

Cause: The wax was poured too cold, or the mould was very cold, and wax has set on the inside of the mould before pouring was completed.

Remedy: A dip in hot wax of the same colour at 93°C will sometimes cure this fault, but often the only solution is to re-melt and start again. Make sure that the wax is hotter than 77°C before pouring, except for special processes like using whipped wax.

These scales can also occur if a metal mould is used immersed in the cooling water before the wax is poured. Again the wax sets on the surface of the mould in irregular shapes before pouring is complete, and these show up as marks on the surface of the finished candle.

Large cracks in the candle.

Cause: These are thermal cracks, caused by cooling the candle too rapidly.

Remedy: There is no remedy for these cracks. Re-melt the candle, or cut it up to make chunks for other candles. You should avoid cooling that is too rapid -- putting the candle in a refrigerator, for example.

In winter, make sure that your candle is not in an icy draught as it cools.

Candle sticks in the mould.

Cause: The wax blend may be incorrect - stearin or beeswax should always be present to make sure that the mixture contracts as it cools in the mould. The topping-up process may have introduced a wedge of wax at the top of the candle which makes it difficult to get out of the mould.

Remedy: Place the mould in hot water at about 93°C briefly to melt the surface of the wax. Don't leave it in the water long, or you may spoil the surface gloss of the candle. Make sure that the trouble is not due merely to the wick sticking in its hold - you can melt this out with a hot knife applied to the mould where the wick goes through.

Small bubbly line around the candle.

Cause: The cooling water round the mould did not reach up to the same level as the wax. The bubbled line represents the height of the water: the wax above this line cooled much slower than the wax below, so there is a stress mark.

Remedy: This fault can sometimes be cured by dipping the candle in hot wax of the same colour at about 93°C but usually it is necessary to cover up the fault by painting or hammering the candle. Always try to adjust the water in your cooling bath or bucket so that the water level is the same as the level of wax in the filled mould.

'Ice Candles' will not burn properly.

Cause: The wick was not sufficiently well waxed before the ice was put in the mould, and water has soaked into it as the ice melted. The wick for ice candles should always be covered with a thick layer of wax by dipping before it is fitted into the mould.

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Remedy: Sometimes the water will dry out of the candle by itself, if the candle is left standing in a warm place for a few days. Otherwise pour off the molten wax from the pool round the wick when spluttering starts, and re-light the candle.

Faults with multicoloured Candles

Background colour of chunky candles becomes discoloured.

Cause: The background wax was too hot when poured, and it has melted the chunks and mixed with them. Wax for chunky candles should be poured at 93°C.

Remedy: Carve away the background wax with a sharp knife. You can either leave the candle this way, as a carved shape, or go on to dissect it still further, cut out the chunks and start again.

Layers in multi-layered candles have not joined.

Cause: The wax was poured at too low a temperature, or the layers have been allowed to set too much before the next lot of wax was poured. For making layered candles the wax should always be poured at about 82°C and left until the surface is just 'rubbery' before the next lot of wax is poured on top. It is better to melt all your colours together and keep them at the right temperature, rather than melting them one after another, because if you have them all ready you can concentrate on pouring at just the right moment.

Remedy: There is no remedy for cracking or badly joined multicoloured candles. Re-melt and use the mixed coloured wax that you will obtain (it is usually brown or grey) for 'antique' effects. Alternatively you can cut carefully along each join and use the pieces of coloured wax for chunks, or to stick on the surface of white candles by welding with a hot knife.

Edge of layers not straight in multicoloured candles.

Cause: The lower layer has been allowed to set too much before the next colour was poured on top. This means that the lower layer has had the opportunity to shrink away from the mould, and wax from the next layer has run down into the gaps at the side. Always pour when the lower layer is just 'rubbery'.

Remedy: Shave around the sides of the candle with a sharp knife to remove the unwanted streaks of colour. A very quick dip in hot plain white wax (99 degrees C) or boiling water may help to clean up the lines after you have shaved off the worst of the streaks.

Layers have run together in multicoloured candles.

Cause: The wax has been poured too hot or too soon, so that the coloured waxes have mixed along the edges of the layers.

Remedy: There is no remedy for this. If the effects of the mixed colours are at all pleasing you might try putting the candle back in its mould and exaggerating the mixing effect by immersing the mould in hot water. If this is not an effective solution, re-melt and use the mixed wax for antique effects.

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Faults with Wicks

Wax runs down the candle in streams, and the well round the wick becomes flooded and overflows.

Cause: Wick too large for the diameter of the candle or the type of wax used. Waxes (like paraffin wax), which melt very easily need a smaller wick than beeswax or stearin.



The different effects of wick size. The candle on the left has too large a wick, so that the flame is smoky and the wax is melting over the side of the bowl. The candle in the right has too small a wick, and not enough wax is getting to the flame to maintain burning.

