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ABSTRACT

An exploratory course in the creation of shapes using a variety of metals and techniques is described in this guide for quinmester elective course for grades 7-12. Students cut, form, weld, rivet, cast and finish such metals as steel, copper, aluminum, brass, pewter, and bronze. They develop a working knowledge of the various tools and processes, while gaining experience in three-dimensional design. Sections of this guide cover: course description and rationale; course content; behavioral objectives; course procedures; strategies and suggested learning activities; and resources for students and teachers. (Sculpture, Metallic Formations I is represented by ED 061 234.) (JLB)

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

SCULPTURE
METALLIC FORMATIONS II

6683.12 b

Art Education

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1971

SCULPTURE

METALLIC FORMATIONS II

(Tentative Course Outline)

6683.12 b

ART EDUCATION

Written by: Edward R. Dubocq

for the

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PREFACE

Learning has been referred to by many contemporary educators as a noun; but it is a verb experience--full of action and involvement, doing and being. At least it should be--and that kind of involved learning is what this course of study is all about.

The Quinmester Visual Arts Education Curriculum construct is a long range developmental effort directed towards providing a general education for learners in the aesthetically related art education field. To accomplish this goal, instructional courses of study have been developed basically for teachers by teachers. Many Dade art specialists in various arts media have been recruited by the Art Office to write over 75 new and innovative courses of study in the area of art education. Educational specialists from the four corners of this land, along with aestheticians, social critics, and behavioral scientists have hailed the philosophy of the overall art curriculum construct undertaken by the Division of Instruction to be consistent with the latest national trends in art education, and to be an exemplary example of "success" oriented curricula designed to provide intense involvement in aesthetics and creative arts through group and individualized participation on the part of the learner.

All courses of study produced have been constructed with one major goal in mind: to provide a broad framework of goals and objectives; content; instructional procedures and strategies; and suggested learning activities. Many of the technically oriented courses of study list a variety of "Work Sheets" designed to assist the learner with specific and highly technical studio procedures delineated in a manner so that art specialists (teachers) can use them "as is," or utilize the source information as a basis for producing "Learning Activities Packages." The appendix may include other pertinent material needed for today's contemporary art curriculum, e.g., vocabulary, resources for both learner and teacher, etc.

Constructive criticisms or recommendations relating to this publication are invited; please send to: Art Education Office, Room 300, Lindsey Hopkins, A-1.

Charles M. King, Consultant
Art Education

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METALLIC FORMATIONS: PART II

II. COURSE NUMBER

6683.12 b

III. COURSE DESCRIPTION

An exploratory course in the creation of shapes using a variety of metals and techniques. Students cut, form, weld, rivet, cast and finish such metals as steel, copper, aluminum, brass, pewter, and bronze. They develop a working knowledge of the various tools and processes, while gaining experience in three-dimensional design.

IV. RATIONALE

Sculpture: - "Plastic or hard materials that have been welded, engraved, carved, molded or constructed into a primarily three-dimensional work of art."

It is important that students of art become acquainted with the various areas of sculpture. We are constantly surrounded with varying forms of sculpture in our natural environment. "Sculpture" can entail any three-dimensional form around us, from a tree to a building. Sculpture affects every day of our lives; be it through an object

that is simply pleasing to the eye, or the pure functionality of a unit of sculptured steel; the modern automobile.

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VII. BEHAVIORAL OBJECTIVES

A. Competencies expected of the student upon completion of this unit. The student will be able to:

1. Describe or demonstrate the procedures for the following metal sculpting techniques:
   a. Sand casting
   b. Lost wax casting
   c. Non heat metal sculpting
   d. Surface treatment
2. Define, orally or in writing, related vocabulary terms as listed in this quinmester course of study.
3. Create open and closed forms in metal through manipulation of sculptural tools and materials.
4. Manipulate metal sculpting tools and related materials according to individual specifications.
5. Investigate and compare various metals and their abilities to be sculpted.
6. Differentiate among a minimum of four metal sculptors from past and/or contemporary movements.

7. Demonstrate correct procedures for working in a metal sculpting studio.
8. Create a minimum of two sculptural examples of techniques listed in this course outline.
9. Compare the types of surface treatment and select one or more types for application to sculptural examples.
10. Apply the selected surface treatments to sculptural examples.
11. Construct a compatible base for each of the two metal sculptures created.

B. The student will demonstrate competencies under the following conditions:
1. Classroom demonstration.
2. Classroom discussion.
3. Individual research.
4. Individual studio procedures.
5. Group critiques.

C. Acceptable performance will be determined by the individual instructor on these bases:
1. Evaluation of classroom participation.
2. Required projects turned in for grade.
3. Individual and group critiques.
4. Test items based on the performance objectives.

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A. Vocabulary list

Alloy - a secondary metal composed by the permanent fusion of two or more primary metals.

Asbestos - a heat resistant material used as an insulator.

Base metal - the piece of metal being cut, welded or worked on.

Burnout - melting out wax and removing moisture from a mold before pouring the metal.

Closed form - a form being solid in appearance; having no holes or cavities. A form that encloses space.

Cold shut - a crack in a casting caused by two streams of metal that do not fuse when meeting (usually due to varying temperatures).

Core - the material used to form the hollow area of a casting mold.

Crucible - a container used for holding molten metal previous to pouring.

False core - a removable part of a sand cast mold.

Fin - a projection of poured metal that may

form in the seam or parting line of a mold.

Fusion - the complete and permanent joining of two metals.

Gated pattern - a pattern used in a mold to create two or more castings from one pour.

Holding furnace - a furnace used to keep metal in a molten state prior to pouring.

Loam - a course sand used in sand casting molds.

Lute - a fire clay used in sealing crucibles.

Melting point - the temperature at which metal changes to a liquid state.

Metal casting - pouring metal into a mold. Also the resulting product.

Mold wash - a liquid applied to the inside of plaster molds as a sealer and separator.

Open form - a form containing hollow areas, cavities, etc. (as opposed to closed forms).

Parting line - the line on a casting indicating the seam in a mold.

Patina - the color of the surface of a metal: may be altered with chemicals.

Pattern - the form around which a sand mold is created: removed before pouring.

Plate - sheet metal thicker than 1/8".

Pinhole porosity - a texture on cast metal,

generally caused by gas during metal shrinkage.

Pouring gate - the opening in a mold into which the molten metal is poured.

Quenching - cooling m[illegible] dipping it into water.

Riser - a passage in a mold through which gas escapes during pouring.

Sand burning - the surface caused by contact between the mold surface (sand) and the molten metal.

Sculptor - one who sculpts, or creates sculpture.

Sculpture - plastic or hard materials that have been carved, engraved, molded, welded or constructed into a primarily three-dimensional work of art.

Skimmer - a tool used to remove impurities from the surface of molten metal.

Slush casting - to pour metal into a mold, then pour out excess, causing a hollow casting.

Studio - any area designed for, or in which metal sculpting takes place.

Texture - the composition of the surface of a metal sculpture or casting.

Vent - a tiny opening on the surface of a mold: the opening of a riser.

B. Procedure

(Suggested Instructor Demonstration Aid)

The general procedures that apply to all forms of sculpture are discussed in this section. Individual procedures for specific sculptural techniques are listed and described on the work sheets.

The primary guideline applying to all forms of sculpture is good three-dimensional design. The sculptor relates his design to a free standing form that will be viewed from all sides. He should keep this fact in mind when designing his sketches or models. If a sculpture has been well designed, it will be pleasing to the eye from any angle.

As in painting or collage, the basic design should be developed through a series of thumbnail sketches, or clay models. Develop an idea of what the piece will look like before you begin to sculpt. By doing a series of "shape" or "form" models, you will discover certain forms that appeal to your artistic style.

Another factor to consider is the base, or stand that will support the finished sculpture. It is

easy to make the mistake of designing a base that detracts from the visual effect of the sculpture itself. Remember that when a base is used, it becomes a part of the sculpture and yet be subtle in its relationship.

Finally, in creating a sculpture try and have the finished form show "movement". A piece of sculpture that appears to relate "movement" or "action" has a greater and more pleasing visual impact that one that is unmoving.

C. Materials and supplies needed

1. Basic:

Metal

Miscellaneous chemicals for patina

Hammers, pliers, files (assorted)

Protective gloves

Asbestos board

Anvil

Clamps

Burnishing tools

Emory paper

Steel wool

Small brushes

Tin snips/metal shears

Hand drill/assorted bits

Carving knife

Goggles

Steelwire

Shellac/varnish

Furnace

2. Sand Casting:

Ram

Round and half round mandrels

Molding boards

Rubber bulb syringe

Casting flask

Crucible

Tongs

Wood sprue pins

Core tubing

Pusher

Sand

Parting powder

Acid dip

Pumic blocks

Charcoal blocks

Binding wire

Strike off iron

3. Lost Wax:

Beeswax

Alcohol lamp/bunsen burner

Porcelain wax pots

Thermometer

Wax press

Blowtorch

Eyedropper

Precision carving tools

Spatula

Burn out kiln

D. Studio procedures for students

1. Each student will be assigned an individual work and storage area for which he or she will be responsible.
2. Equipment will be distributed on a sign-out basis. Students will be expected to demonstrate correct care for and use of materials.
3. At no time will any student be allowed to use, touch, or move another students projects or materials.
4. Monitors will be assigned to certain areas as aides to the instructor.
5. All tools, equipment and areas must be cleaned at the end of each class.

6. Students will, at all times, be expected to maintain a "professional" attitude towards their work, and the work of others.

E. Hints for instructors

1. There are many visual aids available. Plan to order movies, slides, etc., well in advance.
2. Design the studio so that there is a specific storage area for all supplies. (This makes for a way of getting a quick check of materials before the end of the period.
3. Assign monitoring positions to students, on a rotating basis.
4. If equipment is at a premium (as is usually the case) have students sign them out.
5. Stress the use of protective gloves, clothing, etc.
6. Keep a first aid kit containing burn salves, etc. on hand.
7. Designate specific areas for various techniques to avoid contamination of materials.

F. Work Sheets:

Note: The following work sheets have been designed as direct teaching aids for the instructor. They may be distributed to the students for reference following the instructors demonstrations.

WORK SHEET 1 - METALLIC FORMATIONS II

Selection of Metals

The following is a list of metals, their characteristics, and applicability to casting and non-heat sculpting.

Metals fall basically into two families; pure metals and alloys. These families may be further categorized into two more categories; ferrous (magnetic-containing iron), and non-ferrous (not magnetic - containing no iron).

Iron: Iron is obtained by melting ore in a blast furnace and extracting the iron from the ore. In its refined state, the metal is commonly known as "pig iron". Pig iron is used in creating two other metals: cast iron and wrought iron. Wrought iron is relatively easy to work and is used in non-heat sculpture. Cast iron is brittle and cannot be hammered or bent. It is, however, quite applicable to casting and is relatively inexpensive.

Steel: Steel is an alloy of pig iron. It is stronger than iron and melts at a lower temperature. Steel is applicable to both casting and non-heat sculpting. It is also available in bars, sheets and rods.

Aluminum: Aluminum is one of the most applicable metals for casting. It is lightweight, soft, and has a low melting temperature. It is one of the most common metals used in sand casting. The recommended aluminum alloys to use in casting are #43, 108, 355, and 356. Aluminum also works well in lost wax casting.

Lead: Lead is a very soft metal having a low melting point. It also is very good for both casting and non-heat sculpting as it is extremely mallable and easily carved. Lead is highly recommended for use in this unit.

Bronze: Bronze is an alloy of tin (10%) and copper (90% appx.). Bronze is applicable to casting and non-heat sculpting. It is necessary to use special casting bronzes for that method. Bronze is one of the most common casting metals and was used by most of the masters of the art of casting.

WORK SHEET 2 - METALLIC FORMATIONS II

Casting (Sand)

The process of sand casting is limited to symmetrical or simple shapes to be cast. One advantage of sand casting is that the model may be used to create repeated castings (as opposed to lost wax process in which the model is destroyed by the process).

The pattern or model: Materials for patterns or models in sand casting are many. Some examples are wax, cement, wood, metal, plastic, and clay. When selecting the material for your model, remember that the texture of the model will be duplicated in the casting.

The flask: Once the model has been completed it will be used to make an impression in the flask, or mold. Usually, the flask is made from iron, in two parts. These two parts, the cope (upper) and drag (lower) are keyed to fit together tightly in one position. The sprue opening(s) is usually at one end of the flask. (Some castings are made through the sand side of the flask).

Sand: Casting sand is also known as "french" or "green" sand. It may be purchased ready to use. Foundry sand is of this type.

Preparing the mold: For this unit, we will be dealing with two-part molds. Sand casting is also done in three or more mold pieces, but this process becomes highly technical.

1. The model, if other than a simple plate, such as a door escutcheon, must be cut in half (preferably lengthwise).
2. Place the model (flat cut section down) on a board.
3. Place the drag, bottom up, over the model, centering the model in the drag.
4. Sift the green sand onto the model, patting occasionally, until the model is covered approximately 1".
5. Roughen the surface of the sand and fill to the top of the drag.
6. Pack the sand down firmly with a rammer and scrape off the excess with a ruler to the level of the top of the drag.
7. Place a molding board over the drag, and, holding both the board over and the board under the drag, turn the drag over and place it down. Hold the boards tightly to avoid losing sand.
8. Remove the top board, cut back the sand to the edge of the model (to avoid undercuts),

and gently remove the half model.

9. Gently blow off any excess particles of sand, and dust the cavity and mold face with a parting compound.
10. Replace the half model, place the other half model on it correctly, and dust the visible face of the second half model.
11. Attach the cope to the drag, and repeat steps 4, 5, and 6 above.
12. Create a sprue opening by inserting a brass tube through the sprue opening in the flask until it touches the model inside. Remove the tube and the sand inside will come with it.
13. Enlarge the sprue hole at the opening to create a pouring cup.
14. Lift off the cope and place aside (model cavity up).
15. Remove the model gently from the drag.
16. If vents are needed, create them by scraping the sand with a U shaped wire <u>from</u> the model cavity <u>to</u> the same side of the drag as the sprue.
17. Reassemble the flask, place molding boards on both sides, and tie together, securely.

Pouring the casting: Have enough molten metal ready to pour the casting in one pour. Holding the crucible as close to the sprue opening as possible, pour the molten metal gently into the sprue opening. Pour steadily at a moderate speed. Allow the metal to cool, remove the molding boards, separate the flask, and remove the casting.

Finishing: Wash the casting and brush off any excess sand. Remove risers, fins etc., with a saw or file. Detail work may be done if desired, or texture added, You are now ready to go on to surface treatment.

WORK SHEET 3 - METALLIC FORMATIONS II

Casting: (Lost Wax)

The process of lost wax casting has been practiced for centuries. Basically, it involves sculpting a model in wax, covering the wax with a mold, heating the mold to drain off the wax, filling the mold with molten metal, allowing it to cool, and removing the mold. The casting is then finished and polished. This process is over four thousand years old, and has changed very little.

Casting wax: The best types of wax for creating models is a natural wax. For this unit, beeswax is recommended, as it is easily worked, relatively inexpensive, and may be used for detail work.

Tools for sculpting wax include a heat source, spatulas, knives, old dental tools and/or a miscellaneous conglomeration of shaping utensils.

The creation of the model is done on a build-up basis, adding on heated wax, scraping and smoothing. Keep in mind that the detail created in the wax model will appear identically in the casting.

Preparing the model: Once the model is ready to be cast, it must then be sprued. Wax tubes (minimum diameter 1/4") are attached vertically to all the

extremeties of the model and areas that receive heavier amounts of metal. The runners all come together at the top of the model where a cup is formed to receive the metal.

Risers are also run directly from the model to the top of the mold. These tubes do not receive metal, but allow gasses to escape from the mold as the metal is poured into the mold.

The mold: One of the easiest methods of creating a mold is to build up a wall of plaster around the model (outside, not touching, the model or runners).

This wall is created from a mixture of fresh plaster and chunks of previously hardened plaster (for support).

Once this surrounding wall is created, make a liquid mixture of fresh plaster (enough to fill the mold in one pour) and gently fill the walled-in area, up to the height of the sprue cup above the model.
Note: This mixture should be two parts plaster of paris to one and one half parts silica. This creates a fine liquid that will pick up all the details of the model when hard.

The outside of the mold is then wound with steel wire to strengthen it.

Burnout: A burnout kiln is then constructed in a beehive shape, from refractory brick covered with clay to retain the heat. The mold is placed upside down in the kiln and the kiln is heated to 1000° F. As the wax runs out, it may be collected in a run off trough for future use.

Small pieces may take one to two days to burn out, while larger ones, (depending on their size) may take up to two weeks of continous firing.

These kilns are usually heated with oil or gas burners.

Pouring the casting: Once the mold has cooled until it can be handled with gloves, it is turned upright and placed near the furnace. The molds are placed in a flask or box which is a wood or block enclosure. Dirt is packed around the molds in the flask to help strengthen them during pouring.

The molten metal is then poured into the mold in one continuous pour. There are specific temperatures for pouring various metals. These temperatures may be researched by the artist from any one of a number

of references in part IX of this quinmester course of study.

When the metal cools, the mold may be broken away with hammers, chisels, etc.

Finishing: The runners, risers and waste projections of metal are clipped or sawed off. The casting is then sandblasted or scrubbed with wire brushes. You may now move on to finishing.

WORK SHEET 4 - METALLIC FORMATIONS II

Non-heat Metal Sculpting

There are two non-heat metal sculpting techniques that will be discussed in this section: Joining and Forming.

Joining: The most common method of joining metal is a heat involved method known as welding. This process is described in depth in the quinmester course of study entitled Metallic Formations I.

This section will describe several methods of joining sheet and plate metal without the use of heat.

Riveting: Rivets are available in an an assortment of sizes, colors and metals. There are rivets designed for all specific purposes. One of the easiest riveting processes is with a tool known as a "pop-riveter". This tool may be purchased locally and has a variety of rivets that may be used in conjunction with it.

Once you have selected a rivet that is applicable to the metal you are joining, drill a hole through both pieces at the point to be joined. (The rivet should pass through the hole tightly). The rivet is then

inserted and bonded with the use of the pop-rivet tool.

Rivets may also be used as non-functional surface decorations.

Nails: Nails may be used to join metal to wood. If the metal is thicker than sheet gauge, a pre-drilled hole is advisable.

Screws: Sheet metal screws are available in various sizes, and are applied by screwing them into a hole that is slightly smaller than the thread diameter of the screw to be inserted.

Bolts: Bolts will also give an interesting surface effect when attached through pre-drilled holes.

Through experimentation, you may also achieve interesting effects with other methods of joining metal. Some suggestions for experimentation:

1. Gluing with epoxy resins such as "liquid steel", "liquid solder", etc.
2. Bonding with fiberglass.
3. "Sewing" with wire, material or monofilament line.

Each method of joining metal has its own distinct physical and visual characteristics. Through experimentation you will find the method that is most compatible with your artistic style.

Forming: There are two basic methods of forming sheet metal; stretching (over a convex surface) and compressing (into a concave surface). These two methods may be used singularly, or in conjunction on one piece.

Forming is usually done on 14, 16 and 18 B. & S. gauge metals. In the case of stretching, 14 gauge or thicker is recommended.

The primary, and most important tools used in metal forming are hammers, anvils, and finishing tools. They all come in a variety of shapes and sizes. Each hammer or anvil has a specific shaping capability. It is wise to discover the capabilities of these tools through experimentation on scrap pieces before moving to your piece.

Annealing: Annealing is a process by which the metal is heated by a torch. This heating will soften the metal and thus prevent cracking and brittleness when being worked with the hammer. The only risk involved in annealing metal is if the metal is overheated. The metal does not have to be made red hot when heated. In many cases, this will make the metal too weak to be hammered. In order to give the artist a rough appoximation

of temperatures involved, here are some annealing temperatures for various metals:

Aluminum	630-670°F
Brass	800-1100°F
Bronze	800-1100°F
Copper	700-1200°F
Gold	(none required)
Sterling silver	1200°F

As it is difficult to discern when these temperatures have been reached, fluxes with various fusion temperatures may be applied to the metal surface prior to heating.

A propane torch, applied at slightly less than a 90° angle to the surface, is a most economical means of annealing metal. Keep the torch moving over the surface to minimize warping. Annealing should be done periodically throughout the forming process.

Stretch forming: There are two stretching methods that will be discussed in this section: blocking, and sandbagging.

Blocking is a process by which the metal is hammered into a pre-formed depression, such as a metal forming plate, or a wood forming block. In most in-

stances, the edge of the metal is turned first, then worked circularly toward the center. (This applies to wood-forming blocks. Metal blocks are worked from the center to the outer edge.

Blocking is generally used on large bowl or deeply curved pieces.

Sandbag: Prepare the sandbag by sprinkling with water. (This will keep the dust down.) Using a 1½ lb. embossing hammer, work the surface of the metal from the center in a spiral motion to the outside edge. Frequent annealing is required as substantial distortion occurs. Develop a pattern to the spiral. This will keep distortion to a minimum.

Compressing: The basic method of forming metal by compression is raising. The most common raising method is angle raising. In this process the final desired angle in a piece is achieved through creating a series of smaller angles and working up to the final shape. If it is desired, the angle may be rounded out on the anvil in a similar method. Experimentation with various hammers and anvils on scrap pieces is the best method of developing a desired technique.

Swagging: Swagging is also known as edge forming. This is a decorative technique used on the creation of most bowls rather than sculptural pieces, but should be mentioned. The thicker edge makes the piece stronger and helps it hold the desired shape. Swagging is done by hitting the edge of the piece gradually at a 90° angle to the edge. A sandbag support is generally used. This process thickens the edge.

Plannishing: Plannishing is one finishing method that creates a textured surface. It is done by methodically tapping the surface with a slightly convex faced plannishing hammer. Each mark left by the hammer should slightly overlap the previous mark.

In non-heat metal sculpting, formed pieces may be joined to each other, or joined to pieces of bent rod, sheet metal, pipe, or plate metal, depending on the individual artist.

Non-heat metal sculpture is a very broad area and is open to vast amounts of experimentation. Realistic or abstract forms may be created in any one of a variety of ways. Let your imagination and artistic ability be your guide.

WORK SHEET 5 - METALLIC FORMATIONS II

Surface Treatment

There are two qualities of surface treatment involved in metal sculpture: The first being texture; the second, patina.

Texture: In this step you will decide upon the final surface composition of your sculpture. Some shapes lend themselves to a highly refined and polished surface, while others create a more pleasing visual impact in a rough, highly textured state. Some methods of texturing:

1. Incorporating the texture caused by the mold on a cast piece
2. Hammering; working the surface with a ball-peen hammer
3. Filing
4. Sanding
5. Acid corrosion

Patina: The patina of a piece of metal refers to the surface coloration. There are numerous patinas that may be created on metal through painting oxidation, acid application, polishing etc.

Directions for achieving certain colors on some metals will be described below. The solutions listed may be

painted on or dipped into. Due to impurities in various metals, which may cause varying results, experiment on a test piece of the same metal before moving to your sculpture. (Do not limit yourself to this list alone. Research will uncover many other patina effects that may also be achieved.)

Before any solution is applied, the metal should be thoroughly cleaned with a solvent.

Once the solution has been applied and the effect has been achieved, coat the piece with a clear preservative such as lacquer, varnish, or synthetic resin.

Bronze (brass also)

Green
- Sodium chloride - 8 oz.
- Ammonium chloride - 8 oz.
- Ammonia - 6 oz.
- Vinegar(or acetic acid) - 1½qt.

Brown
- Barium sulphide - 3 oz.
- Potassium sulphide - 1 oz.
- Ammonia - 6 oz.
- Water - 1 gallon

Blue Lead- acetate - 2 oz.
Sodium thiosulphate - 4 oz.
Acetic acid - 2 oz.
Water - 1/2 gallon
(Apply warm)

Steel (iron)

Brown (rust)
Natural weathering or strong salt/water solution

Blue
Mercuric Chloride	- 4 parts
Potassium chlorate	- 3 parts
Alcohol	- 8 parts
Water	- 85 parts

Lead

Green
Copper nitrate	- 4 oz.
Chromic acid	- ½ oz.
Ammonium chloride	- 2 oz.
Acetic acid	- 2 oz.
Water	- 1 gallon

(apply warm)

Black Brush a mixture of muriatic acid and lampblack onto the heated metal. Re-heat the lead until black. Wax after cooling.

WORK SHEET 6 - METALLIC FORMATIONS II

Base Design and Creation

Most sculpture is created either free-standing or mounted on a separate base. If your sculpture is of the second type, here are some guidelines on the creation of a suitable base.

Design: A base should be designed to complement the sculpture for which it is made. The design should be simple and direct. Keep in mind that the base should not detract from the visual impact of the sculpture itself.

Some sculptors have a base in mind as early as when they are still creating the sculpture. However, the artist must remember that the base is designed to fit the sculpture, not the other way around.

Simplicity is the key word in the design of a good base.

Media compatibility: The next step is creating your base is to select the material from which it is made.

Basically, it is a matter of individual taste as to which material should be selected. As you have

already selected a design, you are now ready to go on to color and texture. For example, a smooth marble base is generally a cream color. (Some types of marble have pine or grey hues). Certain metals apply themselves very well to a marble base.

A base of the same metal from which the sculpture was made sometimes works well also. There are also many types of wood (both finished and rough) that apply themselves very well to metal subjects.

Let your artistic knowledge of color and design be your guide.

Texture: Do not limit your selection to finished materials alone. Experiment with coarse or unfinished surfaces. You may find that a smooth, polished sculpture may stand out very well against a rough or primitive base.

Mounting: Basically, your sculpture is mounted directly on, or in a raised position above the base. Again, experimentation is your best guideline.

IX. RESOURCES FOR PUPILS

* American Society for Metals, Casting Design Handbook, Ohio: American Society of Metals, (Book Division).

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Lynch, Metal Sculpture, New York: Viking Press.

Meilach and Seider, Direct Metal Sculpture, New York: Crow.

* Mills, J. W., Technique of Casting, New York: Nostrand-Reinhold.

* Morris, J. L., Metal Castings, Englewood Cliffs: Prentice-Hall.

Parlanti, E. J., Casting a Torso in Bronze, New York: Transatlantic Arts.

Van Lancker, Metallurgy of Aluminum Alloys, New York: John Wiley and Sons.

* indicates resources for classroom reference

X. RESOURCES FOR INSTRUCTORS

Note: Resources marked with an asterisk have been selected as most effective during previewing.

A. Movies, Slides. (Available through Dade County Board of Public Instruction - instructional materials division).

* What Goes into a Blast Furnace

15' BW S IFB 1-11597

* What Comes out of a Blast Furnace

8' BW S IFB 1-04073

Twentieth Century Sculpture

C JST 5-20159

B. Textbooks.

* Jansen, History of Art, Englewood Cliffs: Prentice-Hall, 1962.

* Reed, Sir Herbert, Form Space and Vision, Graham Collier, 1967. (State adopted text).

Also: - Those resources listed for pupils (part IX) marked with an asterisk.