



# LESSON PLANS

## CAST PROJECTS

### Clay Whistles



DM# 2323 Peruvian Whistles

Artist: Kyle King, Age 9

#### Introduction

Once dismissed as toys, clay whistles, ocarinas and flutes from the ancient Americas were celebrated as ancient American wind instruments vital to the life and religion of the Incan and Mayan cultures, including the ruling elite.

Recently in Belize, a rich lode of instruments was unearthed from a royal tomb, underscoring their value and importance. The new appreciation of the pre-Columbian instruments is fueled by recent discoveries of musical objects at archeological sites in Central and South America and by increasingly rigorous analysis of such instruments for their cultural significance and mechanical action. Indeed, some are so complex, they have no counterparts in modern instruments.

#### How does a clay whistle work?

Air blown into the whistle must have pressure or force. Blowing into a thin slit causes the pressure and forces the air to hit a thin beveled wall, splitting the air and resulting in a whistle sound. Positioning of holes will change the sounds and pitches of the whistle. Cleaning the clay whistle ensures that it can be played.

#### Educational Objectives

This lesson provides opportunities for students to:

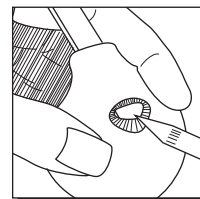
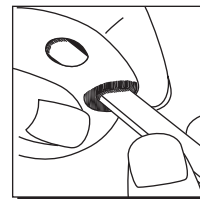
- Create a functioning whistle out of a clay form
- Study clay whistles from Central and South America, and learn the significance of turtles and frogs in those cultures
- Learn how, whistles have been used for music, defense, toys and hunting
- Learn about other materials used to make whistles

#### References

- [www.statnekov.com/peruwhistles](http://www.statnekov.com/peruwhistles)
- [www.chiffandfipple.com](http://www.chiffandfipple.com)
- [www.americanwhistle.com](http://www.americanwhistle.com)
- [www.acmewhistles.co.uk/history.html](http://www.acmewhistles.co.uk/history.html)

#### Teaching Tips

- When these whistles are cast and dried, the large air hole in the back must be beveled very thin. Cut only a narrow slit to blow into. Forced air must hit the bevel directly to split the air and make the whistle sound.
- These whistles must be hand glazed. Submerging the whole piece into a dip tank will round off the bevel and fill the air slit, making them dysfunctional.
- Bring a xylophone or other instrument into the classroom and compare its pitch to that of the whistles.



More Teaching Tips and Glossary on back.

#### Materials

For 30 students

- 30 cast pieces (refer to Teaching Tips on back) fired to cone 04 bisque
- 8-10 8-oz. Concepts™ colors as noted in step-by-step instructions
- Assorted small and medium round brushes to apply color
- Disposable plates to hold color
- Paper towels
- Water containers

#### Step-by-Step

Classroom Participation

1. Casting the molds can be done with the students (refer to Teaching Tips on back). Pieces must be bisque fired to cone 04 before continuing.
2. Apply Concepts™ colors as desired with an assortment of brushes: Suggested colors: CN 022 Bright Saffron, CN 062 Bright Salsa, CN 142 Bright Aqua, CN 181 Light Kiwi, CN 272 Bright Jade, CN 292 Bright Purple, CN 253 Dark Black.
3. Dry the pieces thoroughly overnight.

#### Glaze, Fire, Finish

1. Carefully brush IN 1001 Clear glaze on the piece. Do not fill the air blow slit, or paint glaze on the beveled edge of the bottom hole or inside of whistle.
2. Stilt, place each whistle on the prongs of a stilt and set into the kiln for firing. Leave 1/2" space between each piece.
3. Place 06 shelf cone on each shelf and an 06 small cone in the sitter. Fire to glaze fire cone 06.



# Pilgrims



DM# 2319 Pilgrim Man



DM# 2318 Pilgrim Woman

Artist: Suzie Espinoza, Age 11

## Introduction

The historical accounts of Pilgrims and their Native American neighbors are familiar to most people. Pilgrims evoke powerful images of strength in the face of adversity, ships on storm-tossed seas and bleak New England winters. Additional lessons that can be taught along with these images include Thanksgiving, harvest, bounty, thankfulness and respect of ancestors.

A historical bust reinforces the history of our nation's beginnings. A bust sculpture — a three-dimensional form showing head and shoulders — is an honorary way to respectfully represent real people of the past. Historical sculptures represent the realistic likeness (vs. cartoons) of people, period costumes, traditions and can even depict emotions.

## References

[www.plimoth.org](http://www.plimoth.org)  
Classroom textbooks available

## Educational Objectives

This lesson provides opportunities for students to:

- Learn about sculpture and three-dimensional form
- Study a plaster mold, experience casting and reproduction forms
- Study the likeness of sculpture to the period it represents; costume, hairstyle
- Compare character studies with lifelike sculpture

## Teaching Tips

- Discuss traditional sculpture mediums, including stone, wood, clay, bronze and synthetics.
- Make a classroom display that includes scenes of the harvest.
- The directions for finishing these sculptures calls for fired color; for the look of a metal sculpture, simply brush the bisque with Duncan Ultra Metallics™ — do not fire!  
More Teaching Tips and Glossary on back.

## Materials

For 30 students

- 30 cast pieces; cast each mold 5 times, clean and cone 04 bisque fire
- 4-8 8-oz. Concepts™ colors as noted in step-by-step instructions
- Assorted small and medium round brushes to paint color
- Disposable plates to hold color
- Paper towels
- Water containers

## Step-by-Step

Classroom Participation

1. Casting the molds can be done with the students (refer to Teaching Tips on back).  
Pieces must be bisque fired to cone 04 before continuing.
2. Apply Concepts™ colors as follows with an assortment of brushes:  
Face – CN 222 Bright Blush  
Cheek Blush – CN 062 Bright Salsa  
Face Details & Hair – CN 232 Bright Briarwood  
Clothes – CN 253 Dark Black  
Additional colors for children's projects may include: CN 022 Bright Saffron, CN 073 Dark Scarlet, CN 102 Bright Heather, CN 142 Bright Aqua, CN 181 Light Kiwi, CN 272 Bright Jade plus colors of choice.
3. Dry the pieces thoroughly overnight.

## Glaze, Fire, Finish

1. Dip in CN 2000D Clear glaze for the final finish (refer to Teaching Tips on back).
2. Dryfoot, wipe glaze off the bottom with a damp sponge, and set on kiln shelf for firing. Leave 1/2" space between each piece.
3. Place 06 shelf cone on each shelf and an 06 small cone in the sitter. Glaze fire to cone 06.



# Presidents



DM# 2315 Washington

DM# 2316 Lincoln

Artist: Jenny Reeves, Age 10

## Introduction

Presidents in historical review are remembered for their accomplishments. Artistically, we represent them in a bust sculpture. Putting three-dimensional form and a realistic image of their likeness into children's hands reinforces the reality of historical facts and accounts.

Historical sculptures encourage discussions on clothing, protocol, lifestyles and historical events. Sculptors use various materials to carve a likeness or representation of the person. Soft materials that can be carved include wet clay, bar soap and even soft stone. The sculptor is careful to detail exact likenesses from pictures and paintings of that period. For reproduction work, molds are made for casting clay. This process will happen in your classroom.

Plaster molds are readily available. A multiple casting mold is called a gang mold. For each of the

presidents and Uncle Sam, three busts may be cast from each mold at one time. Gang molds in manufacturing facilities may include dozens of pieces and mechanical filling of the molds.

## References

[www.americanpresidents.org](http://www.americanpresidents.org)

## Educational Objectives

This lesson provides opportunities for students to:

- Use three-dimensional form in studying historical figures
- Study more personal aspects of famous historical presidents; hairstyle, clothing, etc.
- Discuss the myths and meaning of Uncle Sam
- Learn about casting ceramics and terminology related to creating ceramic pieces
- Enjoy painting ceramics and the "magic" that occurs after firing

## Teaching Tips

- Visit local historical areas close to school.
  - Have a veteran of a foreign war or a national guardsman visit your classroom.
  - Create banks from these sculptures by cutting a coin slot into the back of the head right after they are removed from the mold. Discuss war bonds and savings accounts.
  - Discuss careers of public servant, President of the United States and other national offices.
  - Make a display for President's Day, including painted pieces featuring the American Flag.
- More Teaching Tips and Glossary on back.

## Materials

For 30 students

- 30 cast pieces (refer to Teaching Tips on back) fired to cone 04 bisque
- 8-10 8-oz. Concepts™ colors as noted in step-by-step instructions
- Assorted small and medium round brushes to apply color
- Disposable plates to hold color
- Paper towels
- Water containers

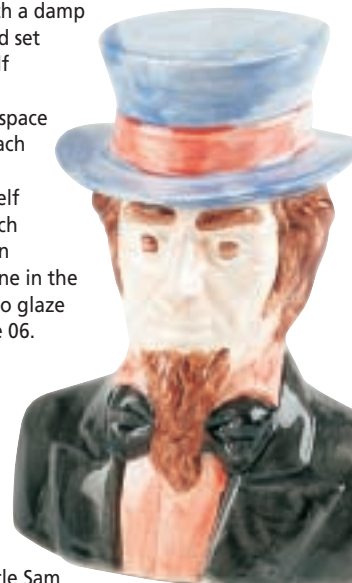
## Step-by-Step

Classroom Participation

1. Casting the molds can be done with the students (refer to Teaching Tips on back). Pieces must be bisque fired to cone 04 before continuing.
2. Apply Concepts™ colors as follows with an assortment of brushes:  
Face – CN 222 Bright Blush  
Cheek Blush – CN 062 Bright Salsa  
Face Details – CN 232 Bright Briarwood  
Hair – CN 232 Bright Briarwood or unpainted for white hair; Clothes – CN 073 Dark Scarlet, CN 102 Bright Heather, CN 253 Dark Black  
Additional colors for children's projects may include; CN 022 Bright Saffron, CN 142 Bright Aqua, CN 181 Light Kiwi, CN 272 Bright Jade; plus colors of choice.
3. Dry the pieces thoroughly overnight.

## Glaze, Fire, Finish

1. Dip in CN 2000D Clear glaze for the final finish (refer to Teaching Tips on back).
2. Dryfoot, wipe glaze off the bottom with a damp sponge, and set on kiln shelf for firing. Leave 1/2" space between each piece.
3. Place 06 shelf cone on each shelf and an 06 small cone in the sitter. Fire to glaze fire to cone 06.



DM# 2317 Uncle Sam



# Holiday



DM# 2321 Santa



DM# 2322 Bunny



DM# 2320 Ghost

Artist: Robert Dean, Age 10

### Introduction

Thomas Nast, a well-known and respected painter, got his inspiration for the extremely popular painting of Santa Claus from Clement C. Moore's world famous poem, "Twas The Night Before Christmas." Christmas and many other Western holidays have a significant educational time slot in the school year. Children delight and look forward to participation in decorations that not only call in the holidays but seasonal changes as well.

Cast holiday and seasonal items create memorable images for imaginative decorating. The opportunity to paint and fire ceramics always enhances learning about the fired ceramic process, creating useful objects out of clay. These decorative forms can be finished in other ways (refer to Teaching Tips on back).

### References

[www.claus.com](http://www.claus.com)  
[www.northpole4kids.com](http://www.northpole4kids.com)  
[www.holidays.net](http://www.holidays.net)

### Educational Objectives

This lesson provides opportunities for students to:

- Decorate a three-dimensional holiday form
- Study origins of holidays
- Experience ceramics and the "magic" of fired color
- Discuss holiday color schemes and relationship to seasons
- Discuss family traditions for each season: "In the fall, we..."

### Teaching Tips

- Plan a classroom party using the ceramic pieces for decorations.
  - Because the forms are simple, try other painting techniques such as fingerprint dots on the ghost, fingerprints made into flower shapes, tiny faces made in the fingerprints with a toothpick, etc.
  - Decoupage floral wrapping paper to the rabbit by painting with thinned white glue or decoupage medium. Cut out shapes, paint on the glue, position the cutouts and cover with more glue. Do not fire!
  - Make the Santa Claus early in the fall, cut a coin slot in the back of his head right after it is removed from the mold. Christmas savings banks can be used for a worthy cause in the classroom.
  - Create an attendance display for the month of October. Make a ghost for each child in the display. When one is absent, remove the ghost for that day.
- More Teaching Tips and Glossary on back.

### Materials

For 30 students

- 30 cast pieces (refer to Teaching Tips on back) fired to cone 04 bisque
- 8-10 8-oz. Concepts™ colors as noted in step-by-step instructions
- Assorted small and medium round brushes to apply color
- Disposable plates to hold color
- Paper towels
- Water containers

### Step-by-Step

Classroom Participation

1. Casting the molds can be done with the students (refer to Teaching Tips on back). Pieces must be bisque fired to cone 04 before continuing.
2. Apply Concepts™ colors as follows with an assortment of brushes:  
 Face – CN 222 Bright Blush  
 Face Details – CN 232 Bright Briarwood  
 Hair, Beard – Unpainted will result in white  
 Red Clothes – CN 073 Dark Scarlet or CN 062 Bright Salsa  
 Suggested colors: CN 022 Bright Saffron, CN 062 Bright Salsa, CN 142 Bright Aqua, CN 181 Light Kiwi, CN 272 Bright Jade, CN 292 Bright Purple, CN 253 Dark Black
3. Dry the pieces thoroughly overnight.

### Glaze, Fire, Finish

1. Dip in CN 2000D Clear glaze for the final finish (refer to Teaching Tips on back).
2. Dryfoot, wipe glaze off the bottom with a damp sponge, and set on kiln shelf for firing. Leave 1/2" space between each piece.
3. Place 06 shelf cone on each shelf and an 06 small cone in the sitter. Glaze fire to cone 06.

# Teaching Tips

## More Teaching Tips

Ceramic studios and casting information is available through Duncan Distributors and Ambassadors. Please call 1-800-CERAMIC for assistance.

### Mold-Made Art from China

When Qin Shih Huang Ti, Emperor of China, died in 206 BC, he was entombed with a remarkable army of more than 7,000 life-sized terra-cotta warriors and horses. Unlike previous rulers, whose unfortunate warriors were sacrificed and buried along with them, Qin Shih Huang Ti wisely commissioned his craftsmen to create this clay army in preparation for his death. Unearthed in 1974, each of the amazing clay figures has a different face, but many experts believe that molds were used to produce other, more similar portions of the figures, such as hands and breastplates.

### Arts/Industry

The next time you are standing over a sink brushing your teeth, look at the curve of the white porcelain basin beneath your face. Then think "molds." Mold-making enters our lives on a daily basis, and the mold-made objects that appear the most mundane sometimes prove the most valuable. The significance of sink, bathtub and toilet molds has not been lost on visual artists who have taken part in Arts/Industry, a program of the John Michael Kohler Arts Center in Sheboygan, Wisconsin. Each year, 15-22 artists from around the world are selected to work from 2-6 months as artists in residence in Kohler Co. – the nation's leading manufacturer of plumbingware.

The casting shop of the Kohler Co. Pottery is the largest pottery in the world under one roof and serves as the primary studio space for Arts/Industry artists in residence working in clay. An unlimited supply of strong, off-white vitreous china clay with an excellent capacity for slip casting and carving is piped under pressure to the artist's work station in slip form. Artists make their own plaster molds and, if they choose, also use discarded production molds and ware. Their cast work goes onto cars and travels through 300 foot long tunnel kilns for precisely adjusted and monitored firing. [www.jmkac.org](http://www.jmkac.org)

For more information about the many functions and forms of ceramics, visit The American Ceramic Society at [www.acers.org](http://www.acers.org)

## Glossary of Terms

**Bisque:** Unglazed ceramic pieces fired at a low temperature.

**Bisque Firing:** The first firing of a ceramic piece. Prepares the surface for applying glaze.

**Body:** A blend of clays that harden when fired in a kiln.

**Greenware:** Unfired clay pieces. Fragile until fired.

**Casting:** The process of pouring liquid clay into a mold.

**Ceramics:** The heating of materials that come from the earth to create functional and decorative ceramic objects.

**Clay:** Slip that has hardened.

**Coil/Coiling:** Rolling out long pieces of clay and joining the pieces together to build objects such as pots and sculptures. Refers to a handbuilding technique.

**Cone:** A heat-measuring device that is used when firing a kiln to react to time and temperature.

**Cut-off Tool:** An instrument used to cut off pieces of clay.

**Dipping:** Quickly plunging a bisque-fired piece into a container of liquid glaze to coat.

**Firing:** The process of heating ceramic products in a kiln using varying degrees of heat.

**Glaze:** A coating that melts and bonds to a clay body when fired in a kiln, giving the surface a glass-like appearance.

**Glaze Firing:** The second firing of ware during which glaze melts onto and coats a clay body.

**Handbuilding:** Creating objects by hand rather than on a potter's wheel. Coiling and slabwork are examples of handbuilding techniques.

**Kiln:** An oven designed to fire pottery.

**Low-Fire:** A range of firing temperatures for clay and glazes that doesn't exceed 1944° F.

**Mold:** A plaster form that is used to shape liquid clay (slip).

**Score:** To scratch tiny criss-cross lines on areas of greenware that will be joined with clay slip.

**Slab:** A flat piece of clay rolled out to about 1/4" thick. Used in handbuilding techniques.

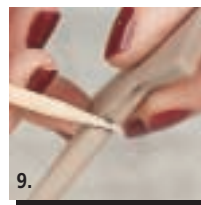
**Slip:** The liquid form of clay (Clay mixed with water makes slip).

**Underglaze:** A ceramic color used under a glaze.

## Casting a Mold

*Using slip (liquid clay)*

1. Dust two mold halves with a large soft brush.
2. Strap or band together securely.
3. Stir slip, strain and pour into a large pitcher.
4. Pour slip steadily into mold openings until completely full.
5. Refill openings. School molds take from 20-45 minutes to cast. The casting body should be approximately 1/4" thick.
6. With openings down, pour out excess slip and drain.
7. After a minimum of two hours, lay mold so that one half can be removed completely.
8. Remove casting from mold when leather hard and strong enough to be trimmed and hold its shape.
9. Dry castings undisturbed before cleaning seam lines. This is called greenware.



## Storing Slip

1. Slip is best stored in a tightly sealed plastic container.
2. To thin slip, add a little water and stir thoroughly to a pourable consistency.

## How to Paint Greenware

Ceramic underglazes, including Duncan E-Z Stroke® Translucent Underglazes and Cover-Coat® Opaque Underglazes, may be applied to ceramics in a greenware stage.

When applied to leather hard clay, these pigment and clay-based products fire into the clay during a cone 04 bisque firing. Cover-Coat® underglazes are velveteen in appearance when fired to cone 04. E-Z Strokes® produce a translucent watercolor effect.

## How to Make Low-Fire Ceramic Bisque

1. Clay pieces should be completely dry before putting in kiln. Allow hand built pieces 3-5 days to air-dry depending on humidity in area. Wet clay pieces can burst during firing.
2. Place a cone 04 self-supporting cone on each kiln shelf
3. Place a cone 04 bar kiln in kiln sitter.
4. Place pieces directly onto kiln shelves 1/2-1" apart, allowing for air circulation during firing.
5. Close kiln, set temperature and fire kiln according to kiln manufacturer's instructions.

## Painting Bisque

1. Bisque is fired clay. This form is a much more durable and safe surface for a child to paint on. Breakage is greatly reduced from greenware or unfired stage. The colors will be much brighter and truer on the whiteness of the bisque. "Mistakes" can simply be washed off with water!
2. Squeeze out quarter-sized puddles of Concepts™ colors onto disposable plates.
3. Paint color as desired with an assortment of brushes. Heavier application of paint results in a brighter piece when fired. Thin color for a wash. Techniques include: sponging, stenciling, spattering, dotting, etc.
4. Dry pieces thoroughly overnight.
5. Dip in CN 2000D Clear glaze for a final finish.
6. **Stilt** (set the pieces onto the prongs of a stilt in the kiln) or **dryfoot** (wipe the glaze off the bottom with a damp sponge before setting on the kiln shelf). Fire to cone 06.

## Duncan University Credits

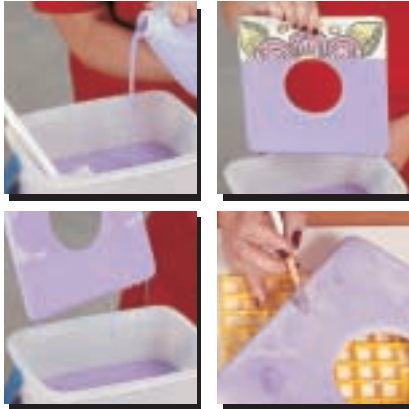
Complete the educational in-service session with a Duncan Ambassador for the Colorworks™ Class Projects 1-4 and receive 1 Duncan University credit in the Duncan Education System.

# General Information

## How to Dip with Clear Glaze

Use CN 2000D Clear glaze on fired bisque and painted bisque pieces.

1. Pour glaze into tank and mix.
2. Dip 1/2-3/4 ware; quickly lift out.
3. Dip remainder of ware; overlap slightly.
4. Touch up with a brush as needed.
5. These pieces **MUST** be placed on stilts in the kiln. Fire to cone 06.



## Choosing and Using Cones

The Duncan Ceramic products in the color guide fire from cone 06, 1828° F to cone 6, 2246° F. Ceramic firing is similar to baking in an oven but with much hotter temperatures. Since hot ceramic kilns cannot be safely opened during firing, pyrometric cones are used to measure the heat absorbed by the ware. Pyrometric cones are numbered to correspond to a desired cone firing level — the lower the cone number, the cooler the firing.

A proper firing will cause the cone to bend at an even 90° angle.



Pyrometric self-supporting shelf cone

### Too close



### Proper distance



Self-supporting cones with desired cone number are placed on each kiln shelf before firing. Since cones bend over during firing to indicate heat absorbed, it is important to keep them at a safe distance from the ceramic piece in kiln.

Small bar cones are used in a kiln-sitter. A kiln-sitter is an automatic mechanical device that shuts off the kiln when the cone bends due to the desired absorption of heat.



Bar cones

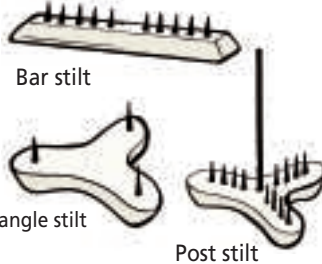
## Using Stilts

Specially designed ceramic stilts are placed under all glazed ware to keep the glaze and art piece from adhering to the kiln shelf.

*Note: Bisque firings without glaze do not require stilts.*

## Loading Kiln Shelf

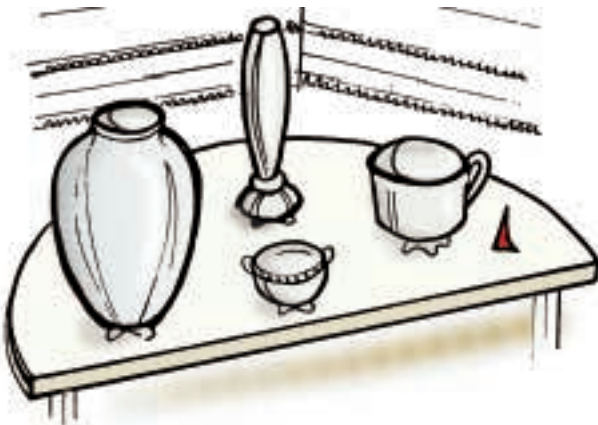
- Kiln shelves are round or half rounds
- Pieces placed 1" from kiln wall
- Pieces placed 1/2-1" apart (do not overcrowd kiln)
- Repeat instructions for each shelf



Bar stilt

Triangle stilt

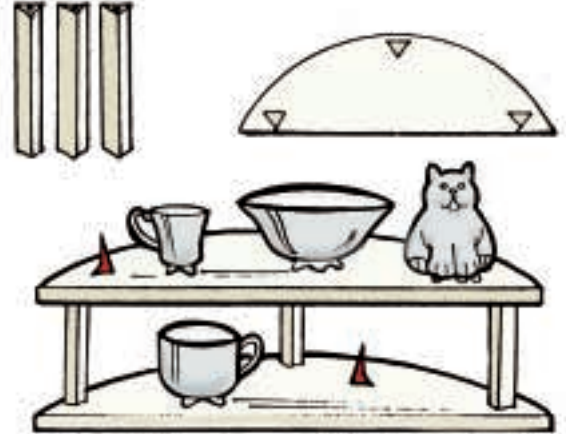
Post stilt



## Add Shelves, Fire Kiln

Arrange same-sized posts in a triangle to support kiln shelf; place shelf on posts; repeat for each shelf added.

Close kiln lid and fire kiln to desired cone per kiln manufacturer's instructions.



## Unloading Kiln

- Open kiln when cool to touch
  - Remove pieces only when cool to touch
  - Grind off stilt marks with stilt stone or dremel tool
- Important: wear eye protection.*



## DUNCAN PRODUCT FIRING GUIDE

| Cone 06 Coolest                     | Cone 04                                   | Cone 5-6 Hottest                               |
|-------------------------------------|---|--|
| Approx 1859°F 1015°C                | Approx 1940°F 1060°C                      | Approx 2246°F 1230°C                           |
| Low Fire Cone 04 Bisque             | Low Fire Clays, Earthenware and Greenware | High Fire Clay, stoneware, porcelain and china |
| E-Z Stroke™ Translucent Underglazes | E-Z Stroke™ Translucent Underglazes       | E-Z Stroke™ Translucent Underglazes            |
| Cover Coat® Opaque Underglazes      | Cover Coat® Opaque Underglazes            | Cover Coat® Opaque Underglazes                 |
| Concepts™                           | French Dimensions™                        | Concepts™ Underglaze for Bisque                |
| French Dimensions™                  | Courtyard™ Art Glazes                     | French Dimensions™                             |
| Envision™ Glazes                    |   | Envision™ Glazes                               |
| Courtyard™ Art Glazes               |   | Courtyard™ Art Glazes                          |
| Crystals™ & Crackles™ Glazes        |   | High Fire Art Glazes                           |
| Low Fire Clear Glazes               |   | High Fire Clear Glazes                         |
| Satin Glazes                        |   | Satin Glazes                                   |

## cone LEVEL

### Cooler

019

018

017

06

05

02

5

### Hotter

10

\*For more information on cones and firing, visit Orton Cones at [www.ortonceramic.com](http://www.ortonceramic.com)

**Duncan**

Duncan Enterprises  
5673 East Shields Avenue  
Fresno, CA 93727  
[www.duncanceramics.com](http://www.duncanceramics.com)  
PR# 006D



© 2000 Duncan Colorworks™