Dalí Museum, Saint Petersburg, Florida

Integrated Curriculum Tour Form

Education Department, 2015

TITLE:

“Salvador Dalí: Elementary School Dalinian Science”

SUBJECT AREA:

(VISUAL ART, LANGUAGE ARTS, SCIENCE, MATHEMATICS, SOCIAL STUDIES)

Visual Art, Science (Next Generation Sunshine State Standards listed at the end of this document)

GRADE LEVEL(S):

Grades: K-5

DURATION: (NUMBER OF SESSIONS, LENGTH OF SESSION)

One session (30 to 45 minutes)

Resources: (Books, Links, Films and Information)

Books:

- The Dalí Museum Collection: Oil Paintings, Objects and Works on Paper.
- The Dalí Museum: Museum Guide.
- The Dalí Museum: Building + Gardens Guide.

Links:

- Florida Art Education Association:  [www.faea.org](http://www.faea.org)
Films:

- Dalí Condensed: 5 lecture series, Peter Tush, Curator of Education Dali Museum You Tube Site.
- The Dalí Dimension, Decoding the Mind of a Genius, Psychoanalysis, Relativity Theory, DNA & Genetics, Mathematics, Nuclear Physics.

Information:

Leonardo da Vinci (1452-1519)

- Italian polymath, scientist, mathematician, engineer, inventor, anatomist, painter, sculptor, architect, botanist, musician and writer. Leonardo has often been described as the archetype of the Renaissance man.
- Painstaking observations and carried out research in fields ranging from architecture and civil engineering to astronomy to anatomy and zoology to geography, geology and paleontology.
- Leonardo had a device for waking.
- Spring Device, geometric perspective.
- c. 1478: Studies of Self-Propelled cart, Codex Atlanticus.
- 1480: Parachute.
- 1480: Archimedes screws and pumps to draw up water.
- 1485: Drawing of a flying machine.
- 1485: Scythed Assault Chariot.
- 1487: Canon Foundry.
- 1490: Study of Horses.
- 1492: Vitruvian Man.
- 1500: Scuba.
- 1502: Armored Tank.
- 1503-04: Study of battles on horseback and foot.
- 1503-05: The Battle of Anghiari (detail), copy by Peter Paul Reubens.
- 1504-05: Head Studies.
- 1505: The Battle of Anghiari.
- 1505: Studies of wing for glider, Codex on the Flight of Birds.
- 1509: Luca Pacioli: Divine Proportion, Illustrated by Leonardo da Vinci. (Elevated Rhombicuboctahedron)
- 1509-10: Muscles of the Shoulder, Geometric proportions applied to the human figure, Windsor.
- 1510-13: Catapult drawings.
- 1510-13: Old man with studies of the action of water.
- 1510-13: Studies of anatomy, including embryos.
- 1513-14: Anatomy of bird wing.
- 1515: Study of Dancers.
- 1651: Treatise on Painting published. In the posthumous Treatise on Painting (1550), Leonardo advocates the visual study of stains on walls, ashes in a fire place, or mottled and grainy stones, mud, or clouds – things that are formless and “confused.” He says that in and of themselves they are meaningless. However, through visual subjective fantasy, “a new invention of speculation” emerges by which “if you consider them well, you will find really marvelous ideas.”

Sigmund Freud

- Vienna was the center of Medical Research.
- Freud as Scientist.
- The Dream Subjected to Rational Inquiry.
- Dreams have Meaning: ’The Royal Road’ to the Unconscious.
- Freud’s Theory of Dream Construction:
  1. The purpose of the dream is to preserve sleep.
  2. The dream expresses a concealed wish.
  3. Manifest versus latent content.
  4. The dream content is instigated by something in the past day or so. (Day Residue)
  5. The Day Residue is also used to express a wish from the past, often childhood.
  6. Latent wish attaches to day residue.
  7. Censor employs the Dream Work to disguise the wish.
  8. In dreaming there is also a ‘topographical regression’ to primary process expression in the dream work.
- The Dream Work:
  1. Displacement.
  2. Condensation.
5. Secondary Revision upon awakening.

- Freud and Surrealism.
- Dalí reads *Interpretation of Dreams* in art school and the rest of Freud’s work in the 20’s.
- Paranoiac-Critical method influenced by psychoanalysis.
- Salvador Dalí, Drawings of Freud.
- 1934: Salvador Dalí, *Skull with Its Lyric Appendage Leaning on a Night Table Which Should Have the Exact temperature of a Cardinal Bird’s Nest*.

Scientific Status of Freud’s Dream Theory Now.
1. REM Studies: Dement (Stanford)
2. Human Lesion Studies.
3. PET and fMRI studies.

Controversy.
2. No manifest v. latent distinction.
3. Dreams express no latent instinctual wish.
4. Dreams derive from Pons region of brain and only during REM sleep.
5. Mark Solms (London)
6. REM and Dreaming comes from activation of different areas.
8. Hobson pulls back.

Neuroanatomical Studies: Calvin Wu (Hong Kong)
1. Dream work: Parietal lobule (supramarginal gyrus).
2. Topographical regression: Infero temporal cortex (BA 37) is pathway for transforming motivated urges (wishes) into perceptual hallucinatory satisfactions.

Salvador Dalí (1904-1989)

- Key scientific areas of interest to Dalí:
  1. Scientists and Inventions.
  2. Psychoanalysis.
  4. Physics (Optics, Atomic Theory, Quantum Mechanics, and Holography, Fourth Dimension).

- When asked if scientists believe him to be mad, Dalí responded: “Quite the opposite, they all find me pleasant and say some of my statements: ‘Well, he doesn’t talk as much rubbish as it seemed.’ My only advantage is that I don’t know anything about anything, so I can give rein to my most capricious and irrational little whims on the basis of my light reading. And I am blessed with a certain amount of genius, from time to time I say something that doesn’t strike them as all that improbable.”

  - “Scientists give me everything, even the immortality of the soul.”
- Dalí had a device for remembering dreams.
- 1920’s: Erwin Schrodinger, Viennese theoretical physicist who achieved fame for his contributions to quantum mechanics in the 1920’s, specifically his discovery of a new form of atomic theory – wave mechanics.
- 1927: Werner Heisenberg, German theoretical physicist who laid the foundation for quantum mechanics. Heisenberg Uncertainty Principle: In quantum physics, an electron is both a particle and a wave simultaneously as it moves around a nucleus. But we are unable to know both the position and the momentum of an electron atom simultaneously. We can only know one or the other, never both (this is called wave-particle duality).
- Dalí’s illustration of a viewing device from 50 Secrets.
- Andre Breton, the leader of the Surrealists, felt that poets have the same right to explore and experiment with the unconscious as scientists did.
- 1929: *The Great Masturbator*.
- 1931: Salvador Dalí, *The Persistence of Memory*, Camembert cheese was the inspiration for the melted watches.
- 1933-35: Archeological Reminiscence of Millet’s Angelus, For Dalí, the female figure’s posture is “...symbolic of the exhibitionistic eroticism of a virgin in waiting, the position before the act of aggression such as that of a praying mantis prior to her cruel coupling with the male that will end with his death.”
- 1935: Salvador Dalí, *Conquest of the Irrational*, Dali described himself as a fish swimming between “the cold water of art and the warm water of science.”
- Albert Einstein, German theoretical physicist. One of the most influential scientists of all time, best known for his theories of special relativity and general relativity. Einstein developed a theory of the universe based on a space-time continuum. Gravity was an integral part, and light and other electromagnetic signals propagated through it at a constant speed – the speed of light.
• Consequences of Einstein’s theory of relativity:
   1. Two events, simultaneous for one observer, may not be simultaneous for another observer if the
      observers are in relative motion.
   2. Rays of light bend in the presence of a gravitational field.
   3. A moving clock ticks more slowly than an observer’s “stationary” clock.
   4. Time goes more slowly in higher gravitational fields.
• The Observer Effect: In science, the observer effect refers to changes that the act of observing has on the phenomenon
   being observed. For example: observing an electron will change its path because the observing light or radiation
   contains enough energy to disturb it. In quantum mechanics, if the outcome of an event has not been observed, it exists
   in a state of superposition, which is being in all possible states at once. The most famous example is the thought
   experiment Schrödinger’s cat, in which the cat is neither alive or dead until observed — until that time, the cat is both
   alive and dead (technically half-alive and half-dead in probability terms).
• 1935: Paranoiac Critical Visage,
  Based on a postcard of an African Village.
• 1935-72: Dalí hired Murcian architect Emilio Perez Pinero, a young architect who shared Fuller’s enthusiasm for geodesic
   domes.
• 1936/1957: Harold Edgerton, Milk Drop Coronet, Stroboscopic image. Dalí’s stylized signature adopted Edgerton’s
   image.
• 1938: Salvador Dalí, The Picture Disappears.
• 1945: August 6, 1945 “Little Boy” bomb dropped on Hiroshima by the Enola Gay B-29. The world changed with the
   explosion of the first atomic bomb. For Jean-Paul Sartre, this was the moment that founded Existentialism. For Jackson
   Pollock and his peers, painting became about process rather than representation. In the mid 1940’s, Dalí shifts from a
   Freudian symbolic language system to a Catholic symbolic language system, expanding his audience while remaining true
   to his symbolic approach to art.
• 1945: Salvador Dalí, Atomic Idyl and Melancholic Uranium.
• 1945: Dalí read a Spanish translation of Reverend Monsignor Ronald Knox’s essay, God and the Atom, which helped him
   to envision reconciliation between God and science.
• 1946: Nuclear testing on Bikini Atoll, July 24, 1946.
• 1948: Philippe Halsman, Dalí Atomicus, Photograph.
• 1949: Salvador Dalí, Study for Madonna of Port Lligat.
• 1949: Salvador Dalí, Leda Atomica.
• 1951: Dalí states that he is a Nuclear Mystical artist. In his Manifeste Mystique, he writes: “...for the first time in the
   history of science, physics was providing proof of the existence of God.”
• 1951: Salvador Dalí, Raphaelesque Head Exploding, The Wheelbarrows (Cupula Consisting of Twisted Carts), employing
   the dome in the Pantheon, Rome, and site of Raphael’s grave.
• 1952: Salvador Dalí, Assumpta Corpusularia Lapislazulina, “If Nietzsche’s Superman has not come into being, a
   Nietzsche’s Superwoman exists in the Assumption. She rises to heaven pushed by anti-matter angels.”
• 1953: James Watson and Francis Crick, American and British molecular biologists who co-discovered the double helix
   structure of DNA.
• 1952-54: Salvador Dalí, The Disintegration of the Persistence of Memory.
• 1954: Salvador Dalí, Soft Watch at the moment of First Explosion, Sketch for Soft Watch Exploding into 888 Pieces After
   Twenty Years of Complete Motionlessness.
• 1954: Salvador Dalí, Crucifixion (Corpus Hypercubus), “I want my Christ to be the painting containing the most beauty
   and joy of anything that anyone has painted up to the present day. I want to paint the Christ who will be the absolute
   antithesis of the materialistic and anti-mystical Christ of Grunewald.” (Mathis Grunewald, 1470-1528, Isenheim
   Alterpiece, 1515)
• 1956: Salvador Dalí, Nature Morte Vivante (Still Life–Fast moving), similar to Floris van Schooten (1590-1655), Table
   with Food, 1617. Dalí describes this painting as “[an] explanatory painting where one can observe the dynamic and
   irrational division of a fruit dish following the coefficients of uncertainty of Heisenberg in opposition to the positive
   security which cubist pictures once tried to offer us.” Logarithmic spirals are found in the rhino horn on the left and in
   the cauliflower on the right, double helix spiral structure of the DNA molecule found in the balcony’s baluster and in the
   disintegrating fruit dish. The stars on the table are a reference to those in the cloisters of the Santiago de Compostela,
   the Spanish hospital built at the end of the Pilgrim’s Way (“Milkyway”) by Isabelle and Ferdinand. The star shape is
   found in the cloister’s heart-shaped groin. “... [the color shards at the lower left represent the] final bits of meaningless
   particles left over from [my] singe-handed assault on Abstract-Expressionism.”
• 1958: Salvador Dalí, Anti-Matter Manifesto, Dalí proclaims that “Today the exterior world — that of physics – has
   transcended the one of psychology. [Instead of Freud,] my father today is Dr. Heisenberg.”
• 1958: Dalí employs Ben Day dot pattern.
• 1958: Salvador Dalí, The Pope’s Ear, Action painting technique produces representational image. Trompe-l’oiel detail of
   cherry.
• Fibonacci sequence: 0 1 1 2 3 5 8 13 21 34 55... Fibonacci numbers can be seen in the spirals of the pine cones, in the
   spirals of the artichokes, and – above all – in the spirals of the DNA molecule.
• 1963: Roy Lichtenstein, Drowning Girl.
• 1963: Salvador Dalí, Fifty Abstract Pictures Which as Seen from Two Yards Change into Three Lenins Masquerading as
   Chinese and as seen from Six Yards Appear as the Head of a Royal Bengal Tiger.
• 1963: Salvador Dalí, Galacidalalacidosorbinucleicacid (Homage to Crick and Watson), soldiers as double helix DNA
   molecule [life], inorganic mineral molecule made of soldiers pointing guns [non-life]. The September 1962 flood of the
   Rio Llobregat killed 450 poor immigrants, with another 300 missing. God reaching down, in his foreshortened head, the
   image of Mary and Christ’s silhouette in blessing, Christ after death being pulled up to Heaven for rebirth,
Gala/Madonna’s hair like Catalan bread.

- Pierre Teilhard de Chardin, French Jesuit priest who trained as a paleontologist and geologist who took part in the discovery of Peking Man. He was interested in integrating religion and natural science, particularly Christian theology with theories of evolution. He came into conflict with the Catholic Church and several of his books were censured.
- 1965: Salvador Dalí, *The Railway Station at Perpignan*.
- 1973: Salvador Dalí, “The atomic explosion of August 6, 1945, shook me seismically. Thenceforth, the atom was my favorite food for thought.” An atom consists of a centrally located nucleus, made up of neutrons and protons surrounded by orbiting electrons. Most importantly, atoms are tiny particles suspended in a vast vacuum, more space than particle.
- 1973: Salvador Dalí, *First Cylindric Chromo-Hologram Portrait of Alice Cooper’s Brain*, Dalí produced the first three dimensional hologram with Alice Cooper wearing a 2 million dollar tiara. Dennis Gabor, Hungarian electrical engineer who invented holography.
- Buckminster Fuller, American architect, author, designer, inventor, and futurist. He developed numerous architectural inventions, the best known of which is the geodesic dome.
- Teatro Museo, Dalí’s geodesic dome and the Torre Galatea, designed by Emilio Perez Pinero.
- The geodesic shape of the Enigma surrounding the east side of our new Dalí Museum refers back to the Teatro’s dome and ultimately back to Fuller.
- 1975: Dalí met with Thomas F. Banchoff, American geometer and professor at Brown University who assisted Dalí in his understanding of the fourth dimension. Dalí was photographed holding a “hypercube.”
- 1976: Salvador Dalí, Gala Contemplating the Mediterranean Sea Which at Twenty meters Becomes the Portrait of Abraham Lincoln (Homage to Rothko) (Second Version). The Scientific American photo by Leon Harmon collaged in the lower left of Dalí’s work.
- 1983: Salvador Dalí, The Swallow’s Tail, Dalí’s last painting inspired by Rene Thom, French mathematician who made his reputation as a topologist. He is celebrated as the founder of catastrophe theory, a new field of mathematics. A theory of mathematical structure in which smooth continuous inputs lead to discontinuous responses. Catastrophe means the loss of stability in a dynamic system. The major method of this theory is sorting dynamic variables into slow and fast. Then stability features of fast variables may change slowly due to dynamics of slow variables.
- 1985: One of Dalí’s last public acts was to host the Symposium, "Culture and Science: Determinism and Freedom” at his Dalí Theater-Museum.
- 1989: When Dalí passed away, there were four books on his bedside table. They were works by Stephen Hawking, Matils Ghyka, Rene Thom and Erwin Schrodinger.

**Youth and Origin of Scientific Interests**

- 1901: Salvador Galo Anselmo Dalí, Born on October 12, 1901, he died on August 1, 1903.
- Philippe Halsman: *Dalí in an Egg*, 1942
- 1919: Dalí contributed an essay on Leonardo da Vinci to the student magazine Studium. “Above all Leonardo was a passionate soul, in love with life; he studied and applied everything with the same ardor and the same pleasure; in life everything appeared to him positive and attractive.” Da Vinci’s paintings are exemplary in the “reflective, constant, loving work” that went into them.
- Both Dalí and Da Vinci had fathers who were notaries.

**Freud’s Leonardo**

- Sigmund Freud: Austrian neurologist who founded the psychoanalytic school of psychology.
- 1910: Freud published the analysis of Da Vinci’s *Virgin and St. Anne* under the title *Leonardo da Vinci, A Memory of His Childhood*. Later Freud said that it was “the only beautiful thing I have ever written.”
- 1932-34: Dalí wrote *The Tragic Myth of Millet’s Angelus*.
- 1963: Dalí painted *Portrait of My Dead Brother*. Dalí states, “The Vulture, according to the Egyptians and Freud, represents my mother’s portrait. The cherries represent the molecules, the dark cherries create the visage of my dead brother, the sun-lighted cherries create the image of Salvador living thus repeating the great myth of the Dioscures Castor and Pollux.”

**Invention**

- 1480: Leonardo da Vinci, Skis with which one can walk on water.
- 1513-14: Leonardo da Vinci, Studies on flight of birds in relation to the wind.
- 1493: Leonardo da Vinci, Study for helicopter and lifting wing.
Dalí’s school master, Senor Trayter, introduced him to scientific mysteries and inventions in his apartment of curiosities. Dalí loved Trayter’s “optical theater,” probably a stereoscope or an early slide projector, where he saw images that “were to stir me most deeply, for the rest of my life.”

1862: Narcis Monturiol i Estarriol, Catalan engineer, artist and intellectual who invented the first combustion engine driven submarine, El Ictineo.

1936: Dalí in London at the International Surrealist Exhibition dressed in a deep sea diving suit.

Scientific American was Dalí’s favorite magazine.

1959: Dalí demonstrates his new invention, the Ovocipede.

Dalí explains his interest in science, “Because artists scarcely interest me at all. I believe that artists should have some notions of science in order to tread a different terrain, which is that of unity.”

Optics & Perspective

1480: Leonardo da Vinci, Sketch with bellows machine for drawing up water and a man using a perspectograph. A point X on the subject image is projected to a point x on the image plane via a straight ray from X to the viewer’s eye.

Salvador Dalí, Illustration of viewing device with sea urchin from 50 Secrets.

1481: Leonardo da Vinci, Perspective study for Adoration of the Magi.

1925: Salvador Dalí, Single point perspective Study for Girl Sewing.

1926: Salvador Dalí, Woman at Window in Figueres.

Mathematics & the Golden Section

1495: Jacopo de Barbari, Portrait of Fra Luca Pacioli with Young Man.

1496: Luca met Leonardo.

1509: Luca Pacioli, Divine Proportion, Polyhedra, including a Rhombicuboctahedron, illustrated by Leonardo da Vinci.

Dalí’s parody transformation of Leonardo’s polygons in 50 Secrets of Magic Craftsmanship.

1946: Prince Matila Costiesco Ghyka met Dalí while a visiting professor of aesthetics at the University of San Diego. Ghyka was a poet, novelist, mathematician, historian, diplomat, and the Romanian Plenipotentiary Minister in the United Kingdom during the late 1930’s until 1940.

The Geometry of Art and Life, Matila Ghyka, “Inspiration, even passion is indeed necessary for creative art, but the knowledge of the Science of Space, of the Theory of Proportions, far from narrowing the creative power of the artist, opens for him an infinite variety of choices within the realm of symphonic composition. There is a geometry of art as there is a geometry of life, and, as the Greeks had guessed, they have to be the same.”

1956: Nature Morte Vivante (Still Life-Fast Moving), Salvador Dalí, Transcription of Ghyka’s golden section diagram used to align images.

1960: The Ecumenical Council, Employs an inverted grid of dynamic triangles as illustrated in Geometry of the Greek Vase by Dr. Caskey. (Greek Vase, Stamnos, Harmonic Analysis)

Golden Spiral: A Fibonacci spiral created by drawing arcs connecting the opposite corners of squares in the Fibonacci tiling. (1,1,2,3,5,8,13,21,34, etc.)

Columbus, Salvador Dalí, Spiral composition, harmony.

Architecture

1488: Leonardo da Vinci, Sketch of a square church with central dome and minaret, as well as study of a central church.

1943: Salvador Dalí, The Esthetic is the Greatest of Earthly Enigmas including sketches similar to Da Vinci’s churches.

1939: Dalí’s Dream of Venus pavilion at the New York World’s Fair.

1945: Salvador Dalí, My Wife, Nude, Contemplating Her Own Flesh Becoming Stairs, Three Vertebrae of a Column, Sky and Architecture.

1949: Salvador Dalí, Project for Icosahedral Studio, Port Lligat. Regular Icosahedron has 20 identical equilateral triangular faces.

Teatro Museo: Dalí’s geodesic dome and the Torre Galatea. Dalí wanted a dome on his museum designed by Buckminster Fuller.


Anatomy & Proportion in Nature

1492: Vitruvian Man, For Da Vinci, man was the perfect proportion of all things. He also applied geometric proportions to the human face.

1509-10: Leonardo da Vinci drew the muscles of the shoulder.

1504-07: Leonardo da Vinci drew a grotesque head recording the features accurately.

1936: Salvador Dalí painted The Great Paranoiac with figures showing muscular structure.

Paranoiac Criticism

c. 1550: Treatise on Painting, a compilation of Leonardo’s instructional writings on drawing and painting, compiled by Francesco Melzi, one of his pupils.

1503: Leonardo da Vinci, Battle Study, Leonardo advocated the study of stains on walls, ashes, grainy stones, mud or clouds – things that are formless, in order to see a subjective fantasy. “…if you consider them well, you will find really
marvelous ideas.”

- 1938: Dalí wrote, in an exhibit catalog, that Leonardo’s Treatise and Freud’s Leonardo study had contributed to the “epistemological and philosophical corner stone of the majestic edifice of imminent paranoiac painting.”
- 1935-36: Salvador Dalí, _Paranonia_.
- 1938: Salvador Dalí, _Enchanted Beach with Three Fluid Graces_ including a horse similar to Da Vinci’s monument horse in the background.

**Leda & the Swan**

- 1506: Leonardo da Vinci, _Studies of a woman’s head and coiffure, for Leda and the Swan_.
- 1948: Salvador Dalí, _Leda Atomica_, Created with assistance from Matila Ghyka including sketches showing Ghyka’s grids.

**Last Supper**

- 1495-98: Leonardo da Vinci, _The Last Supper_ is on the rectory wall of the former Dominican monastery of the Santa Maria delle Grazie, Milan. The mural employs grid lines based on the golden sections and with the perspective vanishing point located at Christ’s right eye.
- 1955: Salvador Dalí, _Last Supper_, “The Communion must be symmetrical” under the dodecahedron. Regular Dodecahedron is a platonic solid composed of 12 regular pentagonal faces, with three meeting at each vertex.

**Mona Lisa**

- 1503-07: Leonardo da Vinci, _Mona Lisa, La Giocanda (The Merry One)_.
- 1919: Marcel Duchamp, _L.H.O.O.Q. (Elle a chua au cul)_.
- 1954: Phillipe Halsman and Salvador Dalí, _Self-Portrait as Mona Lisa_.

**Suggested Illustrations:**

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<tbody>
<tr>
<td>Figueres, Spain, Ampurdan Plain, Province of Gerona</td>
<td>Map of Italy</td>
<td>Palazzo Vecchio, Florence</td>
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**Leonardo da Vinci 1452 - 1519 Italy**

<table>
<thead>
<tr>
<th>1452-1519</th>
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<th>c. 1474-78 Ginevra de’ Benci</th>
<th>c. 1478 Studies of Self-Propelled Cart, Codex Atlanticus</th>
<th>1480 Sketch with bellows Machine for Drawing up Water and A Man Using a Perspectograph</th>
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<tbody>
<tr>
<td>1480 Parachute</td>
<td>1480 Skis With Which One Can Walk On Water</td>
<td>1480 Detail of Man Using a Perspectograph</td>
<td>Illustration of Leonardo’s</td>
<td>1480 Archimedes Screws and Pumps to</td>
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<td>1480-82</td>
<td>Machine Gun</td>
<td>1481-82</td>
<td>Giant Crossbow</td>
<td>1481</td>
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<td>1483-85</td>
<td>Madonna of the Rocks</td>
<td>1485</td>
<td>Drawing of a Flying Machine</td>
<td>1485</td>
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<tr>
<td>1488</td>
<td>Sketch of a Square Church with central dome and Minaret</td>
<td>1488</td>
<td>Study of a Central Church</td>
<td>1488-89</td>
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<td>1490</td>
<td>Grotesque Heads</td>
<td>c. 1492</td>
<td>Vitruvian Man</td>
<td>Vitruvian Man and the Pentagon</td>
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<td>1495</td>
<td>Duke Ludovico Sforza (Detail from the Sforzesca Alterpiece, Master of the Pala Sforzesca, Brera, Milan</td>
<td>1495-98</td>
<td>Copy of The Last Supper</td>
<td>The Last Supper with Golden Sections Highlighted</td>
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<td>1500</td>
<td>Scuba</td>
<td>1502</td>
<td>Scythe Chariot and Armored Tank</td>
<td>c. 1503</td>
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<td>1503-04</td>
<td>Study of Battles on Horseback and on Foot</td>
<td>1503-07</td>
<td>Mona Lisa (La Giocanda, “The Merry One”)</td>
<td>1504-07</td>
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Perspectograph  
Draw up Water  

The Last Supper, Detail of Christ Before Cleaning  
The Last Supper as Theatrical Stage Setting  
1500 Scuba  
1502 Scythe Chariot and Armored Tank  
c. 1503 Battle Study and 1503-05 P.P. Reubens The Battle of Anghiari (detail)  

1503-04 Study of Battles on Horseback and on Foot  
1503-07 Mona Lisa (La Giocanda, “The Merry One”)  
1504-07 Head Studies and A Grotesque Head  
1505 Studies of Wing for Glider, Codex on the Flight of Birds  
1505 The Battle of Anghiari
<table>
<thead>
<tr>
<th>Year</th>
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<tr>
<td>1506</td>
<td>Studies of a Woman’s Head and Coiffure, for Leda and the Swan</td>
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<td>1508</td>
<td>Leda and the Swan (copy by C. da Sesto) and 1510-15 Leda and the Swan (copy)</td>
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<td>1508</td>
<td>Breathing Apparatus for Diver</td>
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<td>1508</td>
<td>Virgin and Child with St. Anne, Church of Santissima Annunziata, Florence</td>
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<td>1509</td>
<td>L. Pacioli, Divine Proportion, Elevated Rhombicuboctahedron, Illustrated by Leonardo</td>
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<td>Study of Water Falling into Still Water</td>
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<td>1510</td>
<td>Skeletal Studies</td>
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<td>1510</td>
<td>The Skull Bisected and Sectioned</td>
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<td>Catapult from Notebook</td>
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<td>Studies of Embryos</td>
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**Salvador Dalí** 1904-1989  
Figueres, Spain

| Artworks numbered in red (1-49) include descriptions below. | Year, Title, Description, Links to Science Curriculum. | Next generation Sunshine State Standards. |  
--- | --- | --- | 
|  |  | Oct. 12, 1901 – Aug. 1, 1903 Salvador Galo Anselmo Dalí |  
| Dali’s Inquisitive Mind | Dalí and Science | Dalí and Nature | Dalí on the BBC | A. Breton |  
| A. Einstein | Spacetime Continuum | Warping of Time | Theory of Relativity | A. Eddington |  
| Dali and Halsman | Dali and Halsman | Narcis Monturiol i Estarriol, Catalan Engineer, Artist and Intellectual (Invented El Ictineo) | 1862 El Ictineo, First Combustion Engine Driven Submarine | Virgin and St. Anne |  
| Sigmund Freud, Austrian Neurologist who Founded the Psychoanalytic School of Psychology | 1910 Freud Published the analysis of Da Vinci’s Virgin and St. Anne under the title Leonardo da Vinci, A Memory of His Childhood | 1915 P. Picasso | 1919 Facsimile of “Studium,” Student Magazine in which Dalí contributed | 1925 Study for Girl Sewing, Single Point Perspective |  
|  |  |  |  |  |  
| 1919 M. Duchamp, L.H.O.O.Q. ("Elle a chaud au cul") | Dali’s school master, Senor Trayter, Apartment of Curiosities | Stereoscope | Early Slide Projector |  |  


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<td>1932-34 The Tragic Myth of Millet’s Angelus</td>
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<td>1935-36 Para</td>
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<td>Dream of Venus Pavilion at the New York World’s Fair</td>
<td>1941 E. Boring, You See My Wife and Mother-in-Law</td>
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<td>1942</td>
<td>P. Halsman, Dalí in an Egg</td>
<td>1945 My Wife, Nude, Contemplating Her Own flesh Becoming Stairs, Three Vertebrae of a Column, Sky and Architecture</td>
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<td>Aug. 6, 1945 Hiroshima “Little Boy” bomb</td>
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<td>Dali met Prince Matila Costiesco Ghyka, Romanian Visiting Professor of Aesthetics at the University of San Diego</td>
<td>July 24, 1946 Bikini Atoll</td>
<td>Atoms and Molecules</td>
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**Notes:**
- **Ghyka’s Golden Section Diagram Overlaid on Nature Morte Vivante**
- **Fibonacci Spiral Created by Drawing Arcs Connecting the Opposite Corners of Squares in the Fibonacci Tiling.**
- **Dalí Painting Fibonacci Sequence Cauliflower Floret Harmony**
- **Spiral Composition 1958 Pope John XXIII**
- **35. Spiral Composition**
- **36. 1958 Pope John XXIII**
- **37. 1960 The Ecumenical Council**
- **38. 1962 Rio Llobregat 1963**
- **39. 1963 Portrait of My Dead Brother**
- **40. 1963**
- **41. 1965**
- **42. 1968 Leonardo da Vinci**
- **43. 1973 A. Cooper Hologram**
- **44. Gala Contemplating the Mediterranean Sea...**
- **45. 1974-76**
- **46. 1975 The Chair**
- **47. 1976 The Chair**
- **48. 1983**
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Salvador Felipe Jacinto Dalí


Artwork 6:

Anna Maria, 1926.
- Portrait of Dalí’s sister sewing.

Artwork 7:

Woman at a Window in Figueras, 1926.
- Strong lines and structure of form.
- Solidarity of presence.
- This painting of his sister Ana Maria can be seen as an early attempt by Dalí to re-work The Lacemaker.
- The Painting by the seventeenth-century Dutch painter Jan Vermeer, became an obsession with Dalí during the fifties.
- She is turned away from the viewer so you cannot see her face.
- The balcony overlooks the town of Figueres, Dalí’s home town.
- The blue color of the distant mountains and of the sky contrasts with the sunlit stone of the buildings to capture the viewer’s eye.
- This blue is repeated in the shimmering blue-black hair of Ana Maria.

Artwork 8:

- Fledging director Luis Buñuel and painter Salvador Dalí create this ultimate surrealist film, which is essentially a barrage of striking and irrational images designed to shock and provoke.
- During the course of the film, we witness a close-up of a woman’s eye being slashed open with a razor; a man dragging a piano, two bishops, and a pair of rotting asses across a room; ants swarming around a hole in a man’s palm; and sundry severed limbs and gratuitous slayings.
- Though this was originally a silent film, Buñuel later added a recorded score consisting of Liebestod from Wagner’s opera Tristan und Isolde and a number of popular tangos of the time.

Artwork 9:

The Persistence of Memory, 1931, oil on canvas, 9.5 x 13 in.
- Many of Dalí’s paintings were influenced and inspired by the landscapes of his youth. Several in particular were painted
on the slopes of Mount Pani, which was covered in beautiful umbrella pines at the time.

- Many of the strange and foreboding shadows in the foreground of many Dalí paintings is a direct reference to and result of Dalí's love of this mountain near his home.
- Even long after he had grown up, Dalí continued to paint details of the landscape of Catalonia into his works, as evidenced by such works as the Persistence of Memory, completed in 1931.
- Note the craggy rocks of Cape Creus in the background to the right. One of Dalí's most memorable Surrealist works, indeed the one with which he is most often associated is The Persistence of Memory.
- It shows a typical Dalinian landscape, with the rocks of his beloved Cape Creus jutting up in the background. In the foreground, a sort of amorphous self portrait of Dalí seems to melt.
- Three Separate Melting Watch images even out the foreground of the work. The melting watches are one symbol that is commonly associated with Salvador Dalí's Surrealism.
- They are literally meant to show the irrelevance of time.
- When Dalí was alone with Gala and his paintings in Cape Creus, he felt that time had little, perhaps no significance for him.
- His days were spent eating, painting, making love, and anything else he wanted to do.
- The warm, summery days seemed to fly by without any real indication of having passed.
- One hot August afternoon, in 1931, as Dalí sat at his work bench nibbling at his lunch, he came upon one of his most stunning paranoiac-critical hallucinations.
- Upon taking a pencil, and sliding it under a bit of Camembert cheese, which had become softer and runnier than usual in the summer heat, Dalí was inspired with the idea for the melting watches.
- They appear often throughout Dalí’s works, and are the subject of much interest.
- In short, this particular work, is an important referral back to Dalí’s Catalan Heritage, that was so very important to him.
- The well-known surrealist piece introduced the image of the soft melting pocket watch.
- It epitomizes Dalí’s theory of “softness” and “hardness”, which was central to his thinking at the time.
- As Dawn Ades wrote, “The soft watches are an unconscious symbol of the relativity of space and time, a Surrealist meditation on the collapse of our notions of a fixed cosmic order”.
- This interpretation suggests that Dalí was incorporating an understanding of the world introduced by Albert Einstein’s Special Theory of Relativity.
- Asked by Ilya Prigogine whether this was in fact the case, Dalí replied that the soft watches were not inspired by the theory of relativity, but by the surrealist perception of a Camembert cheese melting in the sun.
- Although fundamentally part of Dalí’s Freudian phase, the imagery precedes his transition to his scientific phase by fourteen years, which occurred after the atomic bombings of Hiroshima and Nagasaki in 1945.
- It is possible to recognize a human figure in the middle of the composition, in the strange “monster” that Dalí used in several contemporary pieces to represent himself – the abstract form becoming something of a self-portrait, reappearing frequently in his work.
- The orange clock at the bottom left of the painting is covered in ants. Dalí often used ants in his paintings as a symbol of decay.
- The figure in the middle of the picture can be read as a “fading” creature, one that often appears in dreams where the dreamer cannot pinpoint the creature's exact form and composition.
- One can observe that the creature has one closed eye with several eyelashes, suggesting that the creature is also in a dream state.
- The iconography may refer to a dream that Dalí himself had experienced, and the clocks may symbolize the passing of time as one experiences it in sleep or the persistence of time in the eyes of the dreamer.
- The Persistence of Memory employs “the exactitude of realist painting techniques” to depict imagery more likely to be found in dreams than in waking consciousness.
- The craggy rocks to the right represent a tip of Cap de Creus peninsula in north-eastern Catalonia.
- Many of Dalí's paintings were inspired by the landscapes of his life in Catalonia. The strange and foreboding shadow in the foreground of this painting is a reference to Mount Pani.
- Dalí returned to the theme of this painting with the variation The Disintegration of the Persistence of Memory (1954), showing his earlier famous work systematically fragmenting into smaller component elements, and a series of rectangular blocks which reveal further imagery through the gaps between them, implying something beneath the surface of the original work; this work is now in the Dalí Museum in St. Petersburg, Florida, while the original Persistence of Memory remains at the Museum of Modern Art in New York City.
- Dalí also produced various lithographs and sculptures on the theme of soft watches late in his career. Some of these sculptures are the Persistence of Memory, the Nobility of Time, the Profile of Time and the Three Dancing Watches.

**Artwork 10:**

![Archeological Reminiscence of Millet’s “Angelus,”](image-url)

Archeological Reminiscence of Millet’s “Angelus,” 1933-35, oil on panel, 12 ½ x 15 ½ in.

- Millet's Angelus painting had a profound impact on Salvador Dalí.
- He had first seen the work as a child in school, but in 1932, he has a series of experiences that led him to have several paranoiac-critical transformations on the subject.
- The original painting shows several peasants, working in a field, who have stopped for an afternoon prayer.
- Their heads are bowed reverently, and there is a wheelbarrow between them, with field scenery stretching out behind them.

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This painting is a continuation on that theme, but has several instances of Dalinian continuity included as well. The original two Angelus figures have been transformed into towering architectural ruins, which probably were inspired by Dalí’s visits to the Roman ruins near his childhood home. The third figure of the dead son is absent in this rendition of Dalí’s obsession with the original Millet painting. Instead, the female has been made to look even more like a praying mantis, thus reinforcing Dalí’s association of sex with death. Dalí spent time on the plain of Ampurdan, and has added elements from that landscape into this one. In the foreground, however, is another example of Dalinian continuity. Here we see yet again the tiny father/son figure that began to show up in Dalí’s works starting in 1929 with The First days of Spring. Inspired by obsession with Jean-Francois Millet’s Angelus. Angelus obsession: male terrified of female, who will cannibalize him after mating. For Dalí, the theme of Millet’s work: sexual anxiety. Angelus was a childhood image of escape from Dalí’s classroom. Female resembles a praying mantis who devours the male after mating. Female a femme fatale, like succubus or a vampire. Male as terrified victim. Male tries to distract female by hiding arousal. Millet couple in ruins: this terrifying relationship has existed for generations. Psychological landscape. Ruins of Empúries. Father is showing son “this is who we are.” Lucia with young Dalí. Cypress trees do not regenerate = death. Moonlight or twilight setting. Two enormous figures suggesting geological formations and the ruins of ancient towers dominate the vast open plain of the Empordà. The petrified pose of the figures that resemble the “Angelus” couple alludes to a theme of predatory aggression and death, death being both literal and symbolic. Groups of figures contemplate the couple, which is the reminiscence to which the title refers. The dual petrification and erosion of the male figure suggests both a literal death (of the peasant couple’s child—a likely surrogate for Dalí himself—and of the father figure at the hands of his mate) and a symbolic death referring to the Oedipal interdiction and the child’s separation from the maternal body.

Artwork 11:

**Paranoiac Critical Visage**, 1935.

- In the 1930’s Breton was still unsure about visual Surrealism. Until then Breton believed that Surrealism was primarily a literary movement.
- Dalí invented his paranoic-critical method and revealed it with this piece in the journal *Le Surréalisme au Service de la Révolution*.
- The image is a photograph of African people in front of a hut which arrived at Dalí’s house as a post card sent by Pablo Picasso.
- Dalí instantly recognized the double image of a “phantom head” when the postcard is turned 90º.
- Just as clinical paranoia involves the obsessive reinterpretation of external phenomena, Dalí’s method also involved obsessive reinterpretation.
- The resulting back-and-forth between the reality of the African people and illusionary visage creates a “mental crisis” in the viewer.
- Dalí reproduced this effect many times in numerous artworks. A few of these have been featured here.
- Breton was convinced, but as Dalí’s popularity grew, Breton criticized Dalí, calling his work “puzzle-paintings” where the only purpose was to decipher the image. Dalí, being rich, famous, and an egomaniac, didn’t seem to notice Breton’s criticism.

Artwork 12:

**Paranoia**, 1935-36, oil on canvas, 15 x 18 ½ in.

- Belongs to a series of “anthropomorphic landscapes” of the 1930s in which Dalí explores the visual conceit of dual or multiple figurations.
- Dalí challenges the viewer’s visual mastery of form and opens the interpretative process to multiple and often conflicting significations.
The head of the woman/bust simultaneously configures a scene of horsemen in battle.

Reading Leonardo’s recipe for visual inspiration through the grid of Freud’s psychobiography of the artist’s life and work, Dalí suggested that the motivation for and the meaning of his figuration was anything but arbitrary: “The ‘paranoiac phenomenon’ is consubstantial with the human phenomenon of sight.”

The theoretical roots of Dalí’s obsession with multiple images can be traced to 1929 with references to Rene Magritte.

The paranoiac-critical method provided a means for Dalí to test his hypothesis that desire is always/already implicated in the structure of the visual field, and to reproduce that structure symbolically in painting while simultaneously exploring its latent content.

The horses in the background are reminiscent of Da Vinci’s horse studies.

Artwork 13:  
*The Great Paranoiac*, 1936.

"The Great Paranoiac" is another in a long line of double-image strokes of genius by Salvador Dalí – but this one holds special significance.

A cluster of human figures of both genders appears in a sort of dry, barren landscape. Some stand, some recline, some sit, some kneel. But the two largest figures in the foreground – both appearing to be female, one kneeling with head bowed, the woman to her left standing and seen from behind – form the face of a man looking downward and rather anguished or ashamed.

The lighter space just above those two figures, together with the mélange of figures above and to the right of that space, completes the head of the at once visible and invisible man.

The same basic double-image is repeated in smaller dimension at the upper left part of this remarkable picture.

But what do we notice about all of the figures in "The Great Paranoiac"? None of them show their faces! Not one. In fact, their postures and demeanors suggest a sense of shame. Every human figure is either turning away or hiding their face in shame.

In all probability, this was the 32-year-old Dalí examining his own obsessions and neuroses, much as he did in his important 1929 canvas, "The Great Masturbator." Not only did Dalí candidly paint his dream world without any restraint, but he sometimes laid bare his inner-most concerns, obsessions, and preoccupations. Perhaps this painting could just as well have been titled "The Great Shame."

Of course, the illusionary characteristics of this painting are consistent with Dalí’s fascination with double- and hidden-imagery, an interest surely derived from his admiration of the 16th century artist, Arcimboldo – famous for assembling fruits and vegetables and other objects to form human portraits. It also reminds us of how Dalí revered Leonardo DaVinci, who had proclaimed that even random water stains on a wall could yield great battles and other hidden images to a creative artist’s mind.

What's more, Dalí recognized – from reading Freud and studying the tenets of psychoanalysis – that the true paranoid person "sees" in a very different way - often detecting hidden images, or at least imagining they’re there. This was the basis of Dalí’s Paranoiac-Critical creative method, where he was able to envision things the way an actual paranoiac does, but then transformed them onto canvas for the rest of us to see. That was the critical part of his method.

"The Great Paranoiac" demonstrates just how honest Dalí was in sometimes holding a mirror up to himself – providing us with fascinating glimpses into the mind of the greatest of all the Surrealists. The important painting was among the many gems at the 2012-2013 Dalí retrospective at the Centre George Pompidou in Paris, France.

Artwork 14:  
*The Image Disappears*, 1938, oil on canvas, 22.24 x 19.88 in.

Double image painting.

Artwork 15:  
*Enchanted Beach with Three Fluid Graces*, 1938, oil on canvas, 25 5/8 x 32 in.

Belongs to Dalí’s extended series of “anthropomorphic landscapes” of the mid – late 1930s.

Contains the visual conceit of a woman’s face composed of figures and horsemen, and the configuration of a head composed of landscape elements: a boulder in the case of the figure to the left, and an open cavity in a rock formation in
the case of the figure to the right.

- As Dalí continued to exploit the fluid passage between objects and ambient space, he increasingly resorted to a vocabulary of stock images and familiar visual puns.
- The classical reference to the three Graces, symbols of ideal beauty, may be interpreted as an allegory of Dalí’s assault on the Renaissance tradition of form, which locates a unitary subject at the origin of a rational spatial system.
- As Dalí collapses perspective and dismantles familiar figure/ground relationships, a different conception of the subject engenders the visual field: the mobile subject of desire whose precise coordinates cannot be mapped.

Artwork 16: 

**Dream of Venus Pavilion** at the New York World’s Fair, 1939.

- Dalí’s pavilion was entitled “Dream of Venus,” and was a surrealist dream world.
- Patrons entered through a pair of women’s legs (John Malkovich copied this for his Lisbon Nightclub called “Lux”- it is a weird place), and purchased tickets from a fish head booth.
- Dalí designed two pools where topless sirens and mermaids swam about, women dressed as pianos and lobsters cavorted amongst paintings and props in front of a giant four paneled painting by Dalí, and other tableaus with costumes designed by Dalí.
- Sadly, creative compromise happened even then.
- The fair organizers made major modifications to Dalí’s original ideas, which caused him to dramatically write a pamphlet called, “Declaration of the Independence of the Imagination and the Rights of Man to His Own Madness.”
- Although Dalí wasn’t thoroughly satisfied, the exhibition brought Surrealism and Dalí’s creative ideas out of the artistic world and to the masses.

Artwork 17: 

**Dalí in an Egg**, Phillipe Halsman, photograph, 1942.

- Philippe Halsman and Salvador Dalí lived and worked in Paris in the 1930s, when surrealism flourished.
- But they first met in New York in 1941, when both were new émigrés. They had arrived within months of each other – Dalí in August 1940, and Halsman three months later.
- During the previous ten years, their paths must have criss-crossed frequently in the narrow streets of Montparnasse, where Halsman had a studio at 22 Rue Delambre, and Dalí was part of the surrealist enclave at 54 Rue du Chateau.
- In 1936, Halsman exhibited photographs at the Galerie de la Pleiade, where surrealist photographer Man Ray also showed his work.
- But until 1941, Halsman and Dalí had never met.
- Within a year of his arrival in New York, Halsman had re-established himself.
- His iconic portrait of model Connie Ford silhouetteed against an American flag had been featured in a major Elizabeth Arden advertising campaign.
- In April, 1941, Halsman was assigned by the Black Star Agency to photograph the installation of Dalí’s first New York exhibit — at the Julien Levy Gallery.
- Halsman’s relationship with Dalí deepened in October, when he photographed the outsize costumes Dalí created for the Ballets Russes production of “Labyrinth” at the Metropolitan Opera House — with music by Franz Schubert, choreography by Leonid Massine, and scenery and costumes by Salvador Dalí.
- Lacking a large studio, Halsman took the company’s prima ballerina, Tamara Toumanova, and another dancer dressed as a giant white rooster, to a nearby rooftop.
- When Halsman photographed bird and ballerina against the soaring towers of Rockefeller Center, he produced a photograph that evoked one of Dalí’s own sharply-focused, surreal works of art.
- The photo became LIFE’s “Picture of the Week,” the artists became inspired friends, and their creative rapport would last for the next 37 years.
- Several weeks later they collaborated again; this time they produced a collaged photograph of Dalí lying naked in the embryo pose within an enlarged photo of an egg.
- The image, entitled “Pre-Natal Memory,” was published the following year in Dalí’s autobiography, “The Secret Life of Salvador Dalí.”
- In the decades ahead, Halsman and Dalí would “play” together at least once a year — “an elating game,”Halsman wrote in 1972, “creating images that did not exist, except in our imaginations.
- Whenever I needed a striking protagonist for one of my wild ideas, Dalí would graciously oblige. Whenever Dalí thought of a photograph so strange that it seemed impossible to produce, I tried to find a solution.”
- Usually they conspired in Halsman’s large, strobe-equipped studio at 33 West 67th Street, around the corner from St. Nicholas Arena in Manhattan.
• Other “sittings” took place at Dalí’s home in Cadaques, in Los Angeles, and at the St. Regis Hotel, where Dalí invariably stayed when he was in New York.

• Their intense, prolific, 37-year collaboration is unique in the history of 20th Century art.

**Artwork 18:**

*My Wife, Nude, Contemplating Her Own flesh Becoming Stairs, Three Vertebrae of a Column, Sky and Architecture, 1945.*

• Dalí had a thing for backs – his wife Gala's back, to be sure, but backs in general.

• Many of his portraits of Gala and, earlier, of his sister Ana Maria, show the sitters from behind.

• Indeed, in a clear stroke of Dalínian Continuity – where certain imagery in Dalí’s paintings gets repeated from one year or even from one decade to another – virtually the same view of Gala seen in the present work was to appear 15 years later in *Gala Nude, Seen from behind.*

• In the 1945 picture, Gala sits aristocratically, nearly naked, save for a beautifully handled white cloth and the same pearl-studded barrette in her hair as in the 1960 work.

• Gala contemplates the same image of her back-to-the-viewer pose, only now it’s formed by architectural columns and other details surrounding a tiny figure of a man.

• Her left shoulder and arm become what looks like they could be both a tower and a rocket ship.

• A detail in her hair serves as both a balcony railing of an edifice and the aforementioned pear-studded barrette.

• The undeniably classic look to the work – it almost looks like it could have been painted during the Renaissance! – is accentuated by the classical figure on the stone wall, while authors Elizabeth Keevil and Kevin Eyres have noted that the dandelion is “a symbol of transience that is reinforced by the struggle of its roots to find a home in the rock.”

• Was Dalí trying to convey how beauty itself is transient?

• How the lovely Gala of 1945 (she would have been about 51 then) would perhaps see her looks fade with time?

• This remarkable painting was reproduced on the dust jacket of the first hardcover edition of Dalí’s important book, *Fifty Secrets of Magic Craftsmanship,* and is a fitting work for that purpose, given the sheer perfection with which the Catalan Master painted it.

**Artwork 19:**

*Idylle Atomique, 1945.*

• In 1945 Salvador Dalí, a well-known artist, painted an abstract piece that takes reality to another deep, dark place in his mind.

• Although the painting looks like it represents a bazar dream, it could also tell a story about a man's favorite pastime and fears during a time of war.

• The lighting in the painting is very obscure with many well-lit objects to emphasize their importance. Most of the colors are cool versus warm.

• This element creates a cold, depressing, and nightmarish setting for the audience.

• The sky is exposed in two areas: one representing the daytime and one in the evening.

• There are various objects throughout and the lighting plays a large part in telling a story.

• There are several objects painted throughout the piece that seem to be random, but are in fact relevant to the whole picture.

• The focal point is on the bottom left corner, where there is an old man looking up at the whole image in fear.

• There are baseball players throughout who are creating clouds of dust and one who is holding up a baseball bat.

• He is facing an object that at first appears to be a person in a hooded robe holding a bat, but if one looks closer, it turns out to be a melting clock.

• Right next to the melting objects there is an explosion from a bomb. There are also airplanes dropping bombs throughout the painting.

• All of these are in a room of some kind because there is a hard wood floor and shadows on the walls.

• On the upper right, there is an opening where the roof would be and the outside world is exposed.

• There are elephants with extremely long legs with gold balls falling out of their torsos.

• There are so many different images throughout the painting that may not make sense or have multiple meanings behind them; such as elephants with very tall legs or objects that seem to represent human faces.

• Images like this are why some may think this painting could be a dream with no meaning behind it.

• Life changing events can make the mind perceive the world differently.

• In the story being told, the man in the bottom right corner could be hallucinating during a war.

• The painting tells a story about man's favorite pastime, baseball, and the idea of time melting away as he fears his death.

• There is a war obviously going on around him, and he is trying to hold onto the life he knew.
The whole story is about a man fearing what the world is becoming.
Clocks and faces melting show what happens when a bomb drops. Familiar faces and ways of life disappear.
In one rather large part of the painting, there is a face with a tongue sticking out with razor sharp teeth and an eye ball melting out of its socket.
It isn't as graphing as it sounds because the object is all one color and blends with the dark background.
The old man staring into the painting probably symbolizes the artist overlooking his confusing feelings about the world around him.
It depends on personal life experience, culture, and philosophies on life.
This painting was probably intended for those with the ability to use their imagination as well as people who have knowledge of events that occurred in the 1940's; such as World War II.
The painting may seem like a dream to some, but it is a representation of how a man views fear. When people express their emotions with art, it often reveals their passions, fears, and moods.
Those who are exposed to abstract art such as this can usually use their own experience in life to relate to the meaning and interpret.
The painting shows Dalí’s personal fears and the inability to grasp onto the precious life he has when he is consumed by the fear.

Artwork 20:

Three Sphinxes of Bikini, 1947.
- Between the years of 1946 and 1958 (AFTER world war two), the United States conducted 23 nuclear tests at the Micronesian atoll, Bikini.
- The tests caused the radioactive contamination of the entire system of islands.
- The (roughly) two hundred Micronesians who inhabited the islands were relocated by the US before the tests, and eventually brought back in 1968.
- The US lost a lawsuit to the Micronesians in the amount of $100 million when it was discovered, ten years later in 1978, that the levels of radioactivity were still dangerously high.
- These experimental explosions on the atoll of Bikini inspired Dalí to paint the Three Sphinxes of Bikini.
- Dalí himself was a surrealist painter.
- If you look at the point of view of “expressionism,” then paintings in general are supposed to emphasize the expression of inner experience rather than a solely “photographic” portrayal of reality.
- It is subjective emotions and responses that objects and events arouse in the artist. In surrealism, it goes one step further: it’s the unconscious that is emphasized, and paintings express the workings of the mind by using symbolic imagery and interesting juxtaposition of subject matter.
- The painting consisted of one head, one tree and one nuclear mushroom.
- The head might represents humanity, while the tree represents nature and mushroom cloud represents destruction.
- When nuclear exploded, the tree was the one closest to it then come to the head, which could mean that impact on nature is far greater than impact on human.

Artwork 21:

Leda Atomica, 1947.
- Renaissance inspired perspective using architectural elements as well as classical figure proportions, based on the Golden Ratio.
- Intentional use of a pentagon whose angles intersect with a circle to create the optimum aesthetic organization of visual elements.
- Reminiscent of Leonardo da Vinci’s Vitruvian Man, 1490, based on the work of the architect Vitruvius.

Artwork 22:

P. Halsman, 1948.
- Philippe Halsman and Salvador Dalí lived and worked in Paris in the 1930s, when surrealism flourished.
But they first met in New York in 1941, when both were new émigrés. They had arrived within months of each other – Dalí in August 1940, and Halsman three months later.

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Artwork 23:

50 Secrets of Magic Craftsmanship, 1948.

- Important volume in which famed Surrealist expounds — in his inimitably eccentric fashion — on what painting should be, the history of painting, what is good and bad painting, the merits of specific artists, and more.
- Includes his 50 "secrets" for mastering the craft, including “the secret of the painter’s pointed mustaches.”

Artwork 24:

Project for Icosahedral Studio, Port, Lligat, 1949.

- Design for a studio based on a plantonic solid form.

Artwork 25:

The Madonna of Port Lligat, 1949.
The Madonna of Port Lligat is the name of two paintings by Salvador Dalí. The first was created in 1949, measuring 49 x 37.5 centimetres (19.3 x 14.8 in), and is housed in the Haggerty Museum of Art at Marquette University in Milwaukee, Wisconsin, USA. Dalí submitted it to Pope Pius XII for approval, which was granted. Dalí created a second painting in 1950 with the same title and same themes, with various poses and details changed, measuring 144 x 96 centimetres (57.7 x 37.8 in); As of 2008, the 1950 Madonna is exhibited at the Fukuoka Art Museum in Japan. The paintings depict a seated Madonna (posed by Dalí’s wife, Gala) with the infant Christ on her lap. Both figures have rectangular holes cut into their torsos, suggestive of their transcendent status. In the 1950 version Christ has bread at the center of his figure. They are posed in a landscape, with a view of Port Lligat, Catalonia seashore in the background, with surrealist details, including nails, fish, seashells, and an egg. The 1949 Madonna has a sea urchin; the 1950 Madonna has a rhinoceros and figures of angels, also posed by Gala.


Artwork 26:

Exploding Raphaelesque Head, 1949-51.

- The face in this painting is influenced by a Madonna by the Renaissance artist, Raphael.
- Dalí has fragmented the head to show how the sense of order from the past, illustrated by the balance and reason of a classical icon, has been shattered by the advent of nuclear weapons.
- The motif of the shattered head was a common one amongst artists in the post-war years.
- This reflects the emotional turmoil of a period when nuclear war seemed like a reality, following the use of nuclear weapons in Hiroshima and Nagasaki.
- In this context, the delicate halo of the Madonna now suggests a nuclear mushroom cloud and her expression, with eyes downcast in prayer, seems particularly appropriate.

Artwork 27:

The Wheelbarrows. 1951, wash and pencil on paper, 40 x 30 in.

- Dalí executed The Wheelbarrows the same year as the publication of his tract, the Manifeste Mystique, which signaled the official beginning of his “Nuclear mysticism.”
- Dalí brings together the dome and part of the interior of the Pantheon; a large superimposed figure, portrayed from the chest upward; and many wheelbarrows in various states of segmentation.
- The wheelbarrows in the bottom half of the picture give definition to the upper arms and chest of the large figure.
- The central role of the Pantheon in the composition further underlines the picture’s spiritual dimension and its connection to classicism.
- There are elongated shapes that bear resemblance to both wheelbarrow handles and rhinoceros horns.
- To Dalí, the logarithmic spiral of the rhinoceros horn was an example of spiritual order in the universe.
- The wheelbarrow had long been interpreted by Dalí as a sexual symbol, representing in its configuration a popular sexual position and thus having an “erotic personality [that] is among the most unquestionable ones.”
- Dalí’s mysticism was inseparable from erotic deliria.

Artwork 28:

Assumpta Corpuscularia Lapislazulina, 1952, oil on canvas, 90 1/2 x 56 3/4 in.
• This painting has not been exhibited publicly since 1959.
• The subject is Dalí’s imaginative explanation for the Assumption of the Virgin Mary.
• When Pope Pius XII established the ‘Blessed Virgin’s Assumption’ as infallible dogma in 1950, Dalí set to work trying to understand how this miracle might have scientifically taken place.
• He even wrote a letter to the Pontiff asking how exactly the Virgin levitated into Heaven and, once elevated, how she stayed aloft.
• The Pope did not answer Dalí’s inquiry – unsurprising since the Church demanded “unquestionable belief” and “supernatural faith” – though the artist’s ultimate conclusion was imaginative: it was not miraculous that the Virgin ascended to Heaven, but the product of a spiritually guided atomic reaction.
• He wrote in Diary of a Genius: “The Virgin does not ascend to heaven while praying. She ascends by the very strength of her antiprotons.”
• With this work, the artist juxtaposed a recent event of the regarding the Church with contemporary physics: anti-protons had only just been discovered in 1952, when it was found scientists learned that protons had an associated antiparticle with the same mass and opposite electric charge.
• As in other particle-antiparticle pairs, protons and anti-protons can annihilate one another in a burst of energy.
• When Dalí theorized that the Virgin ascended through the “very strength of her antiprotons,” he insinuated that a subatomic reaction had taken place in which colliding protons and anti-protons had created enough energy to rocket the Virgin into Heaven.
• Once in Heaven, he continued, the Virgin’s body was “reintegrated” and held in place by “cosmic glue,” a notion he credited in 1952 to physicist Enrico Fermi, who he said had given him the idea for a “gelatinous universe.”

**Artwork 29:**

**The Disintegration of the Persistence of Memory, 1952-54, oil on canvas, 10 x 13 in.**

• Dalí expresses his interest in the exterior world of physics and Werner Karl Heisenberg.
• Dismantled his earlier surrealist masterpiece to reveal a new structure that visualizes quantum mechanics.
• Extreme use of perspective employed in the grid like construction throughout the foreground and extending into the middle ground, also referencing the mathematical concept of fractals.
• Reinterpretation of Dalí’s most famous painting, The Persistence of Memory, 1931 (Museum of Modern Art, New York), showing how in two decades Dalí and the world moved from Surrealism to Nuclear Mysticism.
• By showing the disintegration of the familiar composition, Dalí indicates how he has changed, and indeed how the world has changed, over the two decades between 1931 and 1952. Where once the mysteries of the universe were explained through psychoanalysis, now they are explained through quantum mechanics.
• Original title: “The chromosome of a highly colored fish’s eye starting the harmonious disintegration of the persistence of memory.”
• The fish bears witness to the end of the world.
• The atomic bomb dissolves objects into elemental particles, a metaphor for the material world dissolving into its atomic structure.
• Rhinoceros horns, containing perfect mathematical spirals, are like the bombs being dropped. For Dalí, even explosions have an underlying harmonious nature.
• Dalí’s great masturbator self-portrait dissolves into jellied skin.
• The watches have become unanchored, with their melting oozing form becoming more brittle like smashed glass or ice.
• During the surrealist period Dalí created the iconography of the interior world of Sigmund Freud.
• With this painting, the exterior world has transcended the one of psychology, the world of physics and Werner Karl Heisenberg.
• Dalí has dismantled his earlier surrealist masterpiece at the figurative level, pulling back the skin of the distant seascape to reveal a new structure that is meant to visualize quantum mechanics.

**Artwork 30:**

**Crucifixion (Corpus Hypercubus), 1954, oil on canvas, 76.5 x 43.75 in.**

• Depicts the Crucifixion of Jesus, though it deviates from traditional portrayals of the Crucifixion by depicting Christ on the polyhedron net of a hypercube and adding elements of Surrealism.
• It is one of his most well-known paintings from the later period of his career.
• Dalí’s inspiration for Corpus Hypercubus came from his change in artistic style during the 1940s and 1950s.
Around that time, his interest in surrealism diminished and he became fascinated with nuclear science, feeling that "thenceforth, the atom was [his] favorite food for thought."

His interest grew from the bombing of Hiroshima at the end of World War II which left a lasting impression on him.

In his 1951 essay "Mystical Manifesto", he introduced an art theory he called "nuclear mysticism" that combined Dalí's interests in Catholicism, mathematics, science, and Catalan culture in an effort to reestablish Classical values and techniques, which he extensively utilizes in Corpus Hypercubus.

That same year, to promote nuclear mysticism and explain the "return to spiritual classicism movement" in modern art, he traveled throughout the United States giving lectures.

Before painting Corpus Hypercubus, Dalí announced his intention to portray an exploding Christ using both classical painting techniques along with the motif of the cube and he declared that "this painting will be the great metaphysical work of [his] summer."

Juan de Herrera's Treatise on Cubic Forms was particularly influential to Dalí.

Consistent with his theory of "nuclear mysticism", Dalí uses classical elements along with ideas inspired by math, science, etc.

Some noticeably classic features are the drapery of the clothing and the Caravagesque lighting that theatrically envelops Christ, though like his 1951 painting Christ of Saint John of the Cross, Corpus Hypercubus takes the traditional Biblical scene of Christ's Crucifixion and almost completely reinvents it.

While he did attempt to distance himself from the Surrealist movement after his development of "nuclear mysticism"; Dalí still incorporates dream-like features consistent with his earlier surrealist work in Corpus Hypercubus, such as the levitating Christ and the giant chessboard below. Jesus' face is turned away from the viewer, making it completely obscured.

The crown of thorns is missing from Christ's head as are the nails from his hands and feet, leaving his body completely devoid of the wounds often closely associate with the Crucifixion.

With Christ of Saint John of the Cross, Dalí did the same in order to leave only the "metaphysical beauty of Christ-God".

Dalí sets the painting in front of the bay of Port Lligat in Catalonia, Dalí's home, which is also the setting of other paintings of his including The Madonna of Port Lligat, The Sacrament of the Last Supper, and Christ of Saint John of the Cross.

One's eyes are quickly drawn to the knees of Christ which have a grotesque exaggeration of realism detail.

If one observes the original painting closely, 5 different images of Gala appear in Christ's right knee and 5 different images of Salvador appear in his left; the most prominent two being Gala's back/neck/back of head with right arm extended upward and Salvador's face replete with trademark swept mustache.

Additional knee images translate extremely poorly to reproductions/prints.

The most striking change Dalí makes from nearly every other crucifixion painting concerns the cross.

Instead of painting Christ on a wooden cross, Dalí depicts him upon the net of a hypercube, also known as a tesseract.

The unfolding of a tesseract into eight cubes is analogous to unfolding the sides of a cube into six squares.

The use of a hypercube for the cross has been interpreted as a geometric symbol for the transcendental nature of God.

Just as God exists in a space that is incomprehensible to humans, the hypercube exists in four spatial dimensions, which is equally inaccessible to the mind.

The net of the hypercube is a three-dimensional representation of it, similar to how Christ is a human form of God that is more relatable to people.

The word "corpus" in the title can refer both to the body of Christ and to geometric figures, reinforcing the link Dalí makes between religion and mathematics and science.

Christ's levitation above the Earth could symbolize His rise above Earthly desire and suffering.

The motif of the cube is present elsewhere: Gala is standing on one and the chessboard is made up of squares.

On the bottom left of the painting, Dalí painted his wife Gala as Mary Magdalene looking up at Jesus.

Dalí thought of her as the "perfect union of the development of the hypercubic octahedron on the human level of the cube".

He used her as a model because "the most noble beings were painted by Velázquez and Zurbarán.

[He] only [approaches] nobility when painting Gala, and nobility can only be inspired by the human being."

Upon completing Corpus Hypercubus, Dalí described his work as "metaphysical, transcendent cubism."

The union of Christ and the tesseract reflects Dalí's opinion that the seemingly separate and incompatible concepts of science and religion can in fact coexist, which has been lauded by viewers and has been widely considered one of Dalí's masterworks.


Artwork 31:

**Soft Watch at the Moment of First Explosion, 1954**

- Created in 1954, Dalí used the presence of a dreamlike quality and ghostly appearance to accentuate the mysterious and unexplainable in his painting.
- Surrealism rejects logic, reason and natural order. It uses techniques such as dreamlike or ghostly qualities, juxtaposition (a method for rejecting harmony in their work) and incorporates surreal objects and subject matter.
- Dalí uses these same techniques in his painting Soft Watch at the Moment of Explosion to intrigue his viewers and provoke thought.
- In his painting, Dalí assimilates shadowy outlines of objects and uses the dreamlike quality in the way the watch twists and its broken pieces unexplainably float above it.
• Also, the ghostly way the watch drapes over one edge of the box as if melting.
• The watch seems to be pulling apart and stretching. It may denote Dalí’s belief that time passing brings eventual destruction.
• In Soft Watch at the Moment of Explosion, Dalí incorporates a great deal of color juxtaposition.
• Most of the background consists of deep browns and gold and is contrasted by the white clock in the center of the painting.
• Dalí’s painting also displays surreal objects, although most of these are in the foreground (a moth, a fly and a bizarre clock). In the background we see a small cluster of mountains.
• As Dawn Ades wrote: The soft watches are an unconscious symbol of the relativity of space and time, a Surrealist meditation on the collapse of our notions of a fixed cosmic order.
• This interpretation suggests that Dalí was incorporating an understanding of the world introduced by Albert Einstein’s Special Theory of Relativity.
• Asked by Ilya Prigogine whether this was in fact the case, Dalí replied that the soft watches were not inspired by the theory of relativity, but by the surrealist perception of a Camembert cheese melting in the sun.

Artwork 32:

Self-Portrait as Mona Lisa, 1954, photograph, P. Halsman and Dalí.

• Philippe Halsman and Salvador Dalí lived and worked in Paris in the 1930s, when surrealism flourished.
• But they first met in New York in 1941, when both were new émigrés. They had arrived within months of each other – Dalí in August 1940, and Halsman three months later.
• During the previous ten years, their paths must have criss-crossed frequently in the narrow streets of Montparnasse, where Halsman had a studio at 22 Rue Delambre, and Dalí was part of the surrealist enclave at 54 Rue du Chateau.
• In 1936, Halsman exhibited photographs at the Galerie de la Pleiade, where surrealist photographer Man Ray also showed his work.
• But until 1941, Halsman and Dalí had never met.
• Within a year of his arrival in New York, Halsman had re-established himself.
• His iconic portrait of model Connie Ford silhouetted against an American flag had been featured in a major Elizabeth Arden advertising campaign.
• In April, 1941, Halsman was assigned by the Black Star Agency to photograph the installation of Dalí’s first New York exhibit — at the Julien Levy Gallery.
• Halsman’s relationship with Dalí deepened in October, when he photographed the outsize costumes Dalí created for the Ballets Russes production of “Labyrinth” at the Metropolitan Opera House — with music by Franz Schubert, choreography by Leonid Massine, and scenery and costumes by Salvador Dalí.
• Lacking a large studio, Halsman took the company’s prima ballerina, Tamara Toumanova, and another dancer dressed as a giant white rooster, to a nearby rooftop.
• When Halsman photographed bird and ballerina against the soaring towers of Rockefeller Center, he produced a photograph that evoked one of Dalí’s own sharply-focused, surreal works of art.
• The photo became LIFE’s “Picture of the Week,” the artists became inspired friends, and their creative rapport would last for the next 37 years.
• Several weeks later they collaborated again; this time they produced a collaged photograph of Dalí lying naked in the embryo pose within an enlarged photo of an egg.
• The image, entitled “Pre-Natal Memory,” was published the following year in Dalí’s autobiography, “The Secret Life of Salvador Dalí.”
• In the decades ahead, Halsman and Dalí would “play” together at least once a year — “an elating game,” Halsman wrote in 1972, “creating images that did not exist, except in our imaginations.
• Whenever I needed a striking protagonist for one of my wild ideas, Dalí would graciously oblige. Whenever Dalí thought of a photograph so strange that it seemed impossible to produce, I tried to find a solution.”
• Usually they conspired in Halsman’s large, strobe-equipped studio at 33 West 67th Street, around the corner from St. Nicholas Arena in Manhattan.
• Other “sittings” took place at Dalí’s home in Cadaques, in Los Angeles, and at the St. Regis Hotel, where Dalí invariably stayed when he was in New York.
• Their intense, prolific, 37-year collaboration is unique in the history of 20th Century art.

Artwork 33:

The Sacrament of the Last Supper, 1955, oil on canvas, 105 x 66 in.

• This painting is designed with connections to the number twelve including: the 12 Apostles, Dodecahedrons and
references to numerology.
- The Communion Must be Symmetrical under the Dodecahedron

Artwork 34:

**Nature Morte Vivante (Still Life – Fast Moving)**, 1956, oil on canvas, 49 ¼ x 63 in.
- This is a key painting that shows Dalí’s intense interest in the geometry of art, the science of beauty and the spiral form.
- Inspired by Matila Ghyka, a Romanian mathematician, who explored “dynamic symmetry” in art and nature using simple mathematical formulas (such as Phi) to explore natural forms.
- Dalí incorporated several of these symmetrical grids as the compositional basis for many paintings, such as the harmonic rectangle (the Phi rectangle) and the dynamic triangle (from Greek canons of proportion).
- The ideas of geometry of art and life are further expanded with the connection of the Fibonacci spiral; the numerical sequence of the Golden spiral: (1,1,2,3,5,8,13,21...).
- Werner Karl Heisenberg’s work on quantum theory is linked with a basic conception of atomic physics.
- DNA double-helix molecular structure represented in the railing post.
- The mathematical concept of fractals is evident in the repeated pattern within the painting of the sea.
- One of Dalí’s most accomplished paintings of the postwar years.
- He produced numerous preparatory sketches and oil studies.
- Emblematic of Nuclear mysticism.
- Post-atomic variation on Dutch artist Floris Van Schooten’s *Table with Food* (1617), in the Prado Museum.
- Dalí breaks down the composition into smaller particles.
- Dalí proposes the idea of a “Fast-moving” still life in which matter is suspended within a dynamic space-time continuum.
- Word play “still life – fast moving.”
- Dalí had become friends with Romanian mathematician Matila Ghyka, whose studies of the Golden Section helped Dalí to create his compositions. This painting laid out rigorously according to the Golden ratio.
- Dalí: Nature Morte Vivante is “(an) explanatory painting where one can observe the dynamic and irrational dividing a fruit dish following the coefficients of uncertainty of Heisenberg in opposition to the positive security which cubist pictures once tried to offer us.”
- Werner Karl Heisenberg’s work on quantum theory is linked with a rudimentary conception of atomic physics. By referring to Heisenberg, Dalí declares his interest in modern physics.
- Heisenberg’s Uncertainty Principle: In quantum mechanics, a fundamental limit to the precision with which the position and momentum of a particle cannot be known simultaneously. The more precisely the position of a particle is determined, the less precisely its momentum can be known, and vice versa.
- Dalí shows this several times with doubled objects (the fruit dish, apple, and cherry) where the located version of the objects casts a shadow, the momentum of the same object just resemble the shooting of the object through space.
- Dalí’s pseudoscientific approach extends to an analysis of the double-helix structure of the DNA molecule and, more generally, of the logarithmic spiral.
- In 1953, Watson and Crick had just proposed that the DNA molecule should have a double helix spiral shape. Here Dalí includes a twisting banister and a rhino horn, with its own perfect spiral, in reference.
- The cauliflower floret on the right looks like the top of a mushroom cloud or a meteor, but Dalí uses it because of its growth patterns of perfect Golden spirals.

Artwork 35:

**The Discovery of America by Christopher Columbus**, 1958-59, oil on canvas, 161 ½ x 122 1/8 in.
- The structure of the painting is based on the harmonic rectangle calculated by Matila Ghyka in *The Geometry of Art and Life*.
- Two symmetric mirrored images of Dalí’s *Christ of Saint John of the Cross*, 1951.
- Repeated linear pattern of crosses, staffs and weapons create movement throughout the canvas.
- One-point perspective employed in the angled crosses and shadows to create the illusion of depth.
- Originally titled “The Dream of Columbus.”
- A late Nuclear Mystical painting.
- Commissioned for Huntington Hartford’s New Gallery of Modern Art which opened on Columbus Avenue in New York in 1962.
- Composition device is a Golden Spiral starting with gala’s face, spiraling clockwise up and sweeping back down through the crosses and out where St. Narciso stands.
• Dali had read a historian who believed that Columbus was from Catalonia, thus the great discovery of the new world parallels Dali’s own discovery of the new world.
• Columbus shown as a Grecian youth in toga discovering New World, so it is like he is in a dream.
• Circle at top contains: 1. Michelangelo’s Pieta, 2. Michelangelo’s Moses, 3. King and Queen of Spain with Columbus prior to voyage – blessed by secular and spiritual power.
• On right: Vertical lances, quoted from Velazquez’s Lances of Breda, hold the image of Christ on the cross, a Spanish mystical image inspired by Spanish mystic St. John drawing of Christ seen from God’s point of view.
• Dali signs work by painting himself in as a monk holding the same cross found in the lances.
• Gala appears twice: First in the banner as The Immaculate Conception and second as the shrouded figure in the lower right who had removed herself from the three ring circus of Dali’s public life.
• The ship is the Santa Maria – the crow’s nest becomes the Catholic chalice (holding the blood of Christ) and the circle in the upper cross is the Catholic Eucharist (the Body of Christ).
• St. Narcisco and the Miracle of the Flies: On three occasions French invaders came over the Pyrenees to capture the city of Girona, the capital of Catalonia. According to the folk legend, large gadflies rose from St. Narciso’s crypt, bringing pestilence and disease to the French, keeping the city free.
• Depicts Columbus stepping ashore on the New World and planting the banner of the Inmaculada on its soil.
• Dali worked on his largest canvas to date for six months, assisted by Isador Bea.
• Weaves historical sources with popular legends.
• The bishop, a portrait of Bea, represents Saint Narciso, the patron of the medieval city of Girona.
• Images also include gadflies, Ferdinand and Isabella receiving Columbus, scene of the pieta in a mandorla, as well as references to his Christ of St. John of the Cross.
• The sea urchin surrounded by cosmic rings is an illusion to the new age of space travel, depicted without spines but with celestial spheres rotating it – looks like some sort of cosmic satellite.
• It is a “sputnik” sea urchin, probably chosen by Dali because its name suggests Sputnik, the unmanned Russian Satellite shot into space the previous year.
• The sea urchin suggests that the discovery of new worlds does not end with America, but continues into space.
• The structure of the painting is based on the harmonic rectangle calculated by Matila Ghyka in The Geometry of Art and Life.

Artwork 36:

The Pope’s Ear, 1958.

• Pope John XXIII.
• Dali employs Ben Day dot pattern.
• Action painting technique produces representational image.
• Trompe-l’oiel detail of cherry.

Artwork 37:

The Ecumenical Council, 1960, oil on canvas, 118 x 100 in.

• Matila Ghyka’s investigation of proportion leads him to a study in Greek proportion from various Greek vase designs.
• Greek vases have specific mathematic ratios that can be studied in terms of geometry.
• Dali utilized the analysis of the Greek vase “Stamnos” and used its reversed direction as a compositional basis for this monumental painting.
• Dali’s last epic painting on the theme of religious mysticism.
• The scene is divided into two zones: an earthly realm and a vast heavenly paradise, interceding between them is Gala as Saint Helena, discoverer and defender of the True Cross.
• Gala appears as a muse through which the artist’s religious and creative energies are channeled.
• Refers to Pope John XXIII’s historic meeting with the archbishop of Canterbury in 1960 in a gesture of religious ecumenism.
• Dali represents the Pope’s coronation four times as well as God, the Son and the Holy Ghost.
• The rendering of St. Peter’s Basilica, the work of Dali’s assistant Isador Bea, adds a note of historical accuracy.

Artwork 38:
**Galacidalacidesoxiribunucleicacid (Homage to Crick and Watson),** 1963, oil on canvas, 120 x 163 ½ in.

- Dalí combined his name, the name of his wife Gala, Allah, and Cid Campeador (the feminine Cid) with desoxiribunucleic acid.
- Dalí weaves his beliefs on nuclear mysticism into a complex and often esoteric historical narrative.
- DNA molecule represents the building-block of life (Dr. Francis Crick and Dr. James Watson, 1953).
- Group of Arab gunmen in "molecular" formations in a geometric cube design.
- 1962 Rio Llobregat floods filling hundreds.
- Commemorates the Riu Llobregat flooding just outside of Barcelona, killing more than four hundred people.
- Dalí combined his name, the name of his wife Gala, Allah, and Cid Campeador (the feminine Cid) with desoxiribunucleic acid (DNA).
- Dalí weaves his beliefs on nuclear mysticism into a complex and often esoteric historical narrative.
- Elaborate cycle of birth, death, and rebirth.
- Left - DNA molecule represents the building-block of life (Dr. Francis Crick and Dr. James Watson, 1953) and the persistence of genetic human memory.
- Watson & Crick receive Nobel Prize for proposal that DNA has a double helix shape.
- Right - Group of Arab gunmen in "molecular" salt formations signify death and self-annihilation (nonlife – one pulls trigger, all die) in addition to the scientific legacy of the Arabs in Spain.
- Middle - God the Father reaches down to lift the body of Christ back to heaven to be reborn, as Gala looks on.
- God's head contains the Madonna and Christ (consubstantial).
- Bottom – Gala as Madonna witnesses Christ's ascension.
- Christ forms arch around Gala, his head is upside down.
- Upper left – Michelangelo’s Prophet Isaiah holds scroll with painting title – he foretold Christ’s birth.

**Artwork 39:**

**Portrait of My Dead Brother,** 1963, oil on canvas, 69 x 69 in.

- Dalí’s older brother, Salvador, died and Dalí inherited his brother’s name.
- Dalí imagined himself as one-half of a double whose unity was irretrievable and kept him in a state of perpetual crisis.
- Cherries joined in a molecular structure of a cube design representing platonic solids.
- Geometric pattern of dots/cherries create his dead brother’s imaginary visage.
- Dalí returns to the theme of mythic autobiography recounting the traumatic events surrounding his older brother’s death.
- Dalí, his brother, and his father all shared the name “Salvador.”
- The death of his brother haunted Dalí throughout his life.
- Dalí imagined himself as one-half of a double whose unity was irretrievable and kept him in a state of perpetual crisis.
- The visage of the child suggests a generic image of wholeness and completion.
- The maternal vulture, Freud’s essay on Leonardo da Vinci, is an image of incestuous desire and restates the theme of predatory female aggression.
- Images of Spanish guards, cherries joined in a molecular structure, and the Angelus.
- Dalí forges an elaborate network of associations redefining his past in relation to myth, psychoanalysis, art history and modern science to shore up a divided self.

**Artwork 40:**

**Fifty Abstract Paintings Which Seen from Two Yards Change into Three Lenins Masquerading as Chinese and as Seen from Six Yards Appear as the Head of a Royal Bengal Tiger,** ca. 1963, oil on canvas.

- Each of the fifty panels of this painting is a separate abstract painting, which as seen from two yards away, change into three Lenins masquerading as Chinese.
- When seen from six yards away, the whole painting comes together to appear as the head of a royal tiger.
- This is an excellent use of geometry, based on the square, employing the mathematical concept of tiling.

**Artwork 41:**

- Salvador Dalí was an eccentric Catalan artist of the Surrealist movement.
- His persona was as unruly and unconventional as the art he created.
- Born in Figueres, Spain, not far from the French border, Dalí developed a deep love for Catalonia during childhood. Dalí traveled throughout the world, but had an interest in the city of Perpignan because of its evident Catalan roots.
- Dalí used to claim that he gained the most inspiration simply by sitting in the train station’s lobby.
- On August 27, 1963 Dalí made a proclamation that changed the reputation of La Gare de Perpignan.
  - “It all became clear in a flash: There, right before me, was the center of the universe,” Dali said. Dali publically declared that the Perpignan train station was the “centre du monde,” the center of the world.
- Dalí later created a painting entitled “La Gare de Perpignan.”
- The work of art is considered to be an exceptional example of the Surrealist movement.
- The piece, which features a small image of the train station amid figures of rural farm workers, is intensely symbolic of Dalí’s obsessive concern with immortality.
- Lluis Colet, a local historian and Dali expert, believes that there are numerous reasons Dalí chose Perpignan’s train station as the center of the world.
  - “In an emotional way, in a historic way and in a scientific way, many things can show that Perpignan is the centre of the world,” said Colet. “For all those reasons the master thinks the center of the universe is here.”
- Dalí’s curiosity for the train station stemmed from his belief in the philosophy of cosmogony.
- Cosmogony is the theory there is a single universal origin from which all existence and reality emerged.
- It is said that when this origin is found, one may come to understand the meaning of existence.
- In order to name a location a cosmogony, Colet said, there must be many different energies surrounding that place.
- Perpignan’s geographical location invites many of the world’s civilizations to gather there, which creates an undeniably unique energy.
- Perspectives of life and creation, existence and reality meet when passing through the seemingly insignificant train station, according to Colet.
- Today arriving at La Gare de Perpignan is like entering the center of Salvador Dalí’s psyche.
- The ceilings are painted in large swirls of bright yellows, oranges and blues in a fashion that makes one question if there is such a thing as too much color.
- The swirls create enormous butterflies, an homage to Dalí’s art, and tempt the imagination to see how many butterflies can be found among the flurry of color.
- The boarding platform displays the words “Perpignan Centre du Monde” painted in chalky white paint across the black pavement.
- Travelers do not seem to notice the references to Dali or note the station’s immeasurable importance to the great artist.
- They hurry through the center of the world in a flash.
- Dalí did not contribute any art to the station, but with his declaration he transformed La Gare de Perpignan into his personal masterpiece.

Artwork 42:
- Portrait of Leonardo da Vinci.

Artwork 43:
First Cylindric Chrono – Hologram Portrait of Alice Cooper’s Brain, 1973, white light integral hologram, 16 inches diameter x 10 inches height.
- Dalí questioned the traditional ways that an image represents a subject, and he responded to advances in technology.
- By experimenting with double images, he discovered ways to multiply the meaning of his paintings.
- By working in animation, he found a way to bring his metamorphic visions to life for others to share.
- In the early 1970’s, Dalí was one of the first artists to explore holography.
Holography is a photographic medium proposed by Dr. Dennis Gabor in 1947 using lasers to record an object so that it can appear as a three-dimensional image.

Choosing Alice Cooper as the focus of the project was a clear indication of Dalí’s enthusiasm for pop culture.

Working with South African artist holographer Sewyn Lissac, Dalí created a rotating three-dimensional image of the rock star.

Cooper seated cross-legged and bare-chested on a rotating base, “shish kebabbed” Venus de Milo statue, real million dollar diamond tiara (armed guards), fake plaster brain stuffed with a chocolate éclair and real ants suspended behind his head.

Through holography Dalí was able to capture the continuity and discontinuity of the image of a real person in real time.

Carefully calibrated square cells that form a complex network of multiple images and two for one optical illusions.


Dalí understood the implications of Harmon’s research for the growing fields of neuroscience and computer imaging.

This painting is designed with a grid-like pattern of squares of color employing the mathematical concepts of tessellations, tiling and platonic solids.

Inspiration Source: 1973 issue of Scientific American containing Leon Harmon’s “The Recognition of Faces” about perception and image recognition. He applied distortions to various familiar images, including the Mona Lisa and Lincoln, to see what the minimal conditions were to how much information our mind needs to recognize a face.

Harmon’s computer generated block portrait Demonstrated the minimal conditions needed to recognize a face.

Dalí’s fascination with double images led to this larger self-imposed challenge: to create a completely new composition out of the distorted image of Lincoln.

There is an earlier version in the Teatre-Museu Dalí in Figueres, Spain, painted on a large photo.

The vast size made it difficult to see the face of Lincoln unless viewed by special glasses that reduce the image. Dalí gave visitors binoculars and asked them to look through the “wrong side” of the lens.

Painted when Dalí was 72, just after he completed his Museum in Spain.

Theme of passing time.

Gala is depicted nude, except for her familiar Chanel bow, standing before an open window in a composition Dalí repeatedly painted over the years. She was 82 years old when this was painted, so she has become much younger.

The rising sun also contains Christ in ascension, reminiscent of Dalí’s 1951 painting titled Christ of St. John of the Cross, where Christ has died and is being resurrected.

The location of the sun, Christ’s head, is possibly where Lincoln was shot.

Dalí’s title references Mark Rothko (1903-1970), a leading Abstract Expressionist painter who had recently committed suicide.

Dalí was competing with the Latvian-born American artist Mark Rothko in terms of the size, scale, and chromatic brilliance of his work.

Carefully calibrated square cells of colors in varying progression of hues is evocative of the meditative “color field” paintings of Rothko, as well as forming a complex network of multiple images and optical illusions.

The skill and ingenuity required to produce the double image of Lincoln/Gala before the window is matched by Dalí’s exquisite employment of trompe-l’œil effects.

Affixed a copy of an altered Lincoln photograph directly to the canvas, underscoring Dalí’s interest in collage as well as photographic and reproduction technologies.

Dalí wed science with psychoanalysis and religious mysticism by means of an extended process of "paranoiac" associations and interpretation, simultaneously engaging the perceptual and critical faculties of the spectator.


Dalí understood the implications of Harmon’s research for the growing fields of neuroscience and computer imaging.

Dalí returns to the major themes of his surrealist years declaring in the process his receptivity to new developments in the science of human perception.

Dalí spent many years living between Spain and the United States and considered America his second home.

Dalí painted this for America’s Bicentennial in 1976.

Painted in Dalí’s hotel room at the St. Regis Hotel in New York.

Gala’s Foot, 1974-76.

- Stereo-optic painting.

Artwork 46:

The Chair, 1975.

- Stereo-optic painting.

Artwork 47:

The Chair, 1975.

- Stereo-optic painting.

Artwork 48:

The Swallow’s Tail — Series on Catastrophes, 1983, oil on canvas, 28.7 x 36.3 in.

- Salvador Dalí’s last painting.
- It was completed in May 1983, as the final part of a series based on René Thom’s catastrophe theory.
- Thom suggested that in four-dimensional phenomena, there are seven possible equilibrium surfaces, and therefore seven possible discontinuities, or “elementary catastrophes”: fold, cusp, swallowtail, butterfly, hyperbolic umbilic, elliptic umbilic, and parabolic umbilic.
- "The shape of Dalí’s Swallow’s Tail is taken directly from Thom’s four-dimensional graph of the same title, combined with a second catastrophe graph, the s-curve that Thom dubbed, "the cusp".
- Thom’s model is presented alongside the elegant curves of a cello and the instrument’s f-holes, which, especially as they lack the small pointed side-cuts of a traditional f-hole, equally connote the mathematical symbol for an integral in calculus: ."
- In his 1979 speech, “Gala, Velázquez and the Golden Fleece”, presented upon his 1979 induction into the prestigious Académie des Beaux-Arts of the Institut de France, Dalí described Thom’s theory of catastrophes as ‘the most beautiful aesthetic theory in the world’.
- He also recollected his first and only meeting with René Thom, at which Thom purportedly told Dalí that he was studying tectonic plates; this provoked Dalí to question Thom about the railway station at Perpignan, France, which the artist had declared in the 1960s as the centre of the universe.
- Thom reportedly replied, "I can assure you that Spain pivoted precisely — not in the area of — but exactly there where the Railway Station in Perpignan stands today”.
- Dalí was immediately enraptured by Thom’s statement, influencing his painting Topological Abduction of Europe — Homage to René Thom, the lower left corner of which features an equation closely linked to the ‘swallow’s tail’.
$V = x^5 + ax^3 + bx^2 + cx$, an illustration of the graph, and the term ‘queue d’aronde’.

- The seismic fracture that transverses *Topological Abduction of Europe* reappears in *The Swallow’s Tail* at the precise point where the y-axis of the swallow’s tail graph intersects with the S-curve of the *cusp*.

Artwork 49:

*Topological Abduction of Europe — Homage to René Thom*, 1983. oil on canvas.

- René Thom was a French mathematician who worked in topology.
- Topology is the branch of mathematics that studies shapes and symmetries of abstract geometric figures.
- Thom’s research culminated in his 1972 book *Structural Stability and Morphogenesis* in which he unveiled his *catastrophe theory*.
- Thom concluded that in four-dimensional phenomena there are seven possible equilibrium, and thus, seven possible breaks in equilibrium, which Thom called *elementary catastrophes*.
- Thom called these: *fold*, *cusp* (s-curve), *swallow’s tail*, *butterfly*, *hyperbolic umbilic*, *elliptic umbilic*, and *parabolic umbilic*.
- *Topological Abduction* features Thom’s equation for the swallows tail in the lower left corner: $V = x^5/5 + (ux^3)/3 + (vx^2)/2 + wx$.
- The words *queue d’aronde*, which are French for *swallow’s tail*, appear in the lower left corner and a small graph of the swallow’s tail shape follows the equation.
- The canvas is fractured by a large seismic crack, which relates to the catastrophe.
- This was Dalí’s penultimate painting, and certainly one of his most conceptual.

**Vocabulary:**

Dali Museum
Salvador Dalí
Albertí’s grid
Anamorphic Art
Back ground
Baroque
Board
Buckminster Fuller
Burlap
Cadaqués
Canvas
Catalonia
Chaos Theory
Chiaroscuro
Collage
Cubism
DNA
Double helix
Double image
Elena Ivanovna Diakononova (Gala)
Glass Enigma
Fibonacci’s sequence
Figueres
Fore ground
Foreshortening
Fractals
Geodesic dome
Geometry
Golden spiral
Golden triangle
Golden rectangle
Horizon line
Hypercube
Illusion
Impressionism
Irrational number
Irregular tessellation
**Declarative Knowledge: (Students will Know/Understand)**

Students will know/understand: that scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.

Students will know/understand: that scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion.

Students will know/understand: that connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields.

**Procedural Knowledge: (Students/Group will be able to do)**

Students will be able to: explain the difference between an experiment and other types of scientific investigation.

Students will be able to: recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.

Students will be able to: discuss how skills learned through the analysis and art-making process are used to solve problems in non-art areas.
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<th><strong>SC.5.N.1</strong></th>
<th><strong>Big Idea 1</strong></th>
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<td><strong>SC.5.N.1.2</strong></td>
<td><strong>Standard 1:</strong> Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations. <strong>Benchmark:</strong> 2. Explain the difference between an experiment and other types of scientific investigation.</td>
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<td><strong>Standard 2:</strong> Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion. <strong>Benchmark:</strong> 1. Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.</td>
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<th><strong>Big Idea: HISTORICAL AND GLOBAL CONNECTIONS</strong></th>
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<td><strong>Enduring Understanding 3:</strong> Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields. <strong>Benchmark:</strong> 1. Discuss how skills learned through the analysis and art-making process are used to solve problems in non-art areas.</td>
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**Formative Assessments:**

1. Observation of student engagement.
2. Monitoring student progress and “Teachable Moments.”
3. Discussion participation and responses.
### Summative Assessments: (Scoring Scales/Rubrics)

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<td><strong>Generally</strong></td>
<td><strong>Partially</strong></td>
<td><strong>No evidence</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Students will:</strong></td>
<td><strong>explain the difference between an experiment and other types of scientific investigation.</strong></td>
<td><strong>explain the difference between an experiment and other types of scientific investigation, including the arts.</strong></td>
<td><strong>explain the difference between an experiment and other types of scientific investigation.</strong></td>
<td><strong>explain the difference between an experiment and other types of scientific investigation.</strong></td>
<td><strong>explain the difference between an experiment and other types of scientific investigation.</strong></td>
</tr>
<tr>
<td><strong>Students will:</strong></td>
<td><strong>recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.</strong></td>
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</tr>
<tr>
<td><strong>Students will:</strong></td>
<td><strong>discuss how skills learned through the analysis and art-making process are used to solve problems in non-art areas.</strong></td>
<td><strong>discuss how skills learned through the analysis and art-making process are used to solve problems in non-art areas, including science.</strong></td>
<td><strong>discuss how skills learned through the analysis and art-making process are used to solve problems in some non-art areas.</strong></td>
<td><strong>discuss how skills learned through the analysis and art-making process are used to solve problems in few non-art areas.</strong></td>
<td><strong>discuss how skills learned through the analysis and art-making process are used to solve problems in non-art areas.</strong></td>
</tr>
</tbody>
</table>

**Note:**
- **4** (Complex): Entirely accurate and well-detailed understanding and application.
- **3** (Target): Understands the main points and can apply them accurately, with some minor errors.
- **2** (Simpler): Partially understands the main points and can apply them with some errors.
- **1** (Partial): Limited understanding and some random correct information.
- **0** (No Success): No evidence of understanding.
REFERENCE SCALE/RUBRIC USED TO ASSESS: Visual Art, Design or any Creative Endeavor.

<table>
<thead>
<tr>
<th>FINE ART SCALE (RUBRIC)</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNOWLEDGE</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Uses basic directions and concepts of the assignment in a unique way.</td>
<td>All basic directions and concepts of the assignment clearly evident.</td>
<td>Uses most assignment specific directions and concepts.</td>
<td>Minimal assignment specific directions and concepts evident.</td>
<td>No evidence of knowledge.</td>
<td></td>
</tr>
<tr>
<td>REASONING</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Connecting information in introspective, logical and sequential choices throughout entire creative process.</td>
<td>Connecting information in logical and sequential choices throughout entire creative process.</td>
<td>Connecting some information in choices throughout entire creative process.</td>
<td>Minimal connection of information in choices throughout entire creative process.</td>
<td>No evidence of reasoning.</td>
<td></td>
</tr>
<tr>
<td>TECHNICAL SKILLS</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Demonstrates high level of expertise in techniques appropriately employed.</td>
<td>Uses all relevant techniques appropriately.</td>
<td>Uses most relevant techniques appropriately.</td>
<td>Minimal use of appropriate and relevant techniques.</td>
<td>No evidence of technical skills.</td>
<td></td>
</tr>
<tr>
<td>CREATIVITY</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Exceptional evidence of personal style continued throughout creative process and product.</td>
<td>Solid evidence of personal style continued throughout creative process and product.</td>
<td>Some evidence of personal style continued throughout creative process and product.</td>
<td>Limited evidence of personal style continued throughout creative process and product.</td>
<td>No evidence of creativity.</td>
<td></td>
</tr>
</tbody>
</table>
ADDITIONAL REFERENCE MATERIAL:

Elements of Art:

Line, Shape, Color, Value, Form, Texture, Space.

Principles of Design:

Balance, Contrast, Emphasis, Movement, Pattern, Rhythm, Unity.

National Core Art Standards:

www.nationalartstandards.org

Creating, Performing/Presenting/Producing, Responding, Connecting.

Anchor Standards:

Creating:
1. Generate and conceptualize artistic ideas and work.
2. Organize and develop artistic ideas and work.
3. Refine and complete artistic work.

Performing/Presenting/Producing:
4. Analyze, interpret, and select artistic work for presentation.
5. Develop and refine artistic work for presentation.
6. Convey meaning through the presentation of artistic work.

Responding:
7. Perceive and analyze artistic work.
8. Interpret intent and meaning in artistic work.
9. Apply criteria to evaluate artistic work.

Connecting:
10. Synthesize and relate knowledge and personal experiences to make art.
11. Relate artistic ideas and works with societal, cultural and historical context to deepen understanding.

Critical Thinking:


Bloom’s Taxonomy:

Remembering, Understanding, Applying, Analyzing, Evaluating, Creating.

Marzano’s Taxonomy:

<table>
<thead>
<tr>
<th>Retrieval</th>
<th>Recognizing, recalling, executing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension</td>
<td>Integrating, symbolizing.</td>
</tr>
<tr>
<td>Analysis</td>
<td>Matching, classifying, analyzing errors, generalizing, specifying.</td>
</tr>
<tr>
<td>Knowledge Utilization</td>
<td>Decision making, problem solving, experimenting, investigating.</td>
</tr>
</tbody>
</table>

Feldman’s Model of Art Criticism (1981):

<table>
<thead>
<tr>
<th>Description</th>
<th>What do you see in this work?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>How is the work organized?</td>
</tr>
<tr>
<td>Interpretation</td>
<td>What is the work about?</td>
</tr>
<tr>
<td>Judgment</td>
<td>Is the work successful? Why?</td>
</tr>
</tbody>
</table>

Anderson’s Model of Art Criticism (1988):

<table>
<thead>
<tr>
<th>Reaction</th>
<th>What is it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>What does the work show? How, why, where was it made?</td>
</tr>
<tr>
<td>Interpretation</td>
<td>What is the work about? How do we know?</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Is the work well done? How do we decide?</td>
</tr>
</tbody>
</table>
Big Idea 1

Standard 1:

A. Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B. Processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C. Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D. Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations. (SC.K.N.1)

Benchmark: 1. Collaborate with a partner to collect information. (SC.K.N.1.1)
Benchmark: 2. Make observations of the natural world and know that they are descriptors collected using the five senses. (SC.K.N.1.2)
Benchmark: 3. Keep records as appropriate -- such as pictorial records -- of investigations conducted. (SC.K.N.1.3)
Benchmark: 4. Observe and create a visual representation of an object which includes its major features. (SC.K.N.1.4)
Benchmark: 5. Recognize that learning can come from careful observation. (SC.K.N.1.5)

Big Idea 5

Standard 2: Humans continue to explore Earth's place in space. Gravity and energy influence the formation of galaxies, including our own Milky Way Galaxy, stars, the Solar System, and Earth. Humankind's need to explore continues to lead to the development of knowledge and understanding of our Solar System. (SC.K.E)

Benchmark: 1. Explore the Law of Gravity by investigating how objects are pulled toward the ground unless something holds them up. (SC.K.E.5.1)
Benchmark: 2. Recognize the repeating pattern of day and night. (SC.K.E.5.2)
Benchmark: 3. Recognize that the Sun can only be seen in the daytime. (SC.K.E.5.3)
Benchmark: 4. Observe that sometimes the Moon can be seen at night and sometimes during the day. (SC.K.E.5.4)
Benchmark: 5. Observe that things can be big and things can be small as seen from Earth. (SC.K.E.5.5)
Benchmark: 6. Observe that some objects are far away and some are nearby as seen from Earth. (SC.K.E.5.6)

Big Idea 8

Standard 3:

A. All objects and substances in the world are made of matter. Matter has two fundamental properties: matter takes up space and matter has mass.
B. Objects and substances can be classified by their physical and chemical properties.
C. Mass is the amount of matter (or "stuff") in an object. Weight, on the other hand, is the measure of force of attraction (gravitational force) between an object and Earth.
D. The concepts of mass and weight are complicated and potentially confusing to elementary students. Hence, the more familiar term of "weight" is recommended for use to stand for both mass and weight in grades K-5. By grades 6-8, students are expected to understand the distinction between mass and weight, and use them appropriately. (SC.K.P.8)

Benchmark: 1. Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light) and texture. (SC.K.P.8.1)

Big Idea 9

Standard 4:
A. Matter can undergo a variety of changes.
B. Matter can be changed physically or chemically. (SC.K.P.9)

**Benchmark: 1.** Recognize that the shape of materials such as paper and clay can be changed by cutting, tearing, crumpling, smashing, or rolling. (SC.K.P.9.1)

**Big Idea 10**

**Standard 5:**

A. Energy is involved in all physical processes and is a unifying concept in many areas of science.
B. Energy exists in many forms and has the ability to do work or cause a change. (SC.K.P.10)

**Benchmark: 1.** Observe that things that make sound vibrate. (SC.K.P.10.1)

**Big Idea 12**

**Standard 6:**

A. Motion is a key characteristic of all matter that can be observed, described, and measured.
B. The motion of objects can be changed by forces. (SC.K.P.12)

**Benchmark: 1.** Investigate that things move in different ways, such as fast, slow, etc. (SC.K.P.12.1)

**Big Idea 13**

**Standard 7:**

A. It takes energy to change the motion of objects.
B. Energy change is understood in terms of forces—pushes or pulls.
C. Some forces act through physical contact, while others act at a distance. (SC.K.P.13)

**Benchmark: 1.** Observe that a push or a pull can change the way an object is moving. (SC.K.P.13.1)

**Big Idea 14**

**Standard 8:**

A. All plants and animals, including humans, are alike in some ways and different in others.
B. All plants and animals, including humans, have internal parts and external structures that function to keep them alive and help them grow and reproduce.
C. Humans can better understand the natural world through careful observation. (SC.K.L.14)

**Benchmark: 1.** Recognize the five senses and related body parts. (SC.K.L.14.1)
**Benchmark: 2.** Recognize that some books and other media portray animals and plants with characteristics and behaviors they do not have in real life. (SC.K.L.14.2)
**Benchmark: 3.** Observe plants and animals, describe how they are alike and how they are different in the way they look and in the things they do. (SC.K.L.14.3)

**Science**

1

**Big Idea 1**

**Standard 1:**

A. Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B. The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C. Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D. Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations. (SC.1.N.1)

**Benchmark:** 1. Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations. (SC.1.N.1.1)

**Benchmark:** 2. Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others. (SC.1.N.1.2)

**Benchmark:** 3. Keep records as appropriate — such as pictorial and written records — of investigations conducted. (SC.1.N.1.3)

**Benchmark:** 4. Ask "how do you know?" in appropriate situations. (SC.1.N.1.4)

**Big Idea 5**

**Standard 2:** Humans continue to explore Earth's place in space. Gravity and energy influence the formation of galaxies, including our own Milky Way Galaxy, stars, the Solar System, and Earth. Humankind's need to explore continues to lead to the development of knowledge and understanding of our Solar System. (SC.1.E.5)

**Benchmark:** 1. Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky. (SC.1.E.5.1)

**Benchmark:** 2. Explore the Law of Gravity by demonstrating that Earth's gravity pulls any object on or near Earth toward it even though nothing is touching the object. (SC.1.E.5.2)

**Benchmark:** 3. Investigate how magnifiers make things appear bigger and help people see things they could not see without them. (SC.1.E.5.3)

**Benchmark:** 4. Identify the beneficial and harmful properties of the Sun. (SC.1.E.5.4)

**Big Idea 6**

**Standard 3:** Humans continue to explore the composition and structure of the surface of the Earth. External sources of energy have continuously altered the features of Earth by means of both constructive and destructive forces. All life, including human civilization, is dependent on Earth's water and natural resources. (SC.1.E.6)

**Benchmark:** 1. Recognize that water, rocks, soil, and living organisms are found on Earth's surface. (SC.1.E.6.1)

**Benchmark:** 2. Describe the need for water and how to be safe around water. (SC.1.E.6.2)

**Benchmark:** 3. Recognize that some things in the world around us happen fast and some happen slowly. (SC.1.E.6.3)

**Big Idea 8**

**Standard 4:**

A. All objects and substances in the world are made of matter. Matter has two fundamental properties: matter takes up space and matter has mass.

B. Objects and substances can be classified by their physical and chemical properties. Mass is the amount of matter (or "stuff") in an object. Weight, on the other hand, is the measure of force of attraction (gravitational force) between an object and Earth.

The concepts of mass and weight are complicated and potentially confusing to elementary students. Hence, the more familiar term of "weight" is recommended for use to stand for both mass and weight in grades K-5. By grades 6-8, students are expected to understand the distinction between mass and weight, and use them appropriately. (SC.1.P.8)

**Benchmark:** 1. Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float. (SC.1.P.8.1)

**Big Idea 12**

**Standard 5:**

A. Motion is a key characteristic of all matter that can be observed, described, and measured.

B. The motion of objects can be changed by forces. (SC.1.P.12)

**Benchmark:** 1. Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow. (SC.1.P.12.1)
Big Idea 13

Standard 6:

A. It takes energy to change the motion of objects.
B. Energy change is understood in terms of forces--pushes or pulls.
C. Some forces act through physical contact, while others act at a distance. (SC.1.P.13)

Benchmark: 1. Demonstrate that the way to change the motion of an object is by applying a push or a pull. (SC.1.P.13.1)

Big Idea 14

Standard 7:

A. All plants and animals, including humans, are alike in some ways and different in others.
B. All plants and animals, including humans, have internal parts and external structures that function to keep them alive and help them grow and reproduce.
C. Humans can better understand the natural world through careful observation. (SC.1.L.14)

Benchmark: 1. Make observations of living things and their environment using the five senses. (SC.1.L.14.1)
Benchmark: 2. Identify the major parts of plants, including stem, roots, leaves, and flowers. (SC.1.L.14.2)

Big Idea 16

Standard 8:

A. Offspring of plants and animals are similar to, but not exactly like, their parents or each other.
B. Life cycles vary among organisms, but reproduction is a major stage in the life cycle of all organisms. (SC.1.L.16)

Benchmark: 1. Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population. (SC.1.L.16.1)

Big Idea 17

Standard 9:

A. Plants and animals, including humans, interact with and depend upon each other and their environment to satisfy their basic needs.
B. Both human activities and natural events can have major impacts on the environment.
C. Energy flows from the sun through producers to consumers. (SC.1.L.17)

Benchmark: 1. Through observation, recognize that all plants and animals, including humans, need the basic necessities of air, water, food, and space. (SC.1.L.17.1)

Science

2

Big Idea 1

Standard 1:

A. Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B. The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C. Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D. Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations. (SC.2.N.1)
Benchmark: 1. Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations. (SC.2.N.1.1)

Benchmark: 2. Compare the observations made by different groups using the same tools. (SC.2.N.1.2)

Benchmark: 3. Ask “how do you know?” in appropriate situations and attempt reasonable answers when asked the same question by others. (SC.2.N.1.3)

Benchmark: 4. Explain how particular scientific investigations should yield similar conclusions when repeated. (SC.2.N.1.4)

Benchmark: 5. Distinguish between empirical observation (what you see, hear, feel, smell, or taste) and ideas or inferences (what you think). (SC.2.N.1.5)

Benchmark: 6. Explain how scientists alone or in groups are always investigating new ways to solve problems. (SC.2.N.1.6)

Big Idea 6

Standard 2: Humans continue to explore the composition and structure of the surface of Earth. External sources of energy have continuously altered the features of Earth by means of both constructive and destructive forces. All life, including human civilization, is dependent on Earth (SC.2.E.6)

Benchmark: 1. Recognize that Earth is made up of rocks. Rocks come in many sizes and shapes. (SC.2.E.6.1)

Benchmark: 2. Describe how small pieces of rock and dead plant and animal parts can be the basis of soil and explain the process by which soil is formed. (SC.2.E.6.2)

Benchmark: 3. Classify soil types based on color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants. (SC.2.E.6.3)

Big Idea 7

Standard 3: Humans continue to explore the interactions among water, air, and land. Air and water are in constant motion that results in changing conditions that can be observed over time. (SC.2.E.7)

Benchmark: 1. Compare and describe changing patterns in nature that repeat themselves, such as weather conditions including temperature and precipitation, day to day and season to season. (SC.2.E.7.1)

Benchmark: 2. Investigate by observing and measuring, that the Sun's energy directly and indirectly warms the water, land, and air. (SC.2.E.7.2)

Benchmark: 3. Investigate, observe and describe how water left in an open container disappears (evaporates), but water in a closed container does not disappear (evaporate). (SC.2.E.7.3)

Benchmark: 4. Investigate that air is all around us and that moving air is wind. (SC.2.E.7.4)

Benchmark: 5. State the importance of preparing for severe weather, lightning, and other weather related events. (SC.2.E.7.5)

Big Idea 8

Standard 4:

A. All objects and substances in the world are made of matter. Matter has two fundamental properties: matter takes up space and matter has mass.

B. Objects and substances can be classified by their physical and chemical properties.

Mass is the amount of matter (or "stuff") in an object. Weight, on the other hand, is the measure of force of attraction (gravitational force) between an object and Earth.

The concepts of mass and weight are complicated and potentially confusing to elementary students. Hence, the more familiar term of "weight" is recommended for use to stand for both mass and weight in grades K-5. By grades 6-8, students are expected to understand the distinction between mass and weight, and use them appropriately. (SC.2.P.8)

Benchmark: 1. Observe and measure objects in terms of their properties, including size, shape, color, temperature, weight, texture, sinking or floating in water, and attraction and repulsion of magnets. (SC.2.P.8.1)

Benchmark: 2. Identify objects and materials as solid, liquid, or gas. (SC.2.P.8.2)

Benchmark: 3. Recognize that solids have a definite shape and that liquids and gases take the shape of their container. (SC.2.P.8.3)

Benchmark: 4. Observe and describe water in its solid, liquid, and gaseous states. (SC.2.P.8.4)

Benchmark: 5. Measure and compare temperatures taken every day at the same time. (SC.2.P.8.5)

Benchmark: 6. Measure and compare the volume of liquids using containers of various shapes and sizes. (SC.2.P.8.6)

Big Idea 9

Standard 5:

A. Matter can undergo a variety of changes.
B. Matter can be changed physically or chemically. (SC.2.P.9)

**Benchmark: 1.** Investigate that materials can be altered to change some of their properties, but not all materials respond the same way to any one alteration. (SC.2.P.9.1)

**Big Idea 10**

**Standard 6:**

A. Energy is involved in all physical processes and is a unifying concept in many areas of science.
B. Energy exists in many forms and has the ability to do work or cause a change. (SC.2.P.10)

**Benchmark: 1.** Discuss that people use electricity or other forms of energy to cook their food, cool or warm their homes, and power their cars. (SC.2.P.10.1)

**Big Idea 13**

**Standard 7:**

A. It takes energy to change the motion of objects.
B. Energy change is understood in terms of forces—pushes or pulls.
C. Some forces act through physical contact, while others act at a distance. (SC.2.P.13)

**Benchmark: 1.** Investigate the effect of applying various pushes and pulls on different objects. (SC.2.P.13.1)
**Benchmark: 2.** Demonstrate that magnets can be used to make some things move without touching them. (SC.2.P.13.2)
**Benchmark: 3.** Recognize that objects are pulled toward the ground unless something holds them up. (SC.2.P.13.3)
**Benchmark: 4.** Demonstrate that the greater the force (push or pull) applied to an object, the greater the change in motion of the object. (SC.2.P.13.4)

**Big Idea 14**

**Standard 8:**

A. All plants and animals, including humans, are alike in some ways and different in others.
B. All plants and animals, including humans, have internal parts and external structures that function to keep them alive and help them grow and reproduce.
C. Humans can better understand the natural world through careful observation. (SC.2.L.14)

**Benchmark: 1.** Distinguish human body parts (brain, heart, lungs, stomach, muscles, and skeleton) and their basic functions. (SC.2.L.14.1)

**Big Idea 16**

**Standard 9:**

A. Offspring of plants and animals are similar to, but not exactly like, their parents or each other.
B. Life cycles vary among organisms, but reproduction is a major stage in the life cycle of all organisms. (SC.2.L.16)

**Benchmark: 1.** Observe and describe major stages in the life cycles of plants and animals, including beans and butterflies. (SC.2.L.16.1)

**Big Idea 17**

**Standard 10:**

A. Plants and animals, including humans, interact with and depend upon each other and their environment to satisfy their basic needs.
B. Both human activities and natural events can have major impacts on the environment.
C. Energy flows from the sun through producers to consumers. (SC.2.L.17)
**Benchmark:** 1. Compare and contrast the basic needs that all living things, including humans, have for survival. (SC.2.L.17.1)

**Benchmark:** 2. Recognize and explain that living things are found all over Earth, but each is only able to live in habitats that meet its basic needs. (SC.2.L.17.2)

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**Science**

**3**

**Big Idea 1**

**Standard 1:**

A. Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.

B. The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."

C. Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.

D. Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations. (SC.3.N.1)

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**Benchmark:** 1. Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations. (SC.3.N.1.1)

**Benchmark:** 2. Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups. (SC.3.N.1.2)

**Benchmark:** 3. Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted. (SC.3.N.1.3)

**Benchmark:** 4. Recognize the importance of communication among scientists. (SC.3.N.1.4)

**Benchmark:** 5. Recognize that scientists question, discuss, and check each others’ evidence and explanations. (SC.3.N.1.5)

**Benchmark:** 6. Infer based on observation. (SC.3.N.1.6)

**Benchmark:** 7. Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena. (SC.3.N.1.7)

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**Big Idea 3**

**Standard 2:** The terms that describe examples of scientific knowledge, for example; "theory," "law," "hypothesis," and "model" have very specific meanings and functions within science. (SC.3.N.3)

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**Benchmark:** 1. Recognize that words in science can have different or more specific meanings than their use in everyday language; for example, energy, cell, heat/cold, and evidence. (SC.3.N.3.1)

**Benchmark:** 2. Recognize that scientists use models to help understand and explain how things work. (SC.3.N.3.2)

**Benchmark:** 3. Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations. (SC.3.N.3.3)

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**Big Idea 5**

**Standard 3:** Humans continue to explore Earth's place in space. Gravity and energy influence the formation of galaxies, including our own Milky Way Galaxy, stars, the Solar System, and Earth. Humankind’s need to explore continues to lead to the development of knowledge and understanding of our Solar System. (SC.3.E.5)

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**Benchmark:** 1. Explain that stars can be different; some are smaller, some are larger, and some appear brighter than others; all except the Sun are so far away that they look like points of light. (SC.3.E.5.1)

**Benchmark:** 2. Identify the Sun as a star that emits energy; some of it in the form of light. (SC.3.E.5.2)

**Benchmark:** 3. Recognize that the Sun appears large and bright because it is the closest star to Earth. (SC.3.E.5.3)

**Benchmark:** 4. Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome. (SC.3.E.5.4)

**Benchmark:** 5. Investigate that the number of stars that can be seen through telescopes is dramatically greater than those seen by the unaided eye. (SC.3.E.5.5)

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**Big Idea 6**

**Standard 4:** Humans continue to explore the composition and structure of the surface of Earth. External sources of energy have continuously altered the features of Earth by means of both constructive and destructive forces. All life, including human civilization, is dependent on Earth (SC.3.E.6)

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45
Benchmark: 1. Demonstrate that radiant energy from the Sun can heat objects and when the Sun is not present, heat may be lost. (SC.3.E.6.1)

Big Idea 8

Standard 5:
A. All objects and substances in the world are made of matter. Matter has two fundamental properties: matter takes up space and matter has mass.
B. Objects and substances can be classified by their physical and chemical properties. Mass is the amount of matter (or "stuff") in an object. Weight, on the other hand, is the measure of force of attraction (gravitational force) between an object and Earth.

The concepts of mass and weight are complicated and potentially confusing to elementary students. Hence, the more familiar term of "weight" is recommended for use to stand for both mass and weight in grades K-5. By grades 6-8, students are expected to understand the distinction between mass and weight, and use them appropriately. (SC.3.P.8)

Benchmark: 1. Measure and compare temperatures of various samples of solids and liquids. (SC.3.P.8.1)
Benchmark: 2. Measure and compare the mass and volume of solids and liquids. (SC.3.P.8.2)
Benchmark: 3. Compare materials and objects according to properties such as size, shape, color, texture, and hardness. (SC.3.P.8.3)

Big Idea 9

Standard 6:
A. Matter can undergo a variety of changes.
B. Matter can be changed physically or chemically. (SC.3.P.9)

Benchmark: 1. Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation. (SC.3.P.9.1)

Big Idea 10

Standard 7:
A. Energy is involved in all physical processes and is a unifying concept in many areas of science.
B. Energy exists in many forms and has the ability to do work or cause a change. (SC.3.P.10)

Benchmark: 1. Identify some basic forms of energy such as light, heat, sound, electrical, and mechanical. (SC.3.P.10.1)
Benchmark: 2. Recognize that energy has the ability to cause motion or create change. (SC.3.P.10.2)
Benchmark: 3. Demonstrate that light travels in a straight line until it strikes an object or travels from one medium to another. (SC.3.P.10.3)
Benchmark: 4. Demonstrate that light can be reflected, refracted, and absorbed. (SC.3.P.10.4)

Big Idea 11

Standard 8:
A. Waves involve a transfer of energy without a transfer of matter.
B. Water and sound waves transfer energy through a material.
C. Light waves can travel through a vacuum and through matter. (SC.3.P.11)

Benchmark: 1. Investigate, observe, and explain that things that give off light often also give off heat. (SC.3.P.11.1)
Benchmark: 2. Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together. (SC.3.P.11.2)

Big Idea 14

Standard 9:
A. All plants and animals, including humans, are alike in some ways and different in others.
B. All plants and animals, including humans, have internal parts and external structures that function to keep them alive and help them grow and reproduce.
C. Humans can better understand the natural world through careful observation. (SC.3.L.14)

**Benchmark: 1.** Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction. (SC.3.L.14.1)

**Benchmark: 2.** Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity. (SC.3.L.14.2)

### Big Idea 15

**Standard 10:**

A. Earth is home to a great diversity of living things, but changes in the environment can affect their survival.
B. Individuals of the same kind often differ in their characteristics and sometimes the differences give individuals an advantage in surviving and reproducing. (SC.3.L.15)

**Benchmark: 1.** Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrae and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors. (SC.3.L.15.1)

**Benchmark: 2.** Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics. (SC.3.L.15.2)

### Big Idea 17

**Standard 11:**

A. Plants and animals, including humans, interact with and depend upon each other and their environment to satisfy their basic needs.
B. Both human activities and natural events can have major impacts on the environment.
C. Energy flows from the sun through producers to consumers. (SC.3.L.17)

**Benchmark: 1.** Describe how animals and plants respond to changing seasons. (SC.3.L.17.1)

**Benchmark: 2.** Recognize that plants use energy from the Sun, air, and water to make their own food. (SC.3.L.17.2)

### Science

**4**

### Big Idea 1

**Standard 1:**

A. Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B. The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C. Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D. Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations. (SC.4.N.1)

**Benchmark: 1.** Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations. (SC.4.N.1.1)

**Benchmark: 2.** Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups. (SC.4.N.1.2)

**Benchmark: 3.** Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence. (SC.4.N.1.3)

**Benchmark: 4.** Attempt reasonable answers to scientific questions and cite evidence in support. (SC.4.N.1.4)

**Benchmark: 5.** Compare the methods and results of investigations done by other classmates. (SC.4.N.1.5)

**Benchmark: 6.** Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations. (SC.4.N.1.6)
**Benchmark: 7.** Recognize and explain that scientists base their explanations on evidence. (SC.4.N.1.7)

**Benchmark: 8.** Recognize that science involves creativity in designing experiments. (SC.4.N.1.8)

**Big Idea 2**

**Standard 2:**

A. Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion.

B. Scientific knowledge is durable and robust, but open to change.

C. Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery. (SC.4.N.2)

**Benchmark: 1.** Explain that science focuses solely on the natural world. (SC.4.N.2.1)

**Big Idea 3**

**Standard 3:** The terms that describe examples of scientific knowledge, for example; "theory," "law," "hypothesis," and "model" have very specific meanings and functions within science. (SC.4.N.3)

**Benchmark: 1.** Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model. (SC.4.N.3.1)

**Big Idea 5**

**Standard 4:** Humans continue to explore Earth's place in space. Gravity and energy influence the formation of galaxies, including our own Milky Way Galaxy, stars, the Solar System, and Earth. Humankind's need to explore continues to lead to the development of knowledge and understanding of our Solar System. (SC.4.E.5)

**Benchmark: 1.** Observe that the patterns of stars in the sky stay the same although they appear to shift across the sky nightly, and different stars can be seen in different seasons. (SC.4.E.5.1)

**Benchmark: 2.** Describe the changes in the observable shape of the moon over the course of about a month. (SC.4.E.5.2)

**Benchmark: 3.** Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day. (SC.4.E.5.3)

**Benchmark: 4.** Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected. (SC.4.E.5.4)

**Benchmark: 5.** Investigate and report the effects of space research and exploration on the economy and culture of Florida. (SC.4.E.5.5)

**Big Idea 6**

**Standard 5:** Humans continue to explore the composition and structure of the surface of Earth. External sources of energy have continuously altered the features of Earth by means of both constructive and destructive forces. All life, including human civilization, is dependent on Earth (SC.4.E.6)

**Benchmark: 1.** Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure). (SC.4.E.6.1)

**Benchmark: 2.** Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks. (SC.4.E.6.2)

**Benchmark: 3.** Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable. (SC.4.E.6.3)

**Benchmark: 4.** Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice). (SC.4.E.6.4)

**Benchmark: 5.** Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things. (SC.4.E.6.5)

**Benchmark: 6.** Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy). (SC.4.E.6.6)

**Big Idea 8**

**Standard 6:**

A. All objects and substances in the world are made of matter. Matter has two fundamental properties: matter takes up space and matter has mass.
B. Objects and substances can be classified by their physical and chemical properties. Mass is the amount of matter (or "stuff") in an object. Weight, on the other hand, is the measure of force of attraction (gravitational force) between an object and Earth.

The concepts of mass and weight are complicated and potentially confusing to elementary students. Hence, the more familiar term of "weight" is recommended for use to stand for both mass and weight in grades K-5. By grades 6-8, students are expected to understand the distinction between mass and weight, and use them appropriately. (SC.4.P.8)

**Benchmark: 1.** Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets. (SC.4.P.8.1)

**Benchmark: 2.** Identify properties and common uses of water in each of its states. (SC.4.P.8.2)

**Benchmark: 3.** Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts. (SC.4.P.8.3)

**Benchmark: 4.** Investigate and describe that magnets can attract magnetic materials and attract and repel other magnets. (SC.4.P.8.4)

**Big Idea 9**

**Standard 7:**

A. Matter can undergo a variety of changes.
B. Matter can be changed physically or chemically. (SC.4.P.9)

**Benchmark: 1.** Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking. (SC.4.P.9.1)

**Big Idea 10**

**Standard 8:**

A. Energy is involved in all physical processes and is a unifying concept in many areas of science.
B. Energy exists in many forms and has the ability to do work or cause a change. (SC.4.P.10)

**Benchmark: 1.** Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion. (SC.4.P.10.1)

**Benchmark: 2.** Investigate and describe that energy has the ability to cause motion or create change. (SC.4.P.10.2)

**Benchmark: 3.** Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates. (SC.4.P.10.3)

**Benchmark: 4.** Describe how moving water and air are sources of energy and can be used to move things. (SC.4.P.10.4)

**Big Idea 11**

**Standard 9:**

A. Waves involve a transfer of energy without a transfer of matter.
B. Water and sound waves transfer energy through a material.
C. Light waves can travel through a vacuum and through matter. (SC.4.P.11)

**Benchmark: 1.** Recognize that heat flows from a hot object to a cold object and that heat flow may cause materials to change temperature. (SC.4.P.11.1)

**Benchmark: 2.** Identify common materials that conduct heat well or poorly. (SC.4.P.11.2)

**Big Idea 12**

**Standard 10:**

A. Motion is a key characteristic of all matter that can be observed, described, and measured.
B. The motion of objects can be changed by forces. (SC.4.P.12)

**Benchmark: 1.** Recognize that an object in motion always changes its position and may change its direction. (SC.4.P.12.1)

**Benchmark: 2.** Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds. (SC.4.P.12.2)
Big Idea 16

Standard 11:

A. Offspring of plants and animals are similar to, but not exactly like, their parents or each other. (SC.4.L.16)
B. Life cycles vary among organisms, but reproduction is a major stage in the life cycle of all organisms. (SC.4.L.16)

Benchmark: 1. Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination. (SC.4.L.16.1)
Benchmark: 2. Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment. (SC.4.L.16.2)
Benchmark: 3. Recognize that animal behaviors may be shaped by heredity and learning. (SC.4.L.16.3)
Benchmark: 4. Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants. (SC.4.L.16.4)

Big Idea 17

Standard 12:

A. Plants and animals, including humans, interact with and depend upon each other and their environment to satisfy their basic needs.
B. Both human activities and natural events can have major impacts on the environment.
C. Energy flows from the sun through producers to consumers. (SC.4.L.17)

Benchmark: 1. Compare the seasonal changes in Florida plants and animals to those in other regions of the country. (SC.4.L.17.1)
Benchmark: 2. Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them. (SC.4.L.17.2)
Benchmark: 3. Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers. (SC.4.L.17.3)
Benchmark: 4. Recognize ways plants and animals, including humans, can impact the environment. (SC.4.L.17.4)

Science

5

Big Idea 1

Standard 1:

A. Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B. The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C. Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D. Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations. (SC.5.N.1)

Benchmark: 1. Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. (SC.5.N.1.1)
Benchmark: 2. Explain the difference between an experiment and other types of scientific investigation. (SC.5.N.1.2)
Benchmark: 3. Recognize and explain the need for repeated experimental trials. (SC.5.N.1.3)
Benchmark: 4. Identify a control group and explain its importance in an experiment. (SC.5.N.1.4)
Benchmark: 5. Recognize and explain that authentic scientific investigation frequently does not parallel the steps of "the scientific method." (SC.5.N.1.5)
Benchmark: 6. Recognize and explain the difference between personal opinion/interpretation and verified observation. (SC.5.N.1.6)

Big Idea 2

Standard 2:
A. Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion.

B. Scientific knowledge is durable and robust, but open to change.

C. Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery. (SC.5.N.2)

**Benchmark: 1.** Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence. (SC.5.N.2.1)

**Benchmark: 2.** Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others. (SC.5.N.2.2)

**Big Idea 5**

**Standard 3:** Humans continue to explore Earth's place in space. Gravity and energy influence the formation of galaxies, including our own Milky Way Galaxy, stars, the Solar System, and Earth. H umankind's need to explore continues to lead to the development of knowledge and understanding of our Solar System. (SC.5.E.5)

**Benchmark: 1.** Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way. (SC.5.E.5.1)

**Benchmark: 2.** Recognize the major common characteristics of all planets and compare/contrast the properties of inner and outer planets. (SC.5.E.5.2)

**Benchmark: 3.** Distinguish among the following objects of the Solar System -- Sun, planets, moons, asteroids, comets -- and identify Earth's position in it. (SC.5.E.5.3)

**Big Idea 7**

**Standard 4:** Humans continue to explore the interactions among water, air, and land. Air and water are in constant motion that results in changing conditions that can be observed over time. (SC.5.E.7)

**Benchmark: 1.** Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another. (SC.5.E.7.1)

**Benchmark: 2.** Recognize that the ocean is an integral part of the water cycle and is connected to all of Earth's water reservoirs via evaporation and precipitation processes. (SC.5.E.7.2)

**Benchmark: 3.** Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time. (SC.5.E.7.3)

**Benchmark: 4.** Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time. (SC.5.E.7.4)

**Benchmark: 5.** Recognize that some of the weather-related differences, such as temperature and humidity, are found among different environments, such as swamps, deserts, and mountains. (SC.5.E.7.5)

**Benchmark: 6.** Describe characteristics (temperature and precipitation) of different climate zones as they relate to latitude, elevation, and proximity to bodies of water. (SC.5.E.7.6)

**Benchmark: 7.** Design a family preparedness plan for natural disasters and identify the reasons for having such a plan. (SC.5.E.7.7)

**Big Idea 8**

**Standard 5:**

A. All objects and substances in the world are made of matter. Matter has two fundamental properties: matter takes up space and matter has mass.

B. Objects and substances can be classified by their physical and chemical properties. Mass is the amount of matter (or "stuff") in an object. Weight, on the other hand, is the measure of force of attraction (gravitational force) between an object and Earth.

The concepts of mass and weight are complicated and potentially confusing to elementary students. Hence, the more familiar term of "weight" is recommended for use to stand for both mass and weight in grades K-5. By grades 6-8, students are expected to understand the distinction between mass and weight, and use them appropriately. (SC.5.P.8)

**Benchmark: 1.** Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature. (SC.5.P.8.1)

**Benchmark: 2.** Investigate and identify materials that will dissolve in water and those that will not and identify the conditions that will speed up or slow down the dissolving process. (SC.5.P.8.2)

**Benchmark: 3.** Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction. (SC.5.P.8.3)

**Benchmark: 4.** Explore the scientific theory of atoms (also called atomic theory) by recognizing that all matter is composed of parts that are too small to be seen without magnification. (SC.5.P.8.4)
Big Idea 9

Standard 6:

A. Matter can undergo a variety of changes.
B. Matter can be changed physically or chemically. (SC.5.P.9)

Benchmark: 1. Investigate and describe that many physical and chemical changes are affected by temperature. (SC.5.P.9.1)

Big Idea 10

Standard 7:

A. Energy is involved in all physical processes and is a unifying concept in many areas of science.
B. Energy exists in many forms and has the ability to do work or cause a change. (SC.5.P.10)

Benchmark: 1. Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical. (SC.5.P.10.1)
Benchmark: 2. Investigate and explain that energy has the ability to cause motion or create change. (SC.5.P.10.2)
Benchmark: 3. Investigate and explain that an electrically-charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects. (SC.5.P.10.3)
Benchmark: 4. Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion. (SC.5.P.10.4)

Big Idea 11

Standard 8:

A. Waves involve a transfer of energy without a transfer of matter.
B. Water and sound waves transfer energy through a material.
C. Light waves can travel through a vacuum and through matter. (SC.5.P.11)

Benchmark: 1. Investigate and illustrate the fact that the flow of electricity requires a closed circuit (a complete loop). (SC.5.P.11.1)
Benchmark: 2. Identify and classify materials that conduct electricity and materials that do not. (SC.5.P.11.2)

Big Idea 13

Standard 9:

A. It takes energy to change the motion of objects.
B. Energy change is understood in terms of forces--pushes or pulls.
C. Some forces act through physical contact, while others act at a distance. (SC.5.P.13)

Benchmark: 1. Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects. (SC.5.P.13.1)
Benchmark: 2. Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object. (SC.5.P.13.2)
Benchmark: 3. Investigate and describe that the more mass an object has, the less effect a given force will have on the object’s motion. (SC.5.P.13.3)
Benchmark: 4. Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced. (SC.5.P.13.4)

Big Idea 14

Standard 10:

A. All plants and animals, including humans, are alike in some ways and different in others.
B. All plants and animals, including humans, have internal parts and external structures that function to keep them alive and help them grow and reproduce.
C. Humans can better understand the natural world through careful observation. (SC.5.L.14)
**Benchmark: 1.** Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs. (SC.5.L.14.1)

**Benchmark: 2.** Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support -- some with internal skeletons others with exoskeletons -- while some plants have stems for support. (SC.5.L.14.2)

**Big Idea 15**

**Standard 11:**

A. Earth is home to a great diversity of living things, but changes in the environment can affect their survival.
B. Individuals of the same kind often differ in their characteristics and sometimes the differences give individuals an advantage in surviving and reproducing. (SC.5.L.15)

**Benchmark: 1.** Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations. (SC.5.L.15.1)

**Big Idea 17**

**Standard 12:**

A. Plants and animals, including humans, interact with and depend upon each other and their environment to satisfy their basic needs.
B. Both human activities and natural events can have major impacts on the environment.
C. Energy flows from the sun through producers to consumers. (SC.5.L.17)

**Benchmark: 1.** Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics. (SC.5.L.17.1)

**Visual Art:**

- Critical Thinking and Reflection (C),
- Skills, Techniques, and Processes (S),
- Organizational Structure (O),
- Historical and Global Connections (H),
- Innovation, Technology, and the Future (F)

**Arts: Visual Art K**

**Big Idea: CRITICAL THINKING AND REFLECTION**

**Enduring Understanding 1:** Cognition and reflection are required to appreciate, interpret, and create with artistic intent. (VA.K.C.1)

**Benchmark: 1.** Create and share personal works of art with others. (VA.K.C.1.1)

**Enduring Understanding 2:** Assessing our own and others' artistic work, using critical-thinking, problem-solving, and decision-making skills, is central to artistic growth. (VA.K.C.2)

**Benchmark: 1.** Describe personal choices made in the creation of artwork. (VA.K.C.2.1)
**Benchmark: 2.** Identify media used by self or peers. (VA.K.C.2.2)

**Big Idea: SKILLS, TECHNIQUES, AND PROCESSES**

**Enduring Understanding 1:** The arts are inherently experiential and actively engage learners in the processes of creating, interpreting, and responding to art. (VA.K.S.1)

**Benchmark: 1.** Explore art processes and media to produce artworks. (VA.K.S.1.1)
**Benchmark: 2.** Produce artwork influenced by personal decisions and ideas. (VA.K.S.1.2)
Enduring Understanding 2: Through purposeful practice, artists learn to manage, master, and refine simple, then complex, skills and techniques. (VA.K.S.3)

Benchmark: 1. Develop artistic skills through the repeated use of tools, processes, and media. (VA.K.S.3.1)
Benchmark: 2. Practice skills to develop craftsmanship. (VA.K.S.3.2)
Benchmark: 3. Handle art tools and media safely in the art room. (VA.K.S.3.3)

Big Idea: ORGANIZATIONAL STRUCTURE

Enduring Understanding 1: Understanding the organizational structure of an art form provides a foundation for appreciation of artistic works and respect for the creative process. (VA.K.O.1)

Benchmark: 1. Explore the placement of the structural elements of art in personal works of art. (VA.K.O.1.1)

Enduring Understanding 2: The structural rules and conventions of an art form serve as both a foundation and departure point for creativity. (VA.K.O.2)

Benchmark: 1. Generate ideas and images for artworks based on memory, imagination, and experiences. (VA.K.O.2.1)

Enduring Understanding 3: Every art form uses its own unique language, verbal and non-verbal, to document and communicate with the world. (VA.K.O.3)

Benchmark: 1. Create works of art to document experiences of self and community. (VA.K.O.3.1)

Big Idea: HISTORICAL AND GLOBAL CONNECTIONS

Enduring Understanding 1: Through study in the arts, we learn about and honor others and the worlds in which they live(d). (VA.K.H.1)

Benchmark: 1. Describe art from selected cultures and places. (VA.K.H.1.1)
Benchmark: 2. Follow directions for suitable behavior in an art audience. (VA.K.H.1.2)
Benchmark: 3. Explain how art-making can help people express ideas and feelings. (VA.K.H.1.3)

Enduring Understanding 2: The arts reflect and document cultural trends and historical events, and help explain how new directions in the arts have emerged. (VA.K.H.2)

Benchmark: 1. Compare selected artworks from various cultures to find differences and similarities. (VA.K.H.2.1)
Benchmark: 2. Explore everyday objects that have been designed and created by artists. (VA.K.H.2.2)
Benchmark: 3. Describe where artwork is displayed in school or other places. (VA.K.H.2.3)

Enduring Understanding 3: Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields. (VA.K.H.3)

Benchmark: 1. Express ideas related to non-art content areas through personal artworks. (VA.K.H.3.1)

Big Idea: INNOVATION, TECHNOLOGY, AND THE FUTURE

Enduring Understanding 1: Creating, interpreting, and responding in the arts stimulate the imagination and encourage innovation and creative risk-taking. (VA.K.F.1)

Benchmark: 1. Experiment with art media for personal satisfaction and perceptual awareness. (VA.K.F.1.1)
Benchmark: 2. Identify real and imaginary subject matter in works of art. (VA.K.F.1.2)

Enduring Understanding 2: Careers in and related to the arts significantly and positively impact local and global economies. (VA.K.F.2)

Benchmark: 1. Describe where art ideas or products can be found in stores. (VA.K.F.2.1)

Enduring Understanding 3: The 21st-century skills necessary for success as citizens, workers, and leaders in a global economy are embedded in the study of the arts. (VA.K.F.3)
Benchmark: 1. Create artwork that communicates an awareness of self as part of the community. (VA.K.F.3.1)

Arts: Visual Art 1

Big Idea: CRITICAL THINKING AND REFLECTION

Enduring Understanding 1: Cognition and reflection are required to appreciate, interpret, and create with artistic intent. (VA.1.C.1)

Benchmark: 1. Create and discuss works of art that convey personal interests. (VA.1.C.1.1)
Benchmark: 2. Gather clues to help interpret and reflect on works of art. (VA.1.C.1.2)

Enduring Understanding 2: Assessing our own and others' artistic work, using critical-thinking, problem-solving, and decision-making skills, is central to artistic growth. (VA.1.C.2)

Benchmark: 1. Describe visual imagery used to complete artwork. (VA.1.C.2.1)
Benchmark: 2. Use various media or techniques to learn how changes affect the completed artwork. (VA.1.C.2.2)

Enduring Understanding 3: The processes of critiquing works of art lead to development of critical-thinking skills transferable to other contexts. (VA.1.C.3)

Benchmark: 1. Identify vocabulary that is used in both visual art and other contexts. (VA.1.C.3.1)
Benchmark: 2. Distinguish between artwork, utilitarian objects, and objects from nature. (VA.1.C.3.2)

Big Idea: SKILLS, TECHNIQUES, AND PROCESSES

Enduring Understanding 1: The arts are inherently experiential and actively engage learners in the processes of creating, interpreting, and responding to art. (VA.1.S.1)

Benchmark: 1. Experiment with art processes and media to express ideas. (VA.1.S.1.1)
Benchmark: 2. Use varied processes to develop artistic skills when expressing personal thoughts, feelings, and experiences. (VA.1.S.1.2)
Benchmark: 3. Create works of art to tell a personal story. (VA.1.S.1.3)
Benchmark: 4. Use accurate art vocabulary to communicate ideas about art. (VA.1.S.1.4)

Enduring Understanding 2: Development of skills, techniques, and processes in the arts strengthens our ability to remember, focus on, process, and sequence information. (VA.1.S.2)

Benchmark: 1. Practice correct use of tools with various art media, techniques, and processes. (VA.1.S.2.1)
Benchmark: 2. Describe the steps used in art production. (VA.1.S.2.2)

Enduring Understanding 3: Through purposeful practice, artists learn to manage, master, and refine simple, then complex, skills and techniques. (VA.1.S.3)

Benchmark: 1. Practice skills and techniques to create with two- and/or three-dimensional media. (VA.1.S.3.1)
Benchmark: 2. Discuss the qualities of good craftsmanship. (VA.1.S.3.2)
Benchmark: 3. Demonstrate safety procedures for using art tools and materials. (VA.1.S.3.3)
Benchmark: 4. Identify and be respectful of artwork that belongs to others and represents their ideas. (VA.1.S.3.4)

Big Idea: ORGANIZATIONAL STRUCTURE

Enduring Understanding 1: Understanding the organizational structure of an art form provides a foundation for appreciation of artistic works and respect for the creative process. (VA.1.O.1)

Benchmark: 1. Identify and use the structural elements of art and organizational principles of design to support artistic development. (VA.1.O.1.1)

Enduring Understanding 2: The structural rules and conventions of an art form serve as both a foundation and departure point for creativity. (VA.1.O.2)

Benchmark: 1. Create imagery and symbols to express thoughts and feelings. (VA.1.O.2.1)
Enduring Understanding 3: Every art form uses its own unique language, verbal and non-verbal, to document and communicate with the world. (VA.1.O.3)

Benchmark: 1. Use personal symbols in artwork to document surroundings and community. (VA.1.O.3.1)

Big Idea: HISTORICAL AND GLOBAL CONNECTIONS

Enduring Understanding 1: Through study in the arts, we learn about and honor others and the worlds in which they live(d). (VA.1.H.1)

Benchmark: 1. Discuss how different works of art communicate information about a particular culture. (VA.1.H.1.1)
Benchmark: 2. Discuss suitable behavior expected of audience members. (VA.1.H.1.2)
Benchmark: 3. Describe ways in which artists use their work to share knowledge and life experiences. (VA.1.H.1.3)

Enduring Understanding 2: The arts reflect and document cultural trends and historical events, and help explain how new directions in the arts have emerged. (VA.1.H.2)

Benchmark: 1. Compare artworks from different cultures, created over time, to identify differences in style and media. (VA.1.H.2.1)
Benchmark: 2. Identify objects of art that are used every day for utilitarian purposes. (VA.1.H.2.2)
Benchmark: 3. Identify places in which artworks may be viewed by others. (VA.1.H.2.3)

Enduring Understanding 3: Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields. (VA.1.H.3)

Benchmark: 1. Identify connections between visual art and other content areas. (VA.1.H.3.1)

Big Idea: INNOVATION, TECHNOLOGY, AND THE FUTURE

Enduring Understanding 1: Creating, interpreting, and responding in the arts stimulate the imagination and encourage innovation and creative risk-taking. (VA.1.F.1)

Benchmark: 1. Use various art media and real or imaginary choices to create artwork. (VA.1.F.1.1)
Benchmark: 2. Identify how classmates solve artistic problems. (VA.1.F.1.2)

Enduring Understanding 2: Careers in and related to the arts significantly and positively impact local and global economies. (VA.1.F.2)

Benchmark: 1. Explain how artists impact the appearance of items for sale in stores. (VA.1.F.2.1)

Enduring Understanding 3: The 21st-century skills necessary for success as citizens, workers, and leaders in a global economy are embedded in the study of the arts. (VA.1.F.3)

Benchmark: 1. Describe the use of art to share community information. (VA.1.F.3.1)
Benchmark: 2. Follow directions for completing classroom tasks in a specified timeframe to show early development of 21st-century skills. (VA.1.F.3.2)

Arts: Visual Art 2

Big Idea: CRITICAL THINKING AND REFLECTION

Enduring Understanding 1: Cognition and reflection are required to appreciate, interpret, and create with artistic intent. (VA.2.C.1)

Benchmark: 1. Use the art-making process to communicate personal interests and self-expression. (VA.2.C.1.1)
Benchmark: 2. Reflect on and discuss various possible meanings in works of art. (VA.2.C.1.2)

Enduring Understanding 2: Assessing our own and others’ artistic work, using critical-thinking, problem-solving, and decision-making skills, is central to artistic growth. (VA.2.C.2)

Benchmark: 1. Use appropriate decision-making skills to meet intended artistic objectives. (VA.2.C.2.1)
Benchmark: 2. Identify skillful techniques used in works by peers and others. (VA.2.C.2.2)
Benchmark: 3. Use suggestions from others to modify the structural elements of art. (VA.2.C.2.3)
Enduring Understanding 3: The processes of critiquing works of art lead to development of critical-thinking skills transferable to other contexts. (VA.2.C.3)

Benchmark: 1. Use accurate art vocabulary to identify connections among visual art and other contexts. (VA.2.C.3.1)
Benchmark: 2. Compare artworks with utilitarian objects and use accurate art vocabulary to describe how they are the same and how they are different. (VA.2.C.3.2)

Big Idea: SKILLS, TECHNIQUES, AND PROCESSES

Enduring Understanding 1: The arts are inherently experiential and actively engage learners in the processes of creating, interpreting, and responding to art. (VA.2.S.1)

Benchmark: 1. Experiment with tools and techniques as part of art-making processes. (VA.2.S.1.1)
Benchmark: 2. Use diverse resources to inspire expression of personal ideas and experiences in works of art. (VA.2.S.1.2)
Benchmark: 3. Explore art from different time periods and cultures as sources for inspiration. (VA.2.S.1.3)
Benchmark: 4. Use accurate art vocabulary to discuss art. (VA.2.S.1.4)

Enduring Understanding 2: Development of skills, techniques, and processes in the arts strengthens our ability to remember, focus on, process, and sequence information. (VA.2.S.2)

Benchmark: 1. Develop artistic skills through repeated experiences with art media, techniques, processes, and tools. (VA.2.S.2.1)
Benchmark: 2. Follow sequential procedures focused on art production. (VA.2.S.2.2)

Enduring Understanding 3: Through purposeful practice, artists learn to manage, master, and refine simple, then complex, skills and techniques. (VA.2.S.3)

Benchmark: 1. Manipulate art materials and refine techniques to create two- and/or three-dimensional personal works. (VA.2.S.3.1)
Benchmark: 2. Demonstrate growth in craftsmanship through purposeful practice. (VA.2.S.3.2)
Benchmark: 3. Follow directions for safety procedures and explain their importance in the art room. (VA.2.S.3.3)
Benchmark: 4. Describe the differences between using one’s own ideas, using someone else’s ideas as one’s own, and drawing inspiration from the works of others. (VA.2.S.3.4)

Big Idea: ORGANIZATIONAL STRUCTURE

Enduring Understanding 1: Understanding the organizational structure of an art form provides a foundation for appreciation of artistic works and respect for the creative process. (VA.2.O.1)

Benchmark: 1. Employ structural elements of art and organizational principles of design in personal work to develop awareness of the creative process. (VA.2.O.1.1)

Enduring Understanding 2: The structural rules and conventions of an art form serve as both a foundation and departure point for creativity. (VA.2.O.2)

Benchmark: 1. Use personal experience to convey meaning or purpose in creating artworks. (VA.2.O.2.1)

Enduring Understanding 3: Every art form uses its own unique language, verbal and non-verbal, to document and communicate with the world. (VA.2.O.3)

Benchmark: 1. Create personally meaningful works of art to document and explain ideas about local and global communities. (VA.2.O.3.1)

Big Idea: HISTORICAL AND GLOBAL CONNECTIONS

Enduring Understanding 1: Through study in the arts, we learn about and honor others and the worlds in which they live(d). (VA.2.H.1)

Benchmark: 1. Identify examples in which artists have created works based on cultural and life experiences. (VA.2.H.1.1)
Benchmark: 2. Distinguish between appropriate and inappropriate audience behavior. (VA.2.H.1.2)
**Enduring Understanding 2:** The arts reflect and document cultural trends and historical events, and help explain how new directions in the arts have emerged. (VA.2.H.2)

**Benchmark:** 1. Identify differences or similarities in artworks across time and culture. (VA.2.H.2.1)
**Benchmark:** 2. Identify objects from everyday life that have been designed and created using artistic skills. (VA.2.H.2.2)
**Benchmark:** 3. Identify the physical features or characteristics of artworks displayed in the community. (VA.2.H.2.3)

**Enduring Understanding 3:** Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields. (VA.2.H.3)

**Benchmark:** 1. Describe connections made between creating with art ideas and creating with information from other content areas. (VA.2.H.3.1)

**Big Idea:** INNOVATION, TECHNOLOGY, AND THE FUTURE

**Enduring Understanding 1:** Creating, interpreting, and responding in the arts stimulate the imagination and encourage innovation and creative risk-taking. (VA.2.F.1)

**Benchmark:** 1. Use imagination to create unique artwork incorporating personal ideas and selected media. (VA.2.F.1.1)
**Benchmark:** 2. Explore the advantages of having multiple solutions to solve an artistic problem. (VA.2.F.1.2)

**Enduring Understanding 2:** Careers in and related to the arts significantly and positively impact local and global economies. (VA.2.F.2)

**Benchmark:** 1. Identify work created by artists and designers. (VA.2.F.2.1)

**Enduring Understanding 3:** The 21st-century skills necessary for success as citizens, workers, and leaders in a global economy are embedded in the study of the arts. (VA.2.F.3)

**Benchmark:** 1. Describe the use of art to promote events within the school or community. (VA.2.F.3.1)
**Benchmark:** 2. Work with peers to complete a task in art. (VA.2.F.3.2)
**Benchmark:** 3. Use time effectively while focused on art production to show early development of 21st-century skills. (VA.2.F.3.3)

**Arts: Visual Art 3**

**Big Idea:** CRITICAL THINKING AND REFLECTION

**Enduring Understanding 1:** Cognition and reflection are required to appreciate, interpret, and create with artistic intent. (VA.3.C.1)

**Benchmark:** 1. Use the art-making process to develop ideas for self-expression. (VA.3.C.1.1)
**Benchmark:** 2. Reflect on and interpret works of art, using observation skills, prior knowledge, and experience. (VA.3.C.1.2)

**Enduring Understanding 2:** Assessing our own and others' artistic work, using critical-thinking, problem-solving, and decision-making skills, is central to artistic growth. (VA.3.C.2)

**Benchmark:** 1. Assess personal artworks for completeness and success in meeting intended objectives. (VA.3.C.2.1)
**Benchmark:** 2. Compare techniques used by peers and established artists as a basis for improving one's own work. (VA.3.C.2.2)
**Benchmark:** 3. Use constructive criticism to improve artwork. (VA.3.C.2.3)

**Enduring Understanding 3:** The processes of critiquing works of art lead to development of critical-thinking skills transferable to other contexts. (VA.3.C.3)

**Benchmark:** 1. Critique one's own and others' artworks, and identify the use of structural elements of art and organizational principles of design. (VA.3.C.3.1)
**Benchmark:** 2. Describe the connections between visual art and other contexts through observation and art criticism. (VA.3.C.3.2)
**Benchmark:** 3. Explain the similarities and differences between artworks and utilitarian objects. (VA.3.C.3.3)

**Big Idea:** SKILLS, TECHNIQUES, AND PROCESSES

**Enduring Understanding 1:** The arts are inherently experiential and actively engage learners in the processes of creating, interpreting, and responding to art. (VA.3.S.1)
**Benchmark:** 1. Manipulate tools and media to enhance communication in personal artworks. (VA.3.S.1.1)
**Benchmark:** 2. Use diverse resources to inspire artistic expression and achieve varied results. (VA.3.S.1.2)
**Benchmark:** 3. Incorporate ideas from art exemplars for specified time periods and cultures. (VA.3.S.1.3)
**Benchmark:** 4. Choose accurate art vocabulary to describe works of art and art processes. (VA.3.S.1.4)

**Enduring Understanding 2:** Development of skills, techniques, and processes in the arts strengthens our ability to remember, focus on, process, and sequence information. (VA.3.S.2)

**Benchmark:** 1. Integrate the structural elements of art and organizational principles of design with sequential procedures and techniques to achieve an artistic goal. (VA.3.S.2.1)
**Benchmark:** 2. Follow procedures, focusing on the art-making process. (VA.3.S.2.2)

**Enduring Understanding 3:** Through purposeful practice, artists learn to manage, master, and refine simple, then complex, skills and techniques. (VA.3.S.3)

**Benchmark:** 1. Use materials, tools, and processes to achieve an intended result in two- and/or three-dimensional artworks. (VA.3.S.3.1)
**Benchmark:** 2. Develop craftsmanship skills through repeated practice. (VA.3.S.3.2)
**Benchmark:** 3. Work within safety guidelines while using tools, media, techniques, and processes. (VA.3.S.3.3)
**Benchmark:** 4. Demonstrate awareness of copyright laws to show respect for the ideas of others when creating art. (VA.3.S.3.4)

**Big Idea: ORGANIZATIONAL STRUCTURE**

**Enduring Understanding 1:** Understanding the organizational structure of an art form provides a foundation for appreciation of artistic works and respect for the creative process. (VA.3.O.1)

**Benchmark:** 1. Demonstrate how the organizational principles of design are used to arrange the structural elements of art in personal work. (VA.3.O.1.1)

**Enduring Understanding 2:** The structural rules and conventions of an art form serve as both a foundation and departure point for creativity. (VA.3.O.2)

**Benchmark:** 1. Use creative and innovative ideas to complete personal artworks. (VA.3.O.2.1)

**Enduring Understanding 3:** Every art form uses its own unique language, verbal and non-verbal, to document and communicate with the world. (VA.3.O.3)

**Benchmark:** 1. Use symbols, visual language, and/or written language to document self or others. (VA.3.O.3.1)

**Big Idea: HISTORICAL AND GLOBAL CONNECTIONS**

**Enduring Understanding 1:** Through study in the arts, we learn about and honor others and the worlds in which they live(d). (VA.3.H.1)

**Benchmark:** 1. Describe cultural similarities and differences in works of art. (VA.3.H.1.1)
**Benchmark:** 2. Describe the importance of displaying suitable behavior as part of an art audience. (VA.3.H.1.2)
**Benchmark:** 3. Identify and be respectful of ideas important to individuals, groups, or cultures that are reflected in their artworks. (VA.3.H.1.3)

**Enduring Understanding 2:** The arts reflect and document cultural trends and historical events, and help explain how new directions in the arts have emerged. (VA.3.H.2)

**Benchmark:** 1. Compare differences or similarities in artworks across time and culture. (VA.3.H.2.1)
**Benchmark:** 2. Examine artworks and utilitarian objects, and describe their significance in the school and/or community. (VA.3.H.2.2)
**Benchmark:** 3. Describe various venues in which artwork is on display for public viewing. (VA.3.H.2.3)

**Enduring Understanding 3:** Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields. (VA.3.H.3)

**Benchmark:** 1. Discuss how knowledge gained in the visual art classroom can serve as prior knowledge in other classrooms. (VA.3.H.3.1)
Big Idea: INNOVATION, TECHNOLOGY, AND THE FUTURE

Enduring Understanding 1: Creating, interpreting, and responding in the arts stimulate the imagination and encourage innovation and creative risk-taking. (VA.3.F.1)

Benchmark: 1. Manipulate art media and incorporate a variety of subject matter to create imaginative artwork. (VA.3.F.1.1)
Benchmark: 2. Explore the effects and merits of different solutions to solve an artistic problem. (VA.3.F.1.2)

Enduring Understanding 2: Careers in and related to the arts significantly and positively impact local and global economies. (VA.3.F.2)

Benchmark: 1. Identify places where artists or designers have made an impact on the community. (VA.3.F.2.1)

Enduring Understanding 3: The 21st-century skills necessary for success as citizens, workers, and leaders in a global economy are embedded in the study of the arts. (VA.3.F.3)

Benchmark: 1. Create artwork that communicates an awareness of events within the community. (VA.3.F.3.1)
Benchmark: 2. Collaborate to complete a task in art. (VA.3.F.3.2)
Benchmark: 3. Demonstrate the skills needed to complete artwork in a timely manner, demonstrating perseverance and development of 21st-century skills. (VA.3.F.3.3)

Arts: Visual Art 4

Big Idea: CRITICAL THINKING AND REFLECTION

Enduring Understanding 1: Cognition and reflection are required to appreciate, interpret, and create with artistic intent. (VA.4.C.1)

Benchmark: 1. Integrate ideas during the art-making process to convey meaning in personal works of art. (VA.4.C.1.1)
Benchmark: 2. Describe observations and apply prior knowledge to interpret visual information and reflect on works of art. (VA.4.C.1.2)

Enduring Understanding 2: Assessing our own and others' artistic work, using critical-thinking, problem-solving, and decision-making skills, is central to artistic growth. (VA.4.C.2)

Benchmark: 1. Revise artworks to meet established criteria. (VA.4.C.2.1)
Benchmark: 2. Use various resources to generate ideas for growth in personal works. (VA.4.C.2.2)
Benchmark: 3. Develop and support ideas from various resources to create unique artworks. (VA.4.C.2.3)

Enduring Understanding 3: The processes of critiquing works of art lead to development of critical-thinking skills transferable to other contexts. (VA.4.C.3)

Benchmark: 1. Use accurate art vocabulary when analyzing works of art. (VA.4.C.3.1)
Benchmark: 2. Compare purposes for the structural elements of art and organizational principles of design in artworks and utilitarian objects. (VA.4.C.3.2)
Benchmark: 3. Use the art-making process, analysis, and discussion to identify the connections between art and other disciplines. (VA.4.C.3.3)

Big Idea: SKILLS, TECHNIQUES, AND PROCESSES

Enduring Understanding 1: The arts are inherently experiential and actively engage learners in the processes of creating, interpreting, and responding to art. (VA.4.S.1)

Benchmark: 1. Manipulate tools and materials to achieve diverse effects in personal works of art. (VA.4.S.1.1)
Benchmark: 2. Explore and use media, technology, and other art resources to express ideas visually. (VA.4.S.1.2)
Benchmark: 3. Create artworks that integrate ideas from culture or history. (VA.4.S.1.3)
Benchmark: 4. Use accurate art vocabulary to discuss works of art and the creative process. (VA.4.S.1.4)

Enduring Understanding 2: Development of skills, techniques, and processes in the arts strengthens our ability to remember, focus on, process, and sequence information. (VA.4.S.2)
Benchmark: 1. Organize the structural elements of art to achieve an artistic objective. (VA.4.S.2.1)
Benchmark: 2. Demonstrate the ability to recall art procedures and focus on art processes through to the end of production. (VA.4.S.2.2)

**Enduring Understanding 3:** Through purposeful practice, artists learn to manage, master, and refine simple, then complex, skills and techniques. (VA.4.S.3)

Benchmark: 1. Experiment with various materials, tools, techniques, and processes to achieve a variety of results in two- and/or three-dimensional artworks. (VA.4.S.3.1)
Benchmark: 2. Plan and produce art through ongoing practice of skills and techniques. (VA.4.S.3.2)
Benchmark: 3. Follow procedures for using tools, media, techniques, and processes safely and responsibly. (VA.4.S.3.3)
Benchmark: 4. Discuss the importance of copyright law in regard to the creation and production of art. (VA.4.S.3.4)

**Big Idea: ORGANIZATIONAL STRUCTURE**

**Enduring Understanding 1:** Understanding the organizational structure of an art form provides a foundation for appreciation of artistic works and respect for the creative process. (VA.4.O.1)

Benchmark: 1. Use the structural elements of art and organizational principles of design to understand the art-making process. (VA.4.O.1.1)
Benchmark: 2. Identify the structural elements of art used to unite an artistic composition. (VA.4.O.1.2)

**Enduring Understanding 2:** The structural rules and conventions of an art form serve as both a foundation and departure point for creativity. (VA.4.O.2)

Benchmark: 1. Use a variety of resources and art skills to overcome visual challenges in personal artworks. (VA.4.O.2.1)

**Enduring Understanding 3:** Every art form uses its own unique language, verbal and non-verbal, to document and communicate with the world. (VA.4.O.3)

Benchmark: 1. Apply meaning and relevance to document self or others visually in artwork. (VA.4.O.3.1)

**Big Idea: HISTORICAL AND GLOBAL CONNECTIONS**

**Enduring Understanding 1:** Through study in the arts, we learn about and honor others and the worlds in which they live(d). (VA.4.H.1)

Benchmark: 1. Identify historical and cultural influences that have inspired artists to produce works of art. (VA.4.H.1.1)
Benchmark: 2. Identify suitable behavior for various art venues and events. (VA.4.H.1.2)
Benchmark: 3. Describe artworks that honor and are reflective of particular individuals, groups, events, and/or cultures. (VA.4.H.1.3)
Benchmark: 4. Identify and practice ways of showing respect for one's own and others' personal works of art. (VA.4.H.1.4)

**Enduring Understanding 2:** The arts reflect and document cultural trends and historical events, and help explain how new directions in the arts have emerged. (VA.4.H.2)

Benchmark: 1. Explore works of art, created over time, to identify the use of the structural elements of art in an historical event or art style. (VA.4.H.2.1)
Benchmark: 2. Identify differences between artworks and utilitarian objects. (VA.4.H.2.2)
Benchmark: 3. Identify reasons to display artwork in public places. (VA.4.H.2.3)

**Enduring Understanding 3:** Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields. (VA.4.H.3)

Benchmark: 1. Discuss how analytical skills and thinking strategies are applied to both art production and problem-solving in other content areas. (VA.4.H.3.1)

**Big Idea: INNOVATION, TECHNOLOGY, AND THE FUTURE**

**Enduring Understanding 1:** Creating, interpreting, and responding in the arts stimulate the imagination and encourage innovation and creative risk-taking. (VA.4.F.1)
**Benchmark:** 1. Combine art media with innovative ideas and techniques to create two- and/or three-dimensional works of art. (VA.4.F.1.1)

**Benchmark:** 2. Examine and apply creative solutions to solve an artistic problem. (VA.4.F.1.2)

**Enduring Understanding 2:** Careers in and related to the arts significantly and positively impact local and global economies. (VA.4.F.2)

**Benchmark:** 1. Discuss how artists and designers have made an impact on the community. (VA.4.F.2.1)

**Benchmark:** 2. Identify the work of local artists to become familiar with art-making careers. (VA.4.F.2.2)

**Enduring Understanding 3:** The 21st-century skills necessary for success as citizens, workers, and leaders in a global economy are embedded in the study of the arts. (VA.4.F.3)

**Benchmark:** 1. Create art to promote awareness of school and/or community concerns. (VA.4.F.3.1)

**Benchmark:** 2. Collaborate with peers in the art room to achieve a common art goal. (VA.4.F.3.2)

**Benchmark:** 3. Work purposefully to complete personal works of art in a timely manner, demonstrating development of 21st-century skills. (VA.4.F.3.3)

**Arts: Visual Art 5**

**Big Idea:** CRITICAL THINKING AND REFLECTION

**Enduring Understanding 1:** Cognition and reflection are required to appreciate, interpret, and create with artistic intent. (VA.5.C.1)

**Benchmark:** 1. Develop a range of interests in the art-making process to influence personal decision-making. (VA.5.C.1.1)

**Benchmark:** 2. Use prior knowledge and observation skills to reflect on, analyze, and interpret exemplary works of art. (VA.5.C.1.2)

**Benchmark:** 3. Examine and discuss exemplary works of art to distinguish which qualities may be used to evaluate personal works. (VA.5.C.1.3)

**Enduring Understanding 2:** Assessing our own and others’ artistic work, using critical-thinking, problem-solving, and decision-making skills, is central to artistic growth. (VA.5.C.2)

**Benchmark:** 1. Revise artwork as a necessary part of the creative process to achieve an artistic goal. (VA.5.C.2.1)

**Benchmark:** 2. Analyze personal artworks to articulate the motivations and intentions in creating personal works of art. (VA.5.C.2.2)

**Benchmark:** 3. Apply established criteria to the art-making process to measure artistic growth. (VA.5.C.2.3)

**Benchmark:** 4. Identify examples of constructive criticism and use them to improve artworks and enhance artistic growth. (VA.5.C.2.4)

**Enduring Understanding 3:** The processes of critiquing works of art lead to development of critical-thinking skills transferable to other contexts. (VA.5.C.3)

**Benchmark:** 1. Use the structural elements of art and organizational principles of design when engaged in art criticism. (VA.5.C.3.1)

**Benchmark:** 2. Use art-criticism processes to form a hypothesis about an artist’s or designer’s intent when creating artworks and/or utilitarian objects. (VA.5.C.3.2)

**Benchmark:** 3. Critique works of art to understand the content and make connections with other content areas. (VA.5.C.3.3)

**Big Idea:** SKILLS, TECHNIQUES, AND PROCESSES

**Enduring Understanding 1:** The arts are inherently experiential and actively engage learners in the processes of creating, interpreting, and responding to art. (VA.5.S.1)

**Benchmark:** 1. Use various art tools, media, and techniques to discover how different choices change the effect on the meaning of an artwork. (VA.5.S.1.1)

**Benchmark:** 2. Use media, technology, and other resources to inspire personal art-making decisions. (VA.5.S.1.2)

**Benchmark:** 3. Create artworks to depict personal, cultural, and/or historical themes. (VA.5.S.1.3)

**Benchmark:** 4. Use accurate art vocabulary to communicate about works of art and artistic and creative processes. (VA.5.S.1.4)

**Enduring Understanding 2:** Development of skills, techniques, and processes in the arts strengthens our ability to remember, focus on, process, and sequence information. (VA.5.S.2)
**Benchmark: 1.** Organize the structural elements of art to support planning, strengthen focus, and implement artistic vision. (VA.S.5.2.1)

**Benchmark: 2.** Identify sequential procedures to engage in art production. (VA.S.5.2.2)

**Benchmark: 3.** Visualize the end product to justify artistic choices of tools, techniques, and processes. (VA.S.5.2.3)

**Enduring Understanding 3:** Through purposeful practice, artists learn to manage, master, and refine simple, then complex, skills and techniques. (VA.S.5.3)

**Big Idea: ORGANIZATIONAL STRUCTURE**

**Enduring Understanding 1:** Understanding the organizational structure of an art form provides a foundation for appreciation of artistic works and respect for the creative process. (VA.S.5.O.1)

**Benchmark: 1.** Use structural elements of art and organizational principles of design to develop content in artwork. (VA.S.5.O.1.1)

**Benchmark: 2.** Organize the structural elements of art to achieve visual unity. (VA.S.5.O.1.2)

**Benchmark: 3.** Explain how creative and technical ability is used to produce a work of art. (VA.S.5.O.1.3)

**Enduring Understanding 2:** The structural rules and conventions of an art form serve as both a foundation and departure point for creativity. (VA.S.5.O.2)

**Benchmark: 1.** Analyze works of art that document people and events from a variety of places and times to synthesize ideas for creating artwork. (VA.S.5.O.2.1)

**Benchmark: 2.** Use a variety of sources for ideas to resolve challenges in creating original works. (VA.S.5.O.2.2)

**Enduring Understanding 3:** Every art form uses its own unique language, verbal and non-verbal, to document and communicate with the world. (VA.S.5.O.3)

**Benchmark: 1.** Create meaningful and unique works of art to effectively communicate and document a personal voice. (VA.S.5.O.3.1)

**Big Idea: HISTORICAL AND GLOBAL CONNECTIONS**

**Enduring Understanding 1:** Through study in the arts, we learn about and honor others and the worlds in which they live(d). (VA.S.H.1)

**Benchmark: 1.** Examine historical and cultural influences that inspire artists and their work. (VA.S.H.1.1)

**Benchmark: 2.** Use suitable behavior as a member of an art audience. (VA.S.H.1.2)

**Benchmark: 3.** Identify and describe the importance of a selected group or culture places on specific works of art. (VA.S.H.1.3)

**Benchmark: 4.** Explain the importance of artwork to show why respect is or should be given to the work of peer or specified professional artists. (VA.S.H.1.4)

**Enduring Understanding 2:** The arts reflect and document cultural trends and historical events, and help explain how new directions in the arts have emerged. (VA.S.H.2)

**Benchmark: 1.** Compare works of art on the basis of style, culture, or artist across time to identify visual differences. (VA.S.H.2.1)

**Benchmark: 2.** Describe the ways in which artworks and utilitarian objects impact everyday life. (VA.S.H.2.2)

**Benchmark: 3.** Discuss artworks found in public venues to identify the significance of the work within the community. (VA.S.H.2.3)

**Enduring Understanding 3:** Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields. (VA.S.H.3)

**Benchmark: 1.** Discuss how skills learned through the analysis and art-making process are used to solve problems in non-art areas. (VA.S.H.3.1)

**Big Idea: INNOVATION, TECHNOLOGY, AND THE FUTURE**

**Enduring Understanding 1:** Creating, interpreting, and responding in the arts stimulate the imagination and encourage innovation and creative risk-taking. (VA.S.F.1)
Benchmark: 1. Examine and experiment with traditional or non-traditional uses of media to apply imaginative techniques in two- and/or three-dimensional artworks. (VA.5.F.1.1)

Benchmark: 2. Develop multiple solutions to solve artistic problems and justify personal artistic or aesthetic choices. (VA.5.F.1.2)

Enduring Understanding 2: Careers in and related to the arts significantly and positively impact local and global economies. (VA.5.F.2)

Benchmark: 1. Describe the knowledge and skills necessary for art-making and art-related careers. (VA.5.F.2.1)

Benchmark: 2. Explore careers in which artworks and utilitarian designs are created. (VA.5.F.2.2)

Benchmark: 3. Discuss contributions that artists make to society. (VA.5.F.2.2)

Enduring Understanding 3: The 21st-century skills necessary for success as citizens, workers, and leaders in a global economy are embedded in the study of the arts. (VA.5.F.3)

Benchmark: 1. Create artwork to promote public awareness of community and/or global concerns. (VA.5.F.3.1)

Benchmark: 2. Create artwork that shows procedural and analytical thinking to communicate ideas. (VA.5.F.3.2)

Benchmark: 3. Work collaboratively with others to complete a task in art and show leadership skills. (VA.5.F.3.3)

Benchmark: 4. Follow directions and complete artwork in the timeframe allotted to show development of 21st-century skills. (VA.5.F.3.4)

Observations and Notes:

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Dalí Museum, One Dalí Boulevard, St. Petersburg, FL 33701

Craig Petersburg, School and Community Education Manager

727.623.4754 cpetersburg@thedali.org

727.894.6068 fax