

Illinois

Science Goals/Standards/Benchmarks Middle, Junior High Goals 11, 12, 13

Correlated to AIMS Activities

Illinois State Specific Team

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Illinois State Goals/Standards/Benchmarks

Middle/Jr. High School Science

GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

A. Know and apply the concepts, principles and processes of scientific inquiry.

11.A.3a Formulate hypotheses that can be tested by collecting data.		
11.A.3b Conduct scientific experiments that control all but one variable.		
11.A.3c Collect and record data accurately using consistent measuring and recording techniques and media.		
11.A.3d Explain the existence of unexpected results in a data set.		
11.A.3e Use data manipulation tools and quantitative (e.g., mean, mode, simple equations) and representational methods (e.g., simulations, image processing) to analyze measurements.		
11.A.3f Interpret and represent results of analysis to produce findings.		
11.A.3g Report and display the process and results of a scientific investigation.		
Activity	Source	Students will:
Pencil Ponderings	5.03	Brainstorm questions about pencils, pick one question and devise and carry out a plan to find the answer.
Drops on a Penny Revisited	12.05	Gather data, draw conclusions. (Includes central tendency and dispersion of data)
Color Sample	12.08	Gather data, make graphic displays, and determine measures of central tendency for samples.
Mini Metric Olympics	Math + Science A Solution	Predict, perform, measure and record scores in six metric events.
Rubber Band Shoot!	Math + Science A Solution	Explore a cause and effect relationship between stretch and flight. (Includes data graphing and formula development)
Graph = Feet - EE	Math + Science A Solution	Predict, measure, graph and interpret results dealing with foot length.
M&M Count and Crunch	Math + Science A Solution	Predict, count, record and design bar graphs using bags of M&Ms.
What's in the Bag?	Math + Science A Solution	Look for central tendencies, compute percentages and the mean for each sample of M&Ms.
Popcorn Comparison #1	Fun With Foods	Experiment with different brands to determine which yields of greater volume.
Popcorn Comparison #2	Fun With Foods	Control variables to determine effect on yield.
Popcorn Comparison #3	Fun With Foods	Make choices applying scientific principles to develop a formula for estimating the amount of popcorn needed to fill various volumes.
Juicy Fruit	Fun With Foods	Predict, test, record and graph percentage of water in various fruits.
Tri to Analyze Soil	16.04	Collect soil samples and derive the percentage of clay, sand, and silt; read a Soil Texture Chart.

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Density Dealings	Spills and Ripples	Measure mass and volume of three liquids to determine relative densities; analyze and generalize a variety of patterns from charts and graphs.
A Penny for Your Drops	Spills and Ripples	Explore surface tension; identify and control the variables in this experiment; explore the effect of soap on surface tension.
Measuring Drops on a Penny	Spills and Ripples	Determine the average number of drops that will fit on a penny.
Soda Can Dunk	Spills and Ripples	Observe and measure the buoyant force described in Archimedes principle.

B. Know and apply the concepts, principles and processes of technological design.

11.B.3a Identify an actual design problem and establish criteria for determining the success of a solution.

11.B.3b Sketch, propose and compare design solutions to the problem considering available materials, tools, cost effectiveness and safety.

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11.B.3d Test the prototype using available materials, instruments and technology and record the data.

11.B.3e Evaluate the test results based on established criteria, note sources of error and recommend improvements.

11.B.3f Using available technology, report the relative success of the design based on the test results and criteria.

Activity	Source	Students will:
Clay Boats	Floaters & Sinkers	Design boat with standard unit of clay to hold the most weight.
Ship Shape	Floaters & Sinkers	Design a foil boat to hold maximum amount of cargo.
Deep Sea Diver Relays	Floaters & Sinkers	Design a Cartesian Diver to perform in the fastest time.
Unbelievable Flying Objects	The Sky's the Limit	Design various geometric figures using rulers, compasses, and protractors to explore flight properties.
But Will It Fly?	The Sky's the Limit	Construct polygons with popsicle sticks to explore flight.
The Whole Kite and Kaboodle	The Sky's the Limit	Construct simple kite to explore flight.
On Your Mark-Accuracy	The Sky's the Limit	Design and construct paper airplanes that improve accuracy.
Get Wet!	16.01	Collect and record data, compute weight difference, and write an equation representing the relationship between weight in air, water, and displacement.

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GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space science.

C. Know and apply concepts that explain how living things function, adapt and change.		
12.A.3a Explain how cells function as “building blocks” of organisms and describe the requirements for cells to live.		
Activity	Source	Students will:
The Cell As A Factory	Magnificent Microworld Adventures	Build a model of a cell to explain how cells function as “building blocks”.
A Complete Package	Magnificent Microworld Adventures	Observe the upper and lower epidermis of a plant leaf and note how they carry out specific functions.

12.A.3b Compare characteristics of organisms produced from a single parent with those of organisms produced by two parents.		
Activity	Source	Students will:
Picturing a Dichotomy	9.08	Compare and contrast data about dominant and recessive traits.
Teddy Bears Come in Pairs	2.05	Investigate Mendelian Laws of heredity.
Trait Combos	6.10	Collect and analyze data about human traits.

12.A.3c Compare and contrast how different forms and structures reflect different functions (e.g., similarities and differences among animals that fly, walk or swim; structures of plant cells and animal cells).		
Activity	Source	Students will:
Spinning the Tale	Magnificent Microworld Adventures	Make flipbooks and zoetropes to compare and contrast protista movement.
Onion Rings	Magnificent Microworld Adventures	Make a wet mount slide of onion cells and observe the cell wall.
Cheek to Cheek	Magnificent Microworld Adventures	Make a wet mount slide of cheek cells and observe that animal cells are different from plant cells.
The Green Machine	Magnificent Microworld Adventures	Observe the chloroplasts within Elodea plant cells and state their functions.
Moving in on Protozoa	Magnificent Microworld Adventures	Observe the ciliate, pseudopodal and the flagellate motions of protoists.
Nature’s Food Factories	Our Wonderful World	Collect, sort, and classify different leaves and relate their structure to their function.
Sea Stars	Magnificent Microworld Adventures	Identify and observe external structures of a sea star.
Bear Feet	11.05	Observe the difference in bear feet and how they adapt to the environment.

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D. Know and apply concepts that describe how living things interact with each other and with the environment.

12.B.3a Identify and classify biotic and abiotic factors in an environment that affect population density, habitat and placement of organisms in an energy pyramid.

Activity	Source	Students will:
Global Gains	11.02	Make predictions on population trends.
Habitat Comparisons	Our Wonderful World	Observe habitats and state similarities and differences.
Transpiration: Why Are Plants So Thirsty?	Our Wonderful World	Test and record plants affect on the environment.
On Living Pond	Our Wonderful World	Observe types of organisms that would be found in a freshwater pond.

12.B.3b Compare and assess features of organisms for their adaptive, competitive and survival potential (e.g., appendages, reproductive rates, camouflage, defensive structures).

Activity	Source	Students will:
Predator vs. Prey	Our Wonderful World	Participate in a simulation of natural selection.
Fly by Heat	Our Wonderful World	Observe and record temperature on insect behavior.
Now You See It, Now You Don't	Our Wonderful World	Investigate natural selection and camouflage.

E. Know and apply concepts that describe properties of matter and energy and the interactions between them.

12.C.3a Explain interactions of energy with matter including changes of state and conservation of mass and energy.

Activity	Source	Students will:
Corny Balloons	12.03	Observe the effects on a balloon as liquid changes into gas.
Evap-O-Weight	Down to Earth	Test variables that effect evaporation.
Betwixt and Between	Spills and Ripples	Observe interfaces between various combinations of solids, liquids, and gases.

12.C.3b Model and describe the chemical and physical characteristics of matter (e.g., atoms, molecules, elements, compounds, and mixtures).

Activity	Source	Students will:
Molecules on the Move	Magnificent Microworld	Observe and measure osmosis.
Salty Change	Down to Earth	Test the effect of salt on boiling and freezing temperature of water.
Super Sleuth	Math + Science A Solution	Test unknown substances using chemical change.
I Scream	Fun with Foods	Weigh, test, and observe the physical change of liquid to solid while making ice cream.

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Flags of the Elements on Parade	13.10	Determine either volume or density of various elements when one of the values are known.
Messing with Mixtures	12.07	Investigate with different mixtures for separation, evaporation, and distillation.
Look Out Below!	Spills and Ripples	Learn basic techniques of controlling Rayleigh-Taylor Instability using various barriers.
Trickle Triathlon	Spills and Ripples	Explore limitations of controlling Rayleigh-Taylor Instability.
Flow Fingers	Spills and Ripples	Observe both simplicity and complexity of flow patterns.
Liquid Rope	Spills and Ripples	Observe the flow patterns of mixing liquids.
Soapy Spills	Spills and Ripples	Explore the effects of lessening surface tension.
Brackish Water	Spills and Ripples	Measure mixing of fresh and salt water and relate results to the mixing of river and ocean water.
Hippo Hydrometer	Spills and Ripples	Make a simple hydrometer, calibrate it to water and compare its floating heights in various liquids.
Delicate Diver	Spills and Ripples	Make a Cartesian Diver and observe how the interplay between pressure and density affects buoyancy.

F. Know and apply concepts that describe force and motion and the principles that explain them.

12.D.3a Explain and demonstrate how forces affect motion (e.g., action/reaction, equilibrium conditions, free-falling objects).		
Activity	Source	Students will:
Seeing is Believing	The Sky's the Limit	Use a series of discrepant events, students will explore aerodynamics.
Skydiver	Gravity Rules	Design a paper skydiver and determine how forces affect motion.
The Race	Gravity Rules	Collect, record, and graph distance/time data from a race between a tortoise and a hare.
A Swing in Time	11.04	Investigate variables affecting the motion of a pendulum.
Threads of Time	11.04	Design, test, and record data of pendulums and develop a formula that addresses the relationship between length of pendulum to its period.
Water Rockets	The Sky's the Limit	Use toy rockets to explore the effects of variables on thrust.

12.D.3b Explain the factors that affect the gravitational forces on objects (e.g., changes in mass, distance).		
Activity	Source	Students will:
How High Can You Throw?	The Sky's the Limit	Determine the height of a thrown object using time and the laws of gravity as the tools for measurement.

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Be a Rotor Promoter	The Sky's the Limit	Design and test paper helicopters and analyze gravity's pull.
It's A Real Corker	The Sky's the Limit	Make a helicopter using feathers and corks. Test feather's angles on helicopters rate of fall.
Weight in Space	Out of This World	Predict, graph, calculate their weight on the planets using the correct gravity factors.
Galactic Games	Out of This World	Compute gravity factors to determine how far and how high they could jump and throw on other planets.

G. Know and apply concepts that describe the features and processes of the Earth and its resources.

12.E.3a Analyze and explain large-scale dynamic forces, events and processes that affect the Earth's land, water and atmospheric systems (e.g., jet stream, hurricanes, plate tectonics).

Activity	Source	Students will:
Water Island	Water Precious Water	Use higher level thinking to solve water distribution problems.
Evap-o-Weight	Down To Earth	Study the variables that affect evaporation rates of several environmental areas.
When Polar Ice Caps Meet	Down to Earth	Investigate the effect of ice melting at sea level.
Sea Salt	13.06	Investigate the salinity of the ocean.
Sun Tracks I	13.06	Measure the sun's angle and relate it to the seasons.
Hurricane!	13.02	Discover how central pressure and wind speed are related in a hurricane.

12.E.3b Describe interactions between solid earth, oceans, atmosphere and organisms that have resulted in ongoing changes of Earth (e.g., erosion, El Niño).

Activity	Source	Students will:
Rain Away	Water Precious Water	Investigate the effects of erosion caused by rain.
The Water Works	Down to Earth	Test, record, and interpret the interrelationship of the slope of a stream and the volume of water flowing.
Quick Sand	Down to Earth	Investigate the effects of a stream's slope and rate of flow on its rate of erosion.
Topping Off Mount Saint Helen's	8.08	Construct models using topographical maps that show the before and after effect of a volcano.

H. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.

12.F.3a Simulate, analyze and explain the effects of gravitational force in the solar system (e.g., orbital shape and speed, tides, spherical shape of the planets and moons).

Activity	Source	Students will:
Round and Round	Out of This World	Construct the shape of planets' orbits by drawing ellipses.
The Moon Shines Bright	Out of This World	Chart apparent movement of the moon, interpret, and predict future movements.

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12.F.3b Describe the organization and physical characteristics of the solar system (e.g., sun, planets, satellites, asteroids, comets).		
Activity	Source	Students will:
Can You Planet?	Out of This World	Describe various aspects of the planets and their relationships using a variety of representations.
Spacing Out the Solar System	Out of This World	Construct a model solar system by determining the relative distance of the planets.
Pasta Parallels	9.06	Construct a model of earth's revolution showing the relationship between seasons and the tilt of the axis.
Size It Up	Out of This World	Determine the relative sizes of the planets in order to construct a model solar system.
Planetary Scavenger Hunt	Out of This World	Use a marble to represent the size of earth and find other spheres with relative sizes to represent the rest of the planets.
It Depends on Your Point of View	Out of This World	Investigate star patterns in constellations, construct constellation models and compare star locations from different points of views.

12.F.3c Compare and contrast the sun as a star with other objects in the Milky Way Galaxy (e.g., nebulae, dust clouds, stars, black holes).		
Activity	Source	Students will:
Stars in the Milky Way Galaxy	Out of This World	Estimate the number of stars in the Milky Way Galaxy.
Sun Dance	Through the Eyes of the Explorers	Track sun shadows over a period of time and recognize the cycle.

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GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

I. Know and apply the accepted practices of science.		
13.A.3a Identify and reduce potential hazards in science activities (e.g., ventilation, handling chemicals).		
Activity	Source	Students will:
NA		

13.A.3b Analyze historical and contemporary cases in which the work of science has been affected by both valid and biased scientific practices.		
Activity	Source	Students will:
Galileo	Historical Connections I	Read about Galileo's life and discuss his banishment.
Antony van Leeuwenhoek	Magnificent Microworld Adventures	Read about the invention of the microscope.
Robert Hooke	Magnificent Microworld Adventures	Read about Hooke's contribution to the cell theory.

13.A.3c Explain what is similar and different about observational and experimental investigations.		
Activity	Source	Students will:
How Can We Agree?	Water Precious Water	Compare the accuracy of estimations and measurements for volume.
Can You Believe It	2.08	Predict and compare relationship between circumference and height of various cans.

J. Know and apply concepts that describe the interaction between science, technology and society.		
13.B.3a Identify and explain ways that scientific knowledge and economics drive technological development.		
Activity	Source	Students will:
Snack Attack	Fun with Foods	Analyze which costs less, prepackaged or homemade.
Economically Speaking	Through the Eyes of the Explorers	Infer and draw conclusions about the relationship between technology and economics of land use.
Trees as a Crop	Our Wonderful World	Learn how foresters manage and maintain the forest as a crop.

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13.B.3b Identify important contributions to science and technology that have been made by individuals and groups from various cultures.		
Activity	Source	Students will:
Antony van Leeuwenhoek	Magnificent Microworld Adventures	Read and discuss the scientists contribution to microbiology.
Cell Theory & Cells: The Basis of Life	Magnificent Microworld Adventures	Learn contributions of Matthias Schleiden and Theodor Schwann to cell theory.
Galileo	Historical Connections I	Read about Galileo's life and work and discuss his banishment.
Biography-Robert Hooke	Magnificent Microworld Adventures	Read and discuss Hooke's role in naming cells.
Biographies	Electrical Connections	Research and discuss scientists contributions.

13.B.3c Describe how occupations use scientific and technological knowledge and skills.		
Activity	Source	Students will:
Forecast for Today	Through the Eyes of the Explorers	Use weather reports to predict patterns.
Fire on the Mountain	Finding Your Bearings	Participate in a forest ranger simulation.
Trees as a Crop	Our Wonderful World	Learn how foresters use scientific knowledge to improve their industry.
Economically Speaking	Finding Your Bearings	Infer and draw conclusions about economy of a country based on land features.

13.B.3d Analyze the interaction of resource acquisition, technological development and ecosystem impact (e.g., diamond, coal or gold mining; deforestation).		
Activity	Source	Students will:
Prospector's	Down to Earth	Determine the cost effectiveness of a mining operation.

13.B.3e Identify advantages and disadvantages of natural resource conservation and management programs.		
Activity	Source	Students will:
What on Earth Can We Do?	Down to Earth	Determine the effect of "developed" land on the natural environment.

13.B.3f Apply classroom-developed criteria to determine the effects of policies on local science and technology issues (e.g., energy consumption, landfills, water quality).		
Activity	Source	Students will:
Water Island	Water Precious Water	Design an efficient water system.