

4TH GRADE SCIENCE CHECKLIST

Goals 11 – 13

Illinois Learning Standards A-F Assessment Frameworks

ISAT test questions are derived from this checklist. Use as a curriculum guide.

SCIENTIFIC INQUIRY

- _____ Design and perform simple experiments.
- _____ Distinguish among—and perform—the following things: observation, drawing a conclusion based on observation, forming a hypothesis, conducting an experiment, organizing data, constructing and reading charts and graphs, and comparing data.
- _____ Compare observations of individual and group results.
- _____ Distinguish among the following: recording the data from an experiment, organizing the data into a more useful form, analyzing it to identify relevant patterns, and reporting and displaying results.

TECHNOLOGICAL DESIGN

- _____ Identify a design problem and identify possible solutions. Assess designs or plans to build a prototype.
- _____ Assess given test results on a prototype (i.e., draw conclusions about the effectiveness of the design using given criteria).

LIVING THINGS

Classification

- _____ Distinguish between living and non-living things.
- _____ Understand the concept of a food chain and the related classifications of plants or animals (e.g., producers, decomposers, consumers, herbivores, and carnivores).
- _____ Identify the basic divisions of animals and their common characteristics (e.g., define mammal, fish, bird, reptile, amphibian, insect, and arachnid; give examples of each).

Reproduction

- _____ Identify the life cycle of familiar animals and compare their various stages: birth, growth and development, reproduction, and death. Understand that metamorphosis occurs in some animals (e.g., in butterflies and frogs).
- _____ Understand that some characteristics of living things are inherited from parents, such as the color of a flower in a plant, or the number of limbs on an animal. Understand that other features, however, are acquired by an organism through interactions with its environment, and cannot be passed down to the next generation merely through reproduction.

ENVIRONMENT AND INTERACTION OF LIVING THINGS

- _____ Identify the basic needs of living things: animals need air, water, food and shelter; plants need air, water, nutrients, and light.
- _____ Know that the world contains many kinds of environments, and that different animals and plants are suited to live in different environments.
- _____ Understand that each plant or animal has different structures that serve different functions in its growth, survival, and reproduction.
- _____ Identify the basic classifications of animals based on how they interact with their environment [e.g., (a) Some animals are active in the daytime (diurnal), others in the night time (nocturnal). (b) Some animals have a body temperature that stays the same regardless of significant temperature changes in their immediate environment (warm blooded), others have a body temperature that rises and falls with the temperature changes of their environment (cold blooded). (c) Some animals eat only plants (herbivores), others eat animals (carnivores)].
- _____ Understand that an ecosystem is made of living and nonliving things. Be familiar with the concepts of a food web and a food chain.
- _____ Understand that some animals survive winter by being fitted for an active life during winter (e.g., penguins), others by hibernation (e.g., certain bears), and others by migration (e.g., monarch butterflies).
- _____ Understand that human activities can change the number of species in an area, whether by increasing it or decreasing it.

MATTER AND ENERGY

Properties of Matter

- _____ Understand that an increase in temperature generally causes things to expand, and that a decrease in temperature generally causes things to contract. Identify the major exception: ice contracts as it melts into water, and water expands as it freezes into ice.
- _____ Understand that when a material is dissolved in water, it is not really gone even if it can no longer be seen. Understand that many materials dissolve in water, but others do not. For example, salt and sugar dissolve in water, but oils do not.
- _____ Understand that matter is usually found in 3 states: liquid, solid, and gas. Understand that water can be found in these forms, and is called water, ice, and water vapor, accordingly. Understand that heating causes a solid substance to melt into liquid form and a liquid substance to evaporate into gaseous form, and that cooling causes a gaseous substance to condense into a liquid form and a liquid substance to freeze into solid form. Understand that changes of state in matter do not produce new substances.

Energy/Electricity

- _____ Understand that a magnet attracts iron, but not plastic, paper, and other nonmetals; nor does it attract all metals (since it does not attract copper or aluminum).
- _____ Understand that rubbing together certain objects produces a static electrical charge; in particular, rubbing a balloon on someone's hair or walking in a dry room can build up a charge on the person walking (which is felt as a shock when that person touches someone else). Understand that objects can be positively charged, or negatively charged.
- _____ Understand that objects of like charge repel each other, and that objects of opposite charge attract each other.
- _____ Understand that electrical energy can be converted to heat, light, and motion.
- _____ Understand that besides static electricity, there is also such a thing as current electricity. (Students will learn about this by building simple series circuits and parallel circuits.) Given simple diagrams of electrical circuits, identify whether the circuit is the series type or parallel.

Light

- _____ Understand that lighter colors reflect more light, darker absorb more, and that the color one sees depends on what kind of light is reflected (rather than absorbed) by the object seen.
- _____ Understand that white light can be broken into all the colors of the rainbow by means of prisms.
- _____ Understand that light can be reflected, refracted, transmitted, and absorbed by matter.
- _____ Identify the colors associated with the acronym ROYGBIV.

FORCE AND MOTION

- _____ Define a force as a push or a pull that tends to move an object. Understand that forces may be balanced or unbalanced. Know that when the forces applied to an object are balanced, the motion or rest of that object does not change.
- _____ Identify the basic forces, such as friction, magnetism, and gravity. Identify which force is operative in a simple scenario.
- _____ Identify simple machines (lever, inclined plane, pulley, screw, and wheel and axle). Understand how they apply forces with advantage, and identify which machine is suited for accomplishing a given simple task.
- _____ Identify equilibrium conditions (e.g., in a diagram of balanced weights on levers or pulleys).

EARTH SCIENCE

Basic Earth Science

- _____ Identify which everyday materials decompose most slowly (e.g., plastics, glass and ceramics decompose slower than metals, wood or food substances). Understand the environmental ramifications of this (e.g., glass and plastic trash, if not recycled, will sit in landfills for hundreds of years).
- _____ Understand that fossil fuels come from animals and plants, and that oil and coal are examples of fossil fuels.

The Earth's Dynamic Processes

- _____ Understand that the surface of the earth changes. Know that some changes are due to slow processes (e.g., erosion and weathering), whereas others are due to sudden events (e.g., landslides, volcanic eruptions, earthquakes, and asteroid impacts).
- _____ Understand that the changes in the surface of the earth cause changes in the environments of living things, and that living things have the ability to adapt to changes in their environments by gradual changes in their structures and behaviors.
- _____ Identify the three basic kinds of rocks: igneous, sedimentary, and metamorphic.
- _____ Understand that movement in parts of the earth's crust causes earthquakes.
- _____ Understand that the main cause of erosion is moving water. Understand that when water erodes landmasses, it carries the land away by rainfall and rivers and re-deposits it in the form of pebbles, sand, silt, and mud. Understand that the delta of a river is formed by such deposits. Understand that deposition of new soil over a flood plain is what makes a river valley fertile. Identify other causes of erosion besides erosion by water (e.g., wind and chemical erosion).
- _____ Understand that land formations (mountains, valleys, shorelines, and caves) change slowly over time, and identify the major natural causes of such changes: (a) Slow causes: erosion, caused by wind, rain, glaciers, water freezing inside cracks of rocks (which expands and splits the rocks), the growth of tree roots; (b) Sudden causes: rare catastrophes (e.g., earthquakes, volcanic activity, asteroid impacts, and floods).

The Atmosphere

- _____ Name and distinguish the different kinds of clouds based on their appearance and place in the atmosphere: cirrus, cumulus, and stratus.
- _____ Identify the stages of the water cycle: evaporation, condensation, and precipitation.
- _____ Understand that weather changes from day to day and over the seasons. Identify the order of the seasons and the different characteristics of each season in terms of temperature and precipitation and the presence or absence of leaves on trees.

_____ Understand that weather can be described by measurable quantities, such as temperature, wind direction and speed, and amount of precipitation.

_____ Understand that weather systems can be tracked—and their motions roughly predicted—by satellites.

Water

_____ Understand that most of Earth's surface is covered by water, and identify the major kinds of land and water formations: continent, mountain, valley, cave, ocean, lake, and river.

ASTRONOMY

_____ Understand that moons and planets do not produce their own light—the light we see when we look at them is the sunlight which they reflect.

_____ Identify the relative positions of the earth, moon, and sun during a solar eclipse, a lunar eclipse, a full moon, a half moon, and a new moon. Given a diagram of the earth, moon, and sun, identify which of these is depicted.

_____ Identify the order of planets from the sun, and know that the further planets take longer to go around the sun. Understand that Neptune and Pluto occasionally switch order.

_____ Know that astronauts have walked on the moon.

_____ Define a constellation as a group of stars that form a pattern in the sky. Understand that constellations are useful in the study of space because they help create a map of the sky. Know that locations in the sky are often described using the names of constellations.

_____ Understand that the Milky Way is our galaxy, so-called because there appears to be a milky-white path or road in the sky.

_____ Understand that the mass of a body stays the same on different planets, but the weight changes depending on the mass of the planet.

SAFETY and PRACTICES OF SCIENCE

_____ Identify the basic safety equipment used in science, (e.g., gloves, goggles, lab coats, and tongs).

_____ Identify the basic safety procedures (e.g., “Keep your clothes and hair away from open flames” and “Don’t taste materials without permission.”) when conducting science activities.

_____ Explain why similar results are expected when procedures are done the same way.

_____ Know that what distinguishes science from mere guesswork is its reliance on and openness to challenge through experiments and careful observation. Know that scientific results must be reproducible. Know that different scientists study different subjects but work in similar ways.

_____ Know that scientists accept a theory that is supported by tests and experiments until it is disproved or improved upon.

- _____ Distinguish between the kinds of questions that can be investigated by the scientific method and those that cannot.
- _____ Recognize that scientists share results so that each scientist may build upon what he or she learns from others.
- _____ Understand that when an experiment is performed a few times and yields conflicting results, one must repeat it many times. Understand that one should also try to find an explanation for the conflicting results.

SCIENCE, TECHNOLOGY, SOCIETY

- _____ Identify important contributions to science and technology that have been made by individuals such as George Washington Carver, Jane Goodall, Wilbur and Orville Wright, Rachel Carson, Thomas Edison, Edward Jenner, Louis Pasteur, Anton van Leeuwenhoek, Elijah McCoy, Florence Nightingale, Daniel Hale Williams, Marie Curie, and Benjamin Franklin.
- _____ Recognize that science and technology advance together.
- _____ Identify occupations in the field of science.
- _____ Identify ways that science and technology affect people's lives (e.g., in transportation, medicine, agriculture, and communication) and careers (e.g., scientists discover a procedure or medication that can cure certain types of diseases; salt lowers the freezing temperature of water so the city street departments spread salt on icy streets during the winter).
- _____ Identify the major advantages and drawbacks to each of the forms of energy which we can harness (e.g., solar, wind, fossil fuel, nuclear, and natural gas).
- _____ Identify ways to reduce, reuse, and recycle materials.

MEASUREMENT

- _____ Know that using measuring tools results in greater accuracy than making estimates.
- _____ Identify basic scientific instruments and their functions (e.g., ruler, balance, graduated cylinder, clock or stopwatch, thermometer, microscope, and telescope).
- _____ Perform simple measurements [e.g., length (using rulers), volume (using graduated cylinders), weight (using scales), temperature (using thermometers), and time (using clocks or stopwatches)]. (On an assessment, read drawn depictions of such instruments.) Identify the metric units for the following measurements and symbols: m, cm, mm, l, mL, g, mg, kg, and degrees Celsius.