

DRAFT 8<sup>th</sup> Grade Pacing Guide FOR 07-08 8/20/07

**UNIT 1: STATIC FORCES/BRIDGES**

CINQ5 Use appropriate tools and techniques to make observations and gather data.

CINQ6 Use mathematical operations to analyze and interpret data.

C. 23 Describe the qualitative relationships among force, mass

C. 30 Explain how beam, truss and suspension bridges are designed to withstand the forces that act on them

**ST: STRONG BRIDGES**

**Q1 Assessment**

**UNIT 2 MOTION**

C 22. Calculate the average speed of a moving object and illustrate the motion of objects in graphs of distance over time.

C 23. Describe the qualitative relationships among force, mass and changes in motion.

C 24. Describe the forces acting on an object moving in a circular path

**ST: REQUIRED EMBEDDED CMT TASK: SHIPPING/SLIDING**

**UNIT 3 PLANETARY MOTION/PHASES/SEASONS/ECLIPSES**

C 28. Explain the effect of gravity on the orbital movement of planets in the solar system.

C 29. Explain how the regular motion and relative position of the sun, Earth and moon affect the seasons, phases of the moon and eclipses.

**Q 2 Assessment**

**UNIT 4 LANDFORMS & CONSTRUCTIVE/DESTRUCTIVE EARTH FORCES**

C 18. Describe how folded and faulted rock layers provide evidence of the gradual up and down motion of the Earth's crust.

C 19. Explain how glaciation, weathering and erosion create and shape valleys and floodplains.

**UNIT 5 TECTONIC PLATES**

C 20. Explain how the boundaries of tectonic plates can be inferred from the location of earthquakes and volcanoes.



**CMT TEST 1<sup>st</sup> Week of March**

Q3 Assessment

**UNIT 6 ROCK CYCLE**

D.21 Explain how internal energy of the Earth causes matter to cycle through the magma and the solid earth.

**UNIT 7 NATURAL DISASTERS**

**8.f.3 National Standard**

## Science Curriculum Pacing Chart **8<sup>th</sup> Grade Integrated Science**

Units by Quarter	Power Standards	Significant Tasks	Dates	
Q1. Unit One: Static Forces and Bridges	C23 Describe the qualitative relationships among force and mass. C30 Explain how beam, truss, and suspension bridges are designed to withstand the forces that act on them.	Which bridge is the strongest?		
Q2. Unit Two: Motion	C22 Calculate the average speed of a moving object and illustrate the motion of objects in graphs of distance over time. C23 Describe the qualitative relationships among force, mass, and changes in motion. C24 Describe the forces acting on an object moving in a circular path.	Required CMT embedded task: Shipping and Sliding		
Q2. Unit Three: Planetary Motion, Phases, Seasons, and Eclipses	C28 Explain the effect of gravity on the orbital movement of planets in the solar system. C29 Explain how the regular motion and relative position of the sun, Earth, and moon affect the seasons, phases of the moon, and eclipses.	Reasons for Seasons  What if moon didn't exist?		
Q3. Unit Four: Landforms, Constructive and Destructive Earth Forces	C18 Describe how folded and faulted rock layers provide evidence of the gradual up and down motion of the Earth's crust. C19 Explain how glaciation, weathering and erosion create and shape valleys and floodplains.	Erosion Lab		
Q3. Unit Five: Tectonic Plates	C20 Explain how the boundaries of tectonic plates can be inferred from the location of earthquakes and volcanoes.	Plate Tectonics  STATE CMT TEST MARCH		
Q4. Unit Six: The Rock Cycle	D21 Explain how internal energy of the Earth causes matter to cycle through the magma and the solid Earth.			
Q4. Unit Seven: Natural Disasters				

## **8th Grade Integrated Science**

### **COURSE OVERVIEW**

The 8<sup>th</sup> grade Integrated Science course will explore key concepts of physical science. Students will be introduced to qualitative relationships among mass and force as well as speed and distance. Some forces can only act on objects when they touch. Other forces, such as gravity, affect objects from a distance. Students will apply those relationships to explore what happens to objects when forces act on them. Bridges offer a way to get over difficult obstacles. Early bridges were simple, made from available materials such as trees or vines. Today, bridges are more complex. They are designed in ways that consider factors such as function, materials, safety, cost and appearance. However, regardless of their design, bridges must be made to withstand the forces that affect them. In this course, students will explore how forces affect beam, truss, and suspension bridges. Gravity is the force that governs the motions of objects in the solar system. Students will explain how the motions of the sun, Earth, and moon affect the seasons, phases of the moon, and eclipses. Internal forces inside the Earth result in the construction and destruction of different landforms on Earth's crust. Students will study how tectonic plate interactions, earthquakes, volcanic activity, glaciation, weathering and erosion work to change the face of earth's crust.

Students will also work to develop skills in scientific inquiry, literacy, and numeracy by questioning, collecting, analyzing, and interpreting data. Students will communicate about science through reading, writing, researching information in both print and electronic media.

# UNIT DESCRIPTIONS

## FIRST QUARTER

### UNIT 1: STATIC FORCES AND BRIDGES

#### II. UNIT 1: Static Forces and Bridges

**Time: Entire quarter**

**a. Unit Introduction:**

Bridges can be designed in different ways to withstand certain loads and the forces that act on them.

**b. Standards**

1. C23 Describe the qualitative relationships among force and mass.
2. C30 Explain how beam, truss, and suspension bridges are designed to withstand the forces that act on them.
3. CINQ1 Identify questions that can be answered through scientific investigation.
4. CINQ2 Read, interpret and examine the credibility of scientific claims in different sources of information.
5. CINQ3 Design and conduct appropriate types of scientific investigations to answer different questions.
6. CINQ4 Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.
7. CINQ5 Use appropriate tools and techniques to make observations and gather data.

**c. Essential Questions**

1. What is the relationship between mass and weight?
2. What affect do balanced and unbalanced forces have on an object's motion?
3. What keeps a bridge from falling down?
4. How does a bridge support its own weight and the weight of a load?
5. How do different bridge designs balance the forces that act on them?

**d. Essential Content**

1. Force is a push or a pull and is described by its strength and direction.
2. Mass is the measure of the amount of matter in an object; weight is the force of gravity that depends on mass.
3. Net force is the combination of all forces acting on an object. They can add or cancel each other depending on direction and strength (magnitude).
4. Unbalanced forces acting on an object cause a change in the object's motion.
5. The most fundamental rule of bridge design is that the net force acting on a bridge must be zero.
6. Bridges are kept from falling down by balancing action/reaction forces.
7. Compression is a "pressing together" force. Tension is a "stretching or pulling apart" force.

8. A beam bridge balances the load of the bridge with the piers that support the bridge.
9. A truss is a structure composed of thin horizontal and vertical members which is used to reinforce the structural strength of bridges.
10. The load on a suspension bridge creates tension forces on the cables. The towers and abutments create reaction forces.

**e. Essential Skills:**

1. To identify dependent and independent variables in an experiment.
2. To measure force using spring scales.
3. To design an experiment that tests how changing different properties on bridges affects bridge strength.
4. To read and interpret different scientific sources of information.

**f. Vocabulary:**

1. Force
2. Mass
3. Weight
4. Gravity
5. Friction
6. Net Force
7. Balanced Forces
8. Unbalanced Forces
9. Action/Reaction Forces
10. Tension
11. Compression
12. Pier
13. Abutment
14. Member
15. Load/Decking
16. Beam Bridge
17. Truss Bridge
18. Suspension Bridge
19. Magnitude

**g. Science Misconceptions:**

1. If an object is at rest, no forces are acting on the object.
2. A rigid solid cannot be compressed or stretched.

**h. Suggested Labs and Activities:**

1. Lab – Sticky Notes
2. Understanding: Bridges (United Streaming Video and Quiz)
3. Bridge “capstone” task
4. Sponge Beam

Internet Resources: Bridges, Minnesota vs. Mianus River Bridge Collapse,

**III. Significant Task:** Which bridge is the strongest?

**Sample Assessment**

**Quarterly Assessment**

## SECOND QUARTER

### UNIT 2: MOTION

### UNIT 3: PLANETARY MOTION, PHASES, SEASONS, AND ECLIPSES

#### II. UNIT 2: Motion

**Time:**

**Approximate Dates:**

**a. Unit Introduction:**

During this unit, students will be introduced to basic concepts about motion. Students will describe the motion of an object based on an object's position, direction, and speed.

**b. Standards:**

1. C22 Calculate the average speed of a moving object and illustrate the motion of objects in graphs of distance over time.
2. C23 Describe the qualitative relationships among force, mass, and changes in motion.
3. C24 Describe the forces acting on an object moving in a circular path.
4. CINQ1 Identify questions that can be answered through scientific investigation.
5. CINQ7 Identify and present relationships between variables in appropriate graphs.

**c. Essential Questions:**

1. When is an object in motion?
2. How do you know an object's speed and velocity?
3. How can you graph motion?
4. What are Newton's Laws of motion?

**d. Essential Concepts:**

1. An object is said to be in motion when its position changes in relation to a point of reference.
2. The meter is the SI unit of length.
3. The speed of an object can be determined by dividing the distance the object traveled by the time it took to travel that distance.
4. The velocity of an object is described by its speed and direction.
5. A distance versus time graph can be used to analyze the motion of an object.
6. Acceleration is defined as a change in an object's speed or its direction.
7. Inertia is an object's tendency to resist a change in its motion. Inertia is Newton's first law of motion.
8. Force depends on an object's mass and its acceleration. This is Newton's second law of motion.
9. When an object exerts a force on another object, the second object exerts a force on the first object of equal strength but in opposite direction. This is Newton's third law of motion.

10. Newton's second law can be applied to a force causing an object to move in a circular path, but it is not a separate force. It is simply a known force – tension, friction, gravity – causing the circular motion.

**e. Essential Skills:**

1. To identify and present relationships between variables using appropriate graphs.

**f. Vocabulary:**

1. Motion
2. Reference Point
3. International System of Units
4. Meter
5. Distance
6. Speed
7. Velocity
8. Acceleration
9. Force
10. Friction
11. Gravity
12. Tension
13. Compression
14. Direction
15. Mass
16. Inertia
17. Newton (N)
18. Newton's First Law of Motion
19. Newton's Second Law of Motion
20. Newton's Third Law of Motion

**Activities:**

**Moving On Down Lab (D-T Graphs)**

**Penny Drop**

**Crash Test Gummies**

**Isaac Newton**

**Balloon Rockets**

**Significant Task: Shipping and Sliding**

## II. UNIT 3: PLANETARY MOTION, PHASES, SEASONS, AND ECLIPSES

**Time:**

**Approximate Dates:**

**a. Unit Introduction:**

**b. Standards:**

1. C28 Explain the effect of gravity on the orbital movement of planets in the solar system.
2. C29 Explain how the regular motion and relative position of the sun, Earth, and moon affect the seasons, phases of the moon, and eclipses.

**c. Essential Questions:**

1. What are the two ways in which earth moves in space?
2. What causes the seasons on Earth?
3. What two factors affect the strength of the force of gravity between two objects?
4. What causes the phases of the moon?
5. What causes an eclipse?

**d. Essential Concepts:**

1. Earth moves through space in two ways: rotation and revolution.
2. The tilt of Earth's axis causes the cycle of seasons on Earth.
3. The two factors that affect the strength of the force of gravity between two objects are the mass of the two objects and the distance between them.
4. Inertia and gravity are the forces that keep one object in orbit around another.
5. The phases of the moon are caused by the change in the relative positions between the sun, the Earth and the moon.
6. During a solar eclipse, the moon keeps sunlight from reaching parts of the earth.
7. During a lunar eclipse, Earth keeps sunlight from reaching the moon.

**e. Essential Skills:**

**f. Vocabulary:**

1. Axis
2. Rotation
3. Revolution
4. Orbit
5. Solstice
6. Equinox
7. Force
8. Gravity
9. Mass
10. Weight
11. Inertia
12. Phases
13. Eclipse

14. Solar Eclipse
15. Lunar Eclipse
16. Umbra Penumbra

**ACTIVITIES:**

**Moon Phases**

**Reason for the Seasons**

**Eclipse**

**Tides**

**Galileo (Reading)**

**Essay Assessment: What if the moon didn't exist?**

**QUARTERLY ASSESSMENT**

## **THIRD QUARTER**

### **II. UNIT 4: Landforms and Constructive and Destructive Forces**

#### **TIMING:**

#### **APPROXIMATE DATES:**

#### **a. Unit Introduction:**

#### **b. Standards:**

1. C18 Describe how folded and faulted rock layers provide evidence of the gradual up and down motion of the Earth's crust.
2. C19 Explain how glaciation, weathering and erosion create and shape valleys and floodplains.

#### **c. Essential Questions:**

1. How does stress in the crust change Earth's surface?
2. What processes wear down and build up the surface of the Earth?
3. What process is mainly responsible for shaping the surface of the land?
4. How do weathering and erosion affect Earth's surface?
5. How do glaciers cause erosion and deposition?
6. How do scientists determine the relative age of rocks?

#### **d. Essential Concept**

1. Earth's outer layer is broken into sections called plates.
2. Stress is created when enormous forces act on rocks to change their shape and volume.
3. A fault is created when enough stress builds up in rock causing the rock to break.
4. Plate movement can cause the crust to fold creating mountains and valleys.
5. Weathering and erosion work together continuously to wear down and carry away the rocks at Earth's surface.
6. Glaciers are large masses of ice that move slowly over land.
7. As a glacier moves over land, the weight of the ice breaks the rock beneath. When it flows downhill, it scrapes away the bedrock under it and carries rock debris with it. When the glacier melts, it deposits the rock fragment creating various landforms.
8. Scientists use the position of rock layers to determine their relative age. The oldest layers are generally found on the bottom while the younger layers are found on top.

#### **e. Essential Skills**

#### **f. Vocabulary**

1. plate
2. stress

3. volume
4. tension
5. compression
6. shearing
7. fold
8. fault
9. normal fault
10. reverse fault
11. strike-slip fault
12. mountain
13. valley
14. weathering
15. mechanical weathering
16. chemical weathering
17. erosion
18. sediment
19. deposition
20. glacier
21. continental glacier
22. valley glacier
23. relative age

**g. Suggested Labs and Activities**

## II. UNIT 5: PLATE TECTONICS

**Time:**

**Approximate Dates:**

### a. Unit Introduction:

### b. Standards

1. C20 Explain how the boundaries of tectonic plates can be inferred from the location of earthquakes and volcanoes.

### c. Essential Questions

1. How do the characteristics of Earth's crust, mantle, and core differ?
2. What causes convection currents in Earth's mantle?
3. How does the theory of plate tectonics explain the formation, movement, and subduction of Earth's plates?
4. What type of movement occurs at each plate boundary? How do the movements affect earth's crust?

### d. Essential Concepts

1. Earth's interior is made up of three main layers; the crust, the mantle, and the core. These layers vary greatly in size, composition, temperature, and pressure.
2. Convection is the heat transfer by the movement of currents within a fluid. Heating and cooling of the fluid mantle, changes in density and gravity combine to cause convection currents in the mantle.
3. The movement of convection currents in the mantle is the major force that causes plate movements.
4. As the plates move, they collide pull, apart, or grind past each other, they change Earth's surface causing earthquakes and creating, among other things, mountains, volcanoes, and deep ocean trenches.

### e. Essential Skills

## **f. Vocabulary**

1. crust
2. mantle
3. core
4. pressure
5. temperature
6. conduction
7. convection
8. radiation
9. density
10. convection current
11. continental drift
12. sea-floor spreading
13. deep-ocean trench
14. subduction
15. plate tectonics
16. boundary
17. divergent boundary
18. convergent
19. boundary
20. transform boundary
21. earthquake

volcanog. **Suggested Activities**

## **THIRD QUARTER (POST CMT)**

### **UNIT 6: THE ROCK CYCLE**

#### **II. UNIT 6: The Rock Cycle**

**Time:**

**Approximate Dates:**

##### **a. Unit Introduction:**

##### **b. Objective:**

1. Describe how forces deep inside the Earth and at the surface produce a slow cycle that builds, destroys, and changes the rocks in the crust.

##### **c. Essential Questions:**

1. What characteristics do scientists use to classify rocks?
2. What is the role of plate tectonics in the rock cycle?

##### **d. Essential Concepts**

1. Scientists use mineral composition, texture, and how the rocks form to classify rocks into three main groups and a few subgroups.
2. The rock cycle is a series of processes on the Earth's surface, crust and mantle that slowly change rocks from one kind to another. These processes are cooling and hardening, weathering, erosion, deposition, compaction, heat and pressure, and melting.
3. Plate movements start the rock cycle by helping to form magma, by causing faulting, folding and other motions to create igneous, sedimentary and metamorphic rocks.

#### **e. Essential Skills**

#### **f. Vocabulary**

1. mineral
2. rock
3. texture
4. igneous rock
5. sedimentary rock
6. metamorphic rock
7. heat
8. pressure
9. rock cycle

### **FOURTH QUARTER**

#### **UNIT 7: NATURAL DISASTERS**

##### **II. UNIT 7: Natural Disasters**

**Time: Entire quarter**

##### **a. Unit Introduction:**

##### **b. Objectives:**

1. Describe how seismic waves carry energy from an earthquake away from the focus, through Earth's interior and across the surface and the damage they cause.
2. Describe how volcanoes form when magma erupts through the crust and reaches the surface.

##### **c. Essential Questions:**

1. How does the energy of an earthquake travel through Earth?
2. How can earthquake safety be increased and earthquake damage reduced?
3. How does the change in pressure and expansion of gases inside affect the magma inside a volcano?
4. How does the silica content of magma affect the type of landform that is formed?
5. How do volcanic belts form along plate boundaries?

##### **d. Essential Concepts**

1. Energy from an earthquake travels in waves. The waves can produce severe movement in the Earth's crust and surface.
2. Scientists use level of damage, size of waves and amount of energy released to rate the magnitude of an earthquake.
3. Scientists use seismic waves to locate an earthquake's epicenter.
4. Data collected from seismographs and fault-monitoring devices is used to monitor active faults and predict earthquakes.
5. When a volcano erupts, the force created by the expanding gases drives the magma to either flow out or explode out of the volcano.
6. Scientists classify eruptions according to the amount of silica found in the magma. Different types of landforms are created by different types of eruptions.
7. Earth's crust often fractures along plate boundaries allowing magma to reach the surface.

#### **e. Essential Skills**

#### **f. Vocabulary**

1. focus
2. epicenter
3. p wave
4. s wave
5. surface wave
6. magnitude
7. seismograph
8. seismogram
9. liquefaction
10. aftershock
11. magma
  
12. lava
13. viscosity
14. silica
15. quiet eruption
16. explosive eruption
17. pyroclastic flow
18. shield volcano
19. cinder cone volcano
20. composite volcano
21. hot spot

Ring of Fire