2nd Grade Balance and Motion
Unit Blueprint

Investigations	**Essential & Unit Questions*** (for conceptual benchmarks)	**Benchmarks** (**Bolded** sections indicate portion of benchmark addressed)	**Formative and Summative Assessments** (Unless noted as a Summative Assessment, the assessments are formative and should be used to guide teaching and learning.)	**Using Assessments to Monitor Student Learning**
<u>Investigation 1: Balance</u> **Pacing Suggestions (45-60 minute lessons):** **Day 1-** Part 1: Trick Crayfish **Days 2 & 3-** Part 2: Triangle and Arch **Day 4-** Part 3: The Pencil Trick **Day 5-** *Make It Balance!* FOSS Science Story **Day 6-** Part 4: Mobiles **Teacher Resources:** 	What is necessary to keep an object from falling to the ground?	4G(K-2)#1: Things near the earth fall to the ground unless something holds them up.	**All Activities** • Class discussion about the observation that objects in a stable balancing position do not fall to the ground ***Trick Crayfish* Lab Book Question** • Answer to student lab book question "How do you know when the crayfish is balanced?" (Lab sheet available under "Teacher Resources" section) ***Triangle and Arch* worksheet** • *Stable Positions* worksheet *Note: The emphasis of this worksheet should be on seeing the relationship between the balance point and counterbalances.*	**All Activities** • Are the students able to express discoveries made about balance, stability, and counterbalance during discussions? • Can students describe where to place counterbalances in order to balance a system? • Do student know that the object will fall if the balance point is not supported? ***Trick Crayfish* Lab Book Question** • Do students write that the crayfish doesn't fall down? ***Triangle and Arch* worksheet** • Do students know what a stable system is? • Are students able to correctly identify the shapes that are balanced?

*Essential/Unit questions are major questions driving the unit. They are directly aligned with the benchmarks. No single lesson address each question in its entirety. By the end of the unit, students should be able to answer these core questions. 2/10/06

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	What are some descriptions of the way things move?	4F(K-2)#1: Things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow.	**All Activities** • Class discussions/observations about how balanced objects move when pushed ***Triangle and Arch*** • Student lab book question: If a shape is balanced, how does it move when given a slight push? (Lab sheet available under "Teacher Resources" section) ***Make It Balance!* FOSS Science Story** • Class discussion about the different ways things move (Questions refer to text on page 3 in book): o What are some things that move from one place to another? o What are some things that spin around and around?	**All Activities & *Triangle and Arch* Lab Book Question** • Do students know that balanced objects wobble or rock back and forth when gently pushed? ***Make It Balance!* FOSS Science Story** • Can students give examples of things that move from one place to another? (Examples: people and animals) • Can students give examples of things that spin around and around? (Examples: merry-go-round, yo-yo, mixer)
	What are parts? Why are parts important for some things?	11A(K-2)#2: Something may not work if some of its parts are missing 11A(K-2)#3 When parts are put together, they can do things that they couldn't do by themselves.	**All Activities** Class discussions about how the addition of parts (counterweights) allows the objects to balance. *Note: To address the benchmark the class discussion must include the idea that only when the parts are put together can the objects balance.* ***Mobiles*** • Student lab book question: What would happen if you removed one of the parts of the mobile? (Lab sheet available under "Teacher Resources" section)	**Class Discussions about All Activities** • Do students understand that the objects and counterweights work together to allow an object to balance? • Do students recognize that without the counterweights the objects can't be balanced? ***Mobiles* Lab Book Question** • Do students know that the mobile will not balance properly without all its parts?

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		12D(K-2)#2: Draw pictures that correctly portray at least some features of the thing being described.	**All Activities** Students draw pictures in their lab books of the items balanced with counterweights (Lab sheets available under "Teacher Resources" section) *Note: The FOSS Teacher's Guide does not direct the teacher to have students draw pictures of the various systems. This is a valuable experience and has been added to the unit. It also reinforces the benchmarks related to "parts."*	• Do students make legible drawings? • Do the pictures correctly portray some of the features? • Do the students' drawings contain accurate and complete labels?
	Why are models important? How are models like the real thing and how are they different?	11B(K-2)#2: A model of something is different from the real thing but can be used to learn something about the real thing.	***Mobiles*** • Class discussion about how the students' model mobiles are alike and different from the real thing. Ask students what we can learn from a model mobile. *Note: The lesson as written in the Teacher's Guide does not address this benchmark. As part of the "Wrapping Up" session, teachers can incorporate these ideas in the class discussion.*	• Are students able to identify similarities between their model mobiles and real ones? (Example: have balanced items hanging from them) • Are students able to identify differences between their model mobiles and real ones? (Example: real ones move and some have motors) • Can students articulate what they learned from their models? (Example: how to balance multiple items)

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<u>Investigation 2: Spinners</u> **Pacing Suggestions (45-60 minute lessons):** **Days 1 & 2-** Part 1: Tops **Day 3-** *Push or Pull?* FOSS Science Story **Day 4-** Part 2: Zoomers **Days 5 & 6-** Part 3: Twirlers **Day 7 –** *Things That Spin* FOSS Science Story **Teacher Resources:** 	What are parts? Why are parts important for some things?	11A(K-2)#1: Most things are made of parts. 11A(K-2)#2: Something may not work if some of its parts are missing. 11A(K-2)#3 When parts are put together, they can do things that they couldn't do by themselves. 12C(K-2)#3: Make something out of paper, cardboard, wood, plastic, metal, or existing objects that can actually be used to perform a task.	**Tops** • Assembly and testing of tops (See Step 3 on page 11 in Teacher's Guide.) • Class questions about the parts of a top (See bullet points 1-3 in Step 6 on page 11 in Teacher's Guide.) **Zoomers** • Assembly and testing of zoomers (See Steps 3-5 on pages 17 & 18 in Teacher's Guide.) **Twirlers** • Assembly and testing of twirlers (See Steps 4-7 on pages 23 & 24 in Teacher's Guide.)	**Tops** • Do students know what parts are needed to build the top? • Can students operate their tops? • Do students recognize that the top may not work if it is not correctly assembled with the right parts? (This is particularly pertinent if students have trouble making their tops operate properly. Are they able to look at their top and problem-solve?) **Zoomers** • Do students know what parts are needed to build the zoomer? • Can students operate their zoomer? • Do students recognize that the zoomer may not work if it is not correctly assembled with the right parts? (This is particularly pertinent if students have trouble making their zoomers operate properly. Are they able to look at their zoomer and problem-solve?) **Twirlers** • Do students know what parts are needed to build the twirler? • Can students operate their twirler? • Do students recognize that the twirler may not work if it is not correctly assembled with the right parts? (This is particularly pertinent if students have trouble making their twirlers operate properly. Are they able to look at their twirler and problem-solve?)

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	How can you make something move? How can you change the way something is moving? What are some descriptions of the way things move?	4F(K-2)#2: The way to change how something is moving is to give it a push or a pull. 4F(K-2)#1: Things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow.	**Tops** • Questions about the movement of tops (See bullet points 3-6 in Step 6 on page 11 in Teacher's Guide.) • Student lab book questions: (1) Describe the movement of your top. (2) How do you make your top move?* ***Push or Pull?* FOSS Science Story** • Questions about moving things (See *After the Story* on page 4 in *Science Stories* section of Teacher's Guide.) • *Making Things Move* class chart (See *Extending the Story* on page 5 in *Science Stories* section of Teacher's Guide.) **Zoomers** • Questions about the movement of zoomers (See bullet points 2 & 3 in Step 9 on page 19 in Teacher's Guide.) • Student lab book questions: (1) Describe the movement of your zoomer. (2) How do you make your zoomer move?* **Twirlers** • Questions about the movement of zoomers (See bullet points 1-3 in Step 8 on page 24 and Step 14 on page 25 in Teacher's Guide.) • Student lab book questions: (1) Describe the movement of your twirler. (2) What makes the twirler move?* *Lab sheets available under "Teacher Resources" section	**Tops** • Do students describe the motion of the top as round and round or spinning? • Do students know that to start the top moving they must give it a (twisting) push? ***Push or Pull?* FOSS Science Story** • Do students know that a push or pull is needed to make something move? • Do students know that they make things move by pushing and pulling? • Do students recognize situations where they apply a push or pull to move something? **Zoomers** • Do students describe the motion of the zoomer as round and round or spinning? • Do students know that to start the zoomer moving they must pull on the string? **Twirlers** • Do students describe the motion of the twirler as round and round or spinning? • Do students know that to start the twirler moving they must drop it so air can push up against the wings?

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		12D(K-2)#2: Draw pictures that correctly portray at least some features of the thing being described.	Students draw pictures in their lab books of the assembled items. (Lab sheets available under "Teacher Resources" section) *Note: The FOSS Teacher's Guide does not direct the teacher to have students draw pictures of the various systems. This is a valuable experience and has been added to the unit. It also reinforces the benchmarks related to "parts."*	• Do students make legible drawings? Are students' drawings showing improvement in organization/legibility? • Do the pictures correctly portray some of the features? Are students including more features/details in their drawings? • Do the students' drawings contain accurate and complete labels?

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<u>Investigation 3: Rollers</u> **Pacing Suggestions (45-60 minute lessons):** **Day 1-** Part 1: Rolling Wheels **Day 2-** Part 2: Rolling Cups **Day 3 –** *Rolling, Rolling, Rolling!* FOSS Science Story **Days 4 & 5-** Part 3: Rolling Spheres **Teacher Resources:** 	What are parts? Why are parts important for some things?	11A(K-2)#1: Most things are made of parts. 11A(K-2)#2: Something may not work if some of its parts are missing. 11A(K-2)#3: When parts are put together, they can do things that they couldn't do by themselves. 12C(K-2)#3: Make something out of paper, cardboard, wood, plastic, metal, or existing objects that can actually be used to perform a task.	**Rolling Wheels** Class discussion/sharing about wheel systems (See Step 10 on page 10 in Teacher's Guide.)	**Rolling Wheels** • As a result of exploration, do students understand that the wheel and axel work together to make the wheel system function? • Do students discover that different configurations yield different types of movement? • Do students discover that the parts have to be put together a certain way in order for the wheel system to work properly?

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	What are some descriptions of the way things move?	4F(K-2)#1: Things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow.	**Rolling Wheels** • Class discussions about different kinds of motion (See Steps 1, 6 & 12 on pages 9 & 11 in Teacher's Guide.) • Student lab book question: Describe how your roller (wheel system) moves.* **Rolling Cups** • Class discussions about the way the cups move (See Steps 4 & 13 on pages 15 & 17 in Teacher's Guide.) • Student predictions about motion of cups (See Step 10 on page 17 in Teacher's Guide.) • Student lab book questions: (1) Describe how one cup moves down the ramp. (2) Describe how two cups taped together move down a ramp. (3) When pennies are added, how does the movement of the cups down the ramp change?* **Rolling Spheres** • Class discussion about the way marbles (spheres) move (See questions under bullet points 2 & 3 in Step 15 on page 25 in Teacher's Guide.) • Student lab book question: Describe how your marble moves.* *Lab book questions available under "Teacher Resources" section	**Rolling Wheels** • Class discussions about different kinds of motion: Are students able to distinguish between rolling and spinning? Following "Show-and-Tell" (Step 12), do students recognize differences in speed and motion of the various rollers? • Student lab book question: Do students provide accurate and detailed descriptions about how their rollers move (fast, slow, zigzag…)? **Rolling Cups** • Class discussions about the way the cups move: Do students recognize the different ways the cups move? • Student predictions about motion of cups: Can students accurately predict/describe the motion of the cups? • Student lab book question: Do students provide accurate and detailed descriptions about how their cups move (fast, slow, zigzag, straight…)? **Rolling Spheres** • Class discussion about the way marbles (spheres) move: Do students know that a sphere moves in all directions? Do students know that ultimately, the marble always moves down? • Student lab book question: Do students provide accurate and detailed descriptions about how their marble moves (fast, slow, down…)?

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		12D(K-2)#2: Draw pictures that correctly portray at least some features of the thing being described.	**Rolling Wheels and Rolling Spheres** Students draw pictures in their lab books of the assembled items. (Lab sheets available under "Teacher Resources" section) *Note: The FOSS Teacher's Guide does not direct the teacher to have students draw pictures of the various systems. This is a valuable experience and has been added to the unit. It also reinforces the benchmarks related to "parts."*	• Do students make legible drawings? Are students' drawings showing improvement in organization/legibility? • Do the pictures correctly portray some of the features? Are students including more features/details in their drawings? • Do the students' drawings contain accurate and complete labels?
	What is necessary to keep an object from falling to the ground?	4G(K-2)#1: Things near the earth fall to the ground unless something holds them up.	**Rolling Spheres** Class discussion about how the ball will move if the runway is sloped downwards (See Step 9 on page 24 in Teacher's Guide. Note: In order to assess students' understanding of why the marble goes down, the class discussion will have to go beyond the three points in the Teacher's Guide. Consider asking "Why does the marble go down the runway?")	• Do students' know that the marble ultimately goes down? • Do students understand that if the runway is sloped, the marble is not fully supported and moves (falls) down the runway? Note: Students are inclined to say the speed of the marble makes it go down. This is inaccurate. Focus on the simplicity of the benchmark—the ramp is sloped and therefore does not fully support the marble. Things that are not held up fall down.)

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<u>End of Module Assessment</u> **Pacing Suggestions:** **Day 1 –** Performance Assessment **Day 2 –** Written Assessment **Optional:** **Days 3 & 4 –** Portfolio Assembly & Reflection	How can you make something move? How can you change the way something is moving? What are some descriptions of the way things move? What is necessary to keep an object from falling to the ground? What are parts? Why are parts important for some things?	4F(K-2)#1: Things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow. 4F(K-2)#2: The way to change how something is moving is to give it a push or a pull. 4G(K-2)#1: Things near the earth fall to the ground unless something holds them up. 11A(K-2)#1: Most things are made of parts. 11A(K-2)#3: When parts are put together, they can do things that they couldn't do by themselves. 12D(K-2)#2: Draw pictures that correctly portray at least some features of the thing being described.	**Summative Assessments:** • Performance Assessment (See *Assessment Duplication Masters* section of Teacher's Guide for copy of assessment.) • Written Assessment (See *Assessment Duplication Masters* section of Teacher's Guide for a copy of assessment.) • Portfolio Assessment (Optional) (See pages 10 & 11 in *Assessments* section of Teacher's Guide.)	**Performance Assessment** • See page 8 in *Assessments* section of Teacher's Guide **Written Assessment** • See page 9 in *Assessments* section of Teacher's Guide