**rwI. Design Planning: Tumbling Unit Plan With Biomechanics**

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| **A. What do I want my students to know?** |
| **Planning Area:** | **REMEMBER to...** |
| 1. **Content**  **Objective(s)** * Estimated 10 Class Sessions
 | Have students determine the biomechanical principles used when performing the tumbling skills. 2.2 |
| 2. **Critical Attributes**  **of the Objective(s)** | Students should be able to do:SkillsFloor Exercise - Transitions:\_\_\_\_\_ *V-sit*\_\_\_\_\_ Front seat supportFloor Exercise - Forward Sequence:\_\_\_\_\_ Log roll\_\_\_\_\_ Front shoulder roll\_\_\_\_\_ Squat forward roll\_\_\_\_\_ Forward roll walk out\_\_\_\_\_ Pike forward roll\_\_\_\_\_ *Forward roll combinations*Floor Exercise - Backward Sequence:\_\_\_\_\_ Log roll\_\_\_\_\_ Back shoulder roll\_\_\_\_\_ Backward roll\_\_\_\_\_ Back roll to standing\_\_\_\_\_ *Backward roll combinations*Floor Exercise - Headstand Sequence:\_\_\_\_\_ Tripod\_\_\_\_\_ Three point tip-up\_\_\_\_\_ *Headstand*Floor Exercise - Handstand Sequence:\_\_\_\_\_ Switcheroo\_\_\_\_\_ Teeter-totter\_\_\_\_\_ *Handstand*\_\_\_\_\_ Handstand roll outFloor Exercise - Lateral Sequence:\_\_\_\_\_ *Cartwheel*\_\_\_\_\_ Round offKnowledge:Students should be able to know these Biomechanic Concepts:**Move an object*** Enough force must be applied to change the object’s state of motion (Newton’s First Law).
* More force is required to move a stationary object (Newton’s First Law).
* Smaller objects require less force (Newton’s Second Law).

**Absorb force*** Force can be absorbed by increasing the surface area and/or the distance or time over which it is absorbed.

**Increase balance*** Stepping forward on the opposite foot when throwing and kicking helps to keep the center of gravity over the base of support.
* When receiving an object the force should be received close to the center of gravity so that stability is maintained.

**Increase force/distance*** The stronger the action the greater the reaction (Newton’s Third Law).
* Stabilizing the body segments involved in the motion increases the distance an object travels.
* Using more muscles increases the distance an object travels.
* Using stronger muscles (levers: force arm) increases the distance an object travels.
* The greater the speed of projection, the lower the angle can be for a given distance.

**Turn an object*** The shorter the radius of rotation, the greater the angular velocity.
* There must be an integration of forward linear motion with angular motion to get best results.
* Angular motion can increase linear speed if the point of release or transfer is at a right angle to the center
* of rotation.
* If linear movement is desired, force should be applied in line with an object's center of gravity.
* To turn an object, force must be exerted at a distance to its axis and the greater the distance, the greater the rotational or spinning effect.
* The axis of a revolving body is a straight line about which all other parts rotate or spin in a plane at right angles.
* Acceleration of rotary movements depends not only on mass but also upon its distribution about the axis.
* The closer the mass to the axis of rotation, the easier the object is to turn.
* A turning body isolated from external forces will have a constant angular momentum.
* Momentum, angular or linear, can be transferred from one object to another and from body part to whole body.
* The angular velocity of two moving body parts is inversely proportional to the moment of inertia about their common axis.
* The further from the center of gravity the force is applied, the less force necessary to rotate the object.

**Implication of resistance*** Drag, buoyancy, friction, and gravitational forces act as resistance.
* As velocity increases the resistance is increased (squared).
* The larger the object the greater the resistance.
* A streamline position provides less resistance.
* A smoother surface provides less resistance.
* Gravity decelerates an object or the boy on its upward flight in airborne situations.
* Gravity causes objects dropped from the same height to fall at the same speed (discounting air resistance).
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| 3. **Key Questions** | * How do the components of biomechanics apply to tumbling?
* How do the components of fitness apply to tumbling?
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| 4. **Key Terms**  | * Balance – ability to keep an upright posture while standing still or moving.
* Coordination – ability to use your senses together with your body parts.
* Reaction time – amount of time it takes you to move once you realize the need to act.
* Agility – ability to change your body position quickly and to control your body’s movements.
* Power – ability to use strength quickly. Areas most likely to improve with repeated effort.
* Speed – ability to perform a movement or cover a distance in a short period of time.
* Leverage – a mechanical advantage.
* Proprioception – The ability to sense the position, location and orientation of the body.
* Base of Support – The area of the base or foundation that supports the body. The base of support may include one or more body parts and the distance between them.
* Rotary Motion – Rotate around an axis.
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| 5. **Essential**  **Prerequisites** | Students should know: * Basic balance skills
* Left/right
* Different levels (high, low, medium)
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| **B. How will I know if they have learned the content objective(s)?** |
| **Planning Area:** | **REMEMBER to...** |
| 1. **Initial Assessment**  (*Diagnosis*) | * Observation
* Verbal and written
* Peer evaluation with a checklist
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| 2. **Acquisition** **Assessments**  (*Short-Term Learning*) | 1.1, 1.2, 1,4, 1.7, 1.8, 1,9, 1.10, 1.11, 1.12* On command students able to perform basic tumbling skills
* Students complete a basic tumbling routine, videotape the routine, and self assess their performance using a scoring rubric. Then students use this information to modify training plans and prepare for final performance to be graded by the teacher.
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| 1. **Mastery**

 **Assessments**  (*Long-Term Learning*) | 1.1, 1.2, 1,4, 1.7, 1.8, 1,9, 1.10, 1.11, 1.12Students perform a basic tumbling routine, performed in front of the class, synchronized to music. Performance assessed based on rubric scoring.* Applies skill-related components of balance, reaction, time, agility, coordination, explosive power, and speed that enhance performance levels in tumbling/gymnastics. [1.3]
* 20 question written assessment which includes biomechanic terminology (see at the end of this plan)
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| **C. What resources and strategies will I use to teach the objective(s)?** |
| **Planning Area:** | **REMEMBER to...** |
| 1. **Resources** | Bonnie’s:* Gymnastics Checklist
* Skill/Health Related Fitness cards
* Biomechanics handout
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| 2. **Strategies** | Structured observation* Demonstrates the correct technique for combination moves. [1.1]
* Demonstrates proficiency for tumbling/gymnastics skills. [1.2]
* Demonstrates advanced transitional strategies in tumbling/gymnastics. [1.4]
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**II. Delivery Planning: Day 1**

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| **How will I construct the learning experiences for each lesson?** |
| **\*Monitoring****And****Feedback** | **Part of INSTRUCTION** | **REMEMBER to...** |
| **Set** | Have students brainstorm leadership skills and how to use them in planned and spontaneous situations. 5.1 [3.8]Lead students in a warm-up followed by muscular strength and endurance exercises. 4.1 [2.2] |
| **Relevant Input** | Discuss the important of moderate-to-vigorous physical activity on a regular basis. 3.1/4.1 [2.1/2.2/3.1] |
| **Guided and Independent Practice** | Demonstrate and describe log rolls. 1.0 [1.2]Have students perform log rolls. (Assessment Opportunity: Structured Observation 1.0, 2.2, 2.4, 5.1 [1.2, 1.3, 1.5, 3.8, 3.9]) 2.1 [1.7]Demonstrate and describe v-sit. 1.0 [1.2]Have students perform v-sit. (Assessment Opportunity: Structured Observation 1.0, 2.2, 2.4, 5.1 [1.2, 1.3, 1.5, 3.8, 3.9]) 2.1 [1.7]Demonstrate and describe front seat support. 1.0 [1.2]Have students perform front seat support. (Assessment Opportunity: Structured Observation 1.0, 2.2, 2.4, 5.1 [1.2, 1.3, 1.5, 3.8,  3.9]) 2.1 [1.7] |
| **Closure** | Lead students in flexibility exercises and a cool-down. 4.1 [2.2] |
| **Mastery Acquisition and Follow-up** | Teacher observation and peer checklist. |
| **\*Monitoring and Feedback** | * Teacher will interact with students, during all parts of the lesson, to give helpful feedback.
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Tumbling Performance Rubric

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|  | 4 | 3 | 2 | 1 |
| **Strength and Flexibility**1. V- Sit
2. Front Seat Support
3. Bridge Up
 | Performance as a group: All members of the group demonstrated three elements presented and held for a minimum of 10 seconds. | All three elements presented and held for a minimum of 10 seconds. | Some elements held for 10 seconds. | No elements were held for 10 seconds, but an attempt was made. |
| **Traveling Inversions**Cartwheel ORRoundoff | Performance as a group: Straight body, toes pointed, arms and legs in line with body. | Straight body, toes pointed, arms and legs in line with body. | Body slightly out of true, arms and legs are not in line with the body. | Skill attempted but numerous form breaks. |
| **Balancing** Tripod or Headstand | Performance as a group: Holds for 10 seconds | Holds for 10 seconds | Holds for 5 seconds | Holds for less that 5 seconds |
| **Balancing** Mulekick, Switcheroo OR Handstand | Performance as a Group: Legs, arm and body straight, back leg used as a lever, toes pointed. | Legs, arms and body straight, back leg used as a lever, toes pointed. | Legs, arms and body somewhat straight, back leg used as a lever, toes pointed. | Skill attempted but numerous form breaks. |
| **Quality of Performance** | All group members knew the routine, energy was high in the routine, and style included creativity and extra flair.  | All group members knew the routine, and for the most part the group was together. Moderate energy level. | Some group members knew the routine, and for the most part the group was together.  | Few group members knew the routine, and for the most part the group was together. Low energy level |
| Total Points (20 Possible)\_\_\_\_\_\_\_\_\_\_\_\_\_\_Comments: |