**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:  Skills  Floor Exercise - Transitions:  \_\_\_\_\_ *V-sit*  \_\_\_\_\_ Front seat support  Floor 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 out  Floor Exercise - Lateral Sequence:  \_\_\_\_\_ *Cartwheel*  \_\_\_\_\_ Round off  Knowledge:  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). |
| 3. **Key Questions** | * How do the components of biomechanics apply to tumbling? * How do the components of fitness apply to tumbling? |
| 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. |
| 5. **Essential**  **Prerequisites** | Students should know:   * Basic balance skills * Left/right * Different levels (high, low, medium) |
| **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 |
| 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. |
| 1. **Mastery**   **Assessments**  (*Long-Term Learning*) | 1.1, 1.2, 1,4, 1.7, 1.8, 1,9, 1.10, 1.11, 1.12  Students 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) |
| **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 |
| 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. |

Tumbling Performance Rubric

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| **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  OR  Roundoff | 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: | | | | | | | | | |