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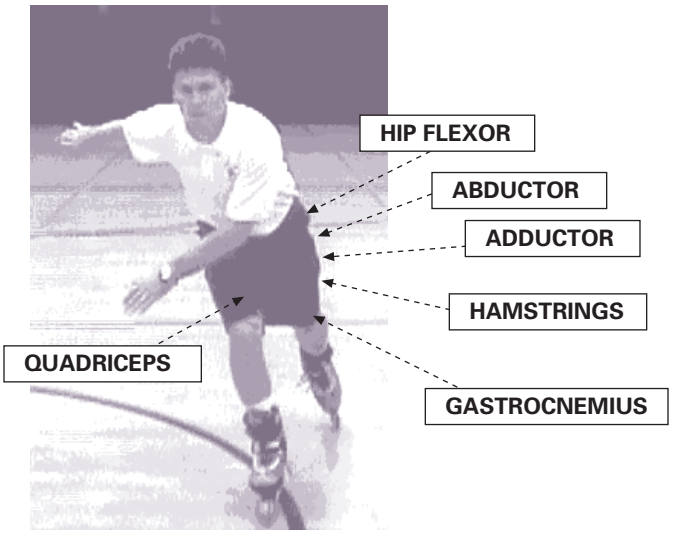
PHYSIOLOGY OF SKATING

Inline skating requires a balance of agility, power, speed, endurance & coordination. It is very similar to ice skating. Research of ice skating and inline skating shows that there are no significant differences in performance when referring to oxygen uptake, ventilation, or heart rate. The stroke frequency, work per stroke, and power have also been shown to be the same. One of the major differences between ice and inline skating is the amount of friction between the skates and the surface. The wheels create much more friction on land than blades do on ice; for this reason it is believed that 45% of the power created by the inline skater is lost to friction (Publow, 1996).



When it comes to biomechanical characteristics inline skating is a unique activity. Unlike traditional weight bearing sports, inline skating does not have the up and down motion of the center of gravity. Rather, it has a horizontal displacement of the center of gravity that results in locomotion. Inline skating primarily uses the musculature of the lower body for locomotion. Running and cycling uses some of the same muscles, but in a different manner. These activities primarily use those muscles to flex and extend the hip, knee, and ankle joints. Inline skating uses these muscles in this fashion to some extent, but also uses the abductors and adductors of the hip. These muscle groups move the leg away from and towards the midline of the body.

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PHYSIOLOGY OF SKATING

Both of these muscle groups aid in lateral movement. Very few aerobic exercises offer the lateral musculature training that inline skating does (Publow, 1996). This training and development of the hip muscles does not occur during traditional cardiovascular activities. The thigh and gluteal muscles are also developed due to the lower limb positioning during the glide phase. The bent over stance used during speedskating also strengthens the low back. This bent over stance is similar to a cyclists, but there are no handle bars to support the weight of the trunk. There is also no seat to support the weight of the body, which makes the lower limbs and lower body musculature support the entire body weight. Another important benefit of inline skating is the repetitive glide of the movement. During running there is a great deal of stress that is placed on the lower joints to absorb the pounding of the foot into the pavement. With inline skating the joint stress is reduced. This makes it physically demanding but the athlete recovers from the workout quicker and without constant abuse on the joints. Research has shown that inline skating offers similar cardiovascular benefits when compared to running or cycling. Because of these advantages many people use inline skating as a method of crosstraining (Burke, 1998).

Inline skating be used to train either the aerobic or anaerobic energy system. The energy system used depends upon the type of skating the athlete is performing. Short, quick bursts are supplied mainly by the anaerobic energy system. Long, sustained efforts use the aerobic energy system. Depending on the sport, the athlete can fine tune the workout to primarily use one system or the other. A distance runner or triathlete would want to focus on the aerobic energy system. A football player would want to focus on the anaerobic. Some athletes use inline skating training as a recovery type workout which keeps the stress off of the joints while still improving fitness. Inline skating can be used in a variety of ways to improve sports performance, cardiovascular endurance, and add variety to training. Additional information can be found in the book Precision Heartrate Training For Maximum Fitness and Performance by Edmond Burke (1998).

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SKATING FOR FITNESS

As we move into the next millennium, we are forced to address one of Americas biggest problems; the inactivity of our children. Children no longer ride their bikes for recreation, they sit in front of high resolution television sets with surround sound speakers and play Nintendo. This lack of exercise is considered to be one of the major risk factors for cardiovascular disease; which is now the number one cause of death in the United States today. To reverse this sad trend many of the top physical education programs in the country are shifting to fitness based programs. Studies have shown that children who participate in regular physical activity are more likely to continue or resume exercise as adults. These programs expose children to activities which will improve cardiovascular endurance and enable them to live longer, healthier lives. These activities need to be fun activities! Activities that the student will participate in on their own after the skills are learned. Activities that last a lifetime! For these reasons Skatetime School Programs sees inline skating as an exciting and excellent component of the fitness based program.

Inline skating is a highly effective method of aerobic activity. All five components of fitness (muscular strength, muscular endurance, flexibility, body composition, and cardiorespiratory endurance) will improve with a proper inline training regimen. Balance and coordination are also additional benefits. Not only will balance improve during skating, but during other activities and sports as well. Inline skating has the same cardiorespiratory benefits as jogging, basketball, racquetball, etc. One of the key benefits of using inline skating as an aerobic workout is the minimal stress the activity places on the joints. Unlike many other high impact cardiorespiratory exercises, inline skating does not put as much stress on the joints, ligaments, and tendons.e by Edmond Burke (1998).

THE F.I.T.T. PRINCIPLE

The F.I.T.T. Principle is an acronym, which helps students remember the key components of a successful aerobic workout.

F STANDS FOR FREQUENCY

How often should I exercise? The American College of Sports Medicine recommends that you do aerobic exercise at a minimum of 3 days per week, ideally 5-7 days per week.

I STANDS FOR INTENSITY

How hard should I exercise? One way to figure whether or not you are training hard enough is to find your aerobic training zone. To find your training zone you must first find your resting heart rate. The ideal time to find your resting heart rate is when you first wake up. Take it before you get out of bed, shower, or eat your bowl of Fruity Pebbles. All of these activities will elevate your resting heart rate.

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SKATING FOR FITNESS

In fact, even sitting up in bed will elevate it. Have a watch with a second hand available at your bedside when you wake up. You should be relaxed; if the alarm clock startled you then wait a minute or so to calm down. Find your pulse on the thumb side of your wrist using your index and middle fingers. Count the number of beats you feel for 60 seconds. This is your resting heart rate. Plug in the appropriate numbers to find your training zone.

1. Subtract your age from the number 220

220 - (your age) = _____ (A) From now on we will use (A) to represent this number

2. Subtract your resting heart rate from (A) , multiply it by .60, and add your resting heart rate.

(A) - (your resting heart rate)= _____ * .60= _____ + (your resting heart rate)= _____

3. Subtract your resting heart rate from (A) , multiply it by .85, and add your resting heart rate.

(A) - (your resting heart rate)= _____ * .85= _____ + (your resting heart rate)= _____

Your training zone is from [final answer in (2)] to [final answer in (3)]. This is where your heart rate should be during aerobic exercise for cardiovascular benefit. If you take your heart rate and it is below your lower value, then you know you need to work harder. If it is above your upper value you know you need to slow down. The use of heart rate monitors during exercise can make this an easy and rewarding way to monitor intensity.

T STANDS FOR TIME

For cardiovascular benefit you need to do aerobic exercise for 20-60 continuous minutes per session.

T STANDS FOR TYPE

For cardiovascular benefit the type of exercise you perform should be aerobic. Aerobic exercise means “with oxygen”. Aerobic exercise is defined as exercise which uses large muscle groups at a moderate intensity that allows oxygen to supply the necessary energy for a sustained effort. Walking, jogging, biking, swimming, and rowing are aerobic exercises. Inline skating is classified as an excellent aerobic activity which can be used to increase cardiovascular fitness. In conclusion, not only can inline skating be used as a fun recreational activity; it can also be used to increase the fitness levels of our children.

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THE WARM-UP

The process of warming up and stretching should be a habitual part of the inline skating unit. Warming up can greatly reduce the chance of a musculoskeletal injury occurring. The most common of these injuries is the muscle strain, or pulled muscle. There are three important components of the warm-up.

AEROBIC

LIGHT TO MODERATE AEROBIC ACTIVITY FOR 3-10 MINUTES.

The first part of the process is to actually 'warm-up' the muscles; to get more blood moving to that area of the body. Any type of light to moderate aerobic activity will do this (jumping jacks, running in place, jogging, even light skating). A cold muscle will be very resistant to stretching. If the internal muscle temperature is low, the muscle will tend to contract and try to protect itself. Warm the muscle up and it becomes more elastic and pliable. The warmer the muscle the less chance that a sudden stretch (such as those performed when an inline skaters legs go in two different directions) will strain the muscle. A strong voluntary muscular contraction, such as when a skater goes to push off to begin moving can also strain a muscle if not properly warm. Actual inline skating at a light pace would be the most specific form of warm-up activity. This warm-up should last between 3-10 minutes, depending on the amount of time available. Extra time may be needed if an older class were being taught. As we get older our muscles become less elastic and we are more susceptible to muscle/joint injuries (Publow, 1997).

GENERAL STRETCHES.

Stretch the major muscles of the upper and lower body. If time is a factor then spend less time on the upper body stretches, because inline skating mainly uses the lower body musculature for locomotion.

Gastrocnemius & Soleus (Bent knee)

Adductors
Place toes up and weight on heel to stretch hamstring.

Quadriceps

Torso

Upper Body

Upper Body

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School Programs

THE WARM-UP

SPORT SPECIFIC STRETCHES

The third and final step is to stretch the muscles that are specific to the inline skating movement. As mentioned previously, these are going to be the muscles of the lower body: the hamstring muscle group, the quadriceps muscle group, the gluteals and hip flexors, the groin, and the hip extensors (Publow, 1997). The stretching routine should also focus on the low back. The bulk of your stretching routine should focus on these muscles. Stretches should be held for 10-30 seconds with no bouncing, with each stretch being performed 2-3 times. The person stretching should feel tension in the muscle. The person should not feel burning, shaking, or pain.

STRETCHES

Hamstrings

Low Back

Hamstrings & Low Back

Abductors/Gluteals

Quadriceps

Adductors

Internal Hip Rotators

Hamstrings & Gluteals

SKATETIME
School Programs

THE WARM-UP

ADDITIONAL STRENGTHENING EXERCISES SPECIFIC TO INLINE SKATING

As an additional part of the warm-up these activities can be used to strengthen the muscles associated with inline skating.

ADDITIONAL STRETCHES

- Wall Sits
  Knees and hips should be at 90 degrees.

  Difficulty level:
  moderate

- One-legged wall sits

  Difficulty level:
  hard

- Hip abduction and adduction.

  Difficulty level:
  WITH SKATES:
  moderate
  WITHOUT SKATES:
  easy

- Squats - One and two-legged squats with skates on. Develops excellent balance and leg strength.

  Difficulty level:
  extremely difficult.

SKATETIME
School Programs

SAMPLE LESSON PLANS

BEGINNER SAMPLE LESSON PLAN

Goal: Basic skating movements & safety.

Length of class: 40 minutes

Steps	Benefits
1 Warm up activity (4 minutes): Jog 3 laps around gym Carioca length of gym and back	Increased temperature of muscles & greater elasticity.
2 Stretching exercises (6 minutes): Found on page xx	Flexibility, Reduced risk of musculoskeletal injury.
3 Students get skates & put them on (2 minutes): Found on page xx	
4 Practice recovery from sitting position; once standing practice squat and fall; repeat (5 minutes) Found on page xx	Safety
5 Practice extended length T - stance (3 minutes): Found on page xx	Balance
6 From extended length T-stance, create forward movement (10 minutes): Found on page xx	Balance and basic movement.
Forward movement to a brakepad stop (7 minutes)	Balance & basic movement.
8 Return skates to cabinet and put on shoes (3 minutes)	

SKATETIME®
School Programs

SAMPLE LESSON PLANS

INTERMEDIATE LESSON PLAN

Goal: Intermediate skating movements, skill drills, increased confidence and skill level.
Length of class: 40 minutes

Steps	Benefits
1 Students get skates and put them on (2 minutes)	
2 Free skate warm-up (5 minutes)	Increase core temperature
3 Stretch (5 minutes)	Flexibility
4 Practice connecting turns using cones (8 minutes)	Movement skills
5 Practice forward crossovers using cones (8 minutes)	Movement skills
6 Play four corners game (9 minutes)	Fun!!
Return skates to cabinet and put shoes on (3 minutes)	

SKATETIME®
School Programs

SAMPLE LESSON PLANS

ADVANCED SAMPLE LESSON PLAN

Goal: Advanced skating movements, advanced drills, sport activities which incorporate skating skills.

Length of class: 40 minutes

Steps	Benefits
1 Students get skates and put them on (2 minutes)	
2 Free skate warm-up which includes slow, elongated, exaggerated skating movements. Forward skating, backward skating, squat skating. Movements need to be slow and controlled. (5 minutes)	Increased internal temperature and flexibility with exaggerated movements.
3 Stretch (5 minutes)	Flexibility
4 Adductor/Abductor strengthening activity with skates on (2 minutes)	Sport Specific Strength
5 Advanced skills stations (4 minutes each) Connecting turns using cones or cans station Forward crossovers station using cones Circle free skate station Backward crossovers station using cones Hockey puck passing station Hockey puck shooting on goal station	Movement and sport skills
6 Return skates to cabinet and put shoes on (2 minutes)	

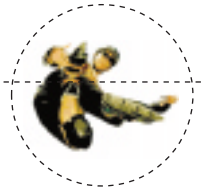
SKATETIME®
School Programs

SAMPLE LESSON PLANS

FITNESS SAMPLE LESSON PLAN

Goal: To improve cardiorespiratory endurance via inline skating.
Length of class: 40 minutes

Steps	Benefits
1 If possible, students put on heart rate monitor.	Accurate heart rate monitoring and recording.
2 Students get skates and put them on (2 minutes)	
3 Free skate warm-up (5 minutes)	Increased temperature and elasticity of muscles.
4 Stretch (5 minutes)	Flexibility
5 50 crunches (2 minutes)	Core strength/endurance
6 5 minute skate with heart rate in target training zone	Cardiorespiratory endurance
2 legged squat with skates on strengthening exercise (1 minute)	Proprioception and kinesthetic awareness, muscular strength/endurance.
8 10 minute skate with heart rate in target training zone	Cardiorespiratory endurance
9 Strengthening exercise – push-ups (1 minute)	Muscular strength/endurance
10 5 minute interval skate: Speed skate for 30 seconds Stroke and glide for 30 seconds Repeat	Utilization of anaerobic energy system via interval training.
11 Return skates to cabinet.	



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SKILLS CHECKLIST

Falling, Recovery, Posture and Balance	
	Starting in squat position, let skates slide out in front and sit down.
	Start in upright position but standing on knees and demonstrate fall and roll technique.
	Start laying down and perform recovery to upright standing position.
	Demonstrate proper skating position: knees bent, skates shoulder width, head up, shoulders facing forward, upper body leaning slightly forward.
Creating Forward Movement, the Stroke and Glide	
	Stroke with rear leg of extended leg stance with "T" and glide on opposite foot.
	Execute a stroke and glide with recovery.
	Execute a stroke and glide with recovery and then continue with other leg performing stroke and glide with recovery.
	Execute alternating stroke and glide with recovery and then glide with extended leg stance.
Stopping	
	Demonstrate a proper brake stop. Arms should be out front and the gluteus maximus low for balance.
	Demonstrate a T-Stop. Drag skate should be at a 90 degree angle to other skate.
	Demonstrate a Y-Stop. Drag skate should be at a 45 degree angle to other skate.
Turns	
	Demonstrate an extended stance turn to the right.
	Demonstrate an extended stance turn to the left.
	Demonstrate back to back turns in opposite directions.
	Demonstrate a right turn using the crossover technique.
	Demonstrate a left turn using the crossover technique.
Backward skating	
	Demonstrate the hourglass drill.
	Demonstrate the hourglass drill using one leg as the stroke and the other as the glide. Repeat with opposite leg as glide.
	Demonstrate the backward stroke and glide.
	Demonstrate the crossover turn going backwards to the right.
	Demonstrate the crossover turn going backwards to the left.
Advanced	
	Demonstrate a heel-toe glide in the extended stance.
	Demonstrate a toe-toe glide in the extended stance.
	Perform a two legged squat with the hips and knees at 90 degrees with skates on.
	Perform a one legged squat with the hips and knee at 90 degrees with skates on.

SKATETIME
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SKATING CHALLENGES & GAMES

CONES

Cones can be used in a variety of fashions for both skill development and fun. Cones can be set up to practice turns or other skills mentioned in the skills section of the manual. Cones can be used to create a circular rink inside the gymnasium which can be used in a variety of manners: to have a free skate with music - all skaters move in the same direction; to have speedskating races with the number of participants in each race depending upon the size of the gym and racetrack created; to have relay races using a baton; and for relay races that can incorporate skills such as back to back turns.

POP CANS

Pop cans can be set up to test the agility and maneuverability of the inline skater. The closer together and the faster the skater approaches increases the difficulty level. Zig zags, connecting turns, crossover turns, and the weaving of the skates are a few of the skills that can be tested.

OBSTACLE COURSE

Obstacle courses can be set up using different objects such as cones, chairs, horizontal apparatus that are intended to be skated under, etc. The obstacle course is limited only by the imagination of the instructor.

LIMBO

Get the limbo going with some music and a pole. The pole is held by two people parallel to the ground at a height which is assumed that everyone participating can pass under without touching it. After all participants successfully skate under the pole, the height is dropped a few inches and everyone attempts again. If the skater touches the pole or loses their balance and falls while going under - they're out! Continue until one person is left. For safety make sure the people holding the pole give with it if the skater makes contact.

Shoot the Duck

Shoot the duck is a game where the participants are asked to glide on one skate. All skaters begin by skating in a similar direction in a large circle to some jams. When the music stops, the participants immediately balance on one skate and coast; the contestant who coasts the longest is declared the winner. No strokes are allowed once the music stops; and the skaters cannot use their hands for locomotion either. Partner shoot the duck is also a fun game - the only difference being that two skaters must hold hands during the contest.

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SKATING CHALLENGES & GAMES

Four Corners:

A cardboard box with either 4 numbers or colors corresponds to the same numbers/ colors which are posted in each of the four corners of the gym. Music is played and all the students skate in the same direction. At the instructors discretion the music is stopped - at which time all skaters must choose 1 of the 4 corners to stop at. The instructor reaches into the cardboard box and draws a number/color. All skaters in the corner that was drawn are out of the game and must leave the skating floor or sit against the wall. This process is continued until there is a single winner.

FREE SKATE WITH MUSIC

Just like the retro days at the roller rink, turn on some music and let the students skate.

INLINE HOCKEY

Inline hockey is an exciting and fun sport. Many schools play floor hockey and have indoor pucks and sticks. This equipment can be a fun addition to the inline unit. The equipment can be used in a variety of ways which include:

PUCK HANDLING

With stick Teach the students how to properly hold the hockey stick with both hands. Teach them proper positioning of the stick for both the forehand and backhand. Teach to skate forward and backward while handling puck.

With skates During floor hockey the skates are a legal way to control, pass, or advance the puck. Have the student skate towards a puck and by turning the toes outward and using the wheels kick the puck forward. The student should be able to use both feet and then alternate.

In this picture the skater in the upper left hand corner is using the wheels of his left skate to stop a pass from his passing partner.

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SKATING CHALLENGES & GAMES

With shot on goal

Have students skate towards the goal handling the puck and take a shot on goal. A goalie can be used to simulate a game experience.

Passing and receiving the puck with partner

Have the partners stand 15-30 feet apart. Have them practice a wrist pass to their partner. Have the partner catch the pass with the blade of the stick or with the wheels of skate; depending on the location of the pass. To increase the difficulty level have partners skate forward in a parallel direction and pass the puck back and forth. For advanced skaters backwards skating with puck handling, passing, and receiving passes is an option. Relay races can be incorporated to emphasize skills.

SAFETY

Remember that basic safety rules must be covered before this is attempted. Hockey sticks seem to bring out the aggressiveness in students, so remind them:

- The hockey stick is not a weapon or sword; do not hit your classmates with it.
- The hockey stick should remain below waist level at all times, even when shooting; this will reduce the chance of someone getting hit in the face.
- No body checking or contact is allowed at any time.