



Train Like an Astronaut: Adapted Physical Activity Strategies

These activities are provided as a guide for adapted physical activities, and represent the work of many dedicated individuals interested in promoting health and fitness to all people. This guide is intended as a resource to complement existing best practices and provides some examples for implementing Train Like an Astronaut with people of unique needs. We encourage you to modify the Train Like an Astronaut activities to safely fit your needs and have some fun!

*Fitness for all,
The Train Like an Astronaut Team*

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~ And especially for all the individuals who smiled for the camera as they trained like astronauts...





Train Like an Astronaut: Adapted Physical Activity Strategies

Agility Astro-Course

YOUR MISSION

You will complete an agility course as quickly and as accurately as possible to improve agility, coordination and speed. After you have completed the Astro-Course and recorded your times, you will comment on your agility during this physical experience in your Mission Journal.

LINK TO SKILLS AND STANDARDS

APENS: 2.01.06.01 Develop and implement programs that stimulate vestibular, visual, and proprioceptive senses

Activity Specific Terms/Skills

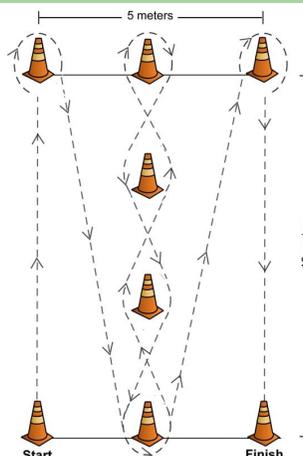
Agility, Spatial Awareness, Laterality and Directionality

SPACE RELEVANCE

When astronauts go into space and return to Earth, they experience challenges with balance and body control due to changes in gravity. When they leave the Earth, their bodies adjust to little or no gravity. Upon return, their bodies have to re-adjust to Earth's gravity. The agility course is used to measure balance, foot-work skill and agility in response to gravity changes. After a few weeks back on Earth, their balance control returns to pre-flight condition.

WARM-UP & PRACTICE

-  Walk the course with the individuals
-  Walk or run in a straight line, go around a single cone and return
-  Break-up Agility Course from simple to complex shapes
-  March in place



SUGGESTED ADAPTED
EQUIPMENT:
BALLOON OR POOL NOODLE



Agility Astro-Course

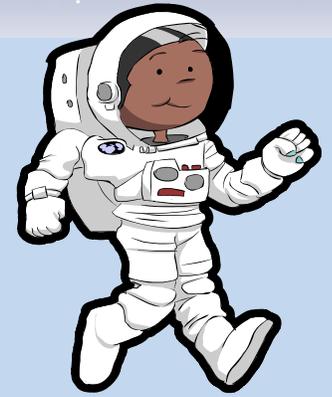
LET'S "TRAIN LIKE AN ASTRONAUT!"

Adjust steps and procedures as appropriate for participants

- ▲ Lie face-down on the ground at the starting point.
- ▲ When time starts, jump to your feet and run the course to the finish following these criteria;
 - Complete the course as quickly as possible.
 - Do not touch or knock over any cones.
 - Touching or knocking over a cone is a 2 second penalty added to your completed time for each cone infraction.
- ▲ Record your final time in your Mission Journal.
- ▲ Record any penalties that occurred in your Mission Journal.
- ▲ Rest at least one minute.
- ▲ Return to the line, repeat the Agility Astro-Course at least three times, following the same directions as the first time.
- ▲ Continue to practice improving your movements, accuracy and time.

TRY THIS! *Some ideas for Adapted Activity*

- ▲ Visual aids as directional floor guides, larger cones, pool noodles or balloons placed upward on cones extending visual field to travel through course; color floor markers; numbers; pictures;
- ▲ Travel in a single direction and gradually increase course complexity
- ▲ Start position standing up
- ▲ Limit/reduce the length/size of the agility course
- ▲ Increase/widen size of travel pathways for wheelchairs and walkers
- ▲ Incorporate preferred object/peer buddy-partner/motivating item to encourage student to move through course
- ▲ Allow student to move through course seated or lying prone (on scooter)
- ▲ Use sound emitting equipment (beeping, jingling) placed along course to touch and move through to end





Train Like an Astronaut: Adapted Physical Activity Strategies

Base Station Walkback

YOUR MISSION

You will perform a walk, progressing to 1600 m (1 mi) to improve lung, heart, and other muscle endurance. You will also record observations about improvements in this walk-back physical endurance experience using your lungs, heart, and other muscles in your Mission Journal.

LINK TO SKILLS AND STANDARDS

APENS: 3.09.08.01 Understand the different types of direct and indirect determinations of muscular strength, endurance, and flexibility tests for individuals with disabilities

Activity Specific Terms/Skills

Endurance, Strength, Orientation, Mobility

SPACE RELEVANCE

When exploring space, astronauts complete many physical tasks. When on a planetary surface, if their vehicle breaks down astronauts must be able to walk a distance of up to 10 km (6.2 mi) back to their base station. To help NASA know crew members are physically prepared to complete their mission tasks or perform a walk-back procedure, astronauts train by running and lifting weights to improve their overall physical fitness.

WARM-UP & PRACTICE

Warm-Up

- ▲ Aerobics or dancing for 2 minutes
- ▲ Jumping in place
- ▲ Moving arms in circles
- ▲ Scooters (in a relay)

Practice

- ▲ Walk around for 2 minutes, increase the pace and/or distance
- ▲ Move your arms for 2 minutes, increase the speed and/or time
- ▲ Practice one task of the entire activity



SUGGESTED ADAPTED EQUIPMENT:

- ▲ TIMER/ STOP WATCH
- ▲ PEDOMETER/ACCELEROMETER
- ▲ MEASURING WHEEL OR TAPE
- ▲ EXTRA-LARGE COLORED COUNTING CRAFT STICKS
- ▲ STICKERS





Base Station Walkback

LET'S "TRAIN LIKE AN ASTRONAUT!"

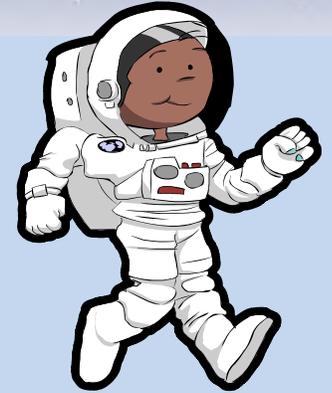
Adjust steps and procedures as appropriate for participants

Instructions for individual play:

- ▲ Measure a course with the following distances:
 - 400 m ($\frac{1}{4}$ mi), 800 m ($\frac{1}{2}$ mi), 1200 m ($\frac{3}{4}$ mi), 1600 m (1 mi)
 - This could be laps around the playground, track, gym, or your neighborhood.
- ▲ At your own pace, walk, jog, or run the measured distance.
- ▲ Start by trying to complete 400 m ($\frac{1}{4}$ mi).
- ▲ Slowly work to increase the distance by 400 m ($\frac{1}{4}$ mi).
- ▲ Over time, your goal should be to complete 1600 m (1 mi).
- ▲ Record observations before and after this physical experience in your Mission Journal.

TRY THIS! *Some ideas for Adapted Activity*

- ▲ Ergometers (upper body)
- ▲ Stationary bike
- ▲ Bicycle motion with legs or arms
- ▲ Modify or accumulate distances
- ▲ Scooters
- ▲ Use Rockport Walk Test
- ▲ Swim
- ▲ Vary distances or areas to walk, jog, run, self-propel
- ▲ Offer incentives (desired objects) for performer to earn to complete distance (stickers, colored counting craft sticks)
- ▲ Use verbal cues/caller, tether rope, or sighted guide
- ▲ Select brightly colored items: cones, markers; or use sound emitting columns for performer to follow; color choice is dependent on performers needs
- ▲ Perform with assistance partner (push in wheelchair or stabilize walker in support via hand over hand assistance)





Train Like an Astronaut: Adapted Physical Activity Strategies

Building an Astronaut Core



YOUR MISSION

You will perform the Commander Crunch and Pilot Plank to improve the strength in abdominal and back muscles. As you train like an astronaut, record your observations about improvements in core muscle strength during this physical experience in your Mission Journal.



LINK TO SKILLS AND STANDARDS

APENS: 3.10.10.01 Understand the use of statics, dynamics, kinematics, body axes, planes, balance, and equilibrium for studying and planning movement activities for individuals with unique needs

Activity Specific Terms/Skills

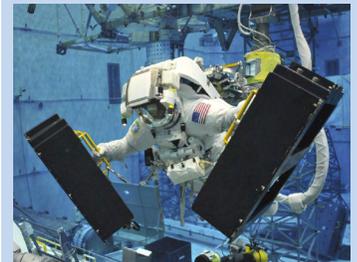
Core, muscle strength, endurance, plank, balance

SUGGESTED ADAPTED EQUIPMENT:

- ▲ RIGID BALL
- ▲ STURDY (CHAIR OR TABLE)

SPACE RELEVANCE

Astronauts in space must be able to twist, bend, lift, and carry massive objects. They must have strong core muscles so they can perform their tasks efficiently and avoid injury. In order to maintain muscle strength while in space, astronauts practice core-building activities before, during, and after their missions. Here on Earth these activities may include swimming, running, weight training, or floor exercises. In space, astronauts use specialized equipment to maintain an exercise routine to keep their core muscles fit for the job.



WARM-UP & PRACTICE

Warm-up

- ▲ Wall push-ups
- ▲ Toe or knee touches
- ▲ Hold push-up position while stacking cups (see image)
- ▲ Modify push-ups (on knees)
- ▲ Demonstrate animal, yoga poses: 'seal' or comic book 'Superman' position
- ▲ Use a core ball, knees @ 90 degrees; squeeze abdominal muscles

Practice: Practice skills separately and build complexity





Building an Astronaut Core

LET'S "TRAIN LIKE AN ASTRONAUT!"

Adjust steps and procedures as appropriate for participants
Instructions for play: You will do the following activities with a partner.

Commander Crunches

- ▲ Starting position: Lie on your back, knees bent, feet flat on the floor.
- ▲ Chin should be pointed to the sky, arms crossed over your chest.

Procedure

- ▲ Using only your abdominal muscles, lift your upper body until your shoulder blades leave the ground. Put one hand on your abdomen to feel your muscles working as you raise your shoulders off the floor.
- ▲ Lower your shoulders down using only your abdominal muscles to complete one crunch.
- ▲ At your partners command, begin to complete as many crunches as possible in one minute, timed or counted by your partner.

Pilot Plank

- ▲ Starting position: Lie down on your stomach.
- ▲ Resting on you forearms, make a fist with each hand, place your knuckles on the floor shoulder width apart.
- ▲ Using only your arm muscles, push your body off the floor supporting your weight on your forearms and toes.
- ▲ Your body should be straight as a board from your head to your feet.

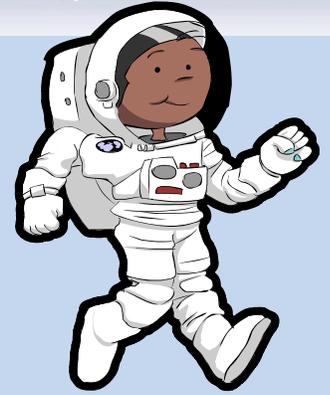
Procedure

- ▲ Using the muscles in your abdomen and back, stabilize your body by tightening these muscles.
- ▲ Try to keep this position for at least 30 seconds.
- ▲ Switch places with your partner and follow the same procedure.

Record observations before and after this physical experience in your Mission Journal.

TRY THIS! *Some ideas for Adapted Activity*

- ▲ In wheelchair, place hands on arm rests and lift up using arms
- ▲ Lift legs and hold. Legs straight or bent.
- ▲ In chair, lean forward 45 degrees
- ▲ Lay on the floor and lift feet or legs,
- ▲ Elevated plank (various levels - using a table, a stool, bench, bar, steps- no wheels)
- ▲ Isometric: squeeze abs, or lean or push against wall.
- ▲ Use stopwatch to get baseline and progress by adding time.
- ▲ Place ball between stomach and floor and while in plank position using hands to walk out and back
- ▲ While in push up position, alternate right and left hand crossing midline to touch opposite shoulder, keeping plank
- ▲ Peer assistance, visual cues





Train Like an Astronaut: Adapted Physical Activity Strategies

Crew Assembly Training

YOUR MISSION

As a team, you will assemble a puzzle quickly and correctly to understand the importance of dexterity and hand-eye coordination; you will also practice communication and problem-solving skills. Observations of your dexterity and hand-eye coordination will be recorded in your Mission Journal.

LINK TO SKILLS AND STANDARDS

APENS: 10.01.03.03 Understand how to effectively analyze progress and provide feedback to individuals with disabilities using a task style teaching method.

Activity Specific Terms/Skills

Team work, communication, problem-solving skills, dexterity, hand-eye coordination, endurance

SPACE RELEVANCE

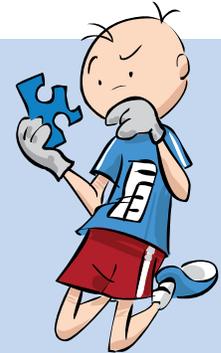
Humans get tired while working in space and they fatigue over the course of Extra Vehicular Activities (EVAs.) To protect against the hostile environment of space, EVA gloves are pressurized and have multiple layers. The gloves have a tactile feel that resembles ice hockey gloves. Astronauts must have strong muscles and endurance to overcome the bulk and pressure inside the suit.

WARM-UP & PRACTICE

Warm-up

- ▶ Play patty cake wearing gloves
- ▶ Lift familiar objects
- ▶ Compete in a relay wearing gloves (pick-up ball and Frisbee)

Practice: Practice skills separately



SUGGESTED ADAPTED EQUIPMENT:

- ▶ VARIOUS LARGE PUZZLES
- ▶ FUNCTIONAL TASK BOARD
- ▶ ASSORTED BUILDING BLOCKS OR CLIPS



Crew Assembly Training

LET'S "TRAIN LIKE AN ASTRONAUT!"

Individual Play

- ▲ Wearing various gloves, put together a puzzle or task items (such as using a screwdriver to turn a screw)

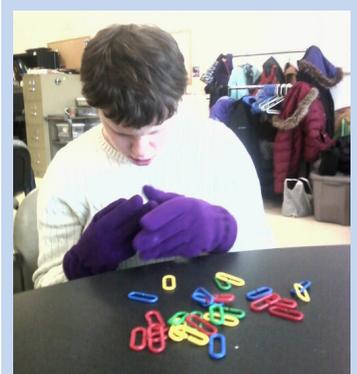
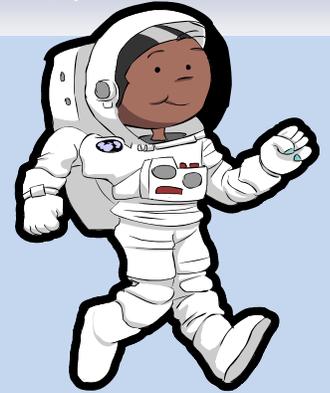
Team relay procedure:

- ▲ Two crew members will start at home base.
- ▲ Have one crew member be the time keeper.
- ▲ One crew member will open the container of puzzle pieces and distribute them equally to all crew members.
- ▲ After distribution of puzzle pieces, crew members should put on two pairs of gloves. The first pair of gloves should tightly cover the hands. The second pair of gloves will be worn on top of the first pair and should be thicker, for instance ski gloves.
- ▲ Crew members holding pieces labeled "A" will go to their assembly area and assemble the outer edge of the puzzle. They are assembling the puzzle face up, not letters up.
- ▲ Once all the "A" pieces are assembled, all crew member will return to their home base and tag team members.
- ▲ Crew members holding pieces labeled "B" will go to the assembly area and assemble the next layer moving inward of the puzzle.
- ▲ Once all the "B" pieces are assembled, crew members will return to home base.
- ▲ If your team has a "C" puzzle piece and letters beyond, continue piecing together the puzzle in alphabetical order until the puzzle is complete, and all crew members have returned to home base.
- ▲ The time keeper will record how long it took your team to complete the puzzle.

Record observations before and after this physical experience in your Mission Journal

TRY THIS! *Some ideas for Adapted Activity*

- ▲ Puzzle with knobs and shape puzzle, zipper board, latch board
- ▲ Velcro pieces (three-dimensional objects)
- ▲ Attach objects to a larger surface like a table or wall
- ▲ Perform a simple assembly task like a "Jewelry Box"
- ▲ Pick up sticks/jacks, large bricks or blocks
- ▲ Place braille on puzzle pieces
- ▲ Verbal cues or hand-over-hand
- ▲ Shorten or eliminate distances to carry pieces





Train Like an Astronaut: Adapted Physical Activity Strategies

Crew Strength Training

YOUR MISSION

You will perform body-weight squats and push-ups to develop upper and lower body strength in muscles and bones. You will also record observations about improvements in strength training during this physical experience in the Mission Journal.

LINK TO SKILLS AND STANDARDS

APENS: 2.01.08.01 Understand variance in “motor milestones” such as typical or average age of achievement for individuals with disabilities – Implement activities that strengthen postural muscles and extremities necessary for locomotion.

Activity Specific Terms/Skills

Squats, push-ups, bone and muscle strengths, cardiac vascular, repetition, endurance, team work, resistance, heart rate

SPACE RELEVANCE

Astronauts must perform physical tasks in space that require strong muscles and bones. In a reduced gravity environment, muscles and bones can become weak, so astronauts must prepare by strength training. They work with NASA strength and conditioning specialists on Earth and continue to work in space to keep their muscles and bones strong for exploration missions and discovery activities.

WARM-UP & PRACTICE

Warm-up

Assistance/Supported squat or activities that mimic a squat:

- ▲ Shooting a basketball, Bowling, Dancing
- ▲ Step-up, Wall push-ups, Walk stairs, Rowing

Practice:

- ▲ Use hand or wrist weight
- ▲ Tug-of-war
- ▲ Resistance exercises (stand face-to-face, gently pushing against each other’s palms)
- ▲ On back, perform straight or bent leg lifts; the Dead Bug movement
- ▲ Demonstrate animal poses: ‘seal’, ‘bear crawl’, or yoga poses: comic book ‘Superman’ position etc., have performer attempt and hold for desired count



SUGGESTED ADAPTED EQUIPMENT:

- ▲ THERA-BANDS/RESISTANT BANDS OR CORDS
- ▲ HAND WEIGHTS
- ▲ WEIGHT BARS
- ▲ CANNED GOODS WEIGHT LIFTING
- ▲ MEDICINE BALLS





Crew Strength Training

LET'S "TRAIN LIKE AN ASTRONAUT!"

Individual Play (Adjust steps and procedures as appropriate for participants. After each activity, rest for 60 seconds)

Body weight squats:

- ▲ Using only your body weight, perform a squat (each squat is a repetition).
- ▲ Stand with your feet shoulder width apart, back straight, looking forward, arms at your side.
- ▲ Lower your body, bending your knees while keeping your back straight (as if sitting). Raise your arms forward for balance as you squat. At the bottom of the motion, your upper legs should be close to parallel with the floor and your knees should not extend past your toes.
- ▲ Raise your body back to a standing position.
- ▲ Try to perform 10 to 25 squat repetitions, increasing over time as possible

Push-ups:

- ▲ Using your arms to lift your body, perform a push-up (each push-up movement is a repetition).
- ▲ Lie down on the floor on your stomach.
- ▲ Place your hands on the floor, under your shoulders, shoulder width apart.
- ▲ Using only your arms to lift your body, lift up slightly until your lower body is off the floor and only your toes and hands are touching the floor. (If this is difficult, you may keep your knees on the floor.) This will be your starting position.
- ▲ Straighten your arms to raise your body. Do not lock your elbows.
- ▲ Lower your body back to the starting position.
- ▲ Try to perform 10 to 25 push-up repetitions, increasing over time as possible.

TRY THIS! *Some ideas for Adapted Activity*

Push-ups and/or related exercises:

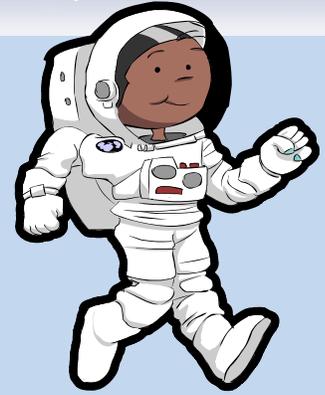
- ▲ Perform at various levels: table, stool, bench, wall or wall bar, steps, etc.
- ▲ Wheelchair push up: Seated in chair with arms, place hands on arm rests and lift body. Hold position In push up position, alternate right and left hand crossing midline to touch opposite shoulder, keeping plank; attempt in wall push up position

Plank and/or related exercises:

- ▲ Perform at various levels: table, stool, bench, wall or wall bar, steps, etc.
- ▲ While in plank, place ball between body and floor and use hands, walk out and back

Seated isometric exercises:

- ▲ In a chair or at bench edge, hold, breathe, and squeeze abdominal muscles Wall sit with back against wall, knees @ 90 degrees; hold, breathe, and squeeze abdominal muscles
- ▲ On a core ball, knees @ 90 degrees; squeeze abdominal muscles





Train Like an Astronaut: Adapted Physical Activity Strategies

Do a Spacewalk

YOUR MISSION

You will perform the "bear crawl" and "crab walk" to increase muscular strength and improve upper and lower body coordination. You will also record observations about improvements in muscular strength and upper and lower body coordination during this physical experience in your Mission Journal.

LINK TO SKILLS AND STANDARDS

APENS: 2.01.10.01 Understand variance in the progression of fundamental motor skill performance among individuals with disabilities

Activity Specific Terms/Skills

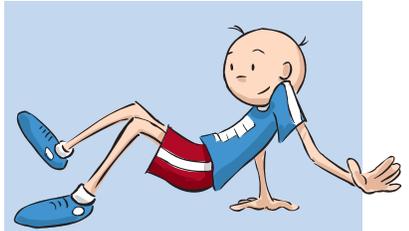
Gross motor skills, mobility, dexterity, flexibility

SPACE RELEVANCE

Astronauts must develop muscular strength and coordination. In a reduced gravity environment, astronauts are unable to walk like they do on Earth. Instead, they coordinate their hands, arms, and feet to pull and push themselves from one place to another. Whether inside a space vehicle or outside doing Extra Vehicular Activities (EVA), strong muscles and coordination help astronauts move in space.

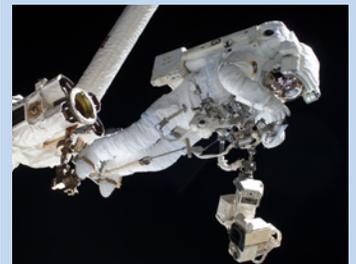
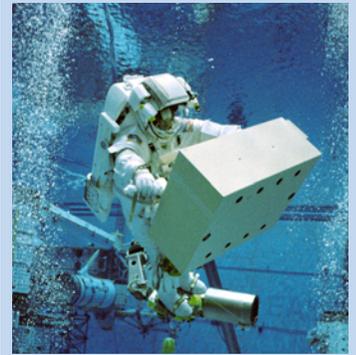
WARM-UP & PRACTICE

- ▲ Use your hands to "walk the wall" (wall walk)
- ▲ "Astronaut Walk" or "Dead Bug" (walk like on Moon or lay on the ground and put one arm in air and opposite leg behind you)
- ▲ Bird dog (get on all fours and put one arm in air and extend opposite leg behind you)
- ▲ Raise both arms above head, and then raise one arm at a time above head
- ▲ Marching
- ▲ Any type of bilateral and alternating movement (wrist, arms, legs)



SUGGESTED ADAPTED EQUIPMENT:

- ▲ AB WHEEL
- ▲ THERA-BANDS
- ▲ SWIVEL CHAIR
- ▲ SCOOTER





Do a Spacewalk

LET'S "TRAIN LIKE AN ASTRONAUT!"

Measure a distance of about 12 m (40 ft).

Bear Crawl:

- ▲ Get down on your hands and feet (facing the floor) and walk on all fours like a bear.
- ▲ Try to travel the measured distance.
- ▲ Rest for two minutes.
- ▲ Repeat two times.

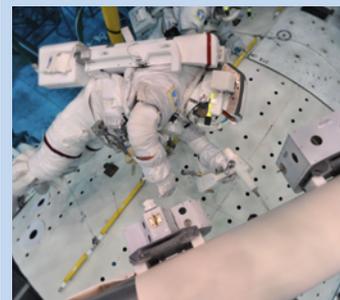
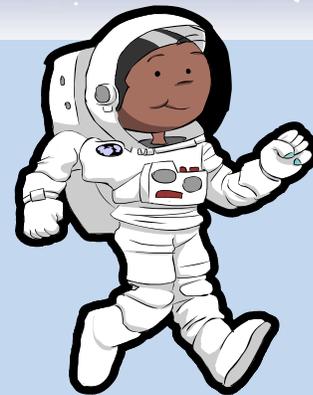
Crab Walk:

- ▲ Reverse the "bear crawl." Sit on the ground and put your arms and hands behind you, knees bent and feet on the floor. Lift yourself off the ground (facing upwards).
- ▲ Try to travel the measured distance.
- ▲ Rest for two minutes.
- ▲ Repeat two times.

Record observations before and after this physical experience in your Mission Journal.

TRY THIS! *Some ideas for Adapted Activity*

- ▲ Use an "ab wheel" to move forward
- ▲ Move wheelchair foot rests, then using feet move forward in chair
- ▲ Let performer self-propel wheelchair/walker
- ▲ Permit partner to push/assist performer in wheelchair or with walker to use hand over hand assistance for retrieval and placement of items
- ▲ Use jump rope/rope to pull body through space (on scooter/carpet square)
- ▲ Lengthen distance
- ▲ Shorten distance
- ▲ Include extensions/reach grippers to assist performers with limited range of motion (ROM) or limb strength
- ▲ Attach preferred items along the desired distance to motivate the walker (toys, paper ribbons, stickers, balloons (if latex allergy does not exist), and sound emitting items (bell/beeper ball)
- ▲ Use verbal cues/caller, tether rope, sighted guide, or partner assistant to direct performer along on space walk; mark area in colored tape or textured boarder; color choice is dependent on performers needed
- ▲ Provide sentence or visual picture/ physical demonstration in order of instruction/steps to follow and complete task





Train Like an Astronaut: Adapted Physical Activity Strategies

Explore and Discover

YOUR MISSION

You will safely carry weighted objects from the Exploration Area back to your Base Station to improve aerobic and anaerobic fitness. You will also record observations about improvements in aerobic and anaerobic fitness during this physical experience in your Mission Journal.

LINK TO SKILLS AND STANDARDS

APENS: 2.03.06.01 Structure tasks and activities to account for difficulty in anticipation for individuals with figure-ground problems involved in ball activities.

Activity Specific Terms/Skills

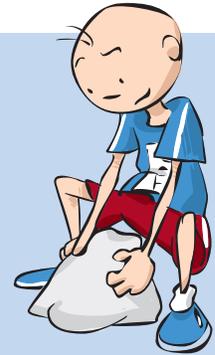
Pacing, endurance, team work, change of direction, recognizing

SPACE RELEVANCE

To explore the Moon and Mars, astronauts must complete the tasks of walking to collection sites, taking samples, carrying science experiments, and safely lifting objects they discover to return to base station. In order to complete this work, astronauts must physically prepare by regularly practicing activities such as walking, running, swimming, and lifting weights.

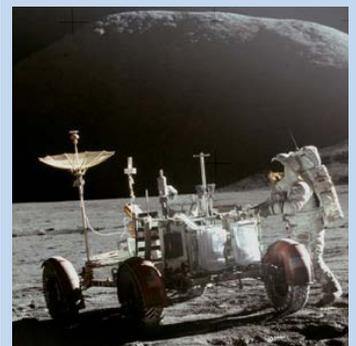
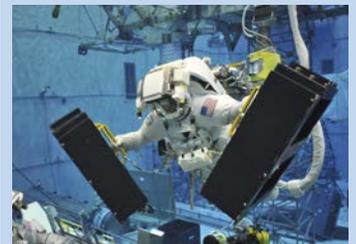
WARM-UP & PRACTICE

- ▲ Squats
- ▲ Twists
- ▲ Locomotive Dance
- ▲ Jump in place
- ▲ Practice locating heart beat; perform physical activity to note heart rate change
- ▲ Separate tasks into smaller steps and perform only the individual steps
- ▲ While squatting, pick up and remove balls. Reverse process to return balls to original position



SUGGESTED ADAPTED EQUIPMENT:

- ▲ BALLOON, OR VARIOUS OBJECTS THAT CAN BE CARRIED



Explore and Discover

LET'S "TRAIN LIKE AN ASTRONAUT!"

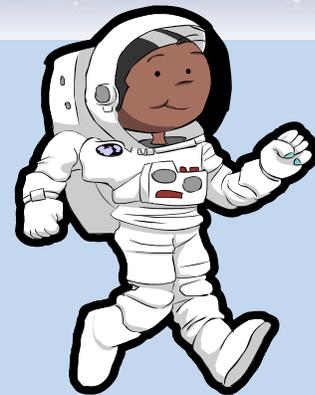
Adjust steps and procedures as appropriate for participants

Instructions for individual play:

- ▲ Begin at the Base Station. The medic will help take the explorer's heart rate and record it in the explorer's Mission Journal. The medic will ask the explorer how they feel and record responses in the explorer's Mission Journal.
- ▲ When instructed, the explorer will walk to the Exploration Area to collect mission samples. It is important that the explorer does not run during this mission.
- ▲ The explorer will safely lift one mission sample and take it to the Base Station.
- ▲ The explorer will continue to collect six mission samples of different sizes and weights, safely lifting one mission sample at a time and taking it to the Base Station. After all mission samples are at the Base Station, the explorer will return all mission samples one at a time to the Exploration Area. When all mission samples are back in the Exploration Area, return to the Base Station.
- ▲ With the medic's help, the explorer will take their heart rate after the Exploration Mission and record it in their Mission Journal. The medic will ask questions about the explorer's physical condition and record answers in the explorer's Mission Journal.

TRY THIS! *Some ideas for Adapted Activity*

- ▲ Different size balls
- ▲ Magnetic items
- ▲ Use hook and loop fasteners to stick objects to wall
- ▲ Change distance and number of objects
- ▲ Use baskets or buckets
- ▲ Extended reach gripper
- ▲ Carry objects in backpacks
- ▲ Items on table
- ▲ Relay format
- ▲ Tie balloons onto objects to make easier to see
- ▲ Use tether rope or sight guide
- ▲ Use wheelchair. Place objects on tray.





Train Like an Astronaut: Adapted Physical Activity Strategies

Jump for the Moon

YOUR MISSION

You will perform jump training with a rope, both while stationary and moving, to increase bone strength and to improve heart and other muscle endurance. You will also record observations about improvements in stationary and moving jump training during this physical experience in your Mission Journal.

LINK TO SKILLS AND STANDARDS

APENS: 2.01.12.01 Understand how appropriate modifications of the physical environment enable individuals with disabilities to perform sport skills

Activity Specific Terms/Skills

Coordination, balance, endurance

SPACE RELEVANCE

On Earth, your weight on your bones provides a constant stress. You maintain your bone strength by doing regular daily activities like standing, walking, and running! In space, astronauts float – unloading that important stress and weakening their bones. Therefore they depend on nutritionists and strength and conditioning specialists at NASA to plan food menus and physical activities that will help them keep their bones as strong as possible while in space. Stronger bones will help astronauts stay safer while performing all of their assigned tasks – whether in a space vehicle, on the moon, Mars, or once back on Earth.

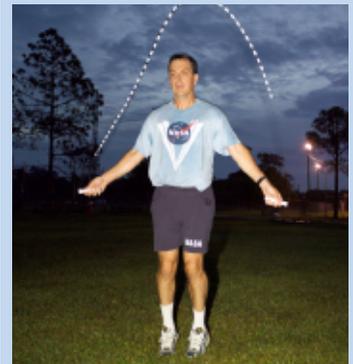
WARM-UP & PRACTICE

- ▲ Jump in place
- ▲ Twist
- ▲ Stomp your feet
- ▲ Swing a rope above head



SUGGESTED ADAPTED EQUIPMENT:

- ▲ STEP BOX, VARIOUS ROPES,
AEROBIC STEP BENCH



Jump for the Moon

LET'S "TRAIN LIKE AN ASTRONAUT!"

Adjust steps and procedures as appropriate for participants
Instructions for individual play:

Stationary:

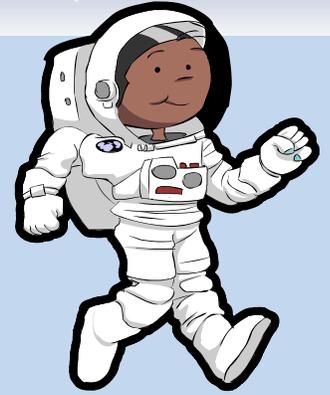
- ▲ With a jump rope, try to jump in place for 30 seconds.
- ▲ Rest for 60 seconds.
- ▲ Repeat three times.
- ▲ When mastered, proceed to moving.

Moving:

- ▲ Try to jump rope while moving across a smooth surface for 30 seconds.
- ▲ Rest for 60 seconds.
- ▲ Repeat three times.
- ▲ Repeat jump training two more times.
- ▲ Record observations before and after

TRY THIS! *Some ideas for Adapted Activity*

- ▲ Jump on trampoline while holding onto wall or partner
- ▲ Jump on step/box
- ▲ Step off a step/box
- ▲ Foot stomp
- ▲ Aerobic step bench
- ▲ Perform jumping jacks or jump in place (side-to-side, or back-to-front)
- ▲ Hop on one foot, then the other
- ▲ Hold onto table and jump in place
- ▲ Place hand on hallway and raise leg to hop down hallway
- ▲ Use a "pretend" jump rope
- ▲ Lay a rope on the ground and jump over it in a variety of ways
- ▲ Use a variety of objects to jump on, or over





Train Like an Astronaut: Adapted Physical Activity Strategies

Mission Control

YOUR MISSION

To improve balance and spatial awareness (one's understanding of themselves in relation to objects around them) you will perform throwing and catching techniques at the same time to maintain balance in challenging situations.

LINK TO SKILLS AND STANDARDS

APENS: 2.01.06.01 Develop and implement programs that stimulate vestibular, visual, and proprioceptive senses (Perception of movement from within the body.)

APENS: 2.03.06.01 Structure tasks and activities involving the flight of objects to control for problems in timing that are evident in certain types of disabilities.

Activity Specific Terms/Skills

Balance, coordination, stability, hand-eye coordination, concentration, reaction time

SPACE RELEVANCE

During and after space flight, astronauts have challenges with balance and spatial awareness. Through astronaut reconditioning, when they return to Earth, they relearn how to use their eyes, inner ear, and muscles to help control body movement.

WARM-UP & PRACTICE

- ▲ Dead Bug (lay on the ground and put one arm and opposite leg in the air. Move opposite arms and legs back and forth like a bug)
- ▲ Bird dog (get on all fours and put one arm in the air and extend your opposite leg behind you).
- ▲ Wall walk
- ▲ Stretch arms, close eyes and touch nose
- ▲ Holding a table/bar, lift one foot at a time (marching)
- ▲ Tai Chi movement
- ▲ Bounce and catching a ball
- ▲ Balance on one foot for 1 sec., gradually increase time



SUGGESTED ADAPTED EQUIPMENT:

- ▲ BALLOON OR BEACH BALLS
- ▲ SAND OR BEAN BAG OR SQUISH BALL
- ▲ VELCRO GLOVES
- ▲ GARBAGE CAN



Mission Control

LET'S "TRAIN LIKE AN ASTRONAUT!"

Adjust steps and procedures as appropriate for participants

Instructions for individual play:

- ▲ Bounce a tennis ball off the wall and try to catch it while balancing on one foot.
- ▲ Raise one foot up behind you, level with your knee.
- ▲ Count how many seconds you can stand on one foot while throwing the tennis ball against the wall. Try not to let the ball, or your foot, touch the floor. Try to balance for at least 30 seconds without falling.
- ▲ Continue to practice this activity over time until you can keep your balance for 60 seconds without having to start over.

Instructions for group play:

- ▲ Divide into groups of 6 or more players, and stand to form a circle.
- ▲ In your circle: Space apart more than arms-length apart.
- ▲ Try to balance on one foot while gently tossing a gym ball to a player across from you.
- ▲ If a player loses balance and both feet touch the floor, he or she should hop on one foot around the outside of the circle before rejoining the game.
- ▲ Record observations of this physical experience in your Mission Journal.

TRY THIS! *Some ideas for Adapted Activity*

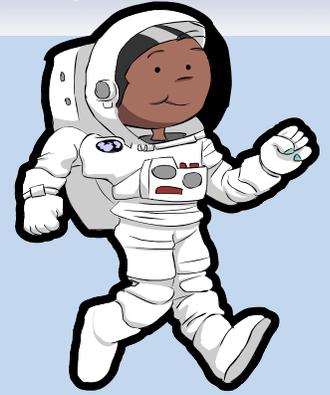
Divide into 3 missions (progress from 1 to 2 to 3):

Mission 1: Balance on one foot

Mission 2: Throwing and catching

Mission 3: Put Missions 1 and 2 together

- ▲ Vary the size of balls
- ▲ Velcro gloves (No Miss Mitts)
- ▲ Use chair, wall or bar to stabilize performer
- ▲ Throw ball to a target (on the floor, into a garbage can, on a wall, or Velcro)
- ▲ Using two hands to bounce or catch a beach ball
- ▲ Sand or bean bag drop
- ▲ Individual toss and catch between right and left hand
- ▲ Individually or in groups, isolate each skill in Mission 2; only throw or catch a ball
- ▲ Hold ball and squeeze and release
- ▲ Teach or review proper falling techniques in case they lose their balance





Train Like an Astronaut: Adapted Physical Activity Strategies

Speed of Light

YOUR MISSION

You will perform a time reaction activity using a ruler to practice your hand-eye reaction time and improve your concentration. You will collect, record, and analyze data during the skill-based experience in your Mission Journal.

LINK TO SKILLS AND STANDARDS

APENS: 2.03.04.01

- 🚩 Understand how certain types of disabilities may affect reaction time
- 🚩 Modify activities to allow more or less processing time, as needed

Activity Specific Terms/Skills

Hand-eye coordination, fine-motor skills, communication, team work, reaction time

SPACE RELEVANCE

Reaction time can be improved with training. Operating the robotic arm on the International Space Station (ISS) or landing the space shuttle requires crew members to have quick reaction times. Crew members must also be prepared for environmental hazards such as lighting and solar winds which could have a negative impact on reaction times.

Space shuttle pilots used simulators on Earth to improve hand-eye coordination and sharpen concentration skills. Experience has shown that shuttle pilots with better hand-eye coordination and sharper concentration skills had more success landing the shuttle after a 12 to 14 day mission.

WARM-UP & PRACTICE

- 🚩 Provide a stimulus to generate reactionary response
- 🚩 Squeeze stress balls; squeeze and release hands
- 🚩 Practice dropping or catching an object
- 🚩 Wrist circles
- 🚩 Catching a ball
- 🚩 Play catch
- 🚩 Passing a ball around
- 🚩 Running to pick-up objects and bring back
- 🚩 Touch each other's hands quickly
- 🚩 Play rock, papers, scissors



SUGGESTED ADAPTED EQUIPMENT:

- 🚩 POOL NOODLE
- 🚩 YARD STICK
- 🚩 TAP LIGHTS



Speed of Light

LET'S "TRAIN LIKE AN ASTRONAUT!"

Instructions for individual or group play: (Adjust steps and procedures as appropriate for participants)

You will complete this mission by yourself or with a leader.

One person will be the crew member and the other the trainer. You will sit or stand directly across from each other. Progress towards two players independently playing.

The crew member will do the following:

- ▲ Extend your dominant arm out in front of your body.
- ▲ Make a fist with your hand, thumb side up.
- ▲ Point your thumb and index finger forward, keeping them about 2 cm apart.
- ▲ Use your index finger and thumb to catch the ruler immediately after it has been released by the trainer.

The trainer will do the following:

- ▲ Hold the ruler between the outstretched index finger and thumb of the crew member's dominant hand.
- ▲ Line the top of the crew member's thumb level with the zero centimeter line on the ruler.
- ▲ Without warning, release the ruler letting it fall between the crew member's thumb and index finger. When the crew member catches the ruler, determine the distance between the bottom of the ruler and the top of the crew member's thumb.

Record the measurement in centimeters in your Mission Journal.

Repeat and record for a total of ten times.

Switch roles and repeat the procedure above for a total of ten trials.

TRY THIS! *Some ideas for Adapted Activity*

- ▲ Use a full-hand grip
- ▲ Perform while seated or supported against a wall
- ▲ Choose a yard stick or longer item
- ▲ Select brightly colored objects, or ones with wide stripes to visibly measure reaction speed
- ▲ Try a slower moving object such as a plastic bag
- ▲ Instead of catching the item, have participant drop an item (like a ruler or noodle) at the same time as instructor
- ▲ Pool noodle instead of yard stick
- ▲ Tap light or sound emitting device

