

MISSION X: MISSION HANDOUT



YOUR MISSION: **Do a Spacewalk!**

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.

Many activities require strength and *coordination* so you can support your weight and move without falling over. When you ride a skateboard, do push-ups, crawl across the ground, or lift your backpack, you are developing muscular strength and *coordination*.

MISSION QUESTION: How could you perform a physical activity that would increase muscular strength, as well as improve upper and lower body *coordination*?



MISSION ASSIGNMENT: **Coordinated Strength Training**

- ☐ 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.

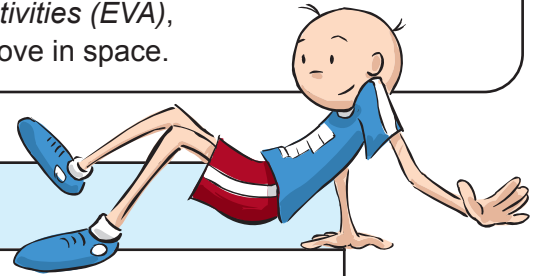
Follow these instructions to train like an astronaut.

Coordination:
Using your muscles together to move your body the way you want it to.

Extra Vehicular Activity (EVA):
Any human movement activity that takes place in space, outside the space vehicle, commonly called a spacewalk.

It's a Space Fact:

Just like you, 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. Before their mission, they practice these movements underwater with divers and specialists at the Neutral Buoyancy Laboratory (NBL) in Houston, Texas. Whether inside a space vehicle or outside doing *Extra Vehicular Activities (EVA)*, strong muscles and *coordination* help astronauts move in space.



Fitness Accelerations

- Complete a 6m (20 ft) relay with other classmates. Travel the measured distance doing the crab walk. Return to the starting place doing the bear crawl. Repeat three times. *Measure the distance for your student ahead of time or have the student's measure out the course themselves.*
- Increase the above acceleration by completing an 18 m (60 ft) relay. *Stress to your students that once they complete this acceleration they will have traveled 36 m (118 ft).*
- Continue the above acceleration. This time wear hand and ankle weights.

Participating in physical activities that use your arms and legs to support your body weight will help your muscles become stronger and improve your *coordination*.

Think Safety!

- **NASA engineers must design the surfaces of space vehicles with an astronaut's safety in mind. The surfaces must be free of obstacles so it is safe to move around.**
 - ⇒ Avoid obstacles, hazards, and uneven surfaces.
 - ⇒ Perform this activity only on a smooth surface to avoid injury to hands.
 - ⇒ Stay an arms length distance between you and others while moving. Look where you are going!
 - ⇒ Remember that drinking plenty of water is important before, during, and after physical activities.

Mission Explorations:

- ⇒ Try moving in a forward direction, then try backward. Do this for both the bear crawl and the crab walk.
- ⇒ In the crab position, play team soccer with a large inflatable ball.
- ⇒ Set up a course to travel through.
- ⇒ Perform these activities as a relay team.
- ⇒ Keep your feet stationary and use your arms to move your body around in a circle, like the hands of a clock.

Status Check: Have you updated your Mission Journal?



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

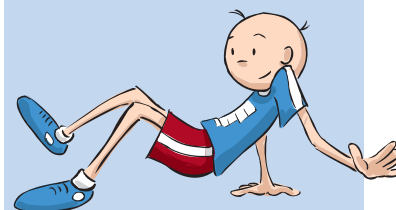
Gross motor skills, mobility, dexterity, flexibility

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.

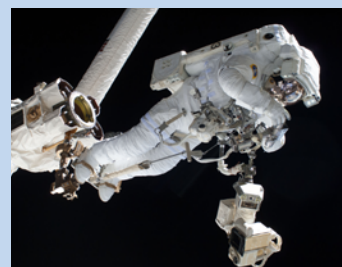
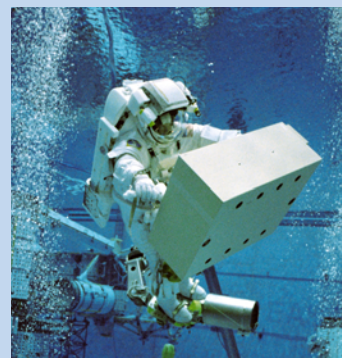
WARM-UP & PRACTICE

- ▲ 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.

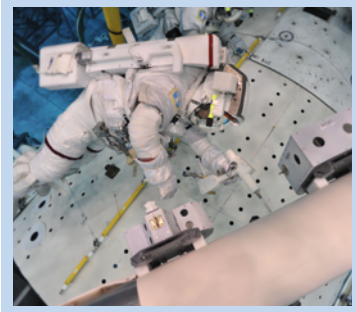
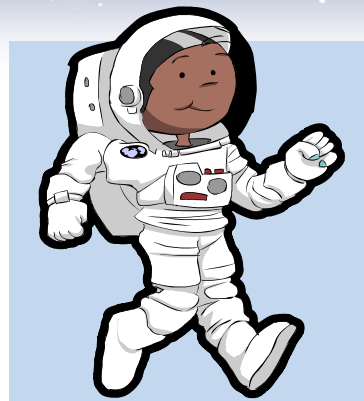
Crab Walk:

- ▲ 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





DO A SPACEWALK!

Learning Objectives

Students will

- perform the “bear crawl” and “crab walk” to increase muscular strength and improve upper and lower body coordination.
- record observations about improvements in muscular strength and coordination during this physical experience in the Mission Journal.

Introduction

In space, astronauts must be able to perform physical tasks that require muscle strength and coordination. One task that certain astronauts must be able to complete is an Extra Vehicular Activity (EVA), or spacewalk. Spacewalks allow a crew member to examine the outside of space vehicles (like the space shuttle and the International Space Station) and make repairs or modifications to the vehicle if necessary.

Although safely tethered to the space vehicle, the conditions under which a spacewalk is completed can be long and strenuous for the crew member. An astronaut must manipulate his or her fingers within large, thick gloves – sometimes for hours at a time. A spacewalk also involves coordinating arm and leg movements to move around, or “translate”. Astronauts prepare for EVAs by practicing these strenuous tasks and movements underwater at the Neutral Buoyancy Laboratory at NASA Johnson Space Center. By training on Earth, crew members learn to rely on their upper body strength and coordination to pull and secure themselves close to the vehicle and to complete their assigned tasks in space.

On Earth, muscle strength and coordination are important to being physically fit and help us perform a variety of everyday tasks. An increase in muscular strength and coordination can be developed by practicing exercises such as the “bear crawl” and the “crab walk”. Use the information below to help administer the Fit Explorer Mission Handout and help your students **train like an astronaut**.

Administration

Follow the outlined procedure in the Do a Spacewalk! Mission Handout. The duration of this physical activity can vary, but will average **25 minutes**. In order for students to perform at their maximum potential, positive reinforcement should be used throughout the activity.

Location

This physical activity should be conducted on a smooth, flat, and dry surface, at least 12 m (40 ft) in length.

The use of a closely placed metronome may assist small groups in keeping cadence in the repetitions.

Set-up

Students should maintain an arms length distance from each other.

Equipment

- Mission Journal and pencil
- tape measure or meter stick

Optional equipment:

- watch or stopwatch

For physical activity, students should wear loose-fitting clothing that permits freedom of movement.

Safety

- The traveled surface should be smooth, flat, and dry as students will be placing their hands on the floor.
- Proper distance between students will ensure safety for hands and feet and will help prevent collisions.
- Proper hydration is important before, during, and after any physical activity.
- Be aware of the signs of overheating.
- A warm-up/stretching and cool-down period is always recommended.

*For information regarding warm-up/stretching and cool-down activities, reference the *Get Fit and Be Active Handbook (ages 6-17)* from the President's Council on Physical Fitness and Sports at <http://www.presidentschallenge.org/pdf/getfit.pdf>.*

Monitoring/Assessment

Ask the Mission Question before students begin the physical activity. Have students use descriptors to verbally communicate their answers.

Use the following open-ended questions **before, during, and after** practicing the physical activity to help students make observations about their own physical fitness level and their progress in this physical activity:

- How do you feel?
- How far did you go?
- How does the “bear crawl” feel different from the “crab walk”?
- What do your arms and legs feel like now compared to when we first tried this physical activity together?
- Where is the energy you are using coming from?
- Why might muscular strength and coordination be important for a spacewalk?
- If you were doing a spacewalk, do you think you would feel the same way as you do on Earth?

Some quantitative data for this physical activity may include:

- rate of perceived exertion (on a scale of 1-10)
- length of time activity was performed without rest
- distance traveled
- length of rest period

Some qualitative data for this physical activity may include:

- technique performance
- identifying soreness in body parts

- identifying shakiness or muscle cramping

Collecting and Recording Data

Students should record observations about their physical experience developing muscular strength and coordination in their Mission Journal before and after the physical activity. They should also record their physical activity goals and enter qualitative data for drawing conclusions.

- Monitor student progress throughout the physical activity by asking open-ended questions.
- Time should be allotted for students to record observations about their experience in their Mission Journal before and after the physical activity.
- Graph the data collected in the Mission Journal on the graph paper provided, letting students interpret the data individually. Share graphs with the group.

Fitness Accelerations

- Complete a 6 m (20 ft) relay with other classmates. Travel the measured distance doing the crab walk, then return to the starting place doing the bear crawl. Repeat three times. *Measure the distance for your student ahead of time or have the student's measure out the course themselves.*
- Increase the above acceleration by completing an 18 m (60 ft) relay. *Stress to your students that once they complete this acceleration they will have traveled 36m (118ft).*
- Continue the above acceleration. This time wear hand and ankle weights. *For safety purposes, use 1-3lb ankle weights. Don't allow weights to exceed 3lbs.*

National Standards

National Physical Education Standards:

- Standard 1: Demonstrates competency in motor skills and movement patterns needed to perform a variety of physical activities.
- Standard 2: Demonstrates understanding of movement concepts, principles, strategies, and tactics as they apply to the learning and performance of physical activities.
- Standard 3: Participates regularly in physical activity.
- Standard 4: Achieves and maintains a health-enhancing level of physical fitness.
- Standard 5: Exhibits responsible personal and social behavior that respects self and others in physical activity settings
- Standard 6: Values physical activity for health, enjoyment, challenge, self-expression, and/or social interaction.

National Health Education Standards (NHES) Second Edition (2006):

- Standard 1: Students will comprehend concepts related to health promotion and disease prevention to enhance health.
 - 1.5.1 Describe the relationship between healthy behaviors and personal health.
- Standard 4: Students will demonstrate the ability to use interpersonal communication skills to enhance health and avoid or reduce health risks.
 - 4.5.1. demonstrate effective verbal and non-verbal communication skills to enhance health.

- Standard 5: Students will demonstrate the ability to use decision-making skills to enhance health.
 - 5.5.4 Predict the potential outcomes of each option when making a health-related decision.
 - 5.5.6 Describe the outcomes of a health-related decision.
- Standard 6: Students will demonstrate the ability to use goal-setting skills to enhance health.
 - 6.5.1 Set a personal health goal and track progress toward its achievement.
- Standard 7: Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.
 - 7.5.2 Demonstrate a variety of healthy practices and behaviors to maintain or improve personal health.

National Initiatives and Other Policies

Supports the *Local Wellness Policy*, Section 204 of the Child Nutrition and WIC Reauthorization Act of 2004 and may be a valuable resource for your Student Health Advisory Council in implementing nutrition education and physical activity.

Resources

For more information about space exploration, visit www.nasa.gov.

To learn about exercise used during past and future space flight missions, visit <http://hacd/jsc.nasa.gov/projects/ecp.cfm>.

Access fitness-related information and resources at www.fitness.gov.

View programs on health and fitness:

Scifiles™ The Case of the Physical Fitness Challenge
<http://www.knowitall.org/nasa/scifiles/index.html>.

NASA Connect™ Good Stress: Building Better Bones and Muscles
<http://www.knowitall.org/nasa/connect/index.html>.

For guidelines for fluid replacement and exercise:

National Athletic Trainer's Association (NATA)

- Fluid Replacement for Athletes (Position Statement)
<http://www.nata.org/statements/position/fluidreplacement.pdf>

For information on warm-up and cool-down stretches, visit:

American Heart Association (AHA)

- Warm-up and Cool-down Stretches
<http://americanheart.org/presenter.jhtml?identifier=3039236>

For information about rate of perceived exertion (RPE), visit:

Centers for Disease Control and Prevention (CDC)

- Perceived Exertion
http://www.cdc.gov/nccdphp/dnpa/physical/measuring/perceived_exertion.htm

Credits and Career Links

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National Aeronautics and Space Administration (NASA) contributors:

David Hoellen, MS, ATC, LAT

Bruce Nieschwitz, ATC, LAT, USAW

Astronaut Strength, Conditioning & Rehabilitation (ASCR) Specialists

NASA Johnson Space Center

Jacob Bloomberg, Ph.D.

Neuroscience Laboratory

NASA Johnson Space Center

<http://hacd.jsc.nasa.gov/labs/neurosciences.cfm>

R. Donald Hagan, Ph.D.

Exercise Lead, Human Adaptation and Countermeasures Office

Manager, Exercise Physiology Laboratory

NASA Johnson Space Center

<http://exploration.nasa.gov/articles/issphysiology.html>

Jean D. Sibonga, Ph.D.

Science Lead, Bone and Mineral Laboratory

NASA Johnson Space Center

<http://www.dsls.usra.edu/sibonga.html>

President's Council on Physical Fitness and Sports (PCPFS) contributors:

Thom McKenzie, Ph.D.

President's Council on Physical Fitness and Sports Science Board Member

Emeritus Professor of Exercise and Nutritional Sciences at San Diego State University

http://www.presidentschallenge.org/advocates/science_board.aspx#Thom

Christine Spain, M.A.

Director, Research, Planning, and Special Projects

President's council on Physical Fitness and Sports, Washington, D.C.