

PEANUTS and SPACE FOUNDATION

Shape Up, Snoopy!

OBJECTIVES

Students will:

- ◆ Read *Snoopy, First Beagle on the Moon!* and *Shoot for the Moon, Snoopy!* to gain background knowledge.
- ◆ Perform a 1-mile walk to improve lung, heart, and other muscle endurance.
- ◆ Record observations in their journals about this physical endurance experience using their lungs, hearts, and other muscles.
- ◆ Conduct physical experiments, and then record/analyze data to track the results of exercise.
- ◆ Demonstrate understanding that physical fitness is a requirement to be an astronaut.
- ◆ Demonstrate understanding of the importance of self-discipline in practicing an exercise routine.

SUGGESTED GRADE LEVELS

K – 5

SUBJECT AREAS

Science, Mathematics, Language Arts, Physical Education, and Health Education

TIMELINE

30 – 60 minutes initially; daily time to be determined by classroom teacher

NEXT GENERATION SCIENCE STANDARDS

- ◆ K-LS1-1: Use observations to describe the patterns of what plants and animals (including humans) need to survive.
- ◆ K-PS2-1: Plan and conduct an investigation to compare the effects of different impact levels or directions of pushing and pulling on the motion of an object.
- ◆ K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
- ◆ 1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
 - ◆ 1-LS1-2: Read texts and use media to determine patterns in the behaviors of parents and their offspring that help the offspring survive.
 - ◆ 3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.



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- ◆ 3-PS2-2: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
- ◆ 4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
- ◆ 5-PS2-1: Support an argument that the gravitational force exerted by Earth on objects is directed down.

21st CENTURY ESSENTIAL SKILLS

Critical Thinking/Problem Solving, Collaboration and Teamwork, Carrying Out Investigations, Peer Communication, and Constructing Explanations

BACKGROUND

- ◆ NASA has proudly shared an association with Charles M. Schulz and his American icon Snoopy since Apollo missions began in the 1960s. Schulz created comic strips depicting Snoopy on the Moon, capturing public excitement about America's achievements in space. In May 1969, Apollo 10 astronauts traveled to the Moon for a final trial run before the lunar landings took place on later missions. Because that mission required the lunar module to skim within 50,000 feet of the Moon's surface and "snoop around" to determine the landing site for Apollo 11, the crew named the lunar module Snoopy. Meanwhile, the Command Module was named Charlie Brown, after Snoopy's loyal owner.
- ◆ These books are a united effort between NASA and Simon & Schuster to generate interest in space among today's younger children.
- ◆ Even though astronauts work in a microgravity environment which requires very little effort to move around, it is still vitally important that astronauts stay healthy and fit.
- ◆ On the International Space Station (ISS) astronauts are required to exercise at least two hours daily to maintain their fitness levels.
- ◆ In the event of an emergency, astronauts must be fit enough to make repairs, close hatches, move equipment or rescue a crewmate. It is important that astronauts exercise and stay fit in the event of such emergencies.
- ◆ When an astronaut is conducting an Extra Vehicular Activity (EVA), or spacewalk, it requires a tremendous amount of energy, and an extraordinary fitness level. The astronaut's EVA suit is pressurized to keep the astronaut safe and keep his/her blood from bubbling out of their body. Unfortunately, this also means that



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the spacesuit acts like a giant blown up balloon. Every time the astronaut moves his or her arms or closes their hand around a tool it is like squeezing a giant balloon. Imagine having to squeeze extremely hard to close your glove around a tool and holding it there while you use the tool.

- ◆ One thing to remember is that when you exercise you typically perspire or sweat. In a microgravity environment, however, that can present a very life-threatening problem. In that environment sweat doesn't fall to the floor-the beads of sweat cling to the astronaut's skin. If too much sweat builds up, it is possible that an astronaut could drown in their own sweat. To prevent that, astronauts wear an LCG or Liquid Cooling Garment under their spacesuit. The LCG has tubes, similar to aquarium tubing, sewn into it. Water flows through the tubes. The temperature of the water is controlled by the astronaut to either cool them down or warm them up, so he or she doesn't sweat. This is important because when an astronaut is in the sun on a spacewalk the temperature can reach 250 degrees Fahrenheit and if he or she is in the shade the temperatures could plummet to -250 Fahrenheit.
- ◆ As we prepare to go back to the Moon and then travel to Mars, the astronauts that make these trips will have to be fit. Even though the Moon's and Mars' gravity is less than that of Earth's, if there is a problem or emergency the astronauts will have to be fit. Imagine you are an astronaut exploring Mars and your rover breaks down and you have to walk a couple of miles or kilometers back to your base. You must be fit to save yourself and your team.
- ◆ Astronauts spend years training for each space mission on Earth. They are supervised by doctors, nutritionists, and strength and conditioning specialists. Running and exercising on Earth not only increases muscle strength, but also heart and lung endurance. Once an astronaut goes into space, he or she will try to maintain that level of fitness with regular exercise.
- ◆ Astronauts must also exercise to maintain their bones. On Earth, our bones stay strong through good nutrition and exercise. Each time we exercise the impact strengthens our bones. Astronauts in a microgravity environment do not get to experience that impact. Without that resistance astronauts' bones would start to degrade and they would experience a medical condition called osteoporosis or a condition where the bones become brittle and fragile. Astronauts must exercise to prevent that from happening to their bones.
- ◆ On the ISS astronauts have various types of exercise equipment to stay healthy. One such device is the COLBERT or Combined Operational Load-Bearing External Resistance Treadmill. Another piece of equipment is the stationary bike. ARED or the



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Advanced Resistive Exercise Device provides resistance for the astronauts during exercise which is critical for strong bones and muscles.

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VOCABULARY

(Upper Primary) Heart Rate, Exercise, Cardiovascular, Exercise Circuit, Physiology

(Lower Primary) Breathe, Exercise, Activity, Heart Rate, Jump

MATERIALS

- ◆ Distance-measuring tools, such as a yardstick, meter stick, or other measuring device
- ◆ Time-measuring tools, such as a watch or stopwatch
- ◆ A heart rate monitor or pedometer — if physical devices are not available, there are many free apps available for download. (Please be consistent with your school's internet policy.)
- ◆ A measuring wheel (or a similar device for measuring actual distances). Teachers may want to premeasure distances to avoid confusion with measurements.
- ◆ Gym mats
- ◆ Mission journals (which can be a Science notebook, or something specifically designed by the teacher for these exercises)
- ◆ Pencils
- ◆ Graph paper
- ◆ Calculators (good for test practice)

LESSON PROCEDURES

Teacher's note: Direct references to the book(s) can be found after the procedural step, in parentheses.

1. Read *Snoopy, First Beagle on the Moon!* and *Shoot for the Moon, Snoopy!* to establish background knowledge for the entire class.
2. ****Safety tips: Read thoroughly**:**
 - a. When doing push-ups, they should be done with arms extended (but not locked), and level with the student's chest. For those students who have difficulty performing a standard push-up, have him/her begin with push-ups where the knees are bent and resting on the ground.
 - b. Impress upon the students that proper technique while performing exercises is extremely important to avoid injury.
 - c. Ensure students stay properly hydrated during exercise. Getting plenty of fluids before, during, and after all activity.



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- d. Watch out for overheating. If a student is sweating profusely and their skin is very red or if the student stops sweating, those can be signs of overheating. If a student stops sweating and his or her skin feels cool to the touch when they should be sweating and their skin should feel warm, get medical help immediately as that is a sign of heat stroke.
- e. Warm-up and cool-down periods with stretching and light jogging are always recommended.
3. Explain to the class, “Today we will discuss the importance of exercise for humans, and especially astronauts.” Open the book *Shoot for the Moon, Snoopy!* to p. 5 and p. 8 and explain that Snoopy needs to exercise to become an astronaut.
 4. Then explain how important it is to astronauts’ survival in space that they are able to execute these exercises precisely each time. Explain that astronauts often spend 2 hours a day exercising to stay in peak fitness condition.
 5. Describe how your students will be completing an “exercise circuit” that is similar to the one that astronauts use to train for spacewalks. Open the book *Shoot for the Moon, Snoopy!*, refer to pp. 9–12, and point out that Peppermint Patty explains to Snoopy that he needs to learn how to work in “low gravity.” Have a quick discussion about the effects of low gravity.
 6. Model for students how they will be recording their before, during, and after data in their “Mission Journals.” Explain that they should take each measurement precisely and record it in their journal. (Journal design data will be left up to the classroom teacher’s discretion.) Model how to record the data (including date/time, exercise type, minutes spent, repetitions and heart rate). Explain to students that they will include all their data and observations in this journal.
 7. Methods of collecting physiological data:
 - a. Wrist heart rate: Lay your index and middle fingers on the inside of your wrist below the base of your thumb, between the bond and tendon. This is your radial artery. When you feel a thump, that is your heartbeat. Count the number of beats during a 15 second interval. Multiply that number by 4 to get the number of beats per minute.
 - b. Neck heart rate: Lay your index and middle fingers on your neck beside your larynx or windpipe. When you feel a thump, that is your heartbeat. Count the number of beats during a 15 second interval. Multiply that number by 4 to get the number of beats per minute.
 - c. Respirations: Count the number of times you take a breath during a 30 second interval. Multiply that number by 2 to get your respirations per minute.



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8. Explain the following exercises to the students and demonstrate how they should be performed. Stress that it is important to pay attention to their form, so they are not injured. Explain to them that everyone should work at their own pace, and that this is not a competition, but a scientific experiment that involves the study of exercise (physiology).
9. Note: During the setup of these activities you can design and arrange the activities to best suit your learning environment. These activities are not arranged in any set order. Have students complete the following exercises as you see fit:
 - a. Sprint 100 meters or 100 yards then walk back that distance. Repeat this 4 times. If that distance is too long for your environment or for the students, start with 50 meters/ yards and work up to 100. Students may also run the distance around the gym.
 - b. Sprint intervals on a basketball court - sprint the distance from one end line of the court to the other, touch the end line on the floor with your hand, and then reverse immediately toward where you started and touch the floor. Repeat this as many times as you feel the students can handle. ****Safety tip****: Remind students about running safely. Overexerting themselves and running too fast into the gym walls are not safe.
 - c. Repeat the above intervals, this time increasing the distance by doing the intervals 4 times instead of twice.
 - d. Squats - Have students stand with feet at shoulder width and toes pointing forward. Squat down keeping the back straight. Make sure students aren't bending at the waist. Complete 5 squats, holding the last squat for 30 seconds. Do 5 more squats, then rest for 60 seconds. Repeat 2 more times, for a total of 30 squats.
 - e. Push-ups - Complete 10-25 pushups. Rest for two minutes then complete 10-25 more.
10. Have the students think about the following questions and record the data in their journals. Use their answers to determine how students felt physically and mentally, keeping in mind that mental conditioning is also very important for astronauts — they have to be very quick and efficient mentally.
 - a. "How do you feel physically? Mentally?" (answers will vary)
 - b. "What happened to your heart rate?" (during the activity, heart rate goes up; after the activity heart rate will go down)
 - c. "Where is the energy you are using coming from?" (the food you eat)
 - d. "What do your legs feel like now, compared to when we first tried this physical activity?" (answers will vary)



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- e. “Can you describe how your breathing changed during the physical activity?” (breathing increased)
 - f. “How did your body cool itself during the physical activity?” (sweating)
 - g. “How well would your body cool itself if you were wearing a thick coat?” (not very efficiently-wearing proper clothing is important)
 - h. “What are some challenges astronauts might face while completing these exercises in space?” (answers will vary)
 - i. “How might these challenges affect their ability to perform these maneuvers in space?” (answers will vary)
11. Monitor as students complete their journal entries.
 12. Explain to the students that they are about to complete a graph using the data that they have collected. Discuss the importance of accurately recording data as you make the graph and demonstrate how they should create a similar graph. (Note: Each teacher should choose the appropriate graphing device to display the student data.)
 13. Explain that there are many variables they can graph.
 - a. Some data of this physical activity may include:
 - Heart rate (beats per minute)
 - Respiration rate (breaths per minute, before and after the activity)
 - Feeling of physical well-being on a scale of 1-10. (before and after the activity)
 - Feeling of mental well-being on a scale of 1-10. (before and after the activity)
 - Identifying soreness in body parts.
 14. Model how to complete the graph by entering the data figures correctly. Clarify any misunderstandings.
 15. Open *Shoot for the Moon, Snoopy!* to pp.11–12, and ask students if they think that this type of training would benefit Snoopy, and why.
 16. Discuss what positive benefits this type of exercise routine could have for the students. Ask how they think they could improve their routine.
 17. Complete the lesson by reviewing how to record exercise data and the reasons for the importance of exercise. Discuss how a low-gravity environment is not always the best to work out in.
 18. Conduct these activities, daily, for one month. Have students note the increase or decrease in any recorded data. Why does this happen? (exercise increases fitness levels and stamina-heart rate and breathing rates should go down; number of repetitions, feelings of physical and mental fitness should go up)



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EXTENSIONS

- ◆ Students can keep track of their progress over time and use their data to analyze how effective their workouts are.
- ◆ Students can determine if different exercises produce different results (changing variables).
- ◆ Older Students can convert the sizes of the courses from feet to meters, etc. Keep track of the conversions.
- ◆ Students can compute the mean, median, and mode of their data.
- ◆ Blow up a long balloon and have students squeeze the balloon as many times per minute as they can. Have them share how their hand feels.

RESOURCES

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Shape Up, Snoopy Data Collection Sheet

Name _____

Activity:		
Number of repetitions:		
Data	Before the Activity	After the Activity
Heart rate	/minute	/minute
Respirations	/minute	/minute
Physical Well-being		Mental Well-being
Scale of 1-10: _____		Scale of 1-10: _____
Notes:		Notes:

Activity:		
Number of repetitions:		
Data	Before the Activity	After the Activity
Heart rate	/minute	/minute
Respirations	/minute	/minute
Physical Well-being		Mental Well-being
Scale of 1-10: _____		Scale of 1-10: _____
Notes:		Notes: