

GRADE 5 PHYSICAL EDUCATION & HEALTH

First edition

5 units

10 lessons • one quarter

A video for every lesson

FIRST EDITION

COURSE GUIDE

This short course follows five strands of health and fitness through one quarter of the school year: keeping active, water, food, strength and the heart and lungs. Each lesson is built around a real person or moment: Eric Liddell refusing to race on a Sunday at the 1924 Paris Olympics, Jerry Morris counting heart attacks among London bus drivers and conductors, Robert Cade studying the sweat of Florida football players in 1965, Daniel's ten-day test in Babylon, James Lind's twelve sailors aboard HMS *Salisbury*, William Harvey tracing the circuit of the blood, and Roger Bannister breaking four minutes for the mile.

Every lesson follows the same path. First comes **the story**. Then **how they figured it out**: the question they faced, what they tried and what they measured. Then **how your body works**, explained for a fifth grader: muscles, bones, sweat, kidneys, vitamins, heart and lungs. Last, **try it**: the student does a real workout, keeps a water or food log, prepares a snack or runs a timed course, records it in a fitness journal, and tries to improve on the second try.

God made the body good, and He gave it to us to care for. This course is about stewardship, strength, joy in movement and good habits. It is never about size or looks: students are measured only against their own effort and improvement. The old Latin saying *Fabricando fit faber*, “by making, one becomes a maker,” fits here too: strength and fitness are built the same way, by practice, a little more each week. The quarter ends with a family fitness day, when the whole household moves, plays and eats together.

Most videos come from trusted health and teaching channels: Nemours KidsHealth, The Hospital for Sick Children, TED-Ed, Peekaboo Kidz (Dr. Binocs), Learn Bright, the BBC and its archive, and a few others chosen lesson by lesson. Every video was previewed for accuracy and for modest dress. A few are cartoons made for a

slightly older audience; the lesson notes say so. Some channels end with an invitation to subscribe; you can stop the video when the teaching ends. Watch together, and do the warm-up moves along with any follow-along workout.

Start with Lesson 1.1 →

WHO IT IS FOR

Written for students in grade 5 (about ages 10–11) who read independently and can tell time, add and multiply, and make a simple bar graph. A parent or teacher reads along, supervises every activity and helps in the kitchen. Nothing needs to be bought: every activity uses household things such as a towel, a sturdy chair, a step, a wall, measuring cups and a timer.

HOW TO USE THIS COURSE

1. **The weekly rhythm.** The quarter has 10 lessons, one a week, each with three sessions of 30–40 minutes. Session 1 is the warm-up, the video, the teaching and the picture study, with a little movement. Session 2 is the activity (the workout, the game or the kitchen task) and the fitness journal. Session 3 repeats the activity and tries to improve on it. In the second week of each unit, use part of Session 3 for the unit review and the unit challenge. On the other days, aim to move for at least 60 minutes in play, chores, sport and walking.
2. **Check with your doctor first.** A parent should know about and supervise every activity. If your child has asthma, a heart condition, diabetes, a recent injury or any other health concern, check with your doctor before starting, and follow the doctor's advice about what to change.
3. **Story, then science, then doing.** The core ideas are written to be read aloud or read by the student. The paragraphs marked *The story* and *How they figured it out* tell what happened; *How your body works* explains the science; *Try it* explains the activity. After each paragraph, ask the student to tell it back in his or her own words.
4. **Picture study.** Each lesson has one public-domain painting, drawing or historic photograph chosen for what it shows about play, work, food, water or rest. Look at it quietly for two minutes, put it away and tell everything you remember, then bring it back and work through the “look for” items and questions.

5. **The fitness journal.** Use any notebook for the whole quarter. Every activity is done, recorded and done again: reps, seconds, minutes, cups of water, colors on a plate, heartbeats. Date every page. Write how it felt and what you will try next time. Honest records matter more than big numbers.
6. **Health, not looks.** In this course we talk about what bodies can do and how to care for them, never about size or shape. We do not weigh children, count calories or call foods bad. Foods are “everyday foods” and “sometimes foods,” and feasts and treats are good gifts in their place. Grades come from effort, consistency and personal improvement, never from comparing one child with another.
7. **Optional books and gear.** Some units list a book, a free government or children’s-hospital web page, or simple gear such as a jump rope or a water bottle with ounce marks. They are never required.
8. **Unit review and unit challenge.** Each unit ends with a short review (30 points) and a unit challenge: a week-long activity log, a water log with a chart, a planned and prepared lunch, a two-week bodyweight challenge, or a pacing chart for a timed run. Keep the challenge pages in a folder.
9. **Safety.** Read the safety note before each activity. Warm up first and cool down after. Clear a space with a flat, non-slip floor and wear good shoes. Stop and tell an adult right away at chest pain, dizziness, fainting, trouble breathing or sharp pain; tired muscles are normal, but joint pain is not. Strength work in this course uses body weight only. A parent supervises knives and the stove, and checks for food allergies before any tasting. Exercise and food are never used as a reward or a punishment.
10. **The family fitness day.** In the last week, plan and lead a family fitness day: stations from every unit, a water table, a healthy snack the student helps make, and a family relay or walk-run. Everyone moves at his or her own pace.

SCOPE AND SEQUENCE

UNIT 1 • WEEKS 1–2

Keeping Active

Why God made bodies to move and how much activity children need, through Eric Liddell’s Sunday decision at the 1924 Olympics; and Jerry Morris’s London bus study, sitting less and a week-long activity log.

- 1.1 A Temple to Care For: Eric Liddell
- 1.2 Sit Less, Move More: Jerry Morris and the London Buses

UNIT 3 • WEEKS 5–6

Nutrition

Daniel’s ten-day test, the balanced plate and a ten-day rainbow challenge; and James Lind’s fair test of scurvy cures aboard HMS *Salisbury* in 1747, vitamins and minerals.

- 3.1 Daniel’s Ten-Day Test
- 3.2 James Lind and the First Fair Test

UNIT 5 • WEEKS 9–10

Aerobic Training

William Harvey and the circuit of the blood, pulse and heart rate; and Roger Bannister’s four-minute mile, pacing and intervals, a timed run and a retest, and the family fitness day.

- 5.1 William Harvey and the Heart’s Circuit
- 5.2 Roger Bannister’s Four-Minute Mile

UNIT 2 • WEEKS 3–4

Hydration

What water does in the body and how much children need, with a three-day water log; and Robert Cade’s 1965 study of Florida football players, sweat, salt, electrolytes and heat safety.

- 2.1 Water: Your Body’s Coolant and Delivery Service
- 2.2 Sweat, Salt and the Florida Gators

UNIT 4 • WEEKS 7–8

Strength

The legend of Milo of Croton and getting stronger little by little, with rest, food and sleep; and Jack LaLanne and good form in the squat, push-up, plank and lunge, with a two-week bodyweight challenge.

- 4.1 Milo of Croton and Getting Stronger Little by Little
- 4.2 Good Form: Jack LaLanne and the Bodyweight Basics

WEEKLY PACING CALENDAR

WEEK	PLAN
1	- Session 1: Lesson 1.1 A Temple to Care For: Eric Liddell: warm-up, video, teaching and picture study - Session 2: Lesson 1.1 activity and fitness journal - Session 3: Repeat the activity, try to improve, and log it <i>Three short sessions a week is the usual rhythm: one to learn, two to move. Keep moving every day, even on days with no lesson.</i>
2	- Session 1: Lesson 1.2 Sit Less, Move More: Jerry Morris and the London Buses: warm-up, video, teaching and picture study - Session 2: Lesson 1.2 activity and fitness journal - Session 3: Repeat the activity, try to improve, and log it - Session 3 (end of unit): Unit 1 review and unit challenge
3	- Session 1: Lesson 2.1 Water: Your Body's Coolant and Delivery Service: warm-up, video, teaching and picture study - Session 2: Lesson 2.1 activity and fitness journal - Session 3: Repeat the activity, try to improve, and log it
4	- Session 1: Lesson 2.2 Sweat, Salt and the Florida Gators: warm-up, video, teaching and picture study - Session 2: Lesson 2.2 activity and fitness journal - Session 3: Repeat the activity, try to improve, and log it - Session 3 (end of unit): Unit 2 review and unit challenge
5	- Session 1: Lesson 3.1 Daniel's Ten-Day Test: warm-up, video, teaching and picture study - Session 2: Lesson 3.1 activity and fitness journal - Session 3: Repeat the activity, try to improve, and log it
6	- Session 1: Lesson 3.2 James Lind and the First Fair Test: warm-up, video, teaching and picture study - Session 2: Lesson 3.2 activity and fitness journal - Session 3: Repeat the activity, try to improve, and log it - Session 3 (end of unit): Unit 3 review and unit challenge
7	Session 1: Lesson 4.1 Milo of Croton and Getting Stronger Little by Little: warm-up, video, teaching and picture study

WEEK	PLAN
	• Session 2: Lesson 4.1 activity and fitness journal • Session 3: Repeat the activity, try to improve, and log it
8	• Session 1: Lesson 4.2 Good Form: Jack LaLanne and the Bodyweight Basics: warm-up, video, teaching and picture study • Session 2: Lesson 4.2 activity and fitness journal • Session 3: Repeat the activity, try to improve, and log it • Session 3 (end of unit): Unit 4 review and unit challenge
9	• Session 1: Lesson 5.1 William Harvey and the Heart's Circuit: warm-up, video, teaching and picture study • Session 2: Lesson 5.1 activity and fitness journal • Session 3: Repeat the activity, try to improve, and log it
10	• Session 1: Lesson 5.2 Roger Bannister's Four-Minute Mile: warm-up, video, teaching and picture study • Session 2: Lesson 5.2 activity and fitness journal • Session 3: Repeat the activity, try to improve, and log it • Session 3 (end of unit): Unit 5 review and unit challenge <i>Last week. Hold a family fitness day: the student leads the family through a warm-up, a favorite activity from each unit and a cool-down, serves a healthy snack and water, and shows the fitness journal.</i>

MATERIALS

Fitness journal (any notebook)

One for the quarter: logs, tallies, heart-rate tables, water charts, plate drawings, how it felt and what to try next time.

A timer or stopwatch (a phone timer works)

For timed holds, work-and-rest circuits, pulse counts and the timed run.

Good athletic shoes and comfortable, modest clothes for exercise

Every activity lesson.

A towel or mat, a sturdy chair that will not slide, a wall and a bottom stair or sturdy step

For push-ups, planks, step-ups and stretches.

A reusable cup or water bottle and a measuring cup

For the water logs in Unit 2. A bottle with ounce marks is handy but not needed.

Measuring spoons, a few drink labels and a ruler

For the drink-label lab in Lesson 2.2.

Fruits and vegetables of many colors, two apples, a lemon and an orange

For the rainbow challenge and the fair test in Unit 3.

Two kitchen or outdoor thermometers, two small cloths and a fan

For the cooling test in Lesson 2.2. One thermometer is enough if you test one after the other.

Sidewalk chalk or a few cones (cups or shoes work)

To mark a running loop, stations and lap lines.

Colored pencils and graph paper

For bar graphs of heart rate, water and reps.

GRADING

Grades come mostly from the activities and the fitness journal, because fitness is learned by doing, recording and doing again. A student who tries hard, records honestly and improves on his or her own numbers earns full credit, whatever those numbers are.

PART	%
Activities (effort, participation and good form)	40
Fitness journal (dated logs, tables, graphs and reflections)	25
Unit reviews	15
Unit challenges	20

Scale: A 90–100, B 80–89, C 70–79, D 60–69. Below 60: repeat the activity or review with help.

- Fitness marks reward effort, consistency and improvement against the student’s own earlier numbers. They never depend on body size, body measurements or comparison with other children.

- A journal page earns full marks when it has a date, the numbers with units (reps, seconds, cups, beats per minute), a sentence about how it felt and a sentence about what to try next time.
- Unit reviews may be done orally for a student who writes slowly; the parent writes down the answers.
- A child who finds sport hard, or who has a health condition that limits some activities, is graded on faithful effort within what the doctor allows. Every body can grow stronger; the goal is faithfulness, not being the best.

A NOTE TO PARENTS

You do not need to be a coach to teach this course. Read the story aloud together, watch the video, and then be the timer, the counter and the cheerleader. Do the workouts alongside your child when you can. Children copy what they see, and a parent doing push-ups on the living-room floor teaches more than any speech.

Keep the talk about bodies on what they can do and how to care for them. Praise effort, good form and honest records, not numbers alone. If a sibling or friend is faster or stronger, steer back to the journal: “Did you beat your own number from last week?” Exercise is good for the body, and Scripture says plainly that godliness is better still (1 Timothy 4:8). We move, eat, drink and rest to the glory of God.

Most of the stories are cheerful. The lesson on James Lind mentions that scurvy was a dangerous sickness at sea; it is told simply and briefly, with the focus on how a careful fair test found the cure.

UNIT 1

KEEPING ACTIVE

Your body is not a machine you happen to live in. It is a gift from God, fearfully and wonderfully made, and it was made to move: to run, climb, carry, balance and play. In this unit you will meet Eric Liddell, the Scottish runner who would not race on a Sunday at the 1924 Paris Olympics and then won the 400 metres instead. You will learn how much activity children need, what “moderate” and “vigorous” mean, and why rest is part of God’s design too. Then you will take a five-station fitness check that becomes your own starting line for the quarter.

Next you will ride the London buses of 1950 with Dr. Jerry Morris, who noticed that the conductors who climbed the stairs all day had fewer heart attacks than the drivers who sat. His study helped show the world that everyday movement protects the heart. You will keep a log of a whole day, minute by minute, and then plan a better one with movement breaks.

PREREQUISITES

- Can tell time and use a stopwatch or phone timer
- Can add minutes and make a simple bar graph
- Has a doctor's go-ahead if there is any health concern (see How to use)

MASTERY CHECKLIST

- ☐ I can tell the story of Eric Liddell's Sunday decision and his 400-metre race, and explain why caring for my body honors God.
- ☐ I can say how much activity children need each day and give examples of moderate, vigorous, muscle-strengthening and bone-strengthening activity.
- ☐ I can explain what Jerry Morris found when he compared bus drivers and conductors, and why sitting for long stretches is not good for the body.
- ☐ I can do a warm-up and a cool-down, take my five-station fitness check, and record and retest my own numbers.
- ☐ I can keep an honest activity log and plan movement breaks into a day.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- ***Eric Liddell: Something Greater Than Gold***, by Janet and Geoff Benge (YWAM Publishing, **Christian Heroes: Then & Now**): A Christian biography for readers about 10–13, from his boyhood to his years as a missionary in China. A good family read-aloud for Lesson 1.1.
- **Move Your Way (U.S. Department of Health and Human Services)**: Free. Plain-language pages, videos and printable fact sheets on the *Physical Activity Guidelines for Americans*, including what children need each week. For parents and older students.
- **A simple pedometer or step counter**: Optional, for counting steps on your log days in Lesson 1.2 and the unit challenge. A tally of minutes works just as well.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

1.1 A Temple to Care For: Eric Liddell

3 sessions of 30–40 minutes

1.2 Sit Less, Move More: Jerry Morris and the London Buses

3 sessions of 30–40 minutes

UNIT 1 REVIEW

Answer each question in complete sentences. The review is worth 30 points. It may be done orally, with a parent writing down the answers.

1. **5 pts**

Why did Eric Liddell refuse to run the 100 metres at the 1924 Olympics, and what did he do instead?

2. **5 pts**

How many minutes of physical activity do children ages 6–17 need each day? Name the three kinds of activity they need on at least 3 days a week.

3. 5 pts

Explain the talk test. Give one example of moderate activity and one of vigorous activity.

4. 5 pts

Whom did Jerry Morris compare in his 1953 study, and what did he find?

5. 5 pts

What would happen if you sat still for three hours in a row without a break?

What could you do about it?

6. 5 pts

Name the five stations of your fitness check. Why do you compare your results only with your own earlier numbers?

ANSWER KEY

1. The heats were on a Sunday, which he kept as the Lord's Day for rest and worship. He trained for the 400 metres instead and won it in Paris in 47.6 seconds, a world record.
2. At least 60 minutes a day, mostly moderate or vigorous. On at least 3 days a week: vigorous activity, muscle-strengthening activity and bone-strengthening activity.
3. If you can talk but not sing, it is moderate (for example, a brisk walk or easy bike ride). If you can say only a few words before taking a breath, it is vigorous (for example, running, jumping rope or a fast game of tag).
4. London double-decker bus drivers, who sat all day, and conductors, who walked and climbed stairs all day. The conductors had fewer heart attacks, and theirs were usually less serious.
5. Your leg muscles would go quiet, blood would flow more slowly, and your back and hips could stiffen; you might feel sluggish and find it harder to concentrate. Take a short movement break every 30 to 60 minutes: stand, walk, do squats or step-ups.
6. Squats, push-ups, plank hold, one-foot balance and step-ups. Because everyone starts in a different place; the goal is faithful effort and personal improvement, not being better than someone else.

UNIT CHALLENGE: MY ACTIVE WEEK

Keep an activity log for seven days in a row. Each day, record your minutes of moderate and vigorous activity, what you did, and whether you included muscle- or bone-strengthening activity. Add at least two movement breaks to every school day. At the end of the week, make a bar graph of your daily active minutes with a line drawn across at 60 minutes, and write a short paragraph: on how many days did you reach 60 minutes, what helped, and what will you change next week? Finish by retesting your five-station fitness check and adding the new numbers to your table.

LOOK FOR	WHAT IT MEANS
Complete record	All seven days logged honestly, with activities and minutes written down each day.
Variety	The week includes vigorous, muscle-strengthening and bone-strengthening activity on at least 3 days, and movement breaks on school days.
Graph	A neat bar graph with a title, labeled days, minutes on the side and a 60-minute line.
Reflection and retest	A paragraph that names what helped and one specific change, and a retest of the five stations compared with Day 1.

1.1 A TEMPLE TO CARE FOR: ERIC LIDDELL

OBJECTIVES

- Tell the true story of Eric Liddell’s decision not to race on a Sunday at the 1924 Olympics and his victory in the 400 metres.
- Explain why God made bodies to move, and state how much activity children ages 6–17 need each day and week.
- Tell the difference between moderate and vigorous activity using the talk test.
- Take a five-station fitness check, record the results, and retest to improve.

Warm-up. March in place for 1 minute, lifting your knees high. Then do 10 big arm circles forward and 10 backward, 10 jumping jacks, and 5 slow squats. Last, jog in place for 30 seconds. Put your hand on your chest. What changed? Is your heart beating faster? Are you breathing harder? Think about it: what was your body made to do?

WATCH

Olympics: The true story behind Chariots of Fire | BBC Global

BBC Global • 2:49

<https://www.youtube.com/watch?v=FRIOnK52JZw>

WHEN TO WATCH

After the story paragraph. Listen for when Eric Liddell found out the 100-metre heats were on a Sunday.

Note: Short clips from a 1984 BBC documentary in which Liddell’s friend and his sister remember him, with film of the 1924 races. It also explains that the 1981 film *Chariots of Fire* changed some facts.

BACKUP VIDEO

The Flying Scotsman takes gold and sets a new record - Eric Liddell - Paris 1924 Olympic Games

Olympic Games • 1:12

<https://www.youtube.com/watch?v=IYNUxdolacA>

To see his unusual running style in the 400-metre final, head back and arms pumping.

KEY TERMS

physical activity

Any movement of your body that uses energy: playing, walking, chores, sport and exercise.

vigorous activity

Activity so hard that you can say only a few words before taking a breath: running, a fast game of tag, jumping rope, soccer.

bone-strengthening activity

Activity with jumping or impact that makes bones stronger: running, hopping, skipping, jumping rope.

moderate activity

Activity that makes you breathe harder and warms you up, but you can still talk (not sing): a brisk walk, a bike ride on flat ground, raking leaves.

muscle-strengthening activity

Work that makes muscles push or pull hard: climbing, push-ups, squats, carrying, tug-of-war.

stewardship

Taking good care of something that belongs to someone else. Your body is a gift from God to care for.

CORE IDEAS

The story. Eric Liddell was born in 1902 in Tianjin, China, where his Scottish parents were missionaries. He grew up to be the fastest sprinter in Britain and was chosen to run the 100 metres, his best race, for Great Britain at the 1924 Olympic Games in Paris. When the schedule was published months before the Games, Eric saw that the heats of the 100 metres would be held on a Sunday. He believed Sunday was the Lord's Day, set apart for rest and worship, so he quietly said he would not run. Some people in Britain criticized him for it. Eric did not argue; he simply began training for the 400 metres instead, a longer race that was not his specialty. In Paris on July 11, 1924, he won the 400-metre final in 47.6 seconds, a world record at the time. He also won a bronze medal in the 200 metres. The next year he went back to China as a missionary teacher.

How they figured it out. The 400 metres is one full lap of a track, and it is a very different race from the 100. Eric had run it before, but a sprinter cannot hold top speed for a whole lap, so Eric and his trainer, Tom McKerchar, had only a few months to build the endurance to keep going hard when his legs burned and his breath ran short. He trained steadily, rested on Sundays, and arrived in Paris ready.

Eric ran with his head thrown back and his arms flailing, a style that made coaches wince, but he had trained his heart, lungs and legs to do the work. His story shows two things we will meet all quarter: training changes the body little by little, and rest is part of the plan, not a break from it.

How your body works. God made your body to move. Muscles pull on bones to make every motion, your heart and lungs deliver oxygen, and moving often makes all of them stronger. Health experts say children and teens ages 6–17 need **at least 60 minutes of physical activity every day**. Most of it should be moderate or vigorous, and on at least 3 days a week it should include vigorous activity, muscle-strengthening activity (climbing, push-ups, carrying) and bone-strengthening activity (running, jumping, skipping). Use the **talk test**: if you can talk but not sing, you are working at a moderate level; if you can say only a few words before taking a breath, that is vigorous. Children who move every day sleep better, think more clearly and grow stronger bones and hearts. Rest matters too: children your age need about 9 to 12 hours of sleep a night, because the body repairs and grows during sleep.

Think it through. Saint Paul wrote that your body is a temple of the Holy Spirit and that you should “glorify God in your body.” Eric Liddell lived that out in two ways at once: he trained his body hard, and he honored God’s day of rest. Exercise is good, but it is not the most important thing; Paul also wrote that bodily exercise has some value, but godliness is valuable in every way (1 Timothy 4:8). We care for our bodies because they are a gift, not to show off, and not to be better than anyone else.

Try it. This week you will set your own starting line with a five-station fitness check: squats, push-ups, a plank, a one-foot balance and step-ups. You will compare your numbers only with yourself. In Session 3 you will do it again, and later in the quarter you will see how much you have grown.

PICTURE STUDY



Eric Liddell at the 1924 Olympic Games, Winner of the 400 Metres, Unknown press photographer, 1924 · Photograph · Paris; reproduced on Wikimedia Commons
Image: [Wikimedia Commons](#), public domain

This photograph was taken at the Paris Olympics in 1924, the summer Eric Liddell won the 400 metres. He is wearing the plain running clothes of his day: a cotton vest, long shorts and leather running shoes with spikes.

Look closely

- Find his race number. Runners still wear numbers today so judges can tell who is who at the finish.
- Look at how he is standing. Does he look tense or relaxed? What might a runner do in the minutes before a big race?
- Look at his shoes. How are they different from the shoes you wear to run?
- Look at the ground behind him. Tracks in 1924 were made of packed cinders, not the rubber tracks of today.

Talk about it

1. Eric trained for months for a longer race than his favorite. What does that tell you about how the body changes with practice?
2. Why do you think he was willing to give up his best race? What did he care about more than a medal?

3. How could you honor God with your body this week?

Safety first. A parent should know about and supervise all activity. If you have asthma, a heart condition, diabetes, a recent injury or any health concern, check with your doctor before starting this course. Warm up first and cool down after; stop and tell an adult right away if you feel chest pain, dizziness, faintness, trouble breathing or sharp pain (tired muscles are normal, but joint pain is not).

ACTIVITY

My Starting Line: A Five-Station Fitness Check

Eric Liddell knew where he was starting from, and he trained to get better. You will do the same. Today you will measure five things your body can do. These numbers belong to you alone. You will never compare them with anyone else's, only with your own numbers later in the quarter.

You will need

- A timer or stopwatch, and a helper to time and count
- A towel or mat on a flat, non-slip floor, and a wall
- The bottom stair of a staircase, or a sturdy step about 6–8 inches high
- Fitness journal and pencil
- A cup of water

Steps

1. **Warm up (5 minutes).** March in place for 1 minute, then 10 arm circles each way, 10 jumping jacks, 10 slow squats, 5 walking lunges on each leg and 30 seconds of easy jogging in place. Draw a table in your journal with five rows (one for each station) and two columns: “Day 1” and “Retest.”
2. **Station 1: Squats (30 seconds).** Stand with feet a little wider than your hips, toes slightly out. Sit back and down as if onto a chair, chest up, knees pointing over your toes, until your thighs are about level with the floor; then stand tall. Your helper counts only squats with good form. Record the number. Rest 1 minute.
3. **Station 2: Push-ups (30 seconds).** Choose one kind and use the same kind every time you retest: wall push-ups (hands on the wall at shoulder height, feet a big step back), knee push-ups, or full push-ups. Keep your body straight as a board from head to knees or heels, lower until your chest is about a fist from the wall or floor, and push back up. Count good-form push-ups. Record the number and the kind. Rest 1 minute.
4. **Station 3: Plank hold (up to 60 seconds).** Rest on your forearms and toes (or forearms and knees), elbows under your shoulders, body in a straight line,

eyes looking at the floor. Breathe normally. Your helper stops the clock when your hips sag or lift high. Record the seconds. Rest 1 minute.

5. **Station 4: One-foot balance (up to 60 seconds each side).** Stand on your right foot with your hands on your hips and your left foot resting against the inside of your right ankle or calf. Fix your eyes on one spot. The clock stops when your hands leave your hips or your lifted foot touches the floor. Repeat on the left foot. Record both times. Rest 1 minute.
6. **Station 5: Step-ups (60 seconds).** Step up onto the bottom stair with your right foot, bring the left up, step down right, then left: that is one. Hold the handrail if there is one. Switch the leading foot halfway through. Count your step-ups. Then take your pulse at your wrist for 15 seconds and write it down.
7. **Cool down (5 minutes).** Walk slowly around the house or yard for 2 minutes, then hold easy stretches for 20 seconds each: reach for your toes, pull one heel toward your seat (hold a chair), and stretch each arm across your chest. Drink some water. Write one sentence about how you felt.
8. **Session 3: Retest.** On another day, warm up the same way and do all five stations again in the same order, with the same rests and the same kind of push-up. Record the numbers in the “Retest” column. Circle every number that went up, and write one goal for the end of the quarter.

Tips

- Good form is worth more than a big number. A slow, deep squat counts; a half squat does not.
- Breathe out as you push or stand up; never hold your breath.
- If one station is very hard today, that is fine. That is exactly what your starting line is for.

Check your work

- ☐ I can name the five stations and show good form at each one.
- ☐ I recorded my own numbers honestly and retested them on a second day.
- ☐ I can explain why I compare my numbers only with my own.

FITNESS JOURNAL

1. Copy your five-station table neatly with the date, your Day 1 numbers and your retest numbers. Circle every improvement.
2. Draw a clock face for one day and shade in when you could fit 60 minutes of activity: before school, after lunch, after chores, in the evening.
3. List ten things your body let you do today, from blinking to climbing the stairs. Write a one-line thank-you to God for one of them.
4. Write how you felt during the hardest station and one thing you will try next time.

From history. Eric Liddell also played rugby for Scotland before he gave it up to concentrate on running. After the Olympics he finished his science degree at the University of Edinburgh and in 1925 went to Tianjin to teach at the Anglo-Chinese College, where he coached sports and taught Sunday school. He married Florence Mackenzie in 1934. In China he was remembered more for his kindness than for his medal.

COMMON MISTAKES

- Skipping the warm-up. Cold muscles are stiffer and more easily strained.
- Rushing reps with poor form to get a bigger number. Slow and steady with good form builds real strength.
- Comparing your numbers with a brother, sister or friend. Your only rival is the person in your last retest.
- Thinking that only sport counts. Brisk walks, chores, bike rides and active play all count toward your 60 minutes.

Make it a game • Liddell's Choice Debate. Your parent plays a reporter asking why Eric Liddell would not race on Sunday. Answer in your own words, then explain why God made bodies to move. Next test your fitness at five quick stations for thirty seconds each and name the activity type: moderate, vigorous, muscle-strengthening or bone-strengthening. Score honestly and aim to beat it later.

Scripture. “For ye are bought with a price: therefore glorify God in your body, and in your spirit, which are God’s.” (1 Corinthians 6:20, KJV)

Your body belongs to God. Caring for it with movement, rest, good food and water is one way to glorify Him.

1.2 SIT LESS, MOVE MORE: JERRY MORRIS AND THE LONDON BUSES

OBJECTIVES

- Tell how Jerry Morris compared London bus drivers and conductors and what he found.
- Explain what happens to the body when we sit for long stretches and why movement breaks help.
- Keep an honest log of a whole day's activity and sitting, and plan a better day with movement breaks.
- Do a 10-minute stair-and-step circuit safely and count the reps.

Warm-up. Pretend you are a bus conductor on a double-decker bus. March in place for 1 minute (walking the aisle), then do 10 step-ups on the bottom stair (climbing to the top deck), then 10 squats (bending to collect fares), then 10 arm circles each way. Repeat once. Think about it: if you did this all day, every day, what would happen to your legs, heart and lungs?

WATCH

Why sitting is bad for you - Murat Dalkilic

TED-Ed • 5:05

<https://www.youtube.com/watch?v=wUEl8KrMz14>

WHEN TO WATCH

After the “How your body works” paragraph. Watch for what happens to muscles, the spine and blood flow during long sitting.

Note: A cartoon lesson made for older students; it names some adult diseases linked to too much sitting. Its suggestion to stretch and move during the day fits this lesson.

KEY TERMS

sedentary

Spending most of the time sitting or lying down while awake, with little movement.

conductor

On an old London double-decker bus, the worker who walked the aisles and climbed the stairs to collect fares, while the driver stayed in his seat.

study

A careful, planned investigation in which scientists collect information and compare groups to answer a question.

coronary heart disease

A sickness in which the blood vessels that feed the heart muscle become narrow, which can lead to a heart attack.

movement break

A few minutes of standing up and moving after a long stretch of sitting.

CORE IDEAS

The story. After the Second World War, a British doctor named Jerry Morris, who had grown up in Glasgow, wondered why more people in Britain seemed to be having heart attacks. He worked for the Medical Research Council in London and studied the health of large groups of people. He chose a clever place to look: London's red double-decker buses. Every bus had two workers. The driver sat in his cab all day. The conductor walked up and down the aisles and climbed the stairs to the top deck over and over, hundreds of steps every working day, collecting fares. Both men worked the same hours on the same buses in the same city. In 1953 Morris and his team reported in the medical journal *The Lancet* that the conductors had fewer heart attacks than the drivers, and when a conductor did have one, it was usually less serious.

How they figured it out. Morris used a **fair comparison**. Because drivers and conductors were alike in many ways, the biggest difference between them was how much they moved at work. His team gathered the health records of thousands of London Transport workers and counted the heart attacks in each group. Then they checked the idea a second way: they compared postmen, who walked or cycled their rounds, with office clerks and telephone operators, who sat. Again the active workers had fewer heart attacks. Morris was one of the first scientists to show with numbers that ordinary daily movement protects the heart. He took his own advice, swimming, cycling and walking for exercise until he was well into his nineties.

How your body works. When you move, your leg muscles squeeze the veins and help push blood back to your heart, your heart beats harder and grows stronger, and your muscles use sugar and fat from the blood for fuel. When you sit still for a long time, your big leg muscles go quiet, blood flows more slowly, and your back and hips

stiffen. Even children who play sport can spend many hours a day sitting at desks, in cars and in front of screens. Scientists now say two things matter: moving enough each day (at least 60 minutes for children) and **breaking up long sitting**. A short movement break every 30 to 60 minutes of sitting wakes up the muscles and the mind.

Think it through. Morris could not change how much the drivers moved at work, but you can change how much you move in your day. You do not need special equipment: stairs, chores, walking to the store, playing outside and standing up to stretch all count. God gave Adam work in the garden “to dress it and to keep it,” and active work has been part of ordinary life ever since.

Try it. This week you will be your own scientist. In Session 2 you will log one whole ordinary day: every half hour, was I sitting, lightly active, moderately active or vigorously active? You will also do a conductor’s stair-and-step circuit. In Session 3 you will plan a “move more” day with movement breaks, log it the same way, and compare the two days.

PICTURE STUDY



Schoolgirls Doing Calisthenics in the Classroom, Frances Benjamin Johnston, About 1899 · Cyanotype photograph · Library of Congress, Washington, D.C.

Image: [Wikimedia Commons](#), public domain

Frances Benjamin Johnston was one of the first women to work as a professional photographer in America. Around 1899 she photographed the public schools of Washington, D.C. Here a class takes a break from sitting at their desks to do **calisthenics**, simple exercises done with the body's own weight. The blue color comes from the cyanotype process she used to print it.

Look closely

- Find the desks. How many hours a day do you think these children sat in them?
- Look at the children's arms. What exercise are they doing? Try it yourself for 30 seconds.
- Find the blackboard and the windows. Why might a teacher open the windows during exercises?
- Look at their clothes. Could you do jumping jacks in a long dress and button boots?

Talk about it

1. This teacher used a movement break more than a hundred years ago. Why do you think it helped the children learn?

2. How is this classroom like the London bus conductors? How is it like the drivers?
3. Where in your own school day could you add a two-minute movement break?

Safety first. Use the handrail on stairs, wear shoes with good grip (not socks on smooth floors), and keep the stairs clear of toys and clutter. Step-ups go on the bottom stair or a sturdy step that will not slide. Stop and tell an adult if you feel dizzy or have pain.

ACTIVITY

The Conductor's Day: Log It, Then Beat It

Jerry Morris answered his question by keeping careful records. You will do the same with your own day. First you will find out how much you really sit and move on an ordinary day. Then you will plan a better day, try it, and compare. You will also do a 10-minute conductor's circuit.

You will need

- Fitness journal with a log chart: one line for every half hour from waking up to bedtime
- A timer (a kitchen timer or phone) to remind you of movement breaks
- The bottom stair or a sturdy step, and a clear floor space
- Colored pencils: red for vigorous, orange for moderate, yellow for light, blue for sitting

Steps

1. **Session 2, the log.** Choose an ordinary day. Every half hour (or at each meal and break, filling in the gaps), color that line on your chart: blue for sitting or lying awake, yellow for light activity (slow walking, standing chores), orange for moderate (brisk walking, biking, active chores), red for vigorous (running games, sport, jumping rope). Do not change your day to look good. Honest numbers are the whole point.
2. **The conductor's circuit (10 minutes).** Warm up for 3 minutes. Then do 3 rounds of: 1 minute of step-ups on the bottom stair (hold the rail, switch the leading foot every 10 steps), 30 seconds of marching in place, 10 squats, and 30 seconds of rest. Count your step-ups in each round and write them down.
3. At bedtime, add up your minutes in each color. (Each colored half-hour line is 30 minutes.) Write: total minutes sitting, total minutes moderate plus vigorous.
4. **Plan a better day.** Look at your blue stretches. Mark every place where you sat more than 30 to 60 minutes in a row. Plan a 2-minute movement break for each: 10 step-ups, 10 squats, 10 arm circles each way and 30 seconds of

marching. Plan at least one more 15-minute block of moderate or vigorous play.

5. **Session 3, the “move more” day.** On another ordinary day, set a timer to ring every 30 to 45 minutes when you are sitting. When it rings, do your movement break. Log the day with the same colors.
6. Do the conductor’s circuit again. Try to add 2 or 3 step-ups to each round while keeping good form.
7. Compare the two days in a bar graph: one pair of bars for minutes sitting, one pair for minutes moderate plus vigorous. Did you reach 60 minutes of activity on either day?
8. Write two sentences: What was the easiest change to make? What was the hardest?

Tips

- Screen time, car rides and schoolwork all count as sitting. Reading time is good, but you can still stand up between chapters.
- Chores count. Carrying groceries, vacuuming and raking leaves are real activity.
- Ask a parent to join your movement breaks. Conductors worked in pairs with the driver, and exercise is easier with company.

Check your work

- ☐ I can explain what Jerry Morris compared and what he found.
- ☐ I kept an honest log of a whole day and added up my minutes.
- ☐ I planned movement breaks, tried them, and compared the two days in a graph.

FITNESS JOURNAL

1. Paste in or copy both day logs. Under each, write total minutes sitting and total minutes moderate plus vigorous.
2. Draw the bar graph comparing your two days. Give it a title and label the bars.
3. Record your step-ups for each round of the conductor’s circuit on both days. Circle any improvement.

4. Draw a double-decker bus with a stick-figure driver and conductor. Under each, write one sentence about what Morris learned.

From history. Jerry Morris was born in 1910 and grew up in Glasgow, Scotland. He has been called the man who invented the idea of exercise for health. He lived to 99, still walking and swimming most days, and kept writing about physical activity until near the end of his life.

COMMON MISTAKES

- Changing an ordinary day to make the first log look better. A scientist records what really happens.
- Thinking a hard workout in the morning makes it fine to sit the rest of the day. Breaking up long sitting matters too.
- Taking the stairs two at a time or without the handrail during the circuit. Steady and safe is the goal.
- Saying the conductors were healthier only because they were younger or different people. Morris chose men in the same jobs on the same buses to make the comparison as fair as he could.

Make it a game • Conductor's Day. Race the clock to list as many sitting habits and movement breaks as you can in sixty seconds. Then act as Jerry Morris: explain what he compared, what he found about conductors and drivers, and what happens when we sit too long. Do a one-minute movement break and log your day.

UNIT 1

KEEPING ACTIVE

Your body is not a machine you happen to live in. It is a gift from God, fearfully and wonderfully made, and it was made to move: to run, climb, carry, balance and play. In this unit you will meet Eric Liddell, the Scottish runner who would not race on a Sunday at the 1924 Paris Olympics and then won the 400 metres instead. You will learn how much activity children need, what “moderate” and “vigorous” mean, and why rest is part of God’s design too. Then you will take a five-station fitness check that becomes your own starting line for the quarter.

Next you will ride the London buses of 1950 with Dr. Jerry Morris, who noticed that the conductors who climbed the stairs all day had fewer heart attacks than the drivers who sat. His study helped show the world that everyday movement protects the heart. You will keep a log of a whole day, minute by minute, and then plan a better one with movement breaks.

PREREQUISITES

- Can tell time and use a stopwatch or phone timer
- Can add minutes and make a simple bar graph
- Has a doctor's go-ahead if there is any health concern (see How to use)

MASTERY CHECKLIST

- ☐ I can tell the story of Eric Liddell's Sunday decision and his 400-metre race, and explain why caring for my body honors God.
- ☐ I can say how much activity children need each day and give examples of moderate, vigorous, muscle-strengthening and bone-strengthening activity.
- ☐ I can explain what Jerry Morris found when he compared bus drivers and conductors, and why sitting for long stretches is not good for the body.
- ☐ I can do a warm-up and a cool-down, take my five-station fitness check, and record and retest my own numbers.
- ☐ I can keep an honest activity log and plan movement breaks into a day.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- ***Eric Liddell: Something Greater Than Gold***, by Janet and Geoff Benge (YWAM Publishing, **Christian Heroes: Then & Now**): A Christian biography for readers about 10–13, from his boyhood to his years as a missionary in China. A good family read-aloud for Lesson 1.1.
- **Move Your Way (U.S. Department of Health and Human Services)**: Free. Plain-language pages, videos and printable fact sheets on the *Physical Activity Guidelines for Americans*, including what children need each week. For parents and older students.
- **A simple pedometer or step counter**: Optional, for counting steps on your log days in Lesson 1.2 and the unit challenge. A tally of minutes works just as well.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

1.1 A Temple to Care For: Eric Liddell

3 sessions of 30–40 minutes

1.2 Sit Less, Move More: Jerry Morris and the London Buses

3 sessions of 30–40 minutes

UNIT 1 REVIEW

Answer each question in complete sentences. The review is worth 30 points. It may be done orally, with a parent writing down the answers.

1. **5 pts**

Why did Eric Liddell refuse to run the 100 metres at the 1924 Olympics, and what did he do instead?

2. **5 pts**

How many minutes of physical activity do children ages 6–17 need each day? Name the three kinds of activity they need on at least 3 days a week.

3. 5 pts

Explain the talk test. Give one example of moderate activity and one of vigorous activity.

4. 5 pts

Whom did Jerry Morris compare in his 1953 study, and what did he find?

5. 5 pts

What would happen if you sat still for three hours in a row without a break?

What could you do about it?

6. 5 pts

Name the five stations of your fitness check. Why do you compare your results only with your own earlier numbers?

ANSWER KEY

1. The heats were on a Sunday, which he kept as the Lord's Day for rest and worship. He trained for the 400 metres instead and won it in Paris in 47.6 seconds, a world record.
2. At least 60 minutes a day, mostly moderate or vigorous. On at least 3 days a week: vigorous activity, muscle-strengthening activity and bone-strengthening activity.
3. If you can talk but not sing, it is moderate (for example, a brisk walk or easy bike ride). If you can say only a few words before taking a breath, it is vigorous (for example, running, jumping rope or a fast game of tag).
4. London double-decker bus drivers, who sat all day, and conductors, who walked and climbed stairs all day. The conductors had fewer heart attacks, and theirs were usually less serious.
5. Your leg muscles would go quiet, blood would flow more slowly, and your back and hips could stiffen; you might feel sluggish and find it harder to concentrate. Take a short movement break every 30 to 60 minutes: stand, walk, do squats or step-ups.
6. Squats, push-ups, plank hold, one-foot balance and step-ups. Because everyone starts in a different place; the goal is faithful effort and personal improvement, not being better than someone else.

UNIT CHALLENGE: MY ACTIVE WEEK

Keep an activity log for seven days in a row. Each day, record your minutes of moderate and vigorous activity, what you did, and whether you included muscle- or bone-strengthening activity. Add at least two movement breaks to every school day. At the end of the week, make a bar graph of your daily active minutes with a line drawn across at 60 minutes, and write a short paragraph: on how many days did you reach 60 minutes, what helped, and what will you change next week? Finish by retesting your five-station fitness check and adding the new numbers to your table.

LOOK FOR	WHAT IT MEANS
Complete record	All seven days logged honestly, with activities and minutes written down each day.
Variety	The week includes vigorous, muscle-strengthening and bone-strengthening activity on at least 3 days, and movement breaks on school days.
Graph	A neat bar graph with a title, labeled days, minutes on the side and a 60-minute line.
Reflection and retest	A paragraph that names what helped and one specific change, and a retest of the five stations compared with Day 1.

UNIT 2

HYDRATION

More than half of your body is water. It is in your blood, your muscles, your brain and the cushions of your joints, and you lose some every day in sweat, breath and urine. In this unit you will learn what water does inside you: cooling you down, carrying food and oxygen to every cell, cushioning your joints and carrying away wastes through your kidneys. You will find out how much children your age need, learn the warning signs of not drinking enough, and keep a three-day water log.

Then you will travel to Florida in the hot summer of 1965, when a football coach asked a team of kidney doctors why his players were wilting in the heat. Dr. Robert Cade and his team measured what the players were losing in sweat and mixed a drink to put it back. You will test how sweat cools the body with a thermometer and a fan, read drink labels to measure the sugar in them, and learn why water is still the best everyday drink.

PREREQUISITES

- Can measure with a measuring cup and read cups and ounces
- Can divide by 4 and make a bar graph
- Knows the talk test and the warm-up routine (Unit 1)

MASTERY CHECKLIST

- ☐ I can name four jobs water does in the body.
- ☐ I can say about how much fluid children my age need each day and when to drink around exercise.
- ☐ I can name the warning signs of dehydration and use a urine color chart.
- ☐ I can tell the story of Robert Cade and the Florida Gators and explain what electrolytes are.
- ☐ I can read a drink label, turn grams of sugar into teaspoons, and explain why water is the best everyday drink.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- **A reusable water bottle with ounce or milliliter marks:** Optional, but it makes the water logs in Lessons 2.1 and 2.2 easy. Any cup and a measuring cup work just as well.
- **“Water and Your Body” (Nemours KidsHealth):** Free. A short, clear article for kids on why the body needs water. Read it with Lesson 2.1.
- **“What Is Sweat?” (Nemours KidsHealth):** Free. A kids’ article on sweat glands and how sweat cools you. Fits Lesson 2.2.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

2.1 Water: Your Body’s Coolant and Delivery Service

3 sessions of 30–40 minutes

2.2 Sweat, Salt and the Florida Gators

3 sessions of 30–40 minutes

UNIT 2 REVIEW

Answer each question. Show your work for the calculation. The review is worth 30 points.

1. **5 pts**

Name four jobs that water does in your body.

2. **5 pts**

List four warning signs of dehydration. What urine colors mean you are drinking enough?

3. **5 pts**

Maria drank 1 cup of milk at breakfast, a 16-ounce bottle of water at school, 1 cup of water with dinner and a 12-ounce glass of juice. How many cups did she drink? (1 cup = 8 ounces)

4. 5 pts

What question did coach Dewayne Douglas ask in 1965, and what did Robert Cade's team find when they studied the players?

5. 5 pts

What would happen if your sweat could not evaporate, for example on a very humid day? What should you do?

6. 5 pts

A drink has 32 grams of added sugar. How many teaspoons is that? When would a sports drink make sense, and what is the best everyday drink?

ANSWER KEY

1. Cools you through sweat; carries oxygen, nutrients and wastes in the blood; cushions joints, the brain and spinal cord; helps the kidneys remove wastes in urine. (Helping digest food is also correct.)
2. Any four: thirst, dry mouth, dark yellow urine, headache, tiredness or grumpiness, dizziness. Pale, straw-colored urine (colors 1–3 on the chart) means you are drinking enough.
3. Milk 1 cup + water $16 \div 8 = 2$ cups + water 1 cup + juice $12 \div 8 = 1\frac{1}{2}$ cups. Total = $5\frac{1}{2}$ cups. She should drink about 2 more cups, mostly water.
4. He asked why his players were wilting in the heat. They found the players were losing a lot of water and salt (sodium and potassium) in sweat, drinking too little, and their blood sugar was dropping. They mixed a drink with water, salt, potassium, sugar and lemon to replace it.
5. You would not cool down well, so your body temperature would rise and you could get heat exhaustion. Take more breaks in the shade or indoors, drink water, use wet cloths to cool off, and exercise at a cooler time of day.
6. $32 \div 4 = 8$ teaspoons. A sports drink makes sense only for long, hard exercise in the heat, usually more than about an hour. Water is the best everyday drink.

UNIT CHALLENGE: MY WATER LOG AND HYDRATION PLAN

Keep a water log for five days in a row, including at least one active day and, if you can, one hot day. Record every drink in cups and your urine color each morning and afternoon. Make a bar graph of your daily cups with a line at 7 cups, and color the water part of each bar blue. Then write a one-page hydration plan for a hot summer day of outdoor play: when you will drink, how much, where you will rest in the shade, what you will drink, and the warning signs you will watch for.

LOOK FOR	WHAT IT MEANS
Complete log	Five days recorded honestly, with times, drinks, amounts and urine colors.
Graph	A neat bar graph with a title, labeled days, cups on the side, a 7-cup line and water shown in blue.
Hydration plan	The plan gives specific times and amounts for before, during and after play, shade breaks, and water as the main drink.
Safety	The plan names at least four warning signs of dehydration or heat illness and what to do.
Improvement	A sentence comparing the first and last days and naming one habit that improved.

2.1 WATER: YOUR BODY'S COOLANT AND DELIVERY SERVICE

OBJECTIVES

- Name four jobs water does in the body: cooling, carrying nutrients and oxygen, cushioning joints, and carrying away wastes.
- State about how much fluid children ages 9–13 need each day and when to drink before, during and after activity.
- Recognize the warning signs of dehydration and use a urine color chart.
- Keep a three-day water log in cups and make a bar graph.

Warm-up. Do 1 minute of jumping jacks, 1 minute of high knees and 1 minute of fast marching with big arm swings. Then touch your forehead and the back of your neck. Are they warm? Damp? Lick your lips. Are they dry? Think about it: where does the water your body uses go, and how does it get back in?

WATCH

Why Do We Drink Water? | Importance Of Water | Stay Hydrated | The Dr Binocs Show | Peekaboo Kidz

Peekaboo Kidz · 6:09

<https://www.youtube.com/watch?v=31F0laJjyy8>

WHEN TO WATCH

After the “How your body works” paragraph. Listen for how much of the body is water and how the brain tells you that you are thirsty.

Note: A cartoon. Near the end it briefly mentions that drinking far too much water at once can also be dangerous; we will not drink huge amounts in this unit.

KEY TERMS

hydration

Having enough water in your body for it to work well.

dehydration

When your body loses more water than it takes in. Signs include thirst, dark yellow urine, a dry mouth, headache and tiredness.

plasma

The liquid part of blood. It is mostly water and carries nutrients, salts and wastes around the body.

kidneys

Two bean-shaped organs in your lower back that filter your blood, keep its water and salt in balance, and send wastes out in urine.

sweat

Salty water released through tiny openings in your skin; as it evaporates, it cools you.

CORE IDEAS

The story. Every great story of travel and work has water in it. Hagar found a well in the wilderness for her thirsty son (Genesis 21:19). Moses struck the rock and water flowed for the people of Israel (Exodus 17:6). Harvesters in the fields have always stopped in the heat to drink, as the man in this lesson's painting is doing. In every age, people have known that a person can live for weeks without food but only a few days without water. What they did not know until scientists studied the body was just how many jobs water does inside us.

How they figured it out. Doctors and scientists learned about water in the body by measuring. They found that about 60 percent of a person's body is water. They measured how much water leaves the body each day in urine, sweat and even breath (breathe on a cold mirror and you can see it), and how much comes back in from drinks and food. They found the body keeps a careful balance: when you lose water, a part of your brain called the hypothalamus notices that your blood has become a little more salty and makes you feel thirsty. Thirst is your body's signal to refill.

How your body works. Water does at least four big jobs. **It cools you.** When you work hard, your muscles make heat; your skin releases sweat, and as the sweat evaporates it carries heat away, like the radiator coolant in a car. **It delivers.** Your blood's plasma is mostly water, and it carries oxygen, sugar, vitamins and minerals to every cell. **It cushions.** Water-filled fluid cushions your joints, your brain and your spinal cord. **It cleans.** Your kidneys filter your blood many times a day, keep the water and salts you need, and send wastes out in urine. Children ages 9–13 need about 7 to 8 cups of fluid a day (about 1.7 to 1.9 liters), most of it water, and more when it is hot or when they are very active. Fruits, vegetables, milk and soup supply some water too.

Know the signs. If you do not drink enough, you may feel **thirsty**, your mouth may feel dry, your **urine may turn dark yellow**, and you may get a **headache** or feel **tired** and grumpy. Pale, straw-colored urine usually means you are drinking enough. Around exercise, drink a cup of water before you start, take a few big gulps every 15 to 20 minutes while you play, and drink again afterward. You do not need to force down huge amounts; steady drinking through the day is the goal.

Try it. This week you will measure your own cup, keep a three-day water log, check your urine color each morning and afternoon, and see how an active day changes how much you need.

PICTURE STUDY



Harvester Drinking from a Flask (The Thirst), Léon-Augustin Lhermitte, 1905 · Oil on canvas · Dahesh Museum of Art, New York

Image: [Wikimedia Commons](#), public domain

Léon Lhermitte grew up in a farming village in northern France and spent his life painting the people who worked the fields. Here it is harvest time and the wheat is ripe. One harvester has stopped in the hot sun to drink, while another keeps binding sheaves and a girl stands by with a pail.

Look closely

- Find the man drinking. How is he holding his flask? How long do you think he has been working?
- Find the girl. What is she carrying, and what might be in it?
- Find the worker who is still bending over the wheat. What is he doing with his hands?
- Look at the sky and the color of the field. What time of year and what kind of weather do you think it is?

Talk about it

1. What would happen to a harvester who worked all day in the sun without drinking?
2. Why might the family send a child into the field with water instead of waiting for the workers to come home?

3. When during your day do you most need to refill, as this harvester did?

Safety first. Drink water steadily through the day, but never try to drink a huge amount all at once or have drinking contests. If you feel dizzy, sick to your stomach, very tired or have a bad headache while active in the heat, stop, go to the shade, sip water and tell an adult right away.

ACTIVITY

My Three-Day Water Log

How much do you really drink? You will measure it for three days, check the color chart that doctors use, and see what changes on an active day.

You will need

- Your usual cup or water bottle and a measuring cup
- Fitness journal with a log table: Day, Time, Drink, Amount (cups), Urine color (1–8)
- A printed or hand-drawn urine color chart: 8 squares from very pale yellow (1) to dark amber (8); colors 1–3 mean well hydrated
- A timer, and a safe outdoor or indoor space to play

Steps

1. **Measure your cup.** Fill your usual cup or bottle with water, pour it into a measuring cup, and write how many cups (or ounces) it holds. 1 cup = 8 fluid ounces $\approx$ 240 mL. Mark the bottle with tape at each half cup if you like.
2. **Make your color chart.** With yellow and orange colored pencils, color 8 squares from very pale (1) to dark amber (8). Number them. Colors 1–3: you are drinking enough. 4–5: drink a cup soon. 6–8: drink now and tell a parent if it does not get lighter.
3. **Days 1 and 2 (ordinary days).** Every time you drink anything, write the time, the drink and the amount in cups. Count milk, juice and soup too, but mark which drinks were water. Check your urine color when you first go to the bathroom in the morning and again in the afternoon, and write the number.
4. Each evening, add up your cups. Did you reach about 7 to 8 cups? What fraction was water?
5. **Day 3 (active day).** Plan 30 minutes of active play: a game of tag, bike riding, a walk-run around the block or 3 rounds of the conductor's circuit from Lesson 1.2. Drink 1 cup of water before you start, 2 or 3 big gulps every 15 minutes while you play, and 1 cup afterward. Log everything as before.

6. During the active play, rate your thirst every 15 minutes from 1 (not thirsty) to 5 (very thirsty) and write it down.
7. Make a bar graph with one bar for each day's total cups. Draw a line across at 7 cups.
8. Write two sentences: How did the active day change your total? What will you do to drink more water (and fewer sugary drinks) next week?

Tips

- Keep a full water bottle where you can see it: on the table, by your schoolbooks, in the car.
- Drink with meals. A cup with breakfast, lunch and dinner is already 3 cups.
- Some vitamins and foods can change urine color for a while; if the color looks strange, ask a parent.

Check your work

- ☐ I can name four jobs water does in my body.
- ☐ I kept an honest three-day water log and added up my cups each day.
- ☐ I can name the signs of dehydration and use the color chart.

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1. Copy your three days of totals into a neat table and draw your bar graph with the 7-cup line.
2. Draw an outline of a person and label four places where water is at work: skin (sweat), blood, joints, kidneys.
3. Write your thirst ratings from the active day and one sentence about how you felt at the end.
4. Write a plan: three times each day when you will drink a cup of water.

From history. Léon Lhermitte (1844–1925) was the son of a village schoolmaster in Mont-Saint-Père, in northern France. He painted the farm families of his home region at work for more than fifty years, in oils, pastels and charcoal.

COMMON MISTAKES

- Waiting until you are very thirsty to drink. Thirst is the first signal, not the only time to drink.

- Forcing down a large amount all at once. Steady sips through the day are better and safer.
- Counting sugary drinks as if they were the same as water. They add water, but also a lot of sugar.
- Forgetting to drink on cool or rainy days. You still lose water in breath and sweat.

Make it a game • Four Jobs of Water. Draw four jobs of water in four boxes: cooling, carrying nutrients and oxygen, cushioning joints, carrying away wastes. Your parent quizzes you in random order and you act out each one in ten seconds. Then say how much fluid you need each day and when to drink around activity. Beat your streak.

Scripture. “As the hart panteth after the water brooks, so panteth my soul after thee, O God.” (Psalm 42:1, KJV)

A thirsty deer runs to the stream because it needs water to live. The psalmist says our souls need God even more than our bodies need water.

2.2 SWEAT, SALT AND THE FLORIDA GATORS

OBJECTIVES

- Tell how Robert Cade and his team studied the University of Florida football players in 1965 and what they found.
- Explain how sweat cools the body by evaporation and what electrolytes are.
- Read drink labels, turn grams of sugar into teaspoons, and explain why water is the best everyday drink.
- Follow a drinking plan during a 20-minute workout and know the signs of heat illness.

Warm-up. Lick the back of your hand and blow on it. Then blow on the dry back of your other hand. Which feels cooler? Now do 1 minute of jumping jacks, 1 minute of squats (slow and deep) and 1 minute of high knees. Feel your forehead. Think about it: why does your body make sweat when you work hard?

WATCH

Why Do We Sweat? - The Dr. Binocs Show | Best Learning Videos For Kids | Peekaboo Kidz

Peekaboo Kidz · 3:52

<https://www.youtube.com/watch?v=8azbDwKekaE>

WHEN TO WATCH

After the “How your body works” paragraph. Watch for where sweat comes from and how it cools the skin.

BACKUP VIDEO

How Gatorade was invented

FOX 13 Tampa Bay · 5:19

https://www.youtube.com/watch?v=rubu1z_Tal

After the story, to hear Dr. Cade and his team tell it themselves.

KEY TERMS

evaporation

When a liquid turns into a gas.
Evaporation takes heat away, so sweat drying on your skin cools you.

sodium

The mineral in table salt. It is the main electrolyte lost in sweat.

heat exhaustion

An illness caused by working too hard in the heat without enough rest and water. Signs include heavy sweating, dizziness, headache, nausea and muscle cramps.

electrolytes

Minerals such as sodium and potassium that dissolve in body water and help nerves and muscles work. Some leave the body in sweat.

added sugars

Sugars put into foods and drinks when they are made, not the sugar found naturally in fruit or milk. About 4 grams is 1 teaspoon.

CORE IDEAS

The story. Early in the summer of 1965, Dewayne Douglas, an assistant football coach at the University of Florida in Gainesville, asked a question of a team of university doctors. Why were so many of his players wilting in the heat? Some lost so much water during practice that they felt sick and had to stop. The doctors were kidney specialists led by Dr. Robert Cade, with Dr. Dana Shires, Dr. Jim Free and Dr. Alejandro de Quesada. They decided to find out exactly what the players were losing.

How they figured it out. Cade's team studied ten players from the freshman team. They measured the players' sweat and blood and found that in the Florida heat the players were losing a great deal of water and a lot of salt, especially sodium and potassium, and that their blood sugar was dropping. The players were drinking little water, as was common then. So the doctors mixed a drink with water, a little salt and potassium to replace what sweat carried away, and some sugar for energy. The first batch tasted so bad that it was hard to drink, and Cade's wife suggested adding lemon juice. The players tried it in practice, and on October 2, 1965, in a game

against Louisiana State played in fierce heat, the Gators drank it and finished strong. The drink was named for the team: Gatorade.

How your body works. Your body works best at about 98.6 °F (37 °C). When you exercise, your muscles make heat, and your body must get rid of it. Millions of tiny **sweat glands** in your skin squeeze out salty water. As the sweat **evaporates**, it takes heat with it, and your skin and blood cool down. Sweat is mostly water, but it also carries **electrolytes**, especially sodium, which help your nerves send messages and your muscles contract. In hot, humid weather sweat evaporates slowly, so you cool down more slowly and must take more breaks in the shade.

Water first. For everyday life, ordinary play and most sports practices, **water is the best drink**. Your meals replace the salt you lose in a normal amount of sweat. Sports drinks were made for long, hard exercise in the heat, usually more than about an hour, and many contain several teaspoons of sugar per bottle. Soda and sweet tea have even more sugar and no help for hydration that water does not give better. Treats have their place, but water is the everyday drink.

Try it. This week you will test how evaporation cools with two thermometers and a fan, measure the sugar in drinks from their labels, and do a 20-minute “Gator workout” with a drinking plan.

PICTURE STUDY



Noonday Rest, Jean-François Millet, 1866 • Pastel and black crayon on paper • Museum of Fine Arts, Boston

Image: [Wikimedia Commons](#), public domain

Jean-François Millet grew up on a farm in Normandy, France, and drew and painted country people at work all his life. In this pastel, two harvesters rest in the shade at noon, the hottest part of the day, before going back to work in the afternoon.

Look closely

- Find the shade. Where is it coming from, and where is the bright sunlight?
- Look at the man's hat and arms. How has he made himself comfortable for a nap?
- Find the shoes and the sickles. What do they tell you about the morning's work?
- Look at the field behind them. How can the artist make it look hot?

Talk about it

1. Farm workers long ago rested in the shade during the hottest hours. Why was that wise?
2. What would they have needed to drink after a morning of cutting grain in the sun?

3. How could you plan your outdoor games on a hot day to stay safe, the way these workers planned their day?

Safety first. On hot days exercise early or late, not in the hottest part of the afternoon, and work in the shade or indoors with water close by. Know the signs of heat illness: heavy sweating, dizziness, headache, nausea, cramps, or skin that feels hot and dry. If they appear, stop, go to the shade, sip water, cool off with wet cloths and tell an adult right away. Do not taste the sugar or salt displays.

ACTIVITY

Sweat Lab, Label Lab and a Gator Workout

Robert Cade answered his question by measuring. You will measure too: first how evaporation cools, then how much sugar is in common drinks, and last how a drinking plan helps you through a hard workout.

You will need

- Two thermometers (kitchen or outdoor), or one used twice
- Two small squares of cloth or paper towel, a rubber band or thread, a cup of room-temperature water and a fan
- Labels from four or five drinks: water, plain milk, 100% juice, a sports drink and a soda (labels or online pictures are fine)
- Measuring spoons, a bowl of sugar and clear cups (for display only)
- A timer, a towel or mat, water bottle and fitness journal

Steps

1. **Sweat lab.** Wrap a dry cloth around the bulb of one thermometer. Wet the other cloth in room-temperature water, squeeze it out, and wrap it around the second thermometer. Read and record both temperatures. Set both in front of a fan, side by side. Record both temperatures every minute for 10 minutes.
2. Make a line graph with two lines, wet and dry. Which one cooled? By how many degrees? Write one sentence explaining how this is like sweat on your skin.
3. **Label lab.** For each drink, find the serving size, **total sugars** or **added sugars** in grams, and sodium in milligrams. Divide grams of sugar by 4 to find teaspoons (4 g $\approx$ 1 teaspoon). Make a table.
4. Measure that many level teaspoons of sugar into a clear cup for each drink and line the cups up with their labels. This is a display only; do not eat it. Which drink would be best after an hour of hard play in the heat? Which is best with lunch every day?
5. **Session 3: Gator workout (20 minutes).** Warm up for 3 minutes. Then do 4 rounds of: jumping jacks 40 seconds, rest 20; squats 40 seconds, rest 20; high

knees 40 seconds, rest 20; bear crawl forward and back 40 seconds, rest 20 (hands under shoulders, knees just off the floor, back flat). After each round, take a 1-minute water break: 2 or 3 big gulps.

6. **Drinking plan.** Drink 1 cup of water 15–30 minutes before you start, follow the water breaks, and drink 1 cup afterward. Before and after, record your urine color. After each round, rate your thirst (1–5) and how hard it felt (1 = easy, 10 = hardest ever).
7. Count the squats you do in each round. On a second day, repeat the workout and try to add 1 or 2 squats per round with good form.
8. Cool down: walk slowly for 2 minutes, then stretch your calves, thighs and shoulders for 20 seconds each.

Tips

- Read the serving size carefully. Many bottles hold two or more servings, so the whole bottle has more sugar than the label number.
- If your house is hot, do the workout in the coolest room or in the shade early in the morning.
- Fruit like oranges, bananas and watermelon gives you water, potassium and natural sugar together.

Check your work

- ☐ I can explain what Robert Cade’s team measured and what they mixed into their drink.
- ☐ I can show with my thermometer test how evaporation cools.
- ☐ I can turn grams of sugar into teaspoons and explain when water is the best choice.

FITNESS JOURNAL

1. Draw your line graph from the sweat lab with both lines labeled, and write the temperature drop.
2. Copy your label-lab table: drink, serving size, grams of sugar, teaspoons, sodium.
3. Record your Gator workout: squats in each round on both days, thirst ratings and effort ratings.
4. Draw a sweat gland in the skin with a drop of sweat at the top and arrows showing heat leaving as it evaporates.

From history. In 1966 the Gators drank their new drink for a whole season and won most of their games. Dr. Cade and his colleagues used part of the money the drink earned to support medical research at the University of Florida.

COMMON MISTAKES

- Thinking a sports drink is needed for every game or practice. For most children, water is enough.
- Saving all your drinking for after the workout. Drink before and during, too.
- Ignoring early signs of heat illness to keep playing. Stopping early is wise, not weak.
- Forgetting that hot and humid days are harder: sweat evaporates slowly, so you cool down more slowly.

Make it a game • Gator Lab Pitch. Be Robert Cade pitching his discovery to the coach. Explain what the Florida players needed and what electrolytes are. Then do ten jumping jacks and explain how sweat cools you by evaporation. Your parent asks one tricky question about sodium and sugar. Answer it. If you stump her, you earn two points.

UNIT 2

HYDRATION

More than half of your body is water. It is in your blood, your muscles, your brain and the cushions of your joints, and you lose some every day in sweat, breath and urine. In this unit you will learn what water does inside you: cooling you down, carrying food and oxygen to every cell, cushioning your joints and carrying away wastes through your kidneys. You will find out how much children your age need, learn the warning signs of not drinking enough, and keep a three-day water log.

Then you will travel to Florida in the hot summer of 1965, when a football coach asked a team of kidney doctors why his players were wilting in the heat. Dr. Robert Cade and his team measured what the players were losing in sweat and mixed a drink to put it back. You will test how sweat cools the body with a thermometer and a fan, read drink labels to measure the sugar in them, and learn why water is still the best everyday drink.

PREREQUISITES

- Can measure with a measuring cup and read cups and ounces
- Can divide by 4 and make a bar graph
- Knows the talk test and the warm-up routine (Unit 1)

MASTERY CHECKLIST

- ☐ I can name four jobs water does in the body.
- ☐ I can say about how much fluid children my age need each day and when to drink around exercise.
- ☐ I can name the warning signs of dehydration and use a urine color chart.
- ☐ I can tell the story of Robert Cade and the Florida Gators and explain what electrolytes are.
- ☐ I can read a drink label, turn grams of sugar into teaspoons, and explain why water is the best everyday drink.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- **A reusable water bottle with ounce or milliliter marks:** Optional, but it makes the water logs in Lessons 2.1 and 2.2 easy. Any cup and a measuring cup work just as well.
- **“Water and Your Body” (Nemours KidsHealth):** Free. A short, clear article for kids on why the body needs water. Read it with Lesson 2.1.
- **“What Is Sweat?” (Nemours KidsHealth):** Free. A kids’ article on sweat glands and how sweat cools you. Fits Lesson 2.2.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

2.1 Water: Your Body’s Coolant and Delivery Service

3 sessions of 30–40 minutes

2.2 Sweat, Salt and the Florida Gators

3 sessions of 30–40 minutes

UNIT 2 REVIEW

Answer each question. Show your work for the calculation. The review is worth 30 points.

1. **5 pts**

Name four jobs that water does in your body.

2. **5 pts**

List four warning signs of dehydration. What urine colors mean you are drinking enough?

3. **5 pts**

Maria drank 1 cup of milk at breakfast, a 16-ounce bottle of water at school, 1 cup of water with dinner and a 12-ounce glass of juice. How many cups did she drink? (1 cup = 8 ounces)

4. 5 pts

What question did coach Dewayne Douglas ask in 1965, and what did Robert Cade's team find when they studied the players?

5. 5 pts

What would happen if your sweat could not evaporate, for example on a very humid day? What should you do?

6. 5 pts

A drink has 32 grams of added sugar. How many teaspoons is that? When would a sports drink make sense, and what is the best everyday drink?

ANSWER KEY

1. Cools you through sweat; carries oxygen, nutrients and wastes in the blood; cushions joints, the brain and spinal cord; helps the kidneys remove wastes in urine. (Helping digest food is also correct.)
2. Any four: thirst, dry mouth, dark yellow urine, headache, tiredness or grumpiness, dizziness. Pale, straw-colored urine (colors 1–3 on the chart) means you are drinking enough.
3. Milk 1 cup + water $16 \div 8 = 2$ cups + water 1 cup + juice $12 \div 8 = 1\frac{1}{2}$ cups. Total = $5\frac{1}{2}$ cups. She should drink about 2 more cups, mostly water.
4. He asked why his players were wilting in the heat. They found the players were losing a lot of water and salt (sodium and potassium) in sweat, drinking too little, and their blood sugar was dropping. They mixed a drink with water, salt, potassium, sugar and lemon to replace it.
5. You would not cool down well, so your body temperature would rise and you could get heat exhaustion. Take more breaks in the shade or indoors, drink water, use wet cloths to cool off, and exercise at a cooler time of day.
6. $32 \div 4 = 8$ teaspoons. A sports drink makes sense only for long, hard exercise in the heat, usually more than about an hour. Water is the best everyday drink.

UNIT CHALLENGE: MY WATER LOG AND HYDRATION PLAN

Keep a water log for five days in a row, including at least one active day and, if you can, one hot day. Record every drink in cups and your urine color each morning and afternoon. Make a bar graph of your daily cups with a line at 7 cups, and color the water part of each bar blue. Then write a one-page hydration plan for a hot summer day of outdoor play: when you will drink, how much, where you will rest in the shade, what you will drink, and the warning signs you will watch for.

LOOK FOR	WHAT IT MEANS
Complete log	Five days recorded honestly, with times, drinks, amounts and urine colors.
Graph	A neat bar graph with a title, labeled days, cups on the side, a 7-cup line and water shown in blue.
Hydration plan	The plan gives specific times and amounts for before, during and after play, shade breaks, and water as the main drink.
Safety	The plan names at least four warning signs of dehydration or heat illness and what to do.
Improvement	A sentence comparing the first and last days and naming one habit that improved.

UNIT 3

NUTRITION

Food is a gift from God and fuel for everything your body does: growing, thinking, running, healing. In this unit you will begin in ancient Babylon, where a young man named Daniel asked for ten days to prove that he and his friends could stay strong on vegetables and water. You will learn how a balanced plate is built, what each food group gives your body, how to read a Nutrition Facts label, and why we call some foods “everyday foods” and others “sometimes foods.” Then you will take your own ten-day rainbow challenge.

Next you will board the British warship HMS *Salisbury* in 1747 with the ship’s surgeon, James Lind, who set up one of the first fair tests in the history of medicine to find out what could cure scurvy. His answer, oranges and lemons, led much later to the discovery of vitamins. You will run your own fair test with twelve apple slices and six treatments, learn what vitamins and minerals do, and prepare a colorful snack full of them.

PREREQUISITES

- Can measure with cups and spoons and divide by 4
- Knows that water is the best everyday drink (Unit 2)
- Has checked with a parent about any food allergies in the family

MASTERY CHECKLIST

- ☐ I can tell the story of Daniel’s ten-day test and explain why Daniel made his choice.
- ☐ I can name the five food groups and describe a balanced plate.
- ☐ I can read serving size, fiber and added sugars on a Nutrition Facts label.
- ☐ I can tell how James Lind ran his fair test aboard HMS

Sal and what he found.

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- ☐ I can name four vitamins or minerals, what they do, and foods that have them.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- **“How to Understand and Use the Nutrition Facts Label” (U.S. Food and Drug Administration)**: Free. The FDA’s own guide to the label, with a labeled picture of each part. For parents and for the label steps in Lesson 3.1.
- **“Breakfast Basics” (Nemours KidsHealth)**: Free. A short article for kids on why breakfast matters and how to build a good one. Fits Lesson 3.1.
- **MyPlate (U.S. Department of Agriculture)**: Free at myplate.gov. Printable plates, kid-friendly recipes and activity sheets for Lessons 3.1–3.2.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

3.1 Daniel’s Ten-Day Test

3 sessions of 30–40 minutes

3.2 James Lind and the First Fair Test

3 sessions of 30–40 minutes

UNIT 3 REVIEW

Answer each question. Show your work for the calculation. The review is worth 30 points.

1. **5 pts**

What test did Daniel ask for in Daniel 1, and what happened at the end? What was his main reason?

2. **5 pts**

Name the five MyPlate food groups and describe how a balanced plate is divided.

3. **5 pts**

A cereal label says: serving size $\frac{3}{4}$ cup, dietary fiber 2 g, added sugars 12 g. How many teaspoons of added sugar are in one serving? If you pour $1\frac{1}{2}$ cups, how many teaspoons is that?

4. 5 pts

Describe James Lind's experiment on HMS *Salisbury*. Which treatment worked?

5. 5 pts

What would happen if a sailor ate no fruits or vegetables for many weeks? Explain why.

6. 5 pts

Match each nutrient to its job and give one food for each: vitamin C, calcium, iron, vitamin A.

ANSWER KEY

1. He asked that he and his friends be given pulse (vegetables and food from seeds) and water for ten days. At the end they looked healthier and stronger than the young men who ate the king's food. His main reason was faithfulness to God's law, not to defile himself with the king's food.
2. Fruits, vegetables, grains, protein foods and dairy. Half the plate is fruits and vegetables; a little more than a quarter grains (half of them whole grains); a little less than a quarter protein; with a serving of dairy or another calcium food.
3. $12 \div 4 = 3$ teaspoons per serving. $1\frac{1}{2}$ cups is 2 servings, so 6 teaspoons.
4. In 1747 he took 12 sailors with scurvy who were as alike as possible, gave them the same meals, and divided them into 6 pairs, each getting a different treatment (cider, elixir of vitriol, vinegar, sea water, oranges and lemons, or a spicy paste). The pair eating two oranges and a lemon a day got better fastest.
5. He would get scurvy: tiredness, swollen and bleeding gums, aching joints and wounds that would not heal. His body would run out of vitamin C, which it needs often because it cannot store much.
6. Vitamin C: healthy gums and skin, healing (oranges, peppers, strawberries). Calcium: strong bones and teeth (milk, yogurt, cheese, leafy greens). Iron: helps blood carry oxygen (beans, meat, spinach). Vitamin A: eyesight in dim light (carrots, sweet potatoes).

UNIT CHALLENGE: A BALANCED LUNCH I PLANNED AND MADE

Plan, shop for (with a parent) and prepare a balanced lunch for your family. Write the menu and draw it on a MyPlate diagram, with every food group filled and at least four colors of fruits and vegetables. Make a shopping list, read the label on at least one packaged food you choose and record its serving size, fiber and added sugars, and prepare the meal with a parent supervising the knife and stove. Serve water as the drink. Take a photo or draw the finished plates, and write a short review: what went well, what the family liked, and what you would change next time.

LOOK FOR	WHAT IT MEANS
Plan	A written menu and a labeled MyPlate drawing with all five food groups and at least four colors.
Label reading	Serving size, fiber and added sugars recorded correctly for at least one packaged food, with sugar turned into teaspoons.
Preparation and safety	Hands washed, allergies checked, knife and stove used only with a parent; the student did most of the work.
Reflection	A photo or drawing of the meal and a short review naming what went well and one change for next time.

3.1 DANIEL'S TEN-DAY TEST

OBJECTIVES

- Tell the story of Daniel's ten-day test from Daniel 1 and explain why Daniel made his choice.
- Name the five food groups and describe a balanced plate: half fruits and vegetables, with grains, protein and dairy.
- Read serving size, fiber and added sugars on a Nutrition Facts label.
- Plan, prepare and record balanced plates and a ten-day rainbow tally.

Warm-up. Play “Food Group Moves.” A parent calls out a food. If it is a fruit or vegetable, do 5 jumping jacks; a grain, 5 squats; a protein, 5 wall push-ups; a dairy food, 5 hops on each foot. Try ten foods: apple, rice, eggs, yogurt, carrots, bread, beans, cheese, oatmeal, banana. Think about it: which group did you jump for most?

WATCH

Food Groups for Kids | Learn about the five food groups and their benefits

Learn Bright • 7:47

<https://www.youtube.com/watch?v=pmgkj01uUTw>

WHEN TO WATCH

After the “How your body works” paragraph. List the five food groups and one benefit of each as you watch.

Note: The channel notes in its description one small error in the video about broccoli and steak; the food-group teaching is sound.

BACKUP VIDEO

Daniel Chapter 1: The Captivity Bible Story for Kids (Sharefaithkids.com)

ShareFaith Kids • 4:05

<https://www.youtube.com/watch?v=o9E8RQO8Eeo>

Before the story paragraph, as an animated retelling of Daniel 1. Then read Daniel 1:8-16 together.

KEY TERMS

pulse

In the King James Bible, food grown from seeds: vegetables, beans, lentils and grains.

nutrient

A substance in food that the body needs to grow, move and stay healthy, such as carbohydrates, protein, fats, vitamins, minerals and water.

fiber

The part of plant foods the body does not digest; it helps food move through and keeps you full longer.

food group

Foods that give the body similar nutrients. MyPlate uses five: fruits, vegetables, grains, protein foods and dairy.

whole grain

A grain food that still has all parts of the seed, including the fiber-rich outer layer: oatmeal, brown rice, whole-wheat bread.

Nutrition Facts label

The panel on packaged food that lists the serving size and the nutrients in one serving.

CORE IDEAS

The story. About six hundred years before Christ, King Nebuchadnezzar of Babylon conquered Jerusalem and carried away some of its brightest young men to train for his service. Among them were Daniel and his friends Hananiah, Mishael and Azariah. They were given food and drink from the king's own table. But Daniel "purposed in his heart that he would not defile himself" with it, because the king's food did not keep God's law for Israel. Daniel asked the steward for a test: "Prove thy servants, I beseech thee, ten days; and let them give us pulse to eat, and water to drink." At the end of ten days, Daniel and his friends looked healthier and stronger than all the young men who ate the king's food, and God gave them wisdom and skill in learning (Daniel 1:8-17).

How they figured it out. Daniel's first reason was faithfulness to God, not a nutrition experiment. But notice how he asked: he proposed a short, fair trial, ten days, with a clear comparison between two groups, and let the steward judge by what he could see. The steward was afraid that the young men would look weak and the king would blame him. The test settled the question. Daniel was respectful, patient and willing to be measured, and God honored his faithfulness.

How your body works. No single food has everything your body needs, so we eat a variety. The U.S. Department of Agriculture's **MyPlate** (2011) shows a balanced meal: make **half your plate fruits and vegetables**, a little more than a quarter grains (at least half of them whole grains), a little less than a quarter protein foods (beans, eggs, fish, meat, nuts), and a serving of dairy or another calcium food such as milk, yogurt or cheese. **Carbohydrates** in grains, fruit and vegetables are your main fuel. **Protein** builds and repairs muscles and other tissues. **Healthy fats** in nuts, seeds, fish and olive oil help your brain and help your body use some vitamins. Fruits and vegetables of different colors bring different vitamins and minerals, so eat a rainbow.

Everyday and sometimes foods. Everyday foods, like fruits, vegetables, whole grains, beans, eggs, milk, fish and lean meat, give your body lots of what it needs. Sometimes foods, like cake, candy, chips and soda, are fine at a birthday or a feast, but they have more added sugar, salt or fat and less of what helps you grow. God gave feasts as good gifts (Nehemiah 8:10). Self-control means enjoying treats in their place, not every day. A **Nutrition Facts label** helps you choose: first read the **serving size**, then look at **dietary fiber** (more is good) and **added sugars** (less is better). Divide grams of sugar by 4 to find teaspoons.

Try it. For ten days, like Daniel, you will keep a tally of the colors of fruits and vegetables you eat, help build balanced plates, read two cereal labels, and taste a “pulse” food you have never tried.

PICTURE STUDY



Still Life with Quince, Cabbage, Melon and Cucumber, Juan Sánchez Cotán, About 1602 · Oil on canvas ·
San Diego Museum of Art, California
Image: [Wikimedia Commons](#), public domain

Juan Sánchez Cotán was a Spanish painter who later became a lay brother in a Carthusian monastery. He painted ordinary fruits and vegetables with such care that they seem to glow. In his time, a stone window like this one was used as a cool pantry to keep food fresh.

Look closely

- Name the four foods. Which are fruits and which are vegetables?
- Find the strings. Why would someone hang a quince and a cabbage instead of setting them down?
- Look at the cut melon. Count the seeds you can see. What does a melon give you on a hot day besides sweetness?
- Trace the curve from the quince down to the cucumber with your finger. Why do you think the artist arranged them that way?

Talk about it

1. Daniel asked for “pulse,” foods grown from seeds. Which foods in this painting grew from seeds?
2. What colors are in this painting? Which colors are missing that you could add to your plate?

3. Why might a monk paint simple vegetables so carefully? What does it say about God's gifts?

Safety first. Check with a parent about food allergies before any tasting. Wash your hands before handling food. A parent supervises any knife or the stove; use a butter knife or kitchen scissors for soft foods if you are new to cutting.

ACTIVITY

The Ten-Day Rainbow Challenge

Daniel asked for ten days. You will take ten too. Each day you will count the colors of fruits and vegetables you eat, help build at least one balanced plate, and drink water with your meals. In the middle you will read cereal labels and taste a new “pulse” food.

You will need

- Fitness journal with a ten-day rainbow chart: columns for red, orange, yellow, green, blue or purple, and white or tan; one row per day
- Colored pencils
- Two boxes of breakfast cereal (or their labels)
- A dried or canned bean, lentil or pea dish to taste (hummus, lentil soup, black beans or split-pea soup)
- A dinner plate, and foods for a balanced lunch or dinner

Steps

1. **Day 1: draw your plate.** Draw a plate and divide it like MyPlate: half fruits and vegetables, a little more than a quarter grains, a little less than a quarter protein, with a cup of milk or yogurt beside it. Write two foods you like in each part.
2. **Every day for ten days:** each time you eat a fruit or vegetable, color one box in its color on your chart. Aim for at least 5 boxes and at least 3 different colors every day.
3. **Session 2: build a balanced plate.** Help a parent plan and prepare one lunch or dinner that fills every part of the plate. Wash and prepare the vegetables yourself. Before you eat, check your plate against your drawing and fix anything missing. Draw or photograph it for your journal.
4. **Label lab.** Look at the Nutrition Facts on two cereals. For each, write the serving size, grams of dietary fiber and grams of added sugars per serving. Divide the added sugars by 4 to find teaspoons. Which would make a better everyday breakfast? Which is a sometimes food?

5. **Session 3: the pulse taste test.** Taste a bean, lentil or pea dish you have never tried. Take three “polite bites.” Rate it from 1 to 5 and write one word for its taste and one for its texture.
6. Build a second balanced plate, this time for breakfast or a snack plate with at least 3 colors.
7. **Day 10: the results.** Count the boxes you colored each day and make a bar graph. Which color did you eat most? Which least? Write one change you will keep.

Tips

- Frozen and canned fruits and vegetables count too. Choose ones without added sugar or heavy sauces.
- Put the vegetables on the plate first, then add the other foods.
- If you do not like a vegetable cooked one way, try it raw, roasted or in soup.

Check your work

- ☐ I can tell Daniel’s ten-day test and why Daniel made his choice.
- ☐ I can draw a balanced plate and name the five food groups.
- ☐ I can read serving size, fiber and added sugars on a label.

FITNESS JOURNAL

1. Keep your ten-day rainbow chart and draw the bar graph of boxes per day.
2. Draw your two balanced plates and label each food group.
3. Copy your cereal label table and write which cereal is the better everyday breakfast and why.
4. Write your pulse taste-test rating and words, and one new food you want to try next.

From history. Daniel served in the courts of Babylon for about seventy years, under several kings, and the Book of Daniel records that he kept praying to God even when it put him in danger. His friends Hananiah, Mishael and Azariah are better known by the Babylonian names Shadrach, Meshach and Abednego.

COMMON MISTAKES

- Calling foods good or bad. Foods are everyday foods or sometimes foods, and treats have their place.

- Reading the sugar number without the serving size. A bowl you pour may be two or three servings.
- Eating only one color of vegetable. Different colors give different vitamins and minerals.
- Skipping breakfast. Your body has gone all night without food and needs fuel for the morning.

Make it a game • Balanced Plate Builder. Gather cups, spoons or toys and build a balanced plate: half fruits and vegetables, then grains, protein and dairy. Your parent calls a food and you add it in the right group. Race to fill the plate. Then tell Daniel's ten-day test in sixty seconds. Beat your plate-building time.

Scripture. “Prove thy servants, I beseech thee, ten days; and let them give us pulse to eat, and water to drink.” (Daniel 1:12, KJV)

Daniel asked for a fair test and trusted God with the result. Plain food, water and faithfulness made him strong.

3.2 JAMES LIND AND THE FIRST FAIR TEST

OBJECTIVES

- Tell how James Lind tested six treatments for scurvy aboard HMS *Salisbury* in 1747 and what he found.
- Explain what makes a test fair: groups that start alike, one difference at a time, and careful records.
- Name four vitamins or minerals, what each does, and foods that contain them.
- Run a fair test with twelve apple slices and six treatments, and prepare a vitamin-rich snack.

Warm-up. Sailors’ drill: “Swab the deck” (5 slow squats, sweeping your arms side to side), “Climb the rigging” (march in place lifting knees high and reaching up hand over hand for 30 seconds), “Haul the line” (5 rows pulling a towel toward your chest), “Lookout” (stand on one foot for 15 seconds each side). Do two rounds. Think about it: what might happen to sailors who ate the same dry food for months?

WATCH

How do vitamins work? - Ginnie Trinh Nguyen

TED-Ed · 4:44

<https://www.youtube.com/watch?v=ISZLTJH5lYg>

WHEN TO WATCH

After the “How your body works” paragraph. Watch for the sailor with scurvy and for the difference between vitamins that dissolve in water and in fat.

Note: A cartoon made for older students, with a cheerful pirate who has scurvy. Pause to explain any words that are new.

BACKUP VIDEO

What are vitamins and mineral salts? - Healthy Eating for Kids

Smile and Learn - English · 3:06

<https://www.youtube.com/watch?v=Pyp96QsS1Hg>

A simpler review of vitamins and minerals and the foods that contain them.

KEY TERMS

scurvy

A sickness caused by too little vitamin C. It causes tiredness, sore and bleeding gums, aching joints and wounds that will not heal.

vitamin

A substance the body needs in small amounts to work properly; most come from food. Examples: vitamins A, C and D.

vitamin C

A vitamin found in citrus fruit, strawberries, peppers and broccoli that keeps gums and skin healthy and helps wounds heal.

fair test

An experiment in which the groups start out alike and only one thing is different, so you can tell what caused the result.

mineral

An element from the earth that the body needs, such as calcium, iron and potassium. We get minerals from food and water.

CORE IDEAS

The story. For hundreds of years, sailors on long voyages fell ill with **scurvy**. After weeks at sea eating hard biscuit and salted meat, they grew weak and tired, their gums swelled and bled, their joints ached and old wounds opened. It was one of the most feared sicknesses at sea. In 1747 a young Scottish ship's surgeon named James Lind was serving aboard the warship HMS *Salisbury* when many of the crew fell sick with it. People had many ideas about what might help, but no one knew which was right. Lind decided to find out.

How they figured it out. On May 20, 1747, Lind chose **twelve sailors** whose scurvy was as alike as he could find. He kept them in the same part of the ship and gave them all the same basic meals. Then he split them into **six pairs** and gave each pair a different treatment: a quart of cider a day; a few drops of a sour acid called elixir of vitriol; two spoonfuls of vinegar; half a pint of sea water; **two oranges and one lemon every day**; or a spicy paste of garlic, mustard seed and horseradish. Within six days, one of the two sailors eating oranges and lemons was fit for duty again, and the other was well enough to help nurse the rest. The cider pair improved a little; the

others did not. Lind published his results in *A Treatise of the Scurvy* in 1753. It took many more years for the Royal Navy to act, but from 1795 British sailors were given lemon juice, and scurvy nearly disappeared from the fleet.

How your body works. Lind did not know why citrus worked. In the 1900s scientists discovered **vitamins**, substances the body needs in tiny amounts, and found that oranges and lemons are rich in **vitamin C**, which your body uses to build strong gums, skin and blood vessels and to heal cuts. Your body cannot store much vitamin C, so you need some most days. Other vitamins and minerals have their own jobs.

Vitamin A (carrots, sweet potatoes, spinach) helps your eyes see in dim light.

Vitamin D (sunlight on your skin, milk, eggs, fish) and the mineral **calcium** (milk, yogurt, cheese, leafy greens) build strong bones. **Iron** (beans, meat, spinach, fortified cereal) helps your blood carry oxygen. **Potassium** (bananas, potatoes, beans) helps your muscles and heart work. Most children get all they need from a variety of foods, which is why the rainbow plate matters.

Think it through. Lind's test was fair because the twelve men started alike, ate the same meals and lived in the same place, so the treatment was the only big difference. That is how scientists and doctors still test new medicines today. His test also needed patience: he watched, measured and wrote down what he saw. You will do the same this week.

Try it. You will run a fair test of your own with twelve apple slices in six pairs, one pair for each treatment, and watch which keeps apples from turning brown. Then you will make a snack full of vitamin C and other vitamins.

PICTURE STUDY



Still Life with Lemons, Oranges and a Rose, Francisco de Zurbarán, 1633 · Oil on canvas · Norton Simon Museum, Pasadena, California

Image: [Wikimedia Commons](#), public domain

Francisco de Zurbarán was a Spanish painter of Seville who painted mostly saints and monks. This is the only still life he signed and dated. Oranges and lemons grew well in the warm south of Spain, the same fruit that would one day keep sailors healthy at sea.

Look closely

- Count the lemons on the plate on the left.
- Look at the basket in the middle. How many oranges can you count? Find the green leaves and white blossoms.
- Find the cup on the right. What do you think is in it?
- Look at the edge of the table. How do the three groups line up like soldiers on parade?

Talk about it

1. Lind gave his sailors two oranges and one lemon a day. How many days would the fruit in this painting last a pair of sailors?
2. Why do you think fresh fruit was so hard to keep on a long voyage in 1747?

3. The painting shows fruit, water and a flower: food, drink and beauty. Which of God's gifts in this painting would you most like to share?

Safety first. Check for food allergies (especially citrus and strawberries) before tasting. Wash your hands and the fruit. A parent supervises all knife work; cut on a cutting board with your fingers curled under. Do not taste the vinegar or salt-water treatments from the experiment; the apple slices from the test are for observing, not eating.

ACTIVITY

Twelve Slices, Six Treatments: A Fair Test

James Lind used twelve sailors in six pairs. You will use twelve apple slices in six pairs. When a cut apple meets the air, it turns brown. Vitamin C slows this down. Your question: which treatment keeps apple slices freshest? Then you will make a vitamin-rich snack.

You will need

- Two apples of the same kind, a cutting board and a knife (with a parent)
- Six small bowls or cups labeled: Nothing, Water, Salt water, Vinegar, Orange juice, Lemon juice
- Water, $\frac{1}{2}$ teaspoon of salt, 2 tablespoons each of vinegar, orange juice and lemon juice
- A large plate or tray labeled in six sections, and a timer
- Fitness journal with a results table: treatment, browning score at 0, 30, 60 and 120 minutes
- Snack foods: oranges or clementines, strawberries, red or yellow bell pepper strips, broccoli florets, a dip such as yogurt or hummus

Steps

1. **Predict.** Write which treatment you think will keep the slices whitest and which will brown the most, and why.
2. **Set up fairly.** Pour each liquid into its labeled bowl (mix the $\frac{1}{2}$ teaspoon of salt into $\frac{1}{4}$ cup of water for salt water). Leave the “Nothing” bowl empty. With a parent, cut the two apples into 12 slices of about the same size.
3. **Treat.** Put 2 slices in each bowl and turn them so every cut surface is wet. Leave them 1 minute, then lift them out and set each pair in its section on the tray. Start the timer.
4. **Observe.** At 0, 30, 60 and 120 minutes, give each slice a browning score: 0 = white, 1 = a little tan, 2 = light brown, 3 = dark brown. Write the score for both slices in your table. Keep the tray in one place out of the sun so the test stays fair.

5. **Results.** Make a bar graph of the 120-minute scores, one bar per treatment. Which worked best? Was your prediction right? Write one sentence explaining what made your test fair, as Lind's was.
6. **Session 3: the vitamin snack.** Wash your hands and the produce. With a parent, peel the oranges and cut strawberries and peppers into strips. Arrange a snack plate with at least 4 colors and a small bowl of dip.
7. Beside each food, write on a card one vitamin or mineral it gives you (orange: vitamin C; pepper: vitamins C and A; broccoli: vitamin C and calcium; strawberries: vitamin C; yogurt: calcium). Serve your plate to your family and explain Lind's test while they eat.
8. Move after you eat: take a 15-minute family walk, and tell the story of HMS *Salisbury* on the way.

Tips

- Lemon juice has both vitamin C and acid, which both slow browning. That is why cooks squeeze lemon on cut apples and avocados.
- Keep everything the same except the treatment: same apple, same size slices, same time in the bowl, same place on the counter.
- Red peppers have even more vitamin C than oranges, ounce for ounce.

Check your work

- ☐ I can tell how James Lind set up his fair test and what he found.
- ☐ I ran my apple test fairly, scored it on time, and graphed the results.
- ☐ I can name four vitamins or minerals and a food that has each one.

FITNESS JOURNAL

1. Copy your results table and bar graph. Circle the treatment that worked best.
2. Draw Lind's six pairs of sailors in a row with each pair's treatment written below. Color the pair that got well.
3. Make a chart of four vitamins or minerals: name, what it does, two foods.
4. Draw your vitamin snack plate and label each color.

From history. Captain James Cook kept his crews free of scurvy on his long voyages in the 1770s, partly by stopping at every chance for fresh food and serving sauerkraut and greens. In 1932 scientists identified vitamin C as the substance in citrus that prevents scurvy, nearly two hundred years after Lind's test.

COMMON MISTAKES

- Changing more than one thing at a time, such as using different apples or leaving one pair in the sun. Then you cannot tell what caused the result.
- Thinking one “super food” has every vitamin. Variety gives the body what it needs.
- Thinking vitamins come mainly from pills. For most children, a rainbow of real food supplies them; a doctor decides if a child needs anything more.
- Deciding after one look. Lind watched for days, and you must score at every time on your table.

Make it a game • Fair Test Detective. Your parent describes a test with one unfair detail, like two groups that start differently. Spot the unfair part and fix it. Tell James Lind's six treatments from memory. Then design a fair test for sleep and focus using one change at a time, careful records and two similar groups. Rate each design.

UNIT 3

NUTRITION

Food is a gift from God and fuel for everything your body does: growing, thinking, running, healing. In this unit you will begin in ancient Babylon, where a young man named Daniel asked for ten days to prove that he and his friends could stay strong on vegetables and water. You will learn how a balanced plate is built, what each food group gives your body, how to read a Nutrition Facts label, and why we call some foods “everyday foods” and others “sometimes foods.” Then you will take your own ten-day rainbow challenge.

Next you will board the British warship HMS *Salisbury* in 1747 with the ship’s surgeon, James Lind, who set up one of the first fair tests in the history of medicine to find out what could cure scurvy. His answer, oranges and lemons, led much later to the discovery of vitamins. You will run your own fair test with twelve apple slices and six treatments, learn what vitamins and minerals do, and prepare a colorful snack full of them.

PREREQUISITES

- Can measure with cups and spoons and divide by 4
- Knows that water is the best everyday drink (Unit 2)
- Has checked with a parent about any food allergies in the family

MASTERY CHECKLIST

- ☐ I can tell the story of Daniel’s ten-day test and explain why Daniel made his choice.
- ☐ I can name the five food groups and describe a balanced plate.
- ☐ I can read serving size, fiber and added sugars on a Nutrition Facts label.
- ☐ I can tell how James Lind ran his fair test aboard HMS

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- ☐ I can name four vitamins or minerals, what they do, and foods that have them.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- **“How to Understand and Use the Nutrition Facts Label” (U.S. Food and Drug Administration)**: Free. The FDA’s own guide to the label, with a labeled picture of each part. For parents and for the label steps in Lesson 3.1.
- **“Breakfast Basics” (Nemours KidsHealth)**: Free. A short article for kids on why breakfast matters and how to build a good one. Fits Lesson 3.1.
- **MyPlate (U.S. Department of Agriculture)**: Free at myplate.gov. Printable plates, kid-friendly recipes and activity sheets for Lessons 3.1–3.2.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

3.1 Daniel’s Ten-Day Test

3 sessions of 30–40 minutes

3.2 James Lind and the First Fair Test

3 sessions of 30–40 minutes

UNIT 3 REVIEW

Answer each question. Show your work for the calculation. The review is worth 30 points.

1. **5 pts**

What test did Daniel ask for in Daniel 1, and what happened at the end? What was his main reason?

2. **5 pts**

Name the five MyPlate food groups and describe how a balanced plate is divided.

3. **5 pts**

A cereal label says: serving size $\frac{3}{4}$ cup, dietary fiber 2 g, added sugars 12 g. How many teaspoons of added sugar are in one serving? If you pour $1\frac{1}{2}$ cups, how many teaspoons is that?

4. 5 pts

Describe James Lind's experiment on HMS *Salisbury*. Which treatment worked?

5. 5 pts

What would happen if a sailor ate no fruits or vegetables for many weeks? Explain why.

6. 5 pts

Match each nutrient to its job and give one food for each: vitamin C, calcium, iron, vitamin A.

ANSWER KEY

1. He asked that he and his friends be given pulse (vegetables and food from seeds) and water for ten days. At the end they looked healthier and stronger than the young men who ate the king's food. His main reason was faithfulness to God's law, not to defile himself with the king's food.
2. Fruits, vegetables, grains, protein foods and dairy. Half the plate is fruits and vegetables; a little more than a quarter grains (half of them whole grains); a little less than a quarter protein; with a serving of dairy or another calcium food.
3. $12 \div 4 = 3$ teaspoons per serving. $1\frac{1}{2}$ cups is 2 servings, so 6 teaspoons.
4. In 1747 he took 12 sailors with scurvy who were as alike as possible, gave them the same meals, and divided them into 6 pairs, each getting a different treatment (cider, elixir of vitriol, vinegar, sea water, oranges and lemons, or a spicy paste). The pair eating two oranges and a lemon a day got better fastest.
5. He would get scurvy: tiredness, swollen and bleeding gums, aching joints and wounds that would not heal. His body would run out of vitamin C, which it needs often because it cannot store much.
6. Vitamin C: healthy gums and skin, healing (oranges, peppers, strawberries). Calcium: strong bones and teeth (milk, yogurt, cheese, leafy greens). Iron: helps blood carry oxygen (beans, meat, spinach). Vitamin A: eyesight in dim light (carrots, sweet potatoes).

UNIT CHALLENGE: A BALANCED LUNCH I PLANNED AND MADE

Plan, shop for (with a parent) and prepare a balanced lunch for your family. Write the menu and draw it on a MyPlate diagram, with every food group filled and at least four colors of fruits and vegetables. Make a shopping list, read the label on at least one packaged food you choose and record its serving size, fiber and added sugars, and prepare the meal with a parent supervising the knife and stove. Serve water as the drink. Take a photo or draw the finished plates, and write a short review: what went well, what the family liked, and what you would change next time.

LOOK FOR	WHAT IT MEANS
Plan	A written menu and a labeled MyPlate drawing with all five food groups and at least four colors.
Label reading	Serving size, fiber and added sugars recorded correctly for at least one packaged food, with sugar turned into teaspoons.
Preparation and safety	Hands washed, allergies checked, knife and stove used only with a parent; the student did most of the work.
Reflection	A photo or drawing of the meal and a short review naming what went well and one change for next time.

UNIT 4

STRENGTH

Strength is the power to push, pull, lift, carry and hold your body steady. You use it to climb a tree, carry groceries, help a neighbor and keep good posture at your desk. In this unit you will hear the old Greek legend of Milo of Croton, who is said to have carried a calf every day until it grew into a bull, and learn the true idea inside it: muscles grow stronger little by little when they are given a bit more work, then rest, good food and sleep. You will find your starting numbers and climb “Milo’s ladder,” one rep at a time.

Then you will meet Jack LaLanne, who in the 1950s began teaching Americans on television to exercise at home with nothing but a chair, a towel and their own body weight. You will learn the form cues for the four bodyweight basics, the squat, push-up, plank and lunge, run a timed circuit, and begin a two-week challenge with a before-and-after rep count.

PREREQUISITES

- Has done the five-station fitness check (Lesson 1.1) and knows the warm-up and cool-down
- Knows that protein builds and repairs the body (Unit 3)
- Can keep a table of numbers and add 1 each time

MASTERY CHECKLIST

- ☐ I can tell the legend of Milo of Croton and explain the true idea in it: progressive overload.
- ☐ I can explain how muscles grow stronger through work, rest, food and sleep.
- ☐ I can show good form in the squat, push-up, plank and lunge and name a form cue for each.
- ☐ I can follow a work-and-rest circuit with a timer and record my reps.
- ☐ I can explain how to train safely: body weight only, good form first, rest days, and stop at pain.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- **“Your Muscles” (Nemours KidsHealth):** Free. A clear kids’ article on the three kinds of muscle and how they work. Read it with Lesson 4.1.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

4.1 Milo of Croton and Getting Stronger Little by Little 3 sessions of 30–40 minutes

4.2 Good Form: Jack LaLanne and the Bodyweight Basics 3 sessions of 30–40 minutes

UNIT 4 REVIEW

Answer each question in complete sentences. The review is worth 30 points. You may show a movement as part of your answer.

1. **5 pts**

Tell the legend of Milo of Croton. What true idea does it teach, and what is that idea called?

2. **5 pts**

Name the three things your muscles need after a workout to grow stronger, and give one example of each.

3. **5 pts**

Name the parts that work together to bend your elbow: what pulls, what is pulled, what connects them, and where the movement happens.

4. **5 pts**

Give two form cues each for the squat and the push-up.

5. **5 pts**

What would happen if you did as many push-ups as possible every single day with no rest days and very little sleep?

6. 5 pts

How did Jack LaLanne show that you do not need a gym to get stronger? Name three exercises you can do with a chair or your body weight.

ANSWER KEY

1. Milo, an ancient Greek champion, is said to have carried a calf every day as it grew until he could carry a full-grown bull. It teaches that muscles grow stronger when the work increases a little at a time. This is called progressive overload.
2. Rest (a day off between hard workouts for the same muscles); food, especially protein (eggs, milk, beans, chicken, yogurt); and sleep (9 to 12 hours a night for children).
3. The biceps muscle pulls; it pulls on a bone of the forearm; a tendon connects the muscle to the bone; the movement happens at the elbow joint. The triceps relaxes (and pulls to straighten the arm).
4. Squat (any two): feet shoulder-width, sit back as onto a chair, chest up, knees over toes, heels down, thighs about level with the floor. Push-up (any two): hands under shoulders, body straight as a board, elbows angled back, chest to about a fist from the floor, breathe out as you push.
5. Your muscles would not have time to recover and rebuild, so you would get tired and sore, your numbers would stop improving or drop, your form would slip, and you would be more likely to get hurt. Rest and sleep are part of training.
6. On his television show he taught families to exercise at home with a chair, a towel and body weight, and he showed good form. Examples: sit-to-stands, step-ups, incline push-ups on a chair against the wall, squats, lunges, planks, push-ups, calf raises.

UNIT CHALLENGE: TWO-WEEK BODYWEIGHT CHALLENGE

Use your round-1 circuit numbers from Lesson 4.2 as your before numbers. For two weeks, train every other day with your Milo's ladder and the bodyweight basics circuit, keeping a chart of every workout and adding one rep (or 5 seconds) at a time while keeping good form. Rest, play, eat well and sleep on the days in between. At the end, run the same circuit again in exactly the same way and record your after numbers. Make a before-and-after bar graph for each station and write a paragraph about what improved, what was hard, and what you learned about getting stronger little by little.

LOOK FOR	WHAT IT MEANS
Faithful training	About 7 workouts in two weeks, each recorded with the date and numbers, with rest days in between.
Good form	A parent watches the after test and confirms that form cues were followed on every station.
Fair before-and-after test	The same stations, times, rests and push-up level for both tests, with numbers recorded honestly.
Graph and reflection	A neat before-and-after bar graph and a paragraph naming what improved, what was hard and what was learned. Effort and improvement count, not the size of the numbers.

4.1 MILO OF CROTON AND GETTING STRONGER LITTLE BY LITTLE

OBJECTIVES

- Tell the legend of Milo of Croton and explain, as a legend, the true idea in it.
- Explain how muscles, bones and joints work together and how muscles grow stronger with work, rest, food and sleep.
- Find safe starting numbers for three bodyweight exercises and follow a two-week plan that adds a little each workout.
- Name the rules of safe strength training for young people.

Warm-up. Animal warm-up: 20 seconds each of bear crawl (hands and feet, knees just off the floor), crab walk (belly up, hands and feet), frog jumps (squat low, jump forward softly) and 10 slow arm circles each way. Repeat once. Think about it: which animal walk was hardest? Which muscles were working?

WATCH

How Your Muscles Work

Nemours KidsHealth • 5:48

https://www.youtube.com/watch?v=f_F5UwtdPOc

WHEN TO WATCH

After the “How your body works” paragraph. Watch for the three kinds of muscle and how muscles pull on bones in pairs.

BACKUP VIDEO

What makes muscles grow? - Jeffrey Siegel

TED-Ed • 4:20

<https://www.youtube.com/watch?v=2tM1LFFxeKg>

For a deeper look at why rest, protein and sleep matter after hard work.

KEY TERMS

muscle

Body tissue that pulls (contracts) to make movement. Skeletal muscles pull on bones; the heart is a muscle too.

tendon

A strong cord that attaches a muscle to a bone.

joint

A place where two bones meet and can move, such as the knee, elbow or shoulder.

repetition (rep)

One complete movement of an exercise, such as one squat. A set is a group of reps done in a row.

progressive overload

Making the work a little harder over time (one more rep, a few more seconds) so the body keeps growing stronger.

recovery

The rest, food and sleep after exercise when the body repairs itself and becomes stronger.

CORE IDEAS

The story. Milo of Croton was a real athlete who lived about 2,500 years ago in Croton, a Greek city in the south of Italy. He was the most famous wrestling champion of his age and won at the ancient Olympic Games six times. Many legends grew up about his strength. The most famous was told by writers who lived hundreds of years after him: when Milo was a boy, he began lifting a newborn calf onto his shoulders and carrying it every day. The calf grew a little each day, and so did Milo's strength, until he could carry a full-grown bull. No one can prove that story, and a real bull would be far too heavy for anyone! But people kept telling it because it holds a true idea.

How they figured it out. The idea in the legend is called **progressive overload**: give your muscles a little more work than they are used to, let them recover, and then give them a little more again. In the 1940s an American army doctor named Thomas DeLorme used this idea to help injured soldiers rebuild their leg strength, adding a small amount of work week by week and carefully recording it. Coaches and doctors have used the same plan ever since. The secret is not huge jumps but small, steady steps, faithfully repeated, like the calf growing a little each day.

How your body works. You have more than 600 skeletal muscles. Each one is attached to bones by **tendons** and pulls across a **joint** to move it; muscles work in pairs, one pulling while the other relaxes, like the biceps and triceps in your upper arm. When you make a muscle work hard, it is challenged. Afterward, during **recovery**, your body repairs it and builds it back a little stronger. It needs three things to do that: **rest** (a day off between hard workouts for the same muscles), **food**, especially protein (children your age need about 34 grams a day, easy to get from

ordinary meals: an egg has about 6 grams, a cup of milk about 8), and **sleep** (9 to 12 hours a night). Before your teen years, much of the strength you gain comes from your brain and nerves learning to use your muscles better, which is why good form and practice matter so much. Strength work also makes your bones stronger.

Good form. Doctors and strength coaches agree that strength training is safe and good for children when it is supervised, uses good technique and starts light. In this course you will use only your own body weight. Warm up first. Move slowly and with control. Breathe out as you push. Stop if anything hurts in a sharp way or in a joint; tired, burning muscles are normal, but pain is a signal to stop and tell an adult.

Try it. This week you will find your starting numbers for three exercises and begin “Milo’s ladder,” a two-week plan in which you add one rep to each set every workout, with a rest day in between.

PICTURE STUDY



The Herring Net, Winslow Homer, 1885 · Oil on canvas · The Art Institute of Chicago

Image: [Wikimedia Commons](#), public domain

Winslow Homer lived for many years on the rocky coast of Maine and painted the sea and the people who worked on it. Here two fishermen haul in a net heavy with herring in a small boat on a rolling sea, far from their ship.

Look closely

- Find the net. How full is it? How heavy do you think it is?
- Look at the man pulling the net. Which muscles is he using: arms, back, legs? How is he bracing himself?
- Look at the second man. What is he doing with the fish, and how does he keep his balance?
- Find the red buoy and the ships in the distance. How far would these men have to row back?

Talk about it

1. Fishermen became strong by doing hard work every day, a little at a time. How is that like Milo's calf?
2. Why is balance as important as strength in this boat?
3. What jobs at your house use pushing, pulling, lifting or carrying? Which could you help with this week?

Safety first. Use body weight only. Warm up first, move slowly with good form, and breathe out as you push; never hold your breath. Rest at least one day between hard workouts for the same muscles. Stop and tell an adult if you feel sharp pain or pain in a joint, dizziness or chest pain.

ACTIVITY

Milo's Ladder: A Two-Week Plan

Milo's calf grew a little every day. You will add a little every workout. First you will find a safe starting number for each exercise. Then you will train every other day for two weeks, adding one rep to each set each time, and watch your numbers climb.

You will need

- A towel or mat on a flat, non-slip floor, and a wall or a sturdy chair pushed against the wall
- A timer, a helper to count and watch your form
- Fitness journal with a ladder chart: date, exercise, set 1, set 2, notes
- A water bottle

Steps

1. **Warm up (5 minutes):** march 1 minute, arm circles, 10 jumping jacks, 10 slow bodyweight squats, 5 inchworms (bend, walk hands out to a plank, walk feet up to hands).
2. **Find your starting numbers.** Do as many good-form reps as you can of each exercise, resting 2 minutes between: (a) squats; (b) push-ups, the kind you used in Lesson 1.1 (wall, incline with hands on a sturdy chair against the wall, knee or full); (c) glute bridges (lie on your back, knees bent, feet flat; squeeze your seat and lift your hips until your body is a straight line from shoulders to knees; lower slowly). Stop when your form breaks. Also time a plank hold.
3. **Set your ladder.** Your starting number for each exercise is your best number minus 2. (If you did 14 squats, start at 12.) Your starting plank time is your best time minus 5 seconds.
4. **Workout 1 (Session 2):** do 2 sets of each exercise at your starting number, resting 1 minute between sets. Hold 2 planks at your starting time, resting 1 minute. Count slowly: 2 seconds down, 1 second up.
5. Record every set on your ladder chart, with a note about how it felt (easy, just right, hard).

6. **Rest day.** The next day, do not repeat the workout. Play, walk, ride a bike, help with chores and get a good night's sleep. Your muscles are rebuilding.
7. **Workout 2 (Session 3):** warm up, then add 1 rep to every set and 5 seconds to each plank. If you cannot finish a set with good form, stay at the same number next time; that is fine.
8. **Keep climbing.** Continue every other day for two weeks (about 7 workouts), adding 1 rep and 5 seconds each time. Cool down after each workout with 2 minutes of walking and gentle stretches for your thighs, hips, chest and shoulders. Your ladder becomes part of your unit challenge.

Tips

- Good form first, numbers second. A slow, full rep builds more strength than three sloppy ones.
- Eat a meal or snack with protein within a couple of hours after a workout: milk, eggs, yogurt, beans, cheese, chicken or peanut butter.
- If a push-up is too hard, move your hands higher (wall or chair). If it is too easy, move them lower. Make each set challenging but possible.

Check your work

- ☐ I can tell the legend of Milo and explain progressive overload.
- ☐ I found safe starting numbers and recorded every set on my ladder chart.
- ☐ I can name three things muscles need to grow stronger after work: rest, food and sleep.

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1. Keep your ladder chart for every workout. Draw a line graph of your squats per set over the two weeks.
2. Draw a bent arm and label the bone, the biceps, the triceps, a tendon and the elbow joint. Show which muscle pulls to bend the arm.
3. Write down what you ate with protein on two workout days and how many hours you slept.
4. Write a sentence after each workout: How did it feel? What will you do next time?

From history. Ancient writers also said Milo was a student of the mathematician Pythagoras, who lived and taught in Croton, and that he once held up the roof of a hall long enough for others to escape when a pillar gave way. Like the calf, these stories are hard to prove, but they show how much people admired his strength.

COMMON MISTAKES

- Adding too much too fast. Milo's calf grew a little at a time; one rep per workout is plenty.
- Training the same muscles hard every day with no rest. Muscles grow stronger during recovery.
- Letting form slip to get one more rep: knees caving in on squats, hips sagging on push-ups.
- Thinking you need weights or machines. Your body weight is all you need at your age.

Make it a game • Milo's Ladder Contest. Do squats, step-ups or wall push-ups for a set number of reps. Add one rep each day to your ladder, like Milo's growing calf. Predict your reps for the week, then test. Tell the legend, and explain progressive overload in your own words. Compare your plan with your parent's. Bigger improvement wins.

4.2 GOOD FORM: JACK LALANNE AND THE BODYWEIGHT BASICS

OBJECTIVES

- Tell how Jack LaLanne taught Americans to exercise at home with simple equipment and body weight.
- Show good form in the squat, push-up, plank and lunge, and name at least two form cues for each.
- Complete a timed work-and-rest circuit and record reps for each station.
- Begin a two-week bodyweight challenge with a before-and-after rep count.

Warm-up. Chair warm-up, Jack LaLanne style: 10 sit-to-stands from a sturdy chair (sit down slowly, stand up without using your hands), 10 chair-back calf raises (hold the back of the chair, rise onto your toes), 10 arm circles each way, and 30 seconds of marching. Repeat once. Think about it: what can you use at home to exercise without any special equipment?

WATCH

Kids FULL BODY Workout (Best Kids Exercises For Strength Training)

GVO Kids • 12:34

https://www.youtube.com/watch?v=EeoUBotbM_w

WHEN TO WATCH

In Session 2, after the form clinic. Follow along: warm-up, squats, lunges, push-ups, planks and side planks.

Note: A follow-along workout led by a boy in a T-shirt and shorts, with an on-screen timer and a water break. Use the knee push-up shown on screen if full push-ups are too hard, and keep the form cues from the lesson in mind.

KEY TERMS

form

The correct way to do an exercise: body position, range of motion and speed.

form cue

A short reminder that helps you move correctly, such as “chest up” or “straight as a board.”

core

The muscles around your middle (stomach, sides and back) that hold your body steady.

circuit

A set of exercise stations done one after another, with a set time to work and to rest at each.

range of motion

How far a joint moves during an exercise, such as how deep you go in a squat.

CORE IDEAS

The story. Jack LaLanne was born in San Francisco in 1914. As a boy he was often sick and ate a great many sweets, and he later said he felt weak and unhappy. When he was about fifteen, he heard a lecture about healthy eating and exercise that changed his life. He began eating plain, wholesome food and exercising every day. In 1936, when most doctors still warned against hard exercise, he opened one of America's first modern health clubs in Oakland, California. In the 1950s he began a television show that ran for more than thirty years. Every morning he invited families watching at home to exercise with him, using only a kitchen chair, a towel and their own body weight. On one television program in the 1950s, he did 1,033 push-ups in 23 minutes. He kept exercising every day until he died in 2011 at the age of 96.

How they figured it out. LaLanne's great idea was that you do not need a gym to get stronger. A chair can be a step for step-ups, a support for incline push-ups or a seat for sit-to-stands. A towel can be used for pulling and stretching. The floor and your own body weight are enough for squats, lunges, push-ups and planks. He also insisted on doing each exercise correctly. He showed viewers how to stand, how far to bend and how to breathe, because good form makes exercise both safe and effective.

Good form. Squat: feet about shoulder-width apart, toes turned out a little; sit back and down as if onto a chair; chest up and eyes forward; knees point the same way as your toes; weight in your heels; go down until your thighs are about level with the floor (or as low as you can with good form), then stand tall. **Push-up:** hands under your shoulders or a little wider; body straight as a board from head to heels (or knees); elbows angled back, not straight out to the sides; lower your chest to about a

fist from the floor; push up and breathe out. **Plank:** elbows under shoulders; squeeze your seat and stomach; straight line from head to heels; eyes on the floor; breathe. **Lunge:** step forward with one foot; lower until both knees bend to about a right angle, front knee over your ankle and back knee hovering just above the floor; keep your body upright; push back to standing.

How your body works. These four basics train your whole body. Squats and lunges work the big muscles of your thighs and hips, which you use to run, jump and climb stairs. Push-ups work your chest, shoulders and the triceps in the back of your arms. Planks train your **core**, the muscles that hold your middle steady and protect your back. Good form spreads the work across the right muscles and protects your knees, back and shoulders. Proverbs 31:17 says the capable woman “strengtheneth her arms”; strength is for serving others.

Try it. In Session 2 you will hold a form clinic, checking each exercise in a mirror or with a helper, and then follow the video workout. In Session 3 you will run a timed circuit, count your reps, and record your “before” numbers for a two-week challenge.

PICTURE STUDY



Calisthenics: Every Day, Every School in Lawton Has 15 Minutes of This Outdoor Work, Lewis Wickes Hine, 1917 · Photograph · Library of Congress, Washington, D.C. (National Child Labor Committee Collection)

Image: [Wikimedia Commons](#), public domain

Lewis Hine was an American photographer who traveled the country photographing children, often to show where they were being worked too hard in mills and mines. Here he photographed something good: a whole school doing its daily fifteen minutes of outdoor exercise in 1917. The children are in the middle of a squat.

Look closely

- How many children can you count in one row? About how many are in the whole schoolyard?
- Look at the children's squats. Are their arms out in front? Are their heels on the ground? Who has the best form?
- Find the teachers. Where are they standing, and what might they be saying?
- Look at their clothes and shoes. Were they dressed for exercise?

Talk about it

1. Why would a school give every child fifteen minutes of exercise every day?
2. Why do you think the children hold their arms out in front during the squat? Try it. Does it help your balance?

3. What could your family do together for fifteen minutes every day?

Safety first. Body weight only. Exercise on a flat, non-slip floor in shoes with good grip, with space around you. If you use a chair for incline push-ups or sit-to-stands, push it firmly against a wall so it cannot slide. Keep good form, breathe steadily, and stop if you feel sharp or joint pain.

ACTIVITY

Form Clinic and the Bodyweight Basics Circuit

Jack LaLanne taught millions of people to exercise well at home. You will become your own coach: first checking your form on the four basics, then running a timed circuit and recording your “before” numbers for a two-week challenge.

You will need

- A towel or mat, a sturdy chair pushed against a wall, and clear floor space
- A full-length mirror, or a helper (a phone video of yourself also works)
- A timer that can count 30-second intervals
- Fitness journal with a circuit chart: station, round 1, round 2, round 3

Steps

1. **Form clinic (Session 2).** After a 5-minute warm-up, do 5 slow reps of each basic in front of the mirror or helper: squat, push-up, lunge (5 on each leg) and a 20-second plank. For each one, read the form cues aloud first. Your helper checks one cue at a time and says “good” or “fix.” Write one cue you need to work on for each exercise.
2. Follow along with the video workout, using your best form and your chosen push-up level.
3. **The circuit (Session 3).** Warm up for 5 minutes. Set up four stations: (1) squats, (2) push-ups at your level, (3) alternating lunges, (4) plank hold.
4. Do 30 seconds of work at each station, then rest 30 seconds while you move to the next station. Count your reps at stations 1–3 and your seconds at station 4. That is one round (4 minutes).
5. Rest 2 minutes and drink water. Do a second round, and a third if you can keep good form.
6. Record every number. Your round-1 numbers are your “before” numbers for the two-week challenge (the unit challenge).
7. **Cool down.** Walk slowly for 2 minutes, then hold gentle stretches for 20 seconds each: thigh (hold a chair, pull your heel toward your seat), hips (step

forward into a gentle lunge stretch), chest (hands clasped behind your back) and calves (press against a wall).

8. Write: Which station was hardest? Which form cue helped most? What is your goal for the after test?

Tips

- On push-ups, a straight body at a higher level (chair or wall) is better than a sagging body on the floor.
- On lunges, imagine your body is an elevator going straight down, not a slide going forward.
- Count out loud on the way up. It reminds you to breathe out as you push.

Check your work

- ☐ I can tell how Jack LaLanne taught people to exercise at home.
- ☐ I can show good form and name two cues each for the squat, push-up, plank and lunge.
- ☐ I completed the circuit with a timer and recorded my before numbers.

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1. Draw a stick figure doing each of the four basics. Under each, write two form cues.
2. Copy your circuit chart with every round. Circle your round-1 numbers: your before numbers.
3. Write the cue you most need to remember for each exercise, and how you will practice it.
4. List five household things Jack LaLanne might use for exercise, and what exercise each could be used for.

From history. Jack LaLanne's television show taught exercises that anyone could do, including older people and mothers at home with small children, and his dog, Happy, often appeared on the show. Many of the exercises he taught on a kitchen chair are still used by physical therapists today.

COMMON MISTAKES

- Squat: knees caving inward or heels lifting. Push your knees out over your toes and keep your heels down.

- Push-up: hips sagging or sticking up, or a tiny bend at the elbows. Keep straight as a board and go down to a fist from the floor.
- Plank: holding your breath or letting your back sag. Breathe steadily and squeeze your seat.
- Lunge: front knee shooting far past the toes, or leaning forward. Step far enough, and keep your chest up.

Make it a game • Jack's Form Showdown. Perform the squat, push-up, plank and lunge for your parent, saying two cues for each. She must find one thing to fix. Then switch: she performs, you are the form judge. Count points for correct cues. Tell Jack LaLanne's story using only bodyweight and simple tools. Complete a mini circuit together.

UNIT 4

STRENGTH

Strength is the power to push, pull, lift, carry and hold your body steady. You use it to climb a tree, carry groceries, help a neighbor and keep good posture at your desk. In this unit you will hear the old Greek legend of Milo of Croton, who is said to have carried a calf every day until it grew into a bull, and learn the true idea inside it: muscles grow stronger little by little when they are given a bit more work, then rest, good food and sleep. You will find your starting numbers and climb “Milo’s ladder,” one rep at a time.

Then you will meet Jack LaLanne, who in the 1950s began teaching Americans on television to exercise at home with nothing but a chair, a towel and their own body weight. You will learn the form cues for the four bodyweight basics, the squat, push-up, plank and lunge, run a timed circuit, and begin a two-week challenge with a before-and-after rep count.

PREREQUISITES

- Has done the five-station fitness check (Lesson 1.1) and knows the warm-up and cool-down
- Knows that protein builds and repairs the body (Unit 3)
- Can keep a table of numbers and add 1 each time

MASTERY CHECKLIST

- ☐ I can tell the legend of Milo of Croton and explain the true idea in it: progressive overload.
- ☐ I can explain how muscles grow stronger through work, rest, food and sleep.
- ☐ I can show good form in the squat, push-up, plank and lunge and name a form cue for each.
- ☐ I can follow a work-and-rest circuit with a timer and record my reps.
- ☐ I can explain how to train safely: body weight only, good form first, rest days, and stop at pain.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- **“Your Muscles” (Nemours KidsHealth):** Free. A clear kids’ article on the three kinds of muscle and how they work. Read it with Lesson 4.1.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

4.1 Milo of Croton and Getting Stronger Little by Little 3 sessions of 30–40 minutes

4.2 Good Form: Jack LaLanne and the Bodyweight Basics 3 sessions of 30–40 minutes

UNIT 4 REVIEW

Answer each question in complete sentences. The review is worth 30 points. You may show a movement as part of your answer.

1. **5 pts**

Tell the legend of Milo of Croton. What true idea does it teach, and what is that idea called?

2. **5 pts**

Name the three things your muscles need after a workout to grow stronger, and give one example of each.

3. **5 pts**

Name the parts that work together to bend your elbow: what pulls, what is pulled, what connects them, and where the movement happens.

4. **5 pts**

Give two form cues each for the squat and the push-up.

5. **5 pts**

What would happen if you did as many push-ups as possible every single day with no rest days and very little sleep?

6. 5 pts

How did Jack LaLanne show that you do not need a gym to get stronger? Name three exercises you can do with a chair or your body weight.

ANSWER KEY

1. Milo, an ancient Greek champion, is said to have carried a calf every day as it grew until he could carry a full-grown bull. It teaches that muscles grow stronger when the work increases a little at a time. This is called progressive overload.
2. Rest (a day off between hard workouts for the same muscles); food, especially protein (eggs, milk, beans, chicken, yogurt); and sleep (9 to 12 hours a night for children).
3. The biceps muscle pulls; it pulls on a bone of the forearm; a tendon connects the muscle to the bone; the movement happens at the elbow joint. The triceps relaxes (and pulls to straighten the arm).
4. Squat (any two): feet shoulder-width, sit back as onto a chair, chest up, knees over toes, heels down, thighs about level with the floor. Push-up (any two): hands under shoulders, body straight as a board, elbows angled back, chest to about a fist from the floor, breathe out as you push.
5. Your muscles would not have time to recover and rebuild, so you would get tired and sore, your numbers would stop improving or drop, your form would slip, and you would be more likely to get hurt. Rest and sleep are part of training.
6. On his television show he taught families to exercise at home with a chair, a towel and body weight, and he showed good form. Examples: sit-to-stands, step-ups, incline push-ups on a chair against the wall, squats, lunges, planks, push-ups, calf raises.

UNIT CHALLENGE: TWO-WEEK BODYWEIGHT CHALLENGE

Use your round-1 circuit numbers from Lesson 4.2 as your before numbers. For two weeks, train every other day with your Milo's ladder and the bodyweight basics circuit, keeping a chart of every workout and adding one rep (or 5 seconds) at a time while keeping good form. Rest, play, eat well and sleep on the days in between. At the end, run the same circuit again in exactly the same way and record your after numbers. Make a before-and-after bar graph for each station and write a paragraph about what improved, what was hard, and what you learned about getting stronger little by little.

LOOK FOR	WHAT IT MEANS
Faithful training	About 7 workouts in two weeks, each recorded with the date and numbers, with rest days in between.
Good form	A parent watches the after test and confirms that form cues were followed on every station.
Fair before-and-after test	The same stations, times, rests and push-up level for both tests, with numbers recorded honestly.
Graph and reflection	A neat before-and-after bar graph and a paragraph naming what improved, what was hard and what was learned. Effort and improvement count, not the size of the numbers.

UNIT 5

AEROBIC TRAINING

Your heart is a muscle about the size of your fist, and it beats about 100,000 times a day without ever taking a holiday. In this unit you will go back to 1628, when the English doctor William Harvey proved by careful measuring that the heart pumps the same blood around and around the body in a circuit. You will find your pulse, measure your heart rate at rest and after exercise, repeat one of Harvey's simple tests on the veins of your own hand, and learn how the heart and lungs grow stronger with training.

Then you will stand beside the cinder track at Oxford on May 6, 1954, as Roger Bannister, a medical student who trained in his lunch hour, became the first person to run a mile in under four minutes. You will learn how pacing and interval training helped him, time your own mile with lap splits, try to run it more evenly a second time, and end the quarter with a family fitness day.

PREREQUISITES

- Can count for 15 seconds and multiply by 4
- Can make a bar graph and find an average
- Knows the warm-up, cool-down, hydration plan and talk test (Units 1-2)

MASTERY CHECKLIST

- ☐ I can tell how William Harvey showed that blood travels in a circuit, and describe the path of the blood through the heart, lungs and body.
- ☐ I can find my pulse at my wrist, count my heart rate in beats per minute, and explain why it rises with exercise and falls with rest.
- ☐ I can explain how aerobic training makes the heart and lungs stronger.
- ☐ I can tell the story of Roger Bannister's four-minute mile and explain pacing, splits and intervals.
- ☐ I can time a run with lap splits, plan an even pace, retest and help lead a family fitness day.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- **“Your Heart and Circulatory System” (Nemours KidsHealth):** Free. A clear kids’ article on the heart, blood vessels and pulse. Read it with Lesson 5.1.
- **A jump rope:** Optional. A great aerobic workout for the family fitness day and for rest-day activity. Size it so the handles reach your armpits when you stand on the middle.
- **A stopwatch with a lap button:** Optional. Makes the lap splits in Lesson 5.2 easy. A phone stopwatch with a lap button works the same way.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

5.1 William Harvey and the Heart’s Circuit

3 sessions of 30–40 minutes

5.2 Roger Bannister’s Four-Minute Mile

3 sessions of 30–40 minutes

UNIT 5 REVIEW

Answer each question. Show your work for calculations. The review is worth 30 points.

1. **5 pts**

What did doctors believe about blood before William Harvey, and what did Harvey prove in 1628? Give one way he proved it.

2. **5 pts**

Trace the path of blood starting from the right side of the heart.

3. **5 pts**

Sam counts 22 beats in 15 seconds at rest and 38 beats in 15 seconds right after jumping jacks. What are his heart rates in beats per minute? Why did it rise?

4. **5 pts**

Bannister’s four laps were about 57.5, 60.7, 62.3 and 58.9 seconds. What was his total time? Why was even pacing important?

5. 5 pts

What would happen if you ran the first lap of a mile as fast as you possibly could?

6. 5 pts

What is interval training? How does aerobic training change the heart?

ANSWER KEY

1. They followed Galen, who taught that the liver kept making new blood from food and the body used it up. Harvey proved that the heart pumps the same blood around the body in a circuit. He calculated that the heart pumps more blood in half an hour than the body holds, so it must come back; he also showed that valves in the veins let blood flow only toward the heart.
2. Right side of the heart → lungs (drops off carbon dioxide, picks up oxygen) → left side of the heart → arteries → tiny vessels in the body (oxygen delivered to cells) → veins → back to the right side of the heart.
3. Rest: $22 \times 4 = 88$ bpm. After jumping jacks: $38 \times 4 = 152$ bpm. His muscles needed more oxygen, so his heart beat faster to pump more blood to them.
4. $57.5 + 60.7 + 62.3 + 58.9 = 239.4$ seconds = 3 minutes 59.4 seconds. A runner who starts too fast runs short of oxygen and slows badly; an even pace uses energy steadily and gives the best total time.
5. Your muscles would need more oxygen than your heart and lungs could deliver, you would tire quickly and have to slow down or walk, and your later laps (and probably your total time) would be much slower.
6. Repeated bursts of faster running, each followed by a rest of walking or easy jogging. Aerobic training makes the heart muscle stronger so it pumps more blood with each beat, and helps the lungs and muscles use oxygen better, building endurance.

UNIT CHALLENGE: MY PACING CHART AND THE FAMILY FITNESS DAY

Put together your aerobic training record and your family fitness day. Include the pacing charts and bar graphs for both of your timed miles, your interval-day log, and your pulse-lab graphs. Then plan, lead and record a family fitness day with at least five stations covering all five units, a warm-up you lead, water for everyone and a healthy snack you help prepare. Write a one-page report: what you planned, how each station went, what your family enjoyed, how your mile changed from the first try to the retest, and one fitness goal you will keep after this course.

LOOK FOR	WHAT IT MEANS
Pacing record	Both miles recorded with four splits and totals, an average lap, and two bar graphs; the retest shows a planned target pace.
Training log	The interval day and pulse lab recorded with numbers and how each felt.
Family fitness day	At least five stations from all five units, a warm-up and cool-down led by the student, water and a healthy snack, with everyone moving at his or her own pace.
Reflection	A one-page report naming what improved, what the family enjoyed, and one specific fitness goal for the future. Effort and improvement count, not speed.

5.1 WILLIAM HARVEY AND THE HEART'S CIRCUIT

OBJECTIVES

- Tell how William Harvey proved in 1628 that the heart pumps blood around the body in a circuit.
- Trace the path of blood from the heart to the lungs, back to the heart and out to the body.
- Find your pulse at your wrist and measure your heart rate in beats per minute at rest, after exercise and during recovery.
- Explain how aerobic exercise makes the heart and lungs stronger.

Warm-up. Sit quietly for 1 minute and put two fingers on the thumb side of your wrist until you feel a soft tap, tap, tap. Then do 30 seconds of jumping jacks, 30 seconds of high knees and 30 seconds of fast marching. Feel your wrist again. Think about it: what is your heart doing differently now, and why?

WATCH

Exploring the Heart - The Circulatory System! | AboutKidsHealth at The Hospital for Sick Children

AboutKidsHealth - The Hospital for Sick Children • 6:11

<https://www.youtube.com/watch?v=-s5iCoCaofc>

WHEN TO WATCH

After the “How your body works” paragraph. Follow the red blood cell through the four chambers and the valves of the heart.

BACKUP VIDEO

Ceaseless motion: William Harvey's experiments in circulation

Royal College of Physicians • 6:07

https://www.youtube.com/watch?v=w6q50_qNMoa

After the story, to see Harvey's own book and drawings from the Royal College of Physicians in London.

KEY TERMS

circulation

The movement of blood in a circuit from the heart to the body and lungs and back to the heart.

vein

A blood vessel that carries blood back to the heart. Veins have little valves that keep blood flowing one way.

pulse

The beat you feel in an artery each time the heart pumps.

artery

A blood vessel that carries blood away from the heart.

valve

A flap that lets blood flow in one direction only, found in the heart and in veins.

heart rate

How many times your heart beats in one minute, measured in beats per minute (bpm).

CORE IDEAS

The story. For almost fifteen hundred years, doctors in Europe followed the teaching of Galen, a Greek doctor of ancient Rome. Galen taught that the liver made new blood from food all the time, that the body used it up like fuel, and that some blood seeped through tiny holes in the wall of the heart. William Harvey, born in Folkestone, England, in 1578, studied medicine at Cambridge and then at Padua in Italy, where his teacher Fabricius showed him little flaps, or valves, inside the veins. Harvey became a physician at St Bartholomew's Hospital in London and later physician to King James I and King Charles I. In 1628 he published a short book in Latin, *On the Motion of the Heart and Blood in Animals*, which showed that Galen was wrong: the heart pumps the same blood around and around the body in a circuit.

How they figured it out. Harvey trusted careful observation and measurement more than old books. He watched the hearts of many animals beating. Then he did some arithmetic: he reckoned how much blood the heart pushes out with each beat and multiplied by the number of beats. Even with a small amount per beat, in half an hour the heart would pump out more blood than the whole body holds. The liver could never make that much from food, so the same blood must be coming back again and again. He also showed how the valves in the veins work. With a band tied around a person's upper arm, the veins of the forearm swell. If you press a vein and

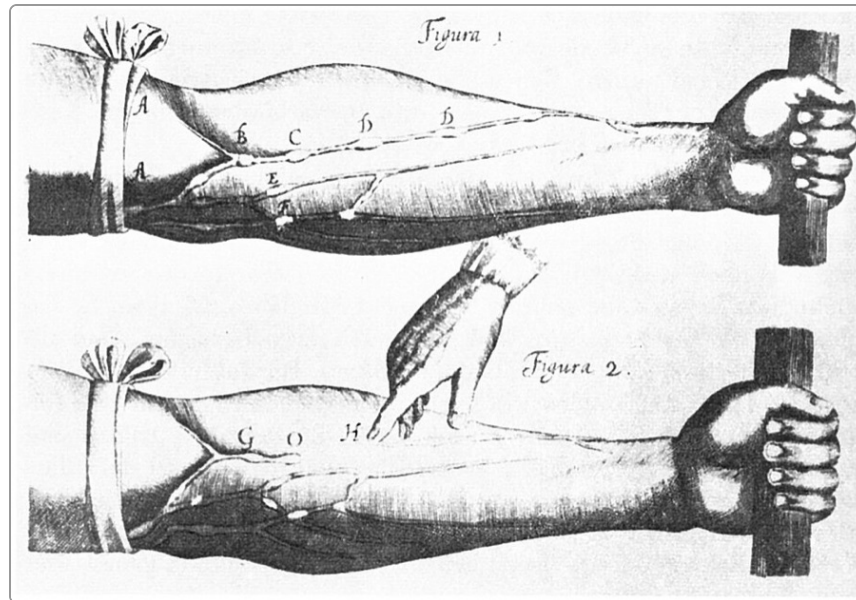
push the blood toward the hand, the vein stays empty, because the valves will not let blood flow backward. Blood in the veins flows only one way: toward the heart.

How your body works. Your heart is a muscle about the size of your fist with four rooms, or chambers. The right side pumps blood that has given up its oxygen to your **lungs**, where it drops off carbon dioxide and picks up fresh oxygen. The blood returns to the left side, which pumps it through the **arteries** to every part of your body. Tiny vessels deliver the oxygen to your cells, and the **veins** carry the blood back to the heart. Each beat sends a pressure wave along your arteries that you can feel as your **pulse**. At rest, the heart of a child your age usually beats about 70 to 100 times a minute. When you run, your muscles need more oxygen, so your heart beats faster and harder and you breathe faster. Aerobic exercise, the kind that keeps you breathing hard for many minutes, makes your heart muscle stronger, so that it can pump more blood with each beat.

Think it through. Harvey wrote that he learned and taught anatomy “not from books” but “from the fabric of nature,” by looking carefully at what God had made. His measurements overturned a teaching that people had believed for centuries. The Psalmist wrote, “I will praise thee; for I am fearfully and wonderfully made.” Your heart’s faithful work, beat after beat, is one reason to praise.

Try it. This week you will repeat a gentle version of Harvey’s vein test on your own hand, find your pulse, and measure your heart rate at rest, after three kinds of exercise and during recovery, and graph the results.

PICTURE STUDY



The Valves in the Veins of the Arm, from On the Motion of the Heart and Blood, Illustration from William Harvey's book, 1628 · Engraving · From the first edition, published in Frankfurt; copies in many libraries

Image: [Wikimedia Commons](#), public domain

These drawings come from Harvey's famous book of 1628. They show how anyone can see the valves in the veins. A band is tied above the elbow and the hand grips a stick to make the veins stand out. The letters mark the little knots where valves sit inside the veins.

Look closely

- Find the band tied around the upper arm. What does it do to the veins below it?
- Find the letters along the veins. What do you think the little bumps at those places are?
- Look at the second drawing. What is the finger doing to the vein?
- Why is the hand gripping a stick? Try squeezing your fist and look at the back of your hand.

Talk about it

1. If blood could flow either way in the veins, what would happen when the finger pushed the blood toward the hand?
2. Why do you think Harvey put simple drawings in his book instead of only words?

3. How did these drawings help prove that blood moves in a circuit?

Safety first. Never tie anything tightly around your arm or neck; the hand test in this lesson needs no band at all. Take your pulse at the wrist, not by pressing hard on your neck. During the exercise bouts, stop and tell an adult if you feel chest pain, dizziness, faintness or trouble breathing.

ACTIVITY

The Pulse Lab and Harvey's Hand

William Harvey learned by watching and measuring. You will measure your own heart: at rest, after exercise and as it slows down again. You will also see the work of your veins on the back of your own hand.

You will need

- A stopwatch or timer with seconds, and a helper
- A chair, the bottom stair or a sturdy step, and clear floor space
- Fitness journal with a pulse table: activity, beats in 15 seconds, beats per minute
- Graph paper and colored pencils

Steps

1. **Harvey's hand.** Let one hand hang down by your side for 30 seconds, then look at the back of it: the veins stand out. Now raise the hand high above your head for 30 seconds and look again: the veins flatten as the blood drains down toward your heart. Write what you saw and why.
2. **Find your pulse.** Turn one hand palm up. Place the tips of your first two fingers (not your thumb, which has its own pulse) on the thumb side of your wrist, just below the base of the thumb. Press gently until you feel the beat.
3. **Resting heart rate.** Sit quietly for 3 minutes. Count your pulse for 15 seconds while your helper times, then multiply by 4 to get beats per minute. Do it twice and write both.
4. **Bout 1:** do jumping jacks for 1 minute. Immediately count your pulse for 15 seconds and multiply by 4. Rest, sitting, until your pulse is within about 10 beats of your resting rate (at least 3 minutes).
5. **Bout 2:** do 1 minute of step-ups on the bottom stair (hold the rail). Count right away as before, then rest.
6. **Bout 3:** jog in place or run easy laps of the yard for 2 minutes. Count right away. Then sit and count again after 1 minute and after 2 minutes of rest. This shows your **recovery**.

7. Make a bar graph with one bar for each count: resting, jumping jacks, step-ups, jogging, 1 minute recovery, 2 minutes recovery. Which activity made your heart work hardest? How fast did it come back down?
8. **Session 3: repeat and compare.** On another day, do the whole lab again in the same order. Compare your numbers. Then calculate: if your resting heart rate is your number, how many times does your heart beat in an hour ($\times 60$)? In a day ($\times 24$)?

Tips

- Count the first beat as 1 when the timer starts, and stop counting exactly at 15 seconds.
- If you cannot find your pulse at your wrist, try the side of your neck below your jaw, pressing very gently on one side only.
- Heart rates differ from person to person. Compare your numbers only with your own.

Check your work

- ☐ I can tell how Harvey proved that blood travels in a circuit.
- ☐ I can find my pulse and calculate my heart rate in beats per minute.
- ☐ I made a bar graph of my heart rate at rest, after exercise and in recovery, and explained it.

FITNESS JOURNAL

1. Draw a simple heart with four chambers. Use blue arrows for blood going to the lungs and red arrows for blood going to the body.
2. Copy your pulse table and bar graph from both days.
3. Write your calculation: heartbeats in one hour and in one day at your resting heart rate.
4. Write a sentence about what you saw in Harvey's hand test and why it happens.

From history. Harvey could not see how blood passed from the smallest arteries to the smallest veins, because the vessels were too small for the eye. In 1661, a few years after Harvey died, the Italian scientist Marcello Malpighi looked at a frog's lung through a microscope and found the tiny vessels, the capillaries, that complete the circuit, just as Harvey had predicted.

COMMON MISTAKES

- Taking your pulse with your thumb, which has its own pulse and can confuse the count.
- Waiting too long to count after exercise. Your heart rate starts to drop within seconds, so count right away.
- Thinking arteries carry only “red” blood and veins only “blue” blood. All blood is red; blood low in oxygen is a darker red, and veins look blue through the skin.
- Comparing your heart rate with someone else’s. A lower or higher number is not better or worse by itself.

Make it a game • Blood Path Relay. Mark spots on the floor: heart, lungs, heart, body.

Walk the circuit carrying a red sock for blood while naming arteries, veins and valves. Take your pulse when you finish. Your parent calls a stop and asks which part you are at. Explain what William Harvey proved. Beat your time around the circuit.

5.2 ROGER BANNISTER’S FOUR-MINUTE MILE

OBJECTIVES

- Tell the story of Roger Bannister’s four-minute mile on May 6, 1954, and how pacers and interval training helped him.
- Explain endurance, pacing, splits and intervals.
- Run (or walk-run) a timed mile with lap splits, plan an even pace, and retest to improve.
- Plan and help lead a family fitness day.

Warm-up. Running drills along a 10-yard stretch, twice each: walking high knees, butt kicks (heels toward your seat), skipping with big arm swings, side shuffles each way, and two easy jogs building to a quick finish. Think about it: if you had to run four laps of a track, would you start as fast as you can? Why or why not?

WATCH

1954: Roger BANNISTER runs the first ever 4 MINUTE MILE | Newsreel | Classic BBC Sport | BBC Archive

BBC Archive · 6:26

<https://www.youtube.com/watch?v=Nb5AtK08gPM>

WHEN TO WATCH

After the story paragraph. Watch Chris Brasher and Chris Chataway set the pace and see when Bannister takes the lead.

Note: The BBC’s own newsreel, first shown the day after the race, in black and white with the original commentary.

KEY TERMS

endurance

The ability to keep going for a long time without stopping.

aerobic

Exercise steady enough that your heart and lungs can keep supplying oxygen to your muscles, like jogging, cycling or swimming.

pace

How fast you are moving, often given as the time for each lap or mile.

split

The time for one part of a race, such as one lap of a mile.

pacers

A runner who sets a steady speed at the front so another runner can follow it.

interval training

Training with repeated bursts of faster running, each followed by a rest of walking or easy jogging.

CORE IDEAS

The story. For years, runners had tried to run a mile in under four minutes, and some people said it was impossible. Roger Bannister was a medical student at St Mary's Hospital in London who had finished fourth in the 1,500 metres at the 1952 Olympics. He had little time to train, so he trained hard in his lunch hour. On May 6, 1954, at the Iffley Road track in Oxford, the wind was gusty, and Bannister almost decided not to try. Just before the start the wind dropped. His friends Chris Brasher and Chris Chataway took turns leading to set an even pace, and with about 300 yards to go Bannister sprinted past. The announcer began, "The time was three..." and the crowd's roar drowned out the rest: 3 minutes 59.4 seconds. Bannister later became a neurologist, a doctor of the brain and nerves.

How they figured it out. A mile was four laps of the Iffley Road track. To break four minutes, Bannister needed to run each lap in about 60 seconds. The secret was **even pacing**: a runner who starts too fast runs short of oxygen and slows badly at the end. His laps that day were about 57.5, 60.7, 62.3 and 58.9 seconds, close to even, with a strong finish. To prepare, he used **interval training**: running quarter-miles (one lap) again and again at the speed he wanted for the race, with a short rest of jogging in between, trying each week to run them a little faster or with a little less rest. Intervals taught his body and his mind exactly what the pace felt like.

How your body works. When you run steadily for many minutes, your heart and lungs work together to deliver oxygen to your leg muscles. That is **aerobic** exercise. If you start too fast, your muscles need more oxygen than you can breathe in, and you soon have to slow down, gasping. With regular training, your heart grows stronger and pumps more blood with each beat, your lungs and muscles get better at using oxygen, and you can go farther and faster before you tire. That is **endurance**.

Running, skipping, jumping rope, cycling, swimming and brisk walking all build it. Even walk-run intervals count, and they are a wise way to start.

Think it through. Scripture often compares the Christian life to a race: “let us run with patience the race that is set before us” (Hebrews 12:1). A good runner does not sprint the first lap and collapse; he trains faithfully, paces himself, and keeps going to the end. Bannister did not run his record alone, either. His friends helped him, and he thanked them all his life.

Try it. You will time your own mile (running or walk-running), record your lap splits, plan an even pace, train with intervals, and run it again to improve. Then you will lead your family in a family fitness day.

PICTURE STUDY



Snap the Whip, Winslow Homer, 1872 · Oil on canvas · Butler Institute of American Art, Youngstown, Ohio

Image: [Wikimedia Commons](#), public domain

Winslow Homer painted this scene of country schoolboys playing “snap the whip” at recess in 1872. In the game, children hold hands and run in a line; the leader turns sharply, and the children at the end swing so fast that some lose their grip and tumble.

Look closely

- Count the boys in the line. Which one is the leader, and which ones are at the “tip of the whip”?
- Find the boys who have fallen. Do they look hurt or happy?
- Look at the boys’ feet. How are they running? Are any of them barefoot?
- Find the schoolhouse, and the girls watching in the distance. Look at the trees on the hill. What season do you think it is?

Talk about it

1. The boys at the end of the line must run fastest. Why? Think about who covers the most ground in a turn.
2. How is this game like interval training: bursts of hard running and then rest?

3. What game could your family play at the family fitness day that gets everyone running and laughing?

Safety first. Run in daylight on a safe path, track or yard away from traffic, with an adult or buddy; wear good running shoes. Warm up first and walk at least 3 minutes after you finish. Walking during the run is always allowed. On hot days run early or late, carry water, and stop and tell an adult right away at chest pain, dizziness, faintness, trouble breathing or sharp pain.

ACTIVITY

My Mile: Splits, Intervals and a Retest

Roger Bannister broke four minutes by learning to run an even pace. You will time your own mile, look at your lap splits, train with intervals, and try to run it more evenly and a little faster the second time. Walking is allowed; your goal is to beat your own time, not anyone else's.

You will need

- A measured loop: a school track (4 laps of 400 metres is just under a mile), or a route around the block or a park measured with a map app or car odometer and divided into 4 equal parts
- A stopwatch with a lap button, a helper to call out times, and chalk or cones to mark the laps
- Water bottle, good running shoes and fitness journal with a pacing chart: lap 1, lap 2, lap 3, lap 4, total

Steps

1. **Session 2: time trial.** Warm up for 5 minutes with walking, easy jogging and the running drills. Then run your mile at a steady effort you think you can keep (walk when you need to). Your helper presses the lap button at the end of each lap and writes down the split.
2. Walk for 3–5 minutes to cool down, drink water, and stretch your calves and thighs.
3. **Make your pacing chart.** Write your four splits and your total time. Find your average lap: $\text{total time} \div 4$. Which lap was fastest? Slowest? Draw a bar graph of the four laps.
4. **Plan an even pace.** For your retest, choose a target lap time a few seconds faster than your average. Write it on your hand or a card. The goal is four laps close to that time, not a fast first lap and a slow last one.
5. **Interval day (between sessions).** Warm up, then do 6 rounds of: 1 minute of running at your target pace (or a little faster), then 2 minutes of walking. Use the talk test: during the walk you should get your breath back. Cool down with 5 minutes of walking. Write how each round felt.

6. **Session 3: the retest.** At least two days after your interval day, warm up the same way and run your mile again on the same loop. Your helper calls out each split so you can speed up or slow down to stay near your target.
7. Record the new splits and total. Make a second bar graph beside the first. Were your laps more even? Did your total time improve?
8. **Family fitness day.** Plan a fitness day for your family with stations from every unit: a Liddell sprint and the five-station check (Unit 1), a water table with a hydration chart (Unit 2), a rainbow snack you prepare (Unit 3), Milo's ladder squats and push-ups (Unit 4), a pulse check and a family walk-run relay or a game of snap the whip on soft grass (Unit 5). Lead the warm-up, explain each station, and finish together with a cool-down walk and a prayer of thanks.

Tips

- Most people start too fast. Hold back on lap 1; it should feel easier than you think it ought to.
- Breathe steadily and keep your shoulders relaxed and your arms swinging forward and back, not across your body.
- If you walk, walk briskly and start jogging again at a landmark, such as the next tree or corner.

Check your work

- ☐ I can tell the story of Bannister's four-minute mile and explain how pacers and intervals helped.
- ☐ I timed my mile with four splits, made a pacing chart, and retested.
- ☐ I helped plan and lead a family fitness day.

FITNESS JOURNAL

1. Copy your pacing chart for both miles and draw the two bar graphs side by side.
2. Record your interval day: each round, and how it felt from 1 (easy) to 10 (hardest).
3. Write Bannister's four lap times and add them up to check that they make 3:59.4.
4. Draw a map of your family fitness day stations and write one sentence about what you enjoyed most.

From history. Only 46 days after Bannister's run, the Australian John Landy ran a mile in 3:57.9 in Finland. Later that summer the two raced each other in Vancouver in what newspapers called the "Miracle Mile," and both broke four minutes; Bannister won. Since then well over a thousand runners have broken four minutes, among them a few high-school students, proof that once one person shows something can be done, many others follow.

COMMON MISTAKES

- Sprinting the first lap and having to walk most of the last one. Even pacing gives a better total time.
- Skipping the warm-up or stopping suddenly at the finish. Warm up first and walk to cool down.
- Thinking walking breaks are cheating. Walk-run intervals are a real training method and a wise way to start.
- Comparing your mile time with a friend's. Your race is against your own last time.

Make it a game • Four Minute Pacers. Run or walk a short course with your parent timing each lap. Plan your pace beforehand and compare. Then run two intervals separated by rest. Tell Roger Bannister's story, including his pacers. Use the words endurance, split and interval correctly in sentences. Score a point per correct term. Retest and see if your splits improve.

Scripture. "let us run with patience the race that is set before us," (Hebrews 12:1, KJV)

A runner who paces himself and keeps going to the end is a picture of a faithful life. Run your race with patience.

UNIT 5

AEROBIC TRAINING

Your heart is a muscle about the size of your fist, and it beats about 100,000 times a day without ever taking a holiday. In this unit you will go back to 1628, when the English doctor William Harvey proved by careful measuring that the heart pumps the same blood around and around the body in a circuit. You will find your pulse, measure your heart rate at rest and after exercise, repeat one of Harvey's simple tests on the veins of your own hand, and learn how the heart and lungs grow stronger with training.

Then you will stand beside the cinder track at Oxford on May 6, 1954, as Roger Bannister, a medical student who trained in his lunch hour, became the first person to run a mile in under four minutes. You will learn how pacing and interval training helped him, time your own mile with lap splits, try to run it more evenly a second time, and end the quarter with a family fitness day.

PREREQUISITES

- Can count for 15 seconds and multiply by 4
- Can make a bar graph and find an average
- Knows the warm-up, cool-down, hydration plan and talk test (Units 1-2)

MASTERY CHECKLIST

- ☐ I can tell how William Harvey showed that blood travels in a circuit, and describe the path of the blood through the heart, lungs and body.
- ☐ I can find my pulse at my wrist, count my heart rate in beats per minute, and explain why it rises with exercise and falls with rest.
- ☐ I can explain how aerobic training makes the heart and lungs stronger.
- ☐ I can tell the story of Roger Bannister's four-minute mile and explain pacing, splits and intervals.
- ☐ I can time a run with lap splits, plan an even pace, retest and help lead a family fitness day.

OPTIONAL BOOKS AND GEAR FOR THIS UNIT

- **“Your Heart and Circulatory System” (Nemours KidsHealth):** Free. A clear kids’ article on the heart, blood vessels and pulse. Read it with Lesson 5.1.
- **A jump rope:** Optional. A great aerobic workout for the family fitness day and for rest-day activity. Size it so the handles reach your armpits when you stand on the middle.
- **A stopwatch with a lap button:** Optional. Makes the lap splits in Lesson 5.2 easy. A phone stopwatch with a lap button works the same way.

Not required. Every activity in this unit works without them. School Launch has no ties to these authors, publishers or companies.

LESSONS IN THIS UNIT

5.1 William Harvey and the Heart’s Circuit

3 sessions of 30–40 minutes

5.2 Roger Bannister’s Four-Minute Mile

3 sessions of 30–40 minutes

UNIT 5 REVIEW

Answer each question. Show your work for calculations. The review is worth 30 points.

1. **5 pts**

What did doctors believe about blood before William Harvey, and what did Harvey prove in 1628? Give one way he proved it.

2. **5 pts**

Trace the path of blood starting from the right side of the heart.

3. **5 pts**

Sam counts 22 beats in 15 seconds at rest and 38 beats in 15 seconds right after jumping jacks. What are his heart rates in beats per minute? Why did it rise?

4. **5 pts**

Bannister’s four laps were about 57.5, 60.7, 62.3 and 58.9 seconds. What was his total time? Why was even pacing important?

5. 5 pts

What would happen if you ran the first lap of a mile as fast as you possibly could?

6. 5 pts

What is interval training? How does aerobic training change the heart?

ANSWER KEY

1. They followed Galen, who taught that the liver kept making new blood from food and the body used it up. Harvey proved that the heart pumps the same blood around the body in a circuit. He calculated that the heart pumps more blood in half an hour than the body holds, so it must come back; he also showed that valves in the veins let blood flow only toward the heart.
2. Right side of the heart → lungs (drops off carbon dioxide, picks up oxygen) → left side of the heart → arteries → tiny vessels in the body (oxygen delivered to cells) → veins → back to the right side of the heart.
3. Rest: $22 \times 4 = 88$ bpm. After jumping jacks: $38 \times 4 = 152$ bpm. His muscles needed more oxygen, so his heart beat faster to pump more blood to them.
4. $57.5 + 60.7 + 62.3 + 58.9 = 239.4$ seconds = 3 minutes 59.4 seconds. A runner who starts too fast runs short of oxygen and slows badly; an even pace uses energy steadily and gives the best total time.
5. Your muscles would need more oxygen than your heart and lungs could deliver, you would tire quickly and have to slow down or walk, and your later laps (and probably your total time) would be much slower.
6. Repeated bursts of faster running, each followed by a rest of walking or easy jogging. Aerobic training makes the heart muscle stronger so it pumps more blood with each beat, and helps the lungs and muscles use oxygen better, building endurance.

UNIT CHALLENGE: MY PACING CHART AND THE FAMILY FITNESS DAY

Put together your aerobic training record and your family fitness day. Include the pacing charts and bar graphs for both of your timed miles, your interval-day log, and your pulse-lab graphs. Then plan, lead and record a family fitness day with at least five stations covering all five units, a warm-up you lead, water for everyone and a healthy snack you help prepare. Write a one-page report: what you planned, how each station went, what your family enjoyed, how your mile changed from the first try to the retest, and one fitness goal you will keep after this course.

LOOK FOR	WHAT IT MEANS
Pacing record	Both miles recorded with four splits and totals, an average lap, and two bar graphs; the retest shows a planned target pace.
Training log	The interval day and pulse lab recorded with numbers and how each felt.
Family fitness day	At least five stations from all five units, a warm-up and cool-down led by the student, water and a healthy snack, with everyone moving at his or her own pace.
Reflection	A one-page report naming what improved, what the family enjoyed, and one specific fitness goal for the future. Effort and improvement count, not speed.