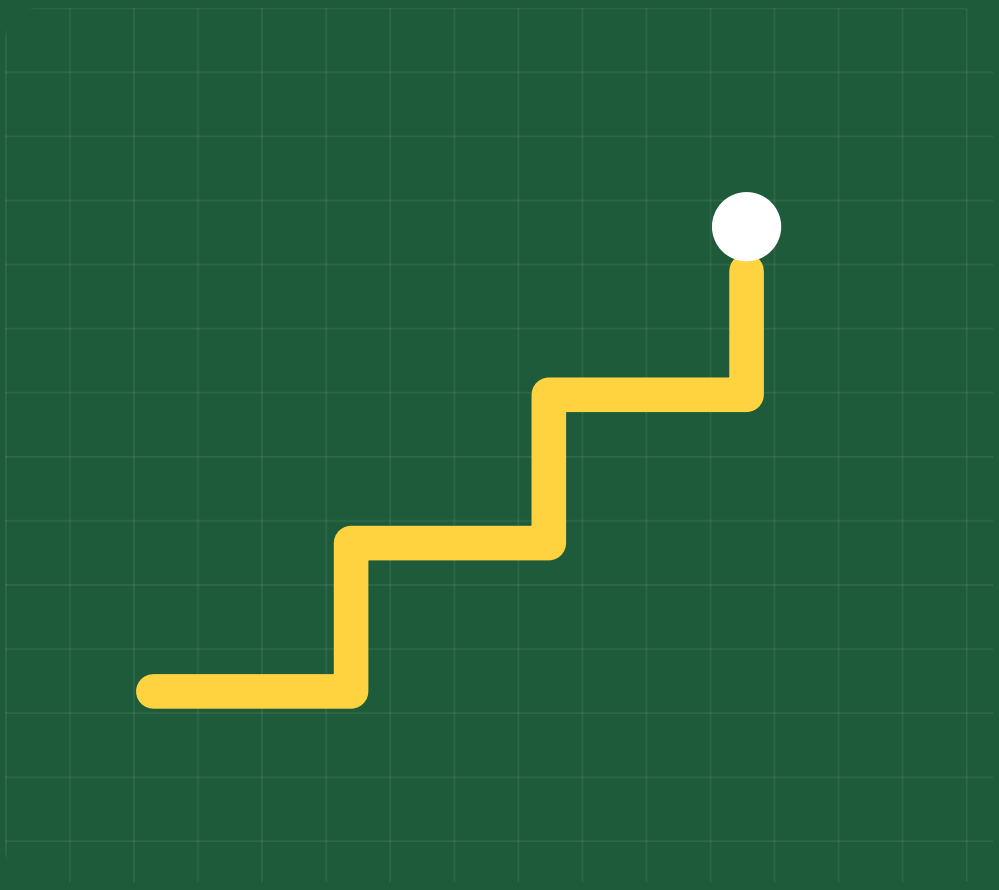
UpOnly Learning



GRADE 4

FREE SAMPLE WORKBOOK

Science Grade 4

One step at a time. · Ages 9–10 · Free sample: 1 of 8 topics

UO-SCI-4

OUR STORY

One step at a time

I'm Dr. Evan J. Hasson. I've run a specific chiropractic practice for over twelve years, and I'm a dad of three. My work is about alignment: get the structure right, and everything else works better.

At home, nothing was aligned. I was spending thousands a month on tutors, extracurriculars and programs, and when I asked about enrolling a second or third child the answer was always the same: that'll be double, that'll be triple. The charter school had a waiting list. The good public school had a waiting list. The private schools had the kind of list where it helps to know someone, or to give generously first.

And underneath all of it, the same quiet threat: if you don't pay for this, your child will fall behind. Not sold with evidence. Sold with fear.

So I did my own research, and here is what I found: none of it is secret. The standards are published. The order a child should learn in is written down and freely available. It is just scattered. Nobody had done the work of pulling it together, putting it in order and handing it over. So I did.

When every step has its place, confusion has nowhere to hide.

I built this for my own kids. I'm giving it to yours.

Dr. Evan J. Hasson, DC
Founder and dad of three

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No guaranteed results, and mistakes happen. Every student learns differently. We write and review every question and answer key carefully, and we still get things wrong. An answer key can be wrong, and a question can be worded badly or have two defensible answers. Check the answer key before you hand it over, and trust your own judgment over ours. Found a problem? **Photograph the page and email it to support@uponlylearning.com**. The picture tells us more than a description, and we fix it for every family.

Safety. Some activities use household items such as scissors, coins or food. An adult should supervise and skip anything unsafe for the student.

Not professional advice. This workbook does not replace an evaluation by a qualified educator or specialist. The founder is a Doctor of Chiropractic; UpOnly Learning does not provide medical or health advice.

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INTRODUCTION

How to use this workbook

Each topic follows the same steps, so your student always knows what comes next.

① **Quick Check.** 10 questions before you teach. Read them aloud for younger students. A high score means you can move faster.

② **Learn It.** Key words, step-by-step teaching with lines you can read aloud, worked examples and the mistakes to watch for.

③ **We Do It Together.** 10 questions you do side by side. The answer and the "why" are printed right after each question, so you can talk it through.

④ **You Try.** 10 questions your student does alone.

Answers with short explanations for every question are in the **Answer Key** at the end of each topic, so students can work without peeking. Go over each wrong answer together using the explanation.

This workbook is printed in full color. To save ink, choose "Black and white" or "Grayscale" in your printer settings; every page still works in black and white.

Want online checks that score themselves and track each student's progress? Visit uponlylearning.com.

GRADE 4

CONTENTS · UO-SCI-4

Science: Grade 4

Free Sample Workbook · Ages 9–10 · 1 of 8 topics, with a Quick Check, a lesson, We Do It Together, You Try and an answer key

Our story 2

Copyright, license and disclaimers 3

How to use this workbook 4

Topic 1 · Speed and energy **6**

The faster an object moves, the more energy it has 4-PS3-1

Quick Check 6 · Learn It 8 · We Do It Together 10 · You Try 12 · Answer Key 14

Speed and energy

The student will use evidence to explain that the speed of an object is related to the energy of that object.

① Quick Check

Do this before the lesson. It shows what your student already knows. Score: ____ / 10

1. Which hammer swing will push a nail in deeper, if everything else is the same?

A A fast swing **B** Both swings the same **C** Holding the hammer still **D** A slow swing

2. Would a fast-moving ball or a slow-moving ball hurt more if it bumped you?

A They would feel the same **B** The slow ball **C** The fast ball **D** Neither would hurt at all

3. What do we call energy that an object has because it is moving?

A Motion energy **B** Food energy **C** Sound energy **D** Bright light energy

4. A swing stops moving at the very top of its path for a moment. At that moment, how much motion energy does it have?

A The same as at the bottom **B** Its most motion energy **C** Twice as much as at the bottom of the path **D** None, because it is stopped for that moment

5. A girl on a sled goes down a short gentle hill and then a long steep hill. On which hill will she be going faster at the bottom?

A The long steep hill **B** She will stop on both **C** The short, gentle green hill **D** Both the same

6. Jamal says a heavy truck always has more energy than a light bike, no matter how fast each goes. What is wrong with this idea?

A Trucks have no energy **B** Bikes never have energy **C** Nothing, heavy things always win in every single race they run **D** Speed matters too; a parked truck has no motion energy at all

7. A toy car on a 2-book ramp knocks down 1 domino. On a 5-book ramp, what is most likely?

A The car will not move **B** It knocks down exactly 1 domino **C** It knocks down more dominoes **D** It knocks down no dominoes

3. A bumper car moving slowly bumps another car. Then it moves quickly and bumps again. Which bump makes the other car move more?

A The quick bump **B** Neither bump moves it **C** The slow bump **D** They are equal

4. A cup moves 4 cm for each book of ramp height. Using this pattern, how far would it move with 6 books?

A 28 cm **B** 10 cm **C** 20 cm **D** 24 cm

5. Why do speed limits near schools help keep students safe?

A Slower cars are louder **B** Fast cars have less energy **C** Speed limits make cars lighter

D Slower cars have less energy, so a crash does less harm

② Learn It

MATERIALS a toy car or marble; a ramp made from a book and a stiff board or cardboard; 3 to 4 extra books to change ramp height; a paper cup with a doorway cut in one side (adult cuts); a ruler or tape measure; masking tape; scissors (adult use only). **Safety:** keep marbles away from younger brothers and sisters (choking risk), and pick them up after the test so no one slips on them

Key words

- **energy**: the ability to cause motion or change
- **speed**: how fast something moves
- **motion energy**: the energy an object has because it is moving
- **evidence**: observations or measurements that support an explanation
- **variable**: something that can change in an experiment

Warm-up

1. Ask: Would it hurt more to be hit by a slowly rolling ball or a fast one? Why?

> *Fast things seem to pack more punch. Today we collect evidence to find out why.*

Teach

1. Explain that energy is the ability to make things move or change, and moving objects have motion energy.
2. State the idea: the faster an object moves, the more energy it has.
3. Show the setup: ramp, marble, and paper cup placed at the bottom. When the marble hits the cup, its energy pushes the cup.
4. Explain that how far the cup slides is our evidence for how much energy the marble had.

> *The farther the cup gets pushed, the more energy the marble had.*

Guided practice

1. Predict: Ask, What do you think will happen to the cup when the ramp is higher? Write the prediction down. Then prop the ramp on 1 book, release the marble (no pushing) and measure how far the cup slides. Repeat 3 times.
2. Prop the ramp on 3 books (steeper means faster). Do 3 more trials and measure each one.
3. Observe and record: write each result in a table like the one below.

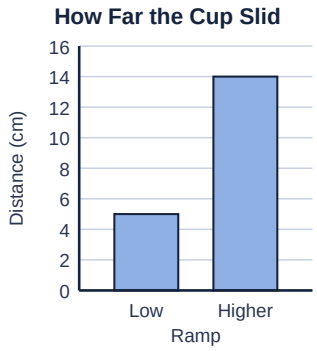
Ramp	Trial 1	Trial 2	Trial 3	Average
1 book	___ cm	___ cm	___ cm	___ cm
3 books	___ cm	___ cm	___ cm	___ cm

4. Explain: Ask, What happened and why? Compare the results with the prediction. The higher ramp made the marble faster, and the cup moved farther.

> *We only changed one thing: the ramp height. What happened to the cup?*

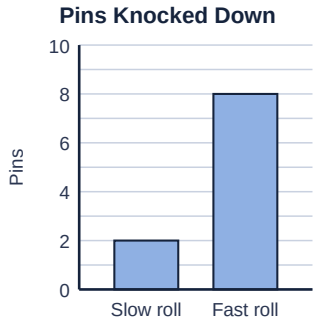
Worked examples

A marble rolled from a low ramp pushes a cup 5 cm. From a higher ramp it pushes the cup 14 cm. What does this show?



The marble from the higher ramp was moving faster, so it had more energy and pushed the cup farther.

A bowling ball rolled slowly knocks down 2 pins. Rolled fast, it knocks down 8 pins. Why?



The faster ball had more energy, so it could move more pins.

Watch for these mistakes

Mistake: Energy only exists in things like batteries or food.
Fix: Any moving object has motion energy. Show the moving marble pushing the cup.

Mistake: A heavier object always has more energy, no matter how fast it goes.
Fix: For the same object, speed decides the energy. In our test, the same marble had more energy only when it was faster. Keep the object the same to see this.

PARENT TIP Mark the release spot and cup spot with masking tape so every trial starts the same way.

GO FURTHER Graph your results: ramp height (in books) on the bottom, average cup distance on the side. Describe the pattern.

③ We Do It Together: 10 questions

> *Do these side by side. Read each question together, let your student answer, then read the answer and the "why" right below it and talk it through.*

1. What is energy?

A The color of an object **B** How heavy something is when you hold it

C The ability to cause motion or change **D** How big something is

> **Answer: C** The ability to cause motion or change
> **Why:** Energy is the ability to make things move or change.

2. Which word means the ability to make things move or change?

A Ramp **B** Speed **C** Energy **D** Distance

> **Answer: C** Energy
> **Why:** Energy is the ability to cause motion or change.

3. Kai pushes a toy truck softly and it rolls slowly. What could he do to give it more energy?

A Push it harder so it goes faster **B** Push it more softly than he did before **C** Paint it red

D Leave it alone

> **Answer: A** Push it harder so it goes faster
> **Why:** A harder push makes the truck go faster, which gives it more energy.

4. What tool would you use to measure how far a cup slid?

A A clock **B** A ruler **C** A thermometer **D** A scale

> **Answer: B** A ruler
> **Why:** A ruler measures distance.

5. Two identical marbles roll toward cups. Marble 1 rolls 30 cm in one second. Marble 2 rolls 60 cm in one second. Which will push its cup farther?

A Marble 1 **B** Marble 2 **C** Both the same **D** Neither

> **Answer: B** Marble 2
> **Why:** Marble 2 is faster, so it has more energy to push its cup.

5. A pitcher throws a baseball slowly, then fast. The fast ball makes the catcher's mitt pop loudly and pushes his hand back more. Why?

A The slow ball had more energy **B** The mitt changed **C** The fast ball had more energy

D Loud sounds come from slow balls

> **Answer: C** The fast ball had more energy
> **Why:** The fast ball carries more energy, so it pushes the mitt and hand harder.

6. Two identical toy cars crash into the same block. Car A moves the block 2 cm. Car B moves it 8 cm. Which car was going faster?

A Neither car was moving **B** Car B **C** They went the same speed **D** Car A

> **Answer: B** Car B
> **Why:** Car B moved the block farther, so it had more energy, which means it was faster.

7. A soccer ball is kicked softly and rolls 4 meters. Kicked hard, it rolls 20 meters. What does the longer roll show?

A The ball got heavier **B** Soft kicks give more energy to the ball than hard ones

C The grass was shorter **D** The hard kick gave the ball more speed and more energy

> **Answer: D** The hard kick gave the ball more speed and more energy
> **Why:** A faster ball has more energy and can travel farther.

8. A boy pedals a bike faster and faster down a flat path. Where does the extra motion energy come from?

A From nowhere **B** From the bike's color **C** From the boy's muscles, which use energy from food

D From the path

> **Answer: C** From the boy's muscles, which use energy from food
> **Why:** The boy's muscles use energy from food to push the pedals and speed up the bike.

9. A roller coaster car goes down a big drop, then up a small hill, then down again. Where on the ride is it likely going fastest?

A At the top of the big drop **B** While waiting to start **C** At the bottom of the big drop

D At the top of the small hill

> **Answer: C** At the bottom of the big drop
> **Why:** After the biggest drop, the car has sped up the most, so it has the most motion energy there.

④ You Try: 10 questions

Now your student works alone. Check answers in the Answer Key at the end of this topic. Score: ____ / 10

1. A toy car rolls down a ramp. Where on the ramp is it moving fastest?

A Halfway up, then it stops **B** It moves at the same speed everywhere always

C At the very top before it starts **D** Near the bottom of the ramp

2. What does a scientist use evidence for?

A To skip the experiment **B** To support an explanation **C** To decorate a poster

D To make a guess without testing

3. In a ramp test, a marble rolls down and hits a paper cup. What shows how much energy the marble had?

A How shiny and smooth the marble is **B** The color of the cup **C** How far the cup slides

D How loud the room is

4. A bowling ball rolled slowly knocks down 3 pins. Rolled fast, it knocks down 9 pins. Which explanation fits the evidence?

A The slow ball had more energy **B** Speed has no effect on pins

C The pins were heavier the first time we rolled the ball

D The fast ball had more energy, so it moved more pins

5. A cup was moved 7 cm in trial 1 and 13 cm in trial 2. How much farther did it move in trial 2?

A 7 cm **B** 5 cm **C** 20 cm **D** 6 cm

6. Why do we do three trials for each ramp height instead of just one?

A Because the marble gets tired **B** To change the ramp each time

C To make the test take longer in class **D** So one odd result does not fool us

7. Priya's cup moved 5 cm, 6 cm and 7 cm in three trials. What is the total distance?

A 16 cm **B** 18 cm **C** 13 cm **D** 17 cm

8. Why does a thrown ball eventually stop rolling across grass?

A It runs out of air **B** Its energy disappears from the universe

C The grass rubs against it and its motion energy changes into other forms, like heat

D Balls can only roll for 5 seconds

2. A cyclist is going down a hill and brakes so she goes slower. What happens to her motion energy, and where is some of it going?

A It shrinks, and turns into more speed **B** It shrinks, and some turns into heat in the brakes

C It grows, and goes into the hill **D** It does not change at all

3. Two identical balls hit two identical walls. Ball X leaves a small dent and Ball Y leaves a big dent. Which claim is best supported?

A Ball Y was moving faster **B** The walls were different **C** Both balls were moving at the same speed

D Ball X was moving faster

Speed and energy: Answers and explanations

① Quick Check

1. Which hammer swing will push a nail in deeper, if everything else is the same?
   A A fast swing
   The faster hammer has more energy to push the nail.

2. Would a fast-moving ball or a slow-moving ball hurt more if it bumped you?
   C The fast ball
   The fast ball has more energy, so it pushes on you harder.

3. What do we call energy that an object has because it is moving?
   A Motion energy
   Motion energy is the energy of moving things.

4. A swing stops moving at the very top of its path for a moment. At that moment, how much motion energy does it have?
   D None, because it is stopped for that moment
   At the very top the swing stops for a moment. Something that is not moving has no motion energy.

5. A girl on a sled goes down a short gentle hill and then a long steep hill. On which hill will she be going faster at the bottom?
   A The long steep hill
   A longer, steeper hill lets her speed up more, so she has more energy at the bottom.

6. Jamal says a heavy truck always has more energy than a light bike, no matter how fast each goes. What is wrong with this idea?
   D Speed matters too; a parked truck has no motion energy at all
   Motion energy depends on speed. A truck that is not moving has no motion energy.

7. A toy car on a 2-book ramp knocks down 1 domino. On a 5-book ramp, what is most likely?
   C It knocks down more dominoes
   The higher ramp makes the car faster, giving it more energy to knock things over.

8. A bumper car moving slowly bumps another car. Then it moves quickly and bumps again. Which bump makes the other car move more?
   A The quick bump
   Faster means more energy, which causes more motion in the other car.

9. A cup moves 4 cm for each book of ramp height. Using this pattern, how far would it move with 6 books?
   D 24 cm
   6 books times 4 cm per book is 24 cm.

1. Why do speed limits near schools help keep students safe?
   D Slower cars have less energy, so a crash does less harm
   Less speed means less motion energy, so a slow car causes less damage if it hits something.

④ You Try

1. A toy car rolls down a ramp. Where on the ramp is it moving fastest?
   D Near the bottom of the ramp
   The car speeds up as it rolls down, so it is fastest near the bottom.

2. What does a scientist use evidence for?
   B To support an explanation
   Evidence backs up an explanation.

3. In a ramp test, a marble rolls down and hits a paper cup. What shows how much energy the marble had?
   C How far the cup slides
   A marble with more energy pushes the cup farther, so the distance is our evidence.

4. A bowling ball rolled slowly knocks down 3 pins. Rolled fast, it knocks down 9 pins. Which explanation fits the evidence?
   D The fast ball had more energy, so it moved more pins
   More pins moved means more energy, and the fast ball had it.

5. A cup was moved 7 cm in trial 1 and 13 cm in trial 2. How much farther did it move in trial 2?
   D 6 cm
   13 minus 7 is 6 cm.

6. Why do we do three trials for each ramp height instead of just one?
   D So one odd result does not fool us
   Repeating trials gives more reliable evidence.

7. Priya's cup moved 5 cm, 6 cm and 7 cm in three trials. What is the total distance?
   B 18 cm
   5 + 6 + 7 = 18 cm.

8. Why does a thrown ball eventually stop rolling across grass?
   C The grass rubs against it and its motion energy changes into other forms, like heat
   Energy is not destroyed. Rubbing slows the ball and changes motion energy into a little heat and sound.

9. A cyclist is going down a hill and brakes so she goes slower. What happens to her motion energy, and where is some of it going?
   B It shrinks, and some turns into heat in the brakes
   Slowing down means less motion energy. Brakes rub and get warm, so some energy becomes heat.

10. Two identical balls hit two identical walls. Ball X leaves a small dent and Ball Y leaves a big dent. Which claim is best supported?
    A Ball Y was moving faster
    The bigger dent is evidence of more energy, and for identical balls more energy means more speed.

THE FULL WORKBOOK

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You just tried one topic. The full Grade 4 workbook has every topic below, each with a Quick Check, a lesson, We Do It Together, up to 90 You Try questions, Show What You Know and a full answer key.

1. Speed and energy 4-PS3-1
2. Energy on the move 4-PS3-2
3. Waves and their patterns 4-PS4-1
4. How we see objects 4-PS4-2
5. Plant and animal structures 4-LS1-1
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