



Lesson Plan: Hands-on Lab Skills/Science Inquiry

Grade Level: 4

Subject: Science Inquiry

Duration: 45–60 min

NGSS 3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Learning Objectives

By the end of this lesson, students will be able to:

- **Sequence** the seven steps of the scientific method from asking a question through stating a conclusion.
- **Identify** the control variable in an experiment and explain why a fair test keeps it



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- **Conclusion:** A statement at the end of an investigation that explains whether your results support your hypothesis. A conclusion must be based on the data you collected, not on what you hoped would happen.
- **Cause and Effect:** A relationship between two things where the cause makes something else happen and the effect is what happens because of it. For example, over-watering a plant every day (cause) made the plant die (effect).
- **Balance:** A lab tool used to measure the weight of an object by comparing it against known masses such as gram weights.



- **Hand Lens:** A tool, also called a magnifying glass, that makes an object look larger so you can study small details. A microscope enlarges an object far more than a hand lens can.
- **Estimate:** A careful guess about a measurement when you do not measure exactly, such as judging which of several objects weighs the most before checking with a balance.

 Materials Needed: (all links are included in this PDF)

- Printed copies of the Hands-on Lab Skills/Science Inquiry Study Guide (<https://newpathworksheets.com/api/guide/study-guide-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade.pdf>)
- Practice Worksheet 0 (scientific method, safety, and tools) (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade-0.pdf>)
- Practice Worksheet 1 (lab tools and interpreting data)



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- Ask students: 'If you wanted to find out how often a plant should be watered, what would you do first, and how would you know your answer was fair?'
- Hold up the pan balance, hand lens, thermometer, and funnel and have students name each tool and guess what job it does.
- Explain that scientists follow a set order of steps so that anyone can repeat the investigation and check the result.

Step 2: Direct Instruction (15 minutes)



- Walk through the Study Guide's seven steps of the scientific method, stopping at Step 3 to define the control variable as the part kept unchanged for comparison. (<https://newpathworksheets.com/api/guide/study-guide-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade.pdf>)
- Pour the sand-and-water mixture through a funnel lined with filter paper so students watch the solid separate from the liquid, then review the Study Guide's lab safety rules while wearing goggles. (<https://newpathworksheets.com/api/guide/study-guide-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade.pdf>)
- Set up the three labeled plants — A watered daily, B every other day, C once a week — and have students name what must stay the same (soil, pot, sunlight) for the test to be fair.

Step 3: Guided Practice (15 minutes)

- Complete Practice Worksheet 0 together, having students justify each scientific-method answer by pointing to the matching step in the Study Guide. (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade-0.pdf>)



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would change and two they would keep the same.

Step 5: Assessment (10 minutes)

- Collect and review Practice Worksheet 0, checking that students placed the scientific-method steps in the correct order and defined the control variable as the part not being tested. (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade-0.pdf>)
- Have students match three everyday jobs to the right tool: weighing an apple, measuring the length of a shoelace, and separating salt from water.



- Ask students to state the cause and the effect in the mealworm investigation from Practice Worksheet 2, where mealworms gathered on the wet towel.

💡 Differentiation Strategies

For advanced learners:

- Challenge students to redesign the plant-watering test so it also checks whether the amount of sunlight matters, naming which variable they would control in each round.
- Have students find the flaw in Molly's dark-room experiment on Practice Worksheet 2 and explain what result would make her revise her prediction.

For learners needing support:

- Provide a pre-printed seven-step scientific method strip with one icon per step that students can lay beside the worksheet and point to while answering.



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📚 Complete List of Available Resources:

- NewPathWorksheets: Hands-on Lab Skills/Science Inquiry (<https://newpathworksheets.com/science/grade-4/hands-on-lab-skills-science-inquiry-4th-grade/>)
- Study Guide PDF (<https://newpathworksheets.com/api/guide/study-guide-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade.pdf>)
- Practice Worksheet 0 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade-0.pdf>)



- Practice Worksheet 1 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade-1.pdf>)
- Practice Worksheet 2 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-4-hands-on-lab-skills-science-inquiry-4th-grade-2.pdf>)



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HANDS-ON LAB SKILLS/SCIENCE INQUIRY

Science Inquiry

Scientists use the **scientific method** when they conduct experiments and investigations. Scientists may use all or only some of the steps in scientific method as they work.

Steps to Using Scientific Method

- Step 1: Ask a **question** about something you observe.
- Step 2: State your **hypothesis**, which is a possible answer to your question.
- Step 3: Identify your **control variable**, which is the part of your experiment that is not and is used for comparison.
- Step 4: **Test** your hypothesis by conducting an experiment.
- Step 5: Collect and record your **data** during your



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- ✓ Clean up all spills.
- ✓ Never taste anything unless your teacher tells you that it is okay to do so.
- ✓ Handle all equipment carefully, especially sharp or breakable tools.
- ✓ If something doesn't look or smell right, tell your teacher right away.
- ✓ Wash your hands thoroughly when you are all finished.



Lesson Checkpoint: What should you always do when you have finished an experiment?

Tools Used in the Lab

There are many tools that can be used to study and measure objects. Some of these tools include:



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Funnels can be used to pour liquids or substances into a small opening.

Filter paper can be used to separate a solid from a liquid.

Lesson Checkpoint:
What is a pan balance used to measure?

Making Predictions and Drawing Conclusions

When you conduct an investigation, you may make predictions, interpret your findings, draw conclusions, and justify your conclusions. When you conduct an experiment, you should collect data to help justify your conclusions. Charts and graphs help you organize your data. You may interpret your charts and graphs to justify the predictions you have made during an investigation.

Measuring and Estimating

During an investigation you may need to find the actual measurements of objects or you may be able to estimate a measurement.

Cause and Effect

During an investigation, you may formulate and justify your predictions based on cause and effect relationships. Cause and effect is a relationship between two things. A **cause** makes something else



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Name _____ Class _____ Date _____

1

The **first step** of the **scientific method** is to _____.

- A** state your conclusion
- B** ask a question about something you observe
- C** record your data
- D** test your hypothesis

**2**

One step of the scientific method is to state your hypothesis. **What is a hypothesis?**

- A** a chart of numbers
- B** your results
- C** a possible answer to a certain question
- D** the definite answer to your question

**3**

It is important to have a control variable during your experiment. A **control variable** is a part of the experiment that is _____ and is **used for comparison**.

- A** often added to
- B** always changed

**4**

After you have come up with a **hypothesis** it is important to _____ your hypothesis by **conducting an experiment**.

- A** guess
- B** test

**5**

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9

When you have **finished an experiment**, it is very important to _____.

- A** wash your hands thoroughly
- B** get out what you need
- C** leave out your supplies
- D** read the directions

**10**

If you need to **compare the weight** of two objects, which **tool** should you use?

- A** thermometer
- B** balance
- C** microscope
- D** metric ruler





Name _____ Class _____ Date _____

1

The **first step** of the **scientific method** is to _____.

- A** state your conclusion
- B** ask a question about something you observe
- C** record your data
- D** test your hypothesis

**B****2**

One step of the scientific method is to state your hypothesis. **What is a hypothesis?**

- A** a chart of numbers
- B** your results
- C** a possible answer to a certain question
- D** the definite answer to your question

**C****3**

It is important to have a control variable during your experiment. A **control variable** is a part of the experiment that is _____ and is **used for comparison**.

- A** often added to
- B** always changed

**D****4**

After you have come up with a **hypothesis** it is important to _____ your hypothesis by **conducting an experiment**.

- A** guess
- B** test

**B****5****A**

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C**9**

When you have **finished an experiment**, it is very important to _____.

- A** wash your hands thoroughly
- B** get out what you need
- C** leave out your supplies
- D** read the directions

**A****10**

If you need to **compare the weight** of two objects, which **tool** should you use?

- A** thermometer
- B** balance
- C** microscope
- D** metric ruler

**B**



Name _____ Class _____ Date _____

1

Which **tool** enlarges objects the most?

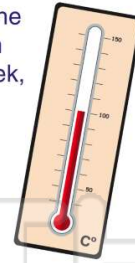
- A magnifying lens
- B microscope
- C mirror
- D eyeglasses



2

If you wanted to compare the inside daily **temperature** in your classroom for one week, what **tool** would you use?

- A barometer
- B rain gauge
- C hygrometer
- D thermometer



3

If you needed to **measure the length and width** of your desk, you would use a _____ to find those measurements.

- A metric ruler
- B hygrometer



4

Why might a **camera** be used during an investigation?

- A to measure the weight of an object
- B to measure the length of an object
- C to document how an object changed



5



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9

What can you **conclude** by looking at the results on this chart?

	PLANT A	PLANT B	PLANT C
Ant Attraction			
Towel with Juice	20 cm	8 cm	5 cm
Dry Towel			3 Ants

- A Ants are attracted to dry areas.
- B Ants are attracted to juice.
- C Ants are not attracted to juice.
- D Ants are not attracted to milk.

10

Use the chart to find a pattern. Which worm was the **longest** by day 30?

	Day 1	Day 10	Day 20	Day 30
Worm A	3 cm	4 cm	5 cm	?
Worm B	2 cm	4 cm	6 cm	8 cm
Worm C	3 cm	6 cm	9 cm	?

- A worm A
- B worm C
- C worms A and C
- D all grew same length



Name _____ Class _____ Date _____

- 1 Which **tool** enlarges objects the most?

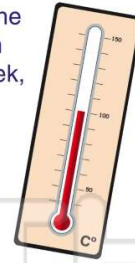
A magnifying lens
B microscope
C mirror
D eyeglasses



B

- 2 If you wanted to compare the inside daily **temperature** in your classroom for one week, what **tool** would you use?

A barometer
B rain gauge
C hygrometer
D thermometer



D

- 3 If you needed to **measure the length and width** of your desk, you would use a _____ to find those measurements.

A metric ruler
B hygrometer



A

- 4 Why might a **camera** be used during an investigation?

A to measure the weight of an object
B to measure the length of an object
C to document how an object changed



C

5



D

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A

- B every other day
C once a week
D never

PLANT A	PLANT B	PLANT C
20 cm	8 cm	5 cm

12:00 p.m.	9:00 a.m.	10	12	9
3:00 p.m.	12:00 p.m.	5	7	6
9:00 p.m.	3:00 p.m.	3	2	4

- 9 What can you **conclude** by looking at the results on this chart?

Ant Attraction	
Towel with Juice	15 Ants
Dry Towel	3 Ants

- A Ants are attracted to dry areas.
B Ants are attracted to juice.
C Ants are not attracted to juice.
D Ants are not attracted to milk.

B

- 10 Use the chart to find a pattern. Which worm was the **longest** by day 30?

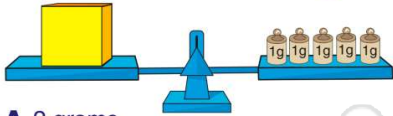
Length of Worms				
	Day 1	Day 10	Day 20	Day 30
Worm A	3 cm	4 cm	5 cm	?
Worm B	2 cm	4 cm	6 cm	8 cm
Worm C	3 cm	6 cm	9 cm	?

- A worm A C worms A and C
B worm C D all grew same length

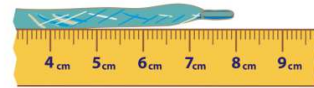
B



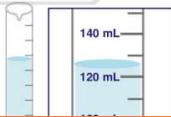
Name _____ Class _____ Date _____

1How much does the block **weigh**?

- A 2 grams
- B 3 grams
- C 4 grams
- D 5 grams

2The shoelace is _____ centimeters in **length**.

- A 8
- B 7
- C 9
- D 10

3The **graduated cylinder** shows that there is _____ of water inside of it.

- A 125 mL
- B 12 mL
- C 30 mL
- D 100 mL

4Use the chart to find a pattern. Which plant grew to be **8 cm** on day 24?

Length of Plants				
	Day 6	Day 12	Day 18	Day 24
Plant A	2 cm	4 cm	6 cm	? cm
Plant B	3 cm	6 cm	9 cm	? cm
Plant C	1 cm	3 cm	5 cm	? cm

5

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- D all are holding same amount



- A yes
- B no

**9**

The results of Jake's experiment showed that mealworms preferred a wet environment over a dry environment. **What would be the cause if the effect was that all the mealworms gathered on the wet towel in the end?**

- A Mealworms prefer wet environments.
- B Mealworms prefer dry environments.
- C Mealworms like both environments.
- D Mealworms do not like towels.

10How many **grams of salt** are needed for this investigation?

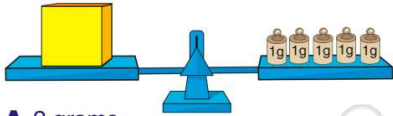
1. Pour 100 mL of water into bowl.
2. Add 25 g of salt.
3. Stir salt and water for 2 minutes with spoon.
4. Record observations in your notebook.



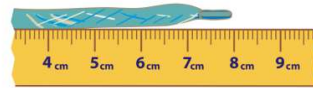
- A 100 mL
- B 25 g
- C 2 g
- D 125 mL



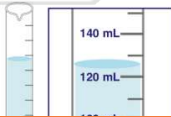
Name _____ Class _____ Date _____

1How much does the block **weigh**?

- A 2 grams
- B 3 grams
- C 4 grams
- D 5 grams

D**2**The shoelace is _____ centimeters in **length**.

- A 8
- B 7
- C 9
- D 10

A**3**The **graduated cylinder** shows that there is _____ of water inside of it.

- A 125 mL
- B 12 mL
- C 30 mL
- D 100 mL

A**4**Use the chart to find a pattern. Which plant grew to be **8 cm** on day 24?

Length of Plants				
	Day 6	Day 12	Day 18	Day 24
Plant A	2 cm	4 cm	6 cm	? cm
Plant B	3 cm	6 cm	9 cm	? cm
Plant C	1 cm	3 cm	5 cm	? cm

A**5****C**

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B

- D all are holding same amount



- A yes
- B no

**9**

The results of Jake's experiment showed that mealworms preferred a wet environment over a dry environment. **What would be the cause if the effect was that all the mealworms gathered on the wet towel in the end?**

- A Mealworms prefer wet environments.
- B Mealworms prefer dry environments.
- C Mealworms like both environments.
- D Mealworms do not like towels.

A**10**How many **grams of salt** are needed for this investigation?

1. Pour 100 mL of water into bowl.
2. Add 25 g of salt.
3. Stir salt and water for 2 minutes with spoon.
4. Record observations in your notebook.



- A 100 mL
- B 25 g
- C 2 g
- D 125 mL

B