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SOLUTIONS BOOK

CLASS 8

Science · Curiosity

CHAPTER 1

Exploring the Investigative World of Science

Complete Questions and Activities Solutions

Probe and Ponder

Think Like a Scientist

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Every question is followed by its answer. Question numbers above are clickable and the PDF bookmarks panel lets you jump to any exercise set or question. Figures are reproduced from the NCERT textbook (© NCERT) for educational use.

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1.1

CLASS 8 SCIENCE · CHAPTER 1

Probe and Ponder

Solutions · 4 questions

Directions (Questions 1–4): These are the “Probe and ponder” questions from the first page of the chapter, numbered in the order in which they appear. Many are open-ended; model answers based on the chapter are given.

QUESTION 1 *Probe and Ponder · p. 1*

Why is one side of a puri thinner than the other?

ANSWER

The chapter itself says that even this simple everyday observation is not completely understood by scientists today. So the best answer is a way to investigate it, as shown on pages 6–7.



a What we observe

When a puri puffs up in hot oil, one side of it turns out thinner than the other. We ask **why**, and then plan simple experiments to find out.

b Things we could change (control)

- The thickness and the size of the rolled dough.
- The type of flour (atta, maida, etc.).

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- The temperature of the hot oil.
- The way the dough is dropped into the oil: vertically, at an angle, or slowly.

c What we can observe or measure

- Whether the puri puffs up (yes/no) and the time it takes to puff (in seconds).
- Whether even a very thick layer of dough still gives a thin side to the puri.

d How to test

Change **only one thing at a time** and keep every other condition the same. For example, if only the way of dropping the dough is changed, we can see whether it decides which side becomes thinner.

Therefore, we find the reason by systematic investigation: change one factor at a time, observe carefully, and look for the pattern.

QUESTION 2 *Probe and Ponder · p. 1*

Are there more grains of sand on all the beaches and deserts of the world, or more stars in our galaxy?

ANSWER

We cannot count them, but a rough estimate is enough to decide. We estimate the grains in a small volume of sand and compare with the number of stars.

a Grains of sand in 1 m³

Diameter of a sand grain ≈ 0.5 mm = 5×10^{-4} m
Volume of one grain ≈ (π ÷ 6) × d^3 = 0.5236 × $(5 \times 10^{-4})^3$ ≈ 6.5×10^{-11} m^3
Grains do not fill all the space; about 60% of a heap is sand
Grains in 1 m^3 ≈ 0.6 ÷ (6.5×10^{-11}) ≈ 9×10^9, about 10^{10}

b Grains on just one beach

Beach 1 km long, 50 m wide and 5 m deep: volume = 1000 × 50 × 5 = 250 000 m^3
Grains ≈ 250 000 × 9×10^9 ≈ 2×10^{15}

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c Stars in our galaxy

The number of stars in our galaxy is usually estimated at about 100 to 400 billion, that is, about 10^{11} (1 to 4 × 10^{11}).

d Comparison

One beach ≈ 2×10^{15} grains versus stars ≈ 3×10^{11}
$2 \times 10^{15} \div 3 \times 10^{11} \approx 7000$ times more
Even 10 m^3 of sand (≈ 10^{11} grains) matches the number of stars

The world has a very large number of beaches and deserts, so the real number of grains is far greater still.

Therefore, there are many more grains of sand on all the beaches and deserts of the world than stars in our galaxy.

QUESTION 3 *Probe and Ponder · p. 1*

Right from Grade 6, we've observed the incredible diversity of plants and animals around us. From the different shapes of leaves to the many kinds of insects — why has nature created such a vast variety?

ANSWER

This is an open question that scientists still study. Here are ideas that the chapter and the earlier grades point to, which you can investigate further.

a Ideas to explore

- **Different places, different conditions.** Water, sunlight, temperature and food differ from place to place, and living things differ in the way they live in each place.
- **Every living thing depends on its surroundings.** From the tiniest insect to the largest whale, from blades of grass to tall trees, each depends on and responds to the air, water, sunlight and other organisms around it.
- **Ecosystems.** Living things and their environments form ecosystems that support life on the planet, and this web of relationships has room for many kinds of organisms.

b How a scientist would go further

Observe and record the plants and insects around you (for example the shapes of leaves), ask a focused question, and look for a pattern, as in the puri investigation.

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Therefore, living things are varied because they live in many different conditions and depend on each other in ecosystems; scientists continue to investigate the full answer.

QUESTION 4 *Probe and Ponder · p. 1*

Is there such a question that makes you curious about the world? Write it here!

ANSWER

This is your own question, in your own words. Model examples from the chapter are shown, with how each can be turned into an investigation.

a Model questions

Question	What we can change or compare	What we can observe
Why does dough rise?	Warmth of the place where the dough is kept	How much the dough has risen after some hours
Is the world getting warmer?	Compare temperature records of different years	Whether the readings go up over the years
Why does the bright part of the Moon shrink after purnima?	Observe on different nights	The shape of the bright part each night

b Tips for your own question

- Start from something you noticed at home, in the kitchen, or in the sky.
- Ask a focused question that can be answered by looking, measuring or a simple experiment.

Therefore, any question you can observe or test is a good scientific question; write yours and start investigating.

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1.2

CLASS 8 SCIENCE · CHAPTER 1

Think Like a Scientist

Solutions · 6 questions

Directions (Questions 1–6): These are the questions raised in the puri investigation on pages 6 and 7 of the chapter. Each is answered using the chapter's method of changing one thing at a time and observing carefully.

QUESTION 1 *Think like a scientist · p. 6*

Have you noticed how a puri or a batura puffs up when placed in hot oil? Or how a phulka swells when put directly on the flame? Why does it puff up like a balloon?

ANSWER

A balloon swells when something expands inside it. A puri or phulka swells in the same way: something inside it expands when it is heated.

a A common explanation

The dough contains water. In hot oil or on a flame the water turns into steam, which takes up much more space than water. The steam gets trapped inside the dough and pushes it outwards, so the puri swells like a balloon.

Note: the chapter says that even this everyday observation is not completely understood by scientists, so this is only a starting idea to be tested.

b How we can test the idea

- Prick a hole in the puri before frying. If the swelling is due to something trapped inside, the puri should puff less.
- Change the thickness of the dough, the oil temperature or the way of dropping it, and see how the puffing changes.

Therefore, a puri puffs up because something expands inside it when it is heated, and we can test this idea with simple experiments.

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QUESTION 2 *Think like a scientist · p. 6*

What are the different things that may change the way a puri puffs up when fried?

ANSWER

To ask a scientific question we first find out what we can **change or control** in the experiment. The chapter lists the following.

Thing we can change	How it can be changed
Thickness of the rolled dough	Thin, medium and thick circles
Size of the rolled dough	Small and large circles
Type of flour	Atta, maida, etc.
Temperature of the hot oil	Boiling hot, hot, not very hot
Way of dropping the dough into the oil	Drop it vertically, slide it at an angle, slide it slowly

Therefore, thickness, size, type of flour, oil temperature and the way of dropping the dough may all change how a puri puffs up.

QUESTION 3 *Think like a scientist · p. 6*

What can we observe or measure to see if these changes made any difference?

ANSWER

Some observations are yes/no answers; others are numbers that we can measure.

Observation	Type	Example
Does the puri puff up?	Yes / No	Yes or no
Time taken to puff up	Number (measurement)	Time in seconds
Does a very thick layer of dough still give a thin side?	Yes / No	Check for each thickness

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Therefore, we can check whether the puri puffs (yes/no), measure the time it takes to puff (seconds), and check whether a thick dough still gives a thin side.

QUESTION 4 *Think like a scientist · p. 6–7*

If we wanted to see the effect of boiling hot, hot, and not very hot oil on the puri, how should we do the experiment?

ANSWER

It is better to change **only one thing at a time** and keep the other conditions the same. Here only the oil temperature is changed. (Ask an adult to help whenever hot oil is used.)

Plan	What to do
Thing to change	Temperature of the oil: boiling hot, hot, not very hot
Keep the same	Circles of dough of the same thickness (and size and flour), dropped in the same way
Observe / measure	Does the puri puff (yes/no)? Time taken to puff (seconds)
Record	Notes on everything seen and sensed, for each oil temperature

Therefore, change only the oil temperature, keep all other conditions the same, and compare how the puris puff.

QUESTION 5 *Think like a scientist · p. 7*

Do puris puff better when made fresh or from stored dough? What happens if I prick a hole in the puri before frying?

ANSWER

After one round of experiments we think of more questions. Each can be answered with a new fair experiment.

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	Fresh or stored dough	Pricking a hole
Change	Age of the dough: fresh or stored	Puri pricked or not pricked
Keep the same	Flour, thickness, size, oil temperature, way of dropping	Flour, thickness, size, oil temperature, way of dropping
Observe	Does it puff? Time taken to puff	Does it puff? How much?

Prediction for the second question: if the puffing is caused by something trapped inside the puri, a hole should let it escape and the puri should puff less. The experiment will show whether this is true. For the first question we cannot guess; the experiment must decide.

Therefore, each new question is answered by a fair test in which only one thing is changed.

QUESTION 6 *Think like a scientist · p. 7*

It is also a good idea to keep notes of everything that you see and sense when doing an experiment. Did the oil splatter, smell, or smoke?

ANSWER

Notes help us notice things that we did not plan to measure, and they help us think of new questions.

a Model record sheet

Oil temperature	Puffs? (yes/no)	Time to puff (s)	Splatter / smell / smoke
Not very hot			
Hot			
Boiling hot			

Fill in each row after every trial. Write what you see (splatter, colour, size), smell and hear, not only the numbers.

Therefore, we keep notes of everything seen and sensed during an experiment, because they guide the next questions.

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