ANSWER KEY

# HOW TO MARK AN INQUIRY ACTIVITY

There is rarely one correct object choice. Reward the quality of the trace, the evidence, and the student's willingness to revise an unsupported first idea.

**EVERYDAY THING -> MATERIAL / SERVICE -> GEOLOGICAL CONNECTION -> EVIDENCE**

## PAGE 1 - OPENING PREDICTION

Any of the four choices is acceptable at the start. The prediction is diagnostic, not graded for correctness. Strong opening examples might include stone flooring, metal furniture, glass, tap water, electronics or heating, but students are not expected to recognize all of these yet.

## PAGE 2 - GEOLOGY IN PLAIN SIGHT

| Possible observation | Strong trace |
|---|---|
| Granite countertop / step | Natural granite -> quarried/cut/polished -> building use. |
| Limestone tile / sill | Natural limestone -> quarried/cut -> building use. |
| Marble floor / panel | Natural marble -> quarried/cut/polished -> building use. |
| Slate roof / tile | Natural slate -> split/cut -> building use. |

**EVIDENCE**

Good evidence can include visible texture, a material label, building documentation or teacher-provided information. Appearance alone should be treated as tentative because engineered materials can imitate natural stone.

ANSWER KEY

# TRANSFORMED MATERIALS & METALS

## PAGE 3 - WHEN GEOLOGY IS TRANSFORMED

| Material | Expected geological trace |
|---|---|
| Glass | Silica-rich sand / quartz-rich raw material + other ingredients -> melting/forming -> glass. |
| Brick | Clay-rich geological raw material -> shaping/firing -> brick. |
| Concrete | Sand/gravel aggregate + cement + water; cement commonly uses limestone and clay/shale-rich raw materials. |
| Steel | Iron ore -> iron extraction -> steel. Hematite and magnetite are major iron minerals. |
| Copper wiring | Copper-bearing ore -> extraction/refining -> copper -> wire. |
| Aluminium | Bauxite -> refining/smelting -> aluminium. |

**BANDED IRON FORMATION**

Accept: many major iron resources occur in BIFs, ancient layered rocks commonly containing hematite and/or magnetite. Do not require BIF knowledge for full marks on the everyday-material trace.

## OBJECT DECONSTRUCTION

A phone, laptop or lamp can yield several separate traces. For example: screen glass -> silica-rich raw material; wiring -> copper ore; steel screws/frame -> iron ore; aluminium case -> bauxite; semiconductor silicon -> silica/quartz-rich raw material. Students need not identify every component.

**STRONG REASONING**

The best answers recognize that a manufactured object may combine **multiple geological supply chains**. Asking “what rock is the phone?” is therefore the wrong type of question.

ANSWER KEY

# WATER & ENERGY

## PAGE 4 - WATER

There is no universal source. Accept **groundwater, surface water, mixed or unknown** when supported by local/public information.

**GROUNDWATER TRACE**

Tap -> public/private supply -> well/aquifer -> water stored and moving through pores/fractures in geological materials.

**SURFACE-WATER TRACE**

Tap -> supply -> river/lake/reservoir -> catchment/valley shaped in part by geology.

**If groundwater is part of the student trace:** porosity describes how much pore or fracture space can hold water; permeability describes how easily water moves through connected spaces. Accept these terms when they genuinely help explain the local groundwater source.

## PAGE 5 - ENERGY

| Source | Expected geological connection |
|---|---|
| Coal | Ancient plant material transformed during burial into a geological fuel. |
| Oil / natural gas | Buried organic matter -> petroleum system in sedimentary basin -> geological fuel/feedstock. |
| Nuclear | Uranium-bearing geological deposit -> mining/processing -> reactor fuel. |
| Geothermal | Heat from within Earth; usable systems depend on local geological conditions. |
| Wind / solar / hydro | Energy source is not geological; infrastructure uses mined materials. |

**ELECTRICITY**

Treat electricity as an **energy carrier**, not the original source, unless the question is specifically about electricity as the delivered form of energy.

**If the original source is uncertain:** accept **mixed grid, unknown or uncertain** when students cannot reliably establish it. Do not reward invented certainty.

ANSWER KEY

# PETROLEUM PRODUCTS & GEMS

## PAGE 6 - OIL WITHOUT BURNING IT

| Example | Acceptable trace |
|---|---|
| Plastic item | Many plastics -> petrochemical feedstocks -> crude oil and/or natural gas geological resources. |
| Polyester/nylon clothing | Synthetic fibre -> petrochemical feedstocks -> oil/gas resource. |
| Synthetic rubber | Many synthetic rubbers -> petrochemical feedstocks -> oil/gas resource. |
| Road asphalt | Mineral aggregate + bitumen binder; bitumen is petroleum-derived. |

Do not accept universal claims such as “all plastic comes from oil” without qualification. Bio-based and other feedstocks exist.

## PAGE 7 - GEOLOGY YOU WEAR

| Example | Expected interpretation |
|---|---|
| Amethyst | Purple quartz; natural mineral. |
| Ruby / sapphire | Gem varieties of corundum; natural mineral. |
| Diamond | Crystalline carbon; natural mineral when naturally formed. |
| Gold / silver jewellery | Refined/alloyed metals originating from geological deposits. |
| Pearl | Biogenic gem material, not a mineral. |
| Glass / cubic zirconia | Manufactured gem materials. |

**STRONG DISCUSSION ANSWER**

A student may choose pearl or manufactured glass/CZ to show that “valuable or decorative” does not automatically mean “natural geological material.”

ANSWER KEY

# FINAL SYNTHESIS

## PAGE 8 - HOW GEOLOGICAL IS YOUR WORLD?

Students should complete **eight traces**. Encourage variety across the different categories, but accurate reasoning matters more than covering every category. Students might trace natural stone, glass, brick, concrete, steel, copper wiring, electronics, tap water, electricity/heating, plastics, synthetic fibres, asphalt, jewellery or other defensible examples.

| Example | Possible strong trace |
|---|---|
| Window | Glass -> silica-rich raw material -> geological source. |
| Radiator / steel chair | Steel -> iron -> iron ore -> geological deposit. |
| Electrical cable | Copper -> copper-bearing ore deposit. |
| Plastic chair | Polymer -> petrochemical feedstock -> oil/gas resource, if that feedstock is supported. |
| Tap water | Supply -> groundwater aquifer or surface-water catchment -> geological control. |
| Building power | Carrier -> source -> direct geological fuel/uranium/heat or mined-material dependence. |

## SIMPLE 4-POINT RUBRIC

| Score | Description |
|---|---|
| 1 | Names an everyday thing but gives little or no geological connection. |
| 2 | Gives a plausible connection but the chain or evidence is incomplete. |
| 3 | Clear trace to a geological connection with relevant evidence. |
| 4 | Clear trace, accurate reasoning, evidence, appropriate uncertainty and meaningful revision after discussion. |

**THE FINAL REALIZATION**

Strong reflections should move beyond “geology is rocks.” Students should recognize several roles: **natural stone, raw materials for manufactured products, metal ores, groundwater systems, geological fuels, uranium, Earth heat, petroleum feedstocks, and mined materials used by modern technology.**

**Best evidence of success:** the student can identify an object that seemed non-geological at first and explain, in their own words, where geology enters its story.