The Power Debate

Weighing the benefits and risks of nuclear energy

PHS.4.6 "Analyze and debate the advantages and disadvantages of nuclear reactions as energy sources."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two advantages of nuclear power and circle three disadvantages. Write the number 1 beside one underlined advantage and one circled disadvantage you would weigh against each other.

A Power Plant for Harbor County?

1. In Harbor County, a proposal for a nuclear power plant has divided a public meeting. Inside a reactor, uranium atoms split, releasing heat that makes steam to turn a turbine. The plant could supply large amounts of electricity day and night, even when the wind is still or clouds cover solar panels. During operation, fission produces electricity without burning fossil fuels, so the plant would release very little carbon dioxide directly. Supporters argue that reliable, low-carbon power could help the county replace its aging coal plant while keeping factories and homes supplied.

2. Opponents point to costs that do not appear on an electric bill right away. A new reactor can take many years and large sums of money to build, delaying cuts in emissions if the coal plant keeps running. Used fuel remains radioactive for a long time and requires secure storage and monitoring. Serious accidents are uncommon, but a release of radioactive material could harm people and force evacuations. Reactors also need cooling; drawing warm water back into a river can affect aquatic life. Cooling systems can reduce this impact, but they add costs.

3. At the meeting, one resident says the county should build more wind turbines and solar panels instead. Those sources also produce little carbon dioxide during operation and can be installed in smaller stages, but their output changes with weather. Another resident suggests keeping the coal plant until cheaper technology arrives, yet burning coal releases carbon dioxide and air pollutants. The council cannot judge any choice by a single advantage. It must weigh when electricity is needed, how quickly each option can start, what environmental risks remain, and whether the county can afford the full plan.

2 ANSWER WITH EVIDENCE

Use the passage

1. How could a nuclear plant help Harbor County meet two goals at once, and what drawback could delay one of those gains?

2. Why should the council consider accident risk even though serious reactor accidents are uncommon?

3. Compare one advantage of nuclear power over wind and solar with one advantage of wind and solar over a new reactor.

4. A resident says keeping the coal plant avoids nuclear risks. What environmental evidence complicates that argument?

3 YOUR TURN

Your own words

An inland region faces dry summers and needs dependable nighttime electricity. Write a five-sentence recommendation for its future power plan: decide whether to include a new nuclear plant, use at least one advantage and two disadvantages from the passage, explain how dry summers affect your choice, and answer one reasonable objection.

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PART 1 · READ AND MARK

Underline two advantages of nuclear power and circle three disadvantages. Write the number 1 beside one underlined advantage and one circled disadvantage you would weigh against each other. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How could a nuclear plant help Harbor County meet two goals at once, and what drawback could delay one of those gains?	**It could provide dependable electricity with very little direct carbon dioxide emissions, but years of construction could delay replacing the coal plant.**
2	Why should the council consider accident risk even though serious reactor accidents are uncommon?	**An accident is unlikely, but a radioactive release could harm people and force evacuations.**
3	Compare one advantage of nuclear power over wind and solar with one advantage of wind and solar over a new reactor.	**A reactor can supply electricity when wind or sunlight is unavailable. Wind and solar can be installed in smaller stages instead of waiting years for a new reactor.**
4	A resident says keeping the coal plant avoids nuclear risks. What environmental evidence complicates that argument?	**Keeping the coal plant avoids nuclear waste and accident risks, but burning coal releases carbon dioxide and air pollutants.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would include a new nuclear plant alongside wind and solar, rather than rely on the plant alone. Nuclear power could supply low-carbon electricity at night, but construction could take years and used fuel would require secure storage. Dry summers could limit water available for cooling, so I would require a cooling plan before approval. Wind and solar could be added in stages while the reactor is built. Critics may say a reactor costs too much, but I think its steady output could justify the expense if the region can afford the full plan.

Accept either recommendation about nuclear power if the five sentences use passage-supported tradeoffs, address cooling during dry summers, and respond to a reasonable objection. For the marking job, accept any defensible numbered advantage and disadvantage.