

TOSS-UP

1. ENERGY *Short Answer* Which isomer of octane has the lowest octane rating?

ANSWER: N-OCTANE

TOSS-UP

2. ENERGY *Short Answer* Order the following four countries from lowest to highest consumption of coal for fossil fuel-based energy: United States, China, India, Australia.

ANSWER: CHINA, UNITED STATES, INDIA, AUSTRALIA

TOSS-UP

3. ENERGY *Short Answer* Using words or numbers, name all of the following three choices that is or are true of coal:
- I. Peat is a precursor of coal that is the result of a lack of decaying in anaerobic or acidic soil
 - II. In the United States, less than 50% of coal is used for the generation of electricity
 - III. Coal-water slurry fuel is a suspension consisting of fine-grained coal to reduce carbon dioxide emissions and to make the coal more explosion-proof
 - IV. Higher grades of coal usually correspond to higher concentrations of sulfur, which are persistent in both liquefied and gasified forms

ANSWER: I AND III

TOSS-UP

4. ENERGY *Multiple Choice* Which of the following is true of fossil fuel power stations?

(W) Coal-powered fossil fuel stations are favored over other non-renewable energy plants since they typically have the highest efficiencies

(X) Most fossil fuel power plants that are intended to distribute energy in a region operate on the diesel cycle

(Y) Combustion of oil yields the greatest amount of carbon dioxide per megawatt-hour, and is the chief contributor to acid rain

(Z) Most radioactive material emitted by fossil fuel power stations is in the form of radioactive uranium or thorium present in coal and emitted in the form of aerosols or particulates

ANSWER: Z

TOSS-UP

5. ENERGY *Multiple Choice* Which of the following is incorrect regarding radioactive nuclide emissions from carbon plants and nuclear power plants?

(W) The Chernobyl disaster released 1.76 EBq of equivalent radioactive dose

(X) In the malfunction of nuclear power plants, iodine-131 is the major nuclide that is emitted

(Y) Nuclear power plant meltdowns are a major concern because of the long half-life of emitted nuclides and the difficulty with which they can be removed from the human body

(Z) Typically, the effective dose equivalent of radioactive nuclides emitted by fossil fuel stations is around 100 times greater than the emissions of nuclear power plants

ANSWER: Y

TOSS-UP

6. ENERGY *Short Answer* Using words or numbers, name all of the following techniques which would be considered clean coal technology efforts:

I. Chemically washing minerals and impurities from the coal

II. Gassification of coal to form syngas

III. Treating the flue gases with steam to remove sulfur dioxide

IV. Dewatering lower rank coals to improve the calorific value

ANSWER: I, II, III, IV

TOSS-UP

7. ENERGY *Multiple Choice* Which of the following forms of coal has the lowest grade?

(W) Black coal

(X) Brown coal

(Y) Gray coal

(Z) Light coal

ANSWER: X

TOSS-UP

8. ENERGY *Multiple Choice* What percent of all energy released through combustion is derived from natural gas?

(W) 11%

(X) 35%

(Y) 48%

(Z) 70%

ANSWER: X

TOSS-UP

9. ENERGY *Short Answer* This type of generator is an electrostatic generator which uses a moving belt to accumulate very high voltages on a hollow metal globe on the top of the stand. It can be thought of as a constant-current source connected in parallel with a capacitor and a very large electrical resistance. Name this type of generator

ANSWER: VAN DE GRAAFF GENERATOR

TOSS-UP

10. ENERGY *Short Answer* Order the following four greenhouse gases from lowest to highest contribution to the greenhouse effect: carbon dioxide, ozone, methane, water vapor

ANSWER: WATER VAPOR, CARBON DIOXIDE, METHANE, OZONE

TOSS-UP

11. ENERGY *Multiple Choice* Which of the following is the largest source of mercury contamination in the United States?

- (W) Coal-fueled fossil fuel plants
- (X) Petroleum power stations
- (Y) Geothermal power plants
- (Z) Ocean thermal energy conversion plants

ANSWER: W

TOSS-UP

12. ENERGY *Multiple Choice* Which of the following countries has the lowest annual natural gas consumption?

- (W) United States
- (X) Canada
- (Y) Turkey
- (Z) Russia

ANSWER: Y

TOSS-UP

13. ENERGY *Short Answer* What is the term for the methane-rich gases that are biogenically produced by the anaerobic decay of non-fossil organic matter?

ANSWER: BIOGAS

TOSS-UP

14. ENERGY *Short Answer* Using words or numbers, identify all of the following three choices that is or are sources of natural gas:
- I. Reduction of carbon dioxide to methane by specialized microbes in marshes, bogs, and landfills
 - II. Decay of buried organic material deep in the Earth
 - III. Gases produced by volcanic activity

ANSWER: I, II

TOSS-UP

15. ENERGY *Short Answer* Using words or numbers, identify all of the following four gases that are produced as biproducts of the processing of natural gas: ethane, propane, hydrogen sulfide, carbon dioxide

ANSWER: ALL

TOSS-UP

16. ENERGY *Short Answer* What is the name of the largest group of geothermal power plants, which is situated in California?

ANSWER: THE GEYSERS

TOSS-UP

17. ENERGY *Multiple Choice* In which country does geothermal energy contribute the most to the total energy consumption?

(W) Phillipines
(X) Iceland
(Y) El Salvador
(Z) New Zealand

ANSWER: X

TOSS-UP

18. ENERGY *Multiple Choice* Which of the following locations is the best place for an ocean thermal energy conversion power plant?

(W) Off the Coast of California
(X) The Southern tip of Africa
(Y) The Eastern coast of Oceania
(Z) The northern half of the Indian Ocean

ANSWER: Y

TOSS-UP

19. ENERGY *Multiple Choice* Which of the following best explains how hydroelectric power can contribute to the greenhouse effect?

(W) The construction of hydroelectric power plants requires the combustion of substantial amounts of fossil fuels
(X) Hydroelectricity is very unreliable, so fossil fuels must be regularly used to compensate for a lack of electricity generated
(Y) Sulfur dioxide and nitrogen dioxide are emitted during the processing of the input water
(Z) In flooded areas, biomass may decay anaerobically to produce methane

ANSWER: Z

TOSS-UP

20. ENERGY *Short Answer* Order the following four countries in terms of increasing total annual hydroelectricity generation: United States, China, Canada, Brazil

ANSWER: CHINA, UNITED STATES, CANADA, BRAZIL

TOSS-UP

21. ENERGY *Short Answer* A seismograph of an earthquake returns two sets of P waves. One is reflected from the shallow layers of the Earth, and the other is refracted from the Earth's deep interior. What is the term for the boundary at which this occurs, which is located between the Earth's crust and the mantle?

ANSWER: MOHO DISCONTINUITY

TOSS-UP

22. ENERGY *Short Answer* This mineral is a hard, compact variety of mineral coal that has a high luster. It has the highest carbon count, the fewest impurities, and the highest calorific content of all types of coals. Name this mineral.

ANSWER: ANTHRACITE

TOSS-UP

23. ENERGY *Short Answer* What is the term for the slow, low-temperature, flameless form of combustion, sustained by the heat evolved when oxygen directly attacks the surface of a condensed-phase fuel, including coal, cellulose, wood, cotton, tobacco, peat, duff, and humus?

ANSWER: SMOULDERING

TOSS-UP

24. ENERGY *Multiple Choice* In which country does the highest percent of energy come from wind power?

(W) Denmark

(X) Germany

(Y) United States

(Z) China

ANSWER: W

TOSS-UP

25. ENERGY *Multiple Choice* Which one of the following sectors contributes to the greatest amount of methane emissions?

(W) Power

(X) Agriculture

(Y) Waste disposal

(Z) Industry

ANSWER: X
