SCIENCE TEST

35 Minutes—40 Questions

DIRECTIONS: There are seven passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

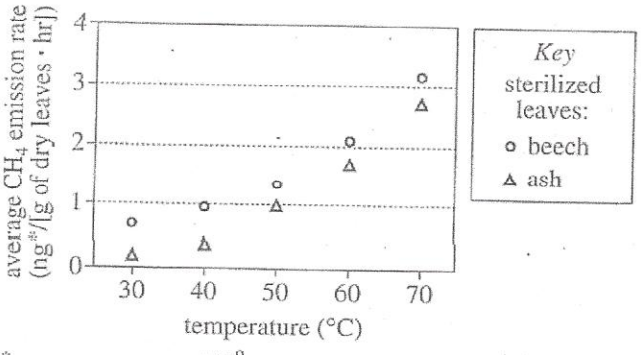
You are NOT permitted to use a calculator on this test.

Passage I

Scientists once thought that on Earth the *methane* (CH_4) from natural sources was produced only by *methanogens* (bacteria that cannot survive in the presence of O_2). It has been recently discovered that some plants emit CH_4 that is generated by an unknown process operating under *aerobic* conditions (O_2 present). Three studies examined CH_4 emission by plants.

Study 1

Beech tree leaves were collected, air-dried, and sterilized. A small quantity (1–6 g) of the air-dried, sterilized leaves was placed in each of 20 identical glass tubes. Each tube was then capped. Using a needle inserted through the cap, the air in each tube was replaced with CH_4-free air. The tubes were then separated into 5 groups of 4 tubes each. Each group of tubes was incubated in the dark for 16 hr at 30°C, 40°C, 50°C, 60°C, or 70°C. The average CH_4 emission rate was determined for each group at the end of the incubation period. This procedure was repeated using ash tree leaves (see Figure 1).



*ng = nanogram = 10^{-9} g

Figure 1

Study 2

The procedure of Study 1 was repeated except that air-dried, *unsterilized* beech and ash leaves were tested (see Figure 2).

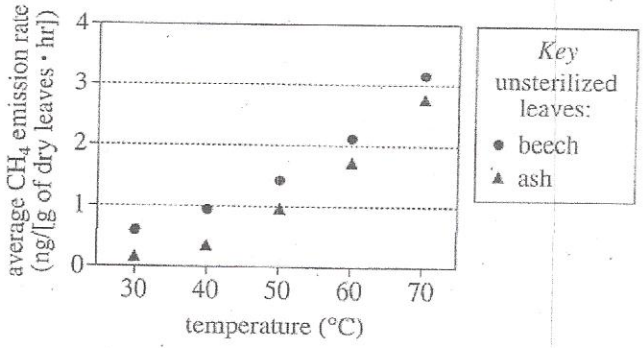
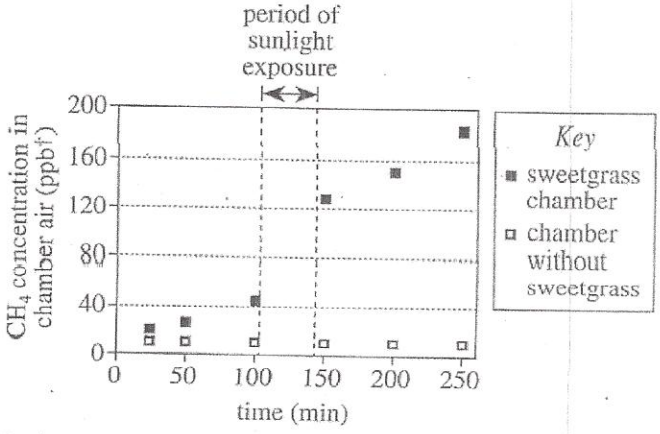


Figure 2

Study 3

Several sweetgrass plants were placed in a large Plexiglas chamber. This chamber and an identical chamber with no sweetgrass inside were then sealed. Using a pump, air in each chamber was replaced with CH_4-free air, after which the chambers were incubated in the dark at 30°C. At 102 min after incubation began, the chambers were placed in direct sunlight for a short period, then returned to the dark to continue incubation at 30°C. Beginning when the chambers were first placed in the dark, the CH_4 concentration in the air inside the chambers was measured every 25 or 50 min for 250 min (see Figure 3).



†ppb = parts per billion

Figure 3

Figures adapted from Frank Keppler et al., "Methane Emissions from Terrestrial Plants under Aerobic Conditions." ©2006 by Nature Publishing Group.

1. According to the results of Study 2, as incubation temperature increased, the average CH_4 emission rate:
   - A. increased for beech leaves, but decreased for ash leaves.
   - B. increased for both beech leaves and ash leaves.
   - C. decreased for beech leaves, but increased for ash leaves.
   - D. decreased for both beech leaves and ash leaves.

2. According to the results of Study 1, the average CH_4 emission rate for air-dried, sterilized beech leaves incubated at 60°C was closest to which of the following?
   - F. 1.5 ng/[g of dry leaves · hr]
   - G. 2.0 ng/[g of dry leaves · hr]
   - H. 2.5 ng/[g of dry leaves · hr]
   - J. 3.0 ng/[g of dry leaves · hr]

3. A complicating factor in interpreting the results of Study 3 was that exposing the chambers to sunlight probably also:
   - A. increased the mass of the plant material inside both chambers.
   - B. decreased the mass of the plant material inside both chambers.
   - C. increased the temperature inside both chambers.
   - D. decreased the temperature inside both chambers.

4. Which of the following served as a control in Study 3 ?
   - F. The tubes containing air-dried, unsterilized ash leaves
   - G. The tubes containing air-dried, unsterilized beech leaves
   - H. The sweetgrass chamber
   - J. The chamber without sweetgrass

5. Is the statement "Sterilization had no effect on the CH_4 emission rate for ash leaves" supported by Figures 1 and 2 ?
   - A. Yes, because at every incubation temperature, the emission rates for both the sterilized and unsterilized ash leaves were the same.
   - B. Yes, because at every incubation temperature, the emission rate for the sterilized ash leaves was less than half that for the unsterilized ash leaves.
   - C. No, because at every incubation temperature, the emission rates for both the sterilized and unsterilized ash leaves were the same.
   - D. No, because at every incubation temperature, the emission rate for the sterilized ash leaves was less than half that for the unsterilized ash leaves.

6. In Study 1, it was unnecessary to put an identical mass of air-dried, sterilized leaves in each tube because the average CH_4 emission rates were determined:
   - F. per g of dry leaves.
   - G. at 5 different temperatures.
   - H. for 2 different types of leaves.
   - J. after incubation in the dark.

Passage II

As fish mature, their diet often changes. Researchers investigated this phenomenon in 2 groups of winter flounder at a location in the Hudson River estuary where there is significant mixing of river water with ocean water. All the flounder were between 2 mo and 5 mo old and at least 20 mm long.

Study 1

Each June of 1996, 1997, and 1998, 100 flounder were captured and placed in cages that were sitting on the bottom of the estuary. Each cage was lined with a mesh bag that had square openings 3 mm in diameter. At the end of 10 days, the fish were removed from the cages and sorted into 4 classes based on length. The stomach contents of the fish in each class were analyzed to determine the percent by mass of each type of prey. The results, averaged over the 3 years, are shown in Figure 1. The percent of fish in each class with empty stomachs is shown in Table 1.

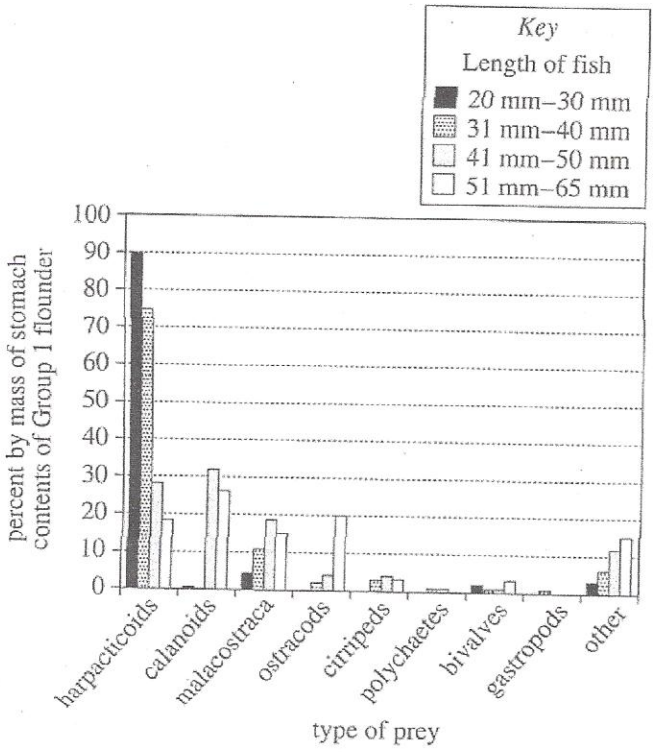


Figure 1

Table 1		
Group 1 flounder		
Length (mm)	Number of flounder	Percent with empty stomachs
20–30	45	15.5
31–40	87	32.2
41–50	100	35.0
51–65	68	23.5

Study 2

In June of 1998, 30 more flounder were captured, removed from the river, and sorted into 4 classes based on length. Immediately after the fish were sorted, their stomach contents were analyzed to determine the percent by mass of the same types of prey identified in Study 1. The results are shown in Figure 2. The percent of fish in each class with empty stomachs is shown in Table 2.

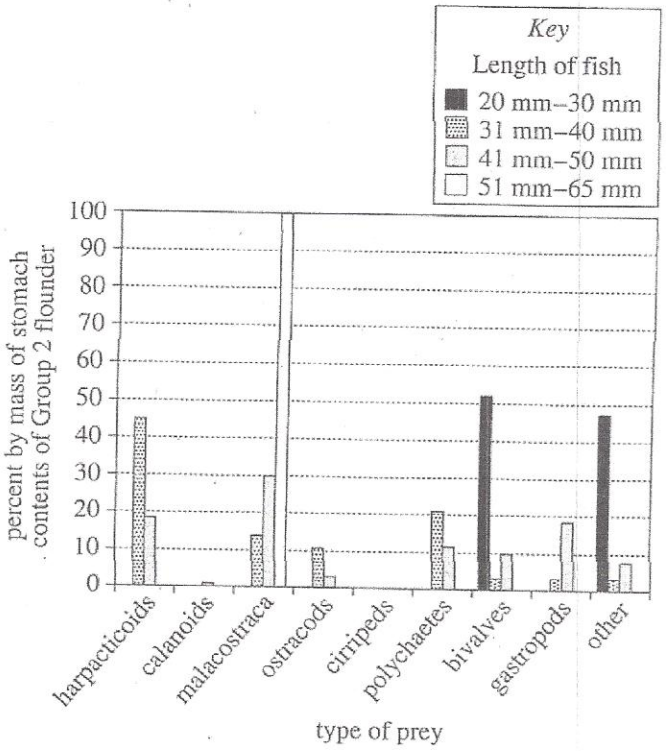


Figure 2

Table 2		
Group 2 flounder		
Length (mm)	Number of flounder	Percent with empty stomachs
20–30	1	0.0
31–40	8	12.5
41–50	15	26.7
51–65	6	50.0

Tables and figures adapted from D. N. Vivian et al., "Feeding Habits of Young-of-the-Year Winter Flounder, *Pseudopleuronectes americanus*, in the Hudson River Estuary, U.S.A." ©2000 by the New Jersey Academy of Science.

7. For the class 51 mm–65 mm in length, were the stomach contents of Group 1 flounder and of Group 2 flounder the same?

   A. Yes; both Group 1 flounder and Group 2 flounder in this class ate calanoids only.
   B. Yes; both Group 1 flounder and Group 2 flounder in this class ate ostracods only.
   C. No; the Group 1 flounder in this class ate many types of prey, whereas the Group 2 flounder in this class ate malacostraca only.
   D. No; the Group 1 flounder in this class ate malacostraca only, whereas the Group 2 flounder in this class ate many types of prey.

8. In Study 2, which type(s) of prey was(were) NOT found in the stomachs of any of the 31 mm–40 mm long Group 2 flounder?

   F. Calanoids only
   G. Ostracods only
   H. Calanoids and cirripeds only
   J. Cirripeds and polychaetes only

9. For how many of the 4 classes was the percent of Group 1 flounder with empty stomachs higher than the percent of Group 2 flounder with empty stomachs?

   A. 1
   B. 2
   C. 3
   D. 4

10. In Study 1, what must the researchers have assumed about winter flounder feeding habits when they placed the cages in the estuary? Winter flounder feed in:

    F. fresh water near the surface of an estuary.
    G. fresh water near the bottom of an estuary.
    H. somewhat salty water near the surface of an estuary.
    J. somewhat salty water near the bottom of an estuary.

11. The total mass of the stomach contents of Group 2 flounder 20 mm–30 mm long was 50 mg. Based on Figure 2, the mass of bivalves in those stomach contents was closest to which of the following?

    A. 5 mg
    B. 10 mg
    C. 25 mg
    D. 50 mg

12. A researcher predicted that the diet of Group 1 flounder would change when flounder length exceeded 40 mm. Are the data in Figure 1 consistent with this prediction?

    F. Yes, because the diet of flounder 40 mm or less in length was at least 75% harpacticoids, whereas the diet of flounder greater than 40 mm in length was more varied.
    G. Yes, because the diet of flounder 40 mm or less in length was 100% harpacticoids, whereas the diet of flounder greater than 40 mm in length was more varied.
    H. No, because the diet of flounder 40 mm or less in length was at least 75% harpacticoids, whereas the diet of flounder more than 40 mm in length was more varied.
    J. No, because the diet of flounder 40 mm or less in length was 100% harpacticoids, whereas the diet of flounder more than 40 mm in length was more varied.

Passage III

As calcium oxalate hydrate ($CaC_2O_4 \cdot H_2O$) is heated, it first dehydrates to yield calcium oxalate (CaC_2O_4). Next, the CaC_2O_4 decomposes into calcium carbonate ($CaCO_3$) and carbon monoxide (CO). The $CaCO_3$ then further decomposes into CaO and CO_2 (see equations below).

$$CaC_2O_4 \cdot H_2O(\text{solid}, s) \xrightarrow{\text{heat}} CaC_2O_4(s) + H_2O(\text{gas}, g)$$

$$CaC_2O_4(s) \xrightarrow{\text{heat}} CaCO_3(s) + CO(g)$$

$$CaCO_3(s) \xrightarrow{\text{heat}} CaO(s) + CO_2(g)$$

In a *thermogravimetric analysis* (TGA), the mass of a sample is monitored as the sample's temperature is steadily increased. A nonreactive gas is streamed over the sample to carry away any gaseous products. The figure shows the results of a TGA of a 100 g sample of $CaC_2O_4 \cdot H_2O$.

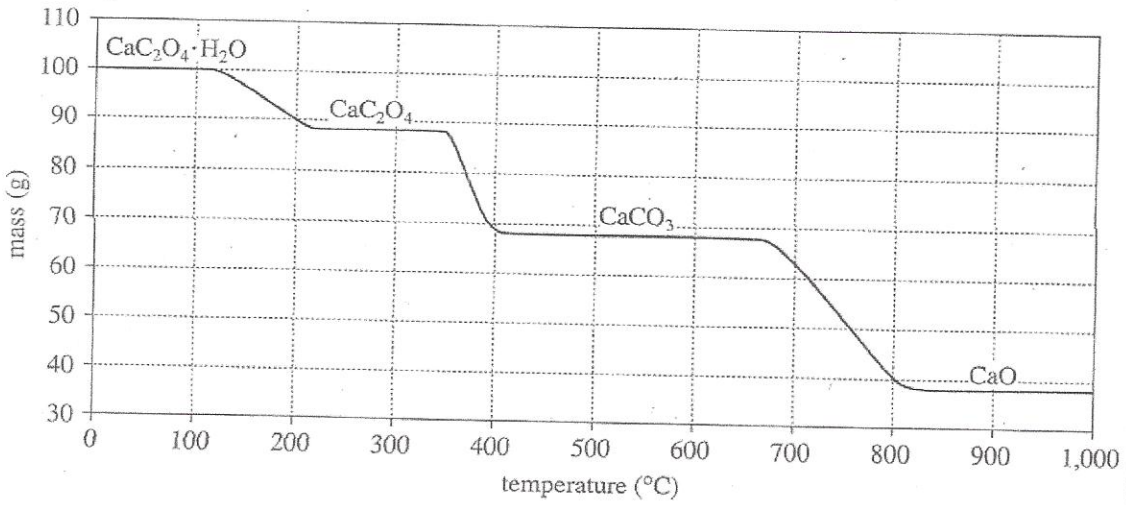


Figure adapted from Mlle. Simonne Peltier and Clément Duval, "Sur la Thermogravimétrie des Précipités Analytiques: II. Dosage Du Calcium." ©1947 by Elsevier Science B.V.

13. If the sample of $CaC_2O_4 \cdot H_2O$ had been 50 g, the mass of the sample at 900°C would have been approximately:
    - A. 20 g.
    - B. 40 g.
    - C. 60 g.
    - D. 80 g.

14. During the TGA, the largest change in mass resulted from the decomposition of:
    - F. $CaC_2O_4 \cdot H_2O$.
    - G. CaC_2O_4.
    - H. $CaCO_3$.
    - J. CaO.

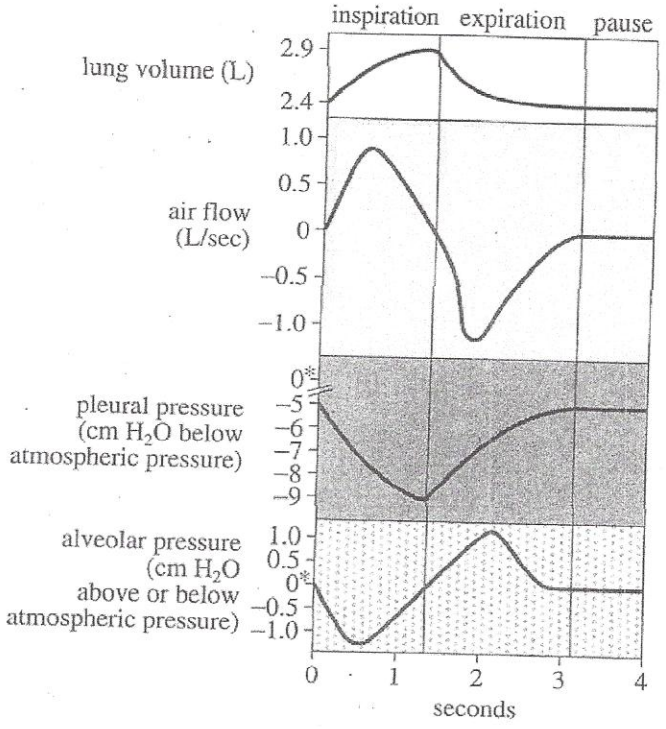
15. Calcium oxalate started to decompose at approximately what temperature?
    - A. 220°C
    - B. 350°C
    - C. 400°C
    - D. 660°C

16. When the TGA began, approximately what percent of the mass of the sample was made up of H_2O?
    - F. 12%
    - G. 38%
    - H. 62%
    - J. 88%

17. The CO_2 that was part of the reactions that occurred during the TGA could best be described as a:
    - A. reactant formed directly by the decomposition of CaC_2O_4.
    - B. reactant formed directly by the decomposition of $CaCO_3$.
    - C. product formed directly by the decomposition of CaC_2O_4.
    - D. product formed directly by the decomposition of $CaCO_3$.

Passage IV

The respiratory cycle for resting humans who are breathing normally has been studied by physiologists. The figure shows 4 average measures of the cycle: *lung volume*, *air flow* (the rate at which air flows into or out of the lungs), *pleural pressure* (the pressure in the area between the lungs and the chest wall), and *alveolar pressure* (the pressure in the *alveoli*, small sacs in the lungs where air exchange takes place). Pleural pressure and alveolar pressure are represented as values above or below *atmospheric pressure* (1,033 cm H_2O). The next inspiration begins at the end of the pause.



*corresponds to atmospheric pressure (1,033 cm H_2O)

Figure adapted from Robert M. Berne and Matthew N. Levy, eds., *Principles of Physiology*. ©1990 by C. V. Mosby Company.

18. *Functional residual capacity* (FRC) refers to average lung volume during the pause portion of the respiratory cycle. Based on the figure, FRC is closest to which of the following values?

F. 0.5 L
G. 2.4 L
H. 2.9 L
J. 5.3 L

19. For a resting human who is breathing normally, how does the duration of inspiration compare with the duration of expiration?

A. The duration of inspiration is longer than the duration of expiration.
B. The duration of inspiration is shorter than the duration of expiration.
C. The duration of inspiration and the duration of expiration do not differ.
D. Cannot be determined from the given information

20. The figure shows that when pleural pressure is lowest, air flow is closest to which of the following?

F. −0.5 L/sec
G. 0 L/sec
H. 0.5 L/sec
J. 1.0 L/sec

21. When the diaphragm contracts during the first 0.5 sec of inspiration, the chest wall expands away from the lungs, which causes the lungs to expand. Based on the figure, what is the effect of the contraction of the diaphragm on pleural pressure and alveolar pressure?

	pleural pressure	alveolar pressure
A.	increases	increases
B.	increases	decreases
C.	decreases	increases
D.	decreases	decreases

22. According to the information provided, which of the following statements best describes the relationship between alveolar pressure, atmospheric pressure, and the direction of air flow during most of expiration?

F. Because alveolar pressure is less than atmospheric pressure during most of expiration, air flows into the lungs.
G. Because alveolar pressure is less than atmospheric pressure during most of expiration, air flows out of the lungs.
H. Because alveolar pressure exceeds atmospheric pressure during most of expiration, air flows into the lungs.
J. Because alveolar pressure exceeds atmospheric pressure during most of expiration, air flows out of the lungs.

Passage V

A material is a *superconductor* (its electrical resistance, R, is zero) if its temperature, T, is lower than its *critical temperature*, T_C.

Students measured R and T for both a sample of Material X and a sample of Material Y while each sample was cooled. They used an ohmmeter to measure R (in ohms) and a *thermocouple* to measure T. The thermocouple displayed the result of each measurement of T as a voltage (in millivolts, mV). Accordingly, the students plotted R versus voltage (see Figure 1). To convert voltage in mV to T in kelvins (K), they used Table 1.

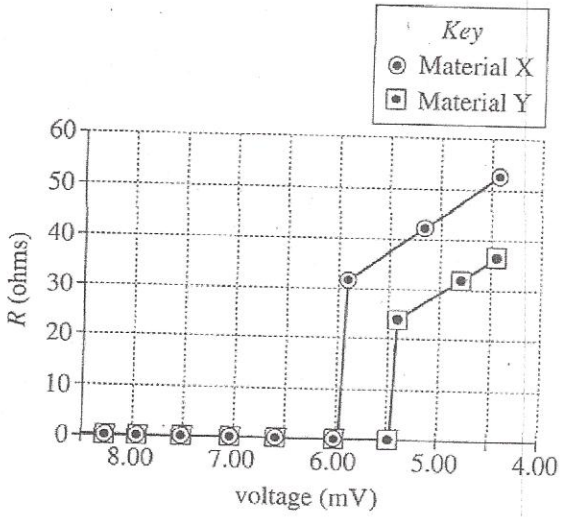


Figure 1

Table 1: Voltage (mV)–Temperature (K) Conversion Chart

T (K)	0	1	2	3	4	5	6	7	8	9
80	6.29*	6.25†	6.21	6.17	6.13	6.09	6.05	6.01	5.97	5.93
90	5.90	5.86	5.83	5.79	5.75	5.72	5.68	5.64	5.60	5.56
100	5.52	5.48	5.44	5.41	5.37	5.34	5.30	5.27	5.23	5.20
110	5.16	5.13	5.09	5.06	5.02	4.99	4.95	4.91	4.88	4.84
120	4.81	4.77	4.74	4.70	4.67	4.63	4.60	4.56	4.53	4.49
130	4.46	4.42	4.39	4.35	4.32	4.28	4.25	4.21	4.18	4.14
140	4.11	4.07	4.04	4.00	3.97	3.93	3.90	3.86	3.83	3.79

*For example, 6.29 mV converts to 80 K.
†For example, 6.25 mV converts to 81 K.

Figure and table adapted from "Instruction Manual for Superconductor Demonstrations." ©1992 by Colorado Superconductor, Inc.

23. Based on Table 1, if the thermocouple were used to measure the temperature of a sample at 112 K, the voltage displayed would most likely be closest to which of the following?

A. 4.81 mV
B. 5.09 mV
C. 5.44 mV
D. 6.29 mV

24. In Table 1, as voltage decreases, temperature:

F. increases only.
G. decreases only.
H. varies, but with no general trend.
J. remains constant.

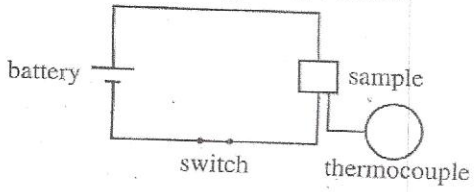
25. Based on Figure 1 and Table 1, the range of temperatures over which Material X is a superconductor is closest to which of the following?

A. 2 K
B. 6 K
C. 88 K
D. 176 K

26. Based on Figure 1 and Table 1, T_C for Material Y is most likely closest to which of the following?

F. 25 K
G. 50 K
H. 75 K
J. 100 K

27. Suppose that the sample of Material Y is included in an electrical circuit, as diagrammed below.



Based on Figure 1 and Table 1, if the sample is kept at 81 K, will the sample generate any heat as a result of the electrical current flowing through the sample?

A. No, because R of the sample will equal zero.
B. No, because R of the sample will be greater than zero.
C. Yes, because R of the sample will equal zero.
D. Yes, because R of the sample will be greater than zero.

Passage VI

A teacher described the procedure of a study to students in a science class:

> A 1 kg sphere, Sphere X, and a 2 kg sphere, Sphere Y, were released from rest, one at a time, from Point P on the right side of a frictionless, U-shaped incline. H_P was the height of Point P above Point L, the lowest point on the incline (see Figure 1).

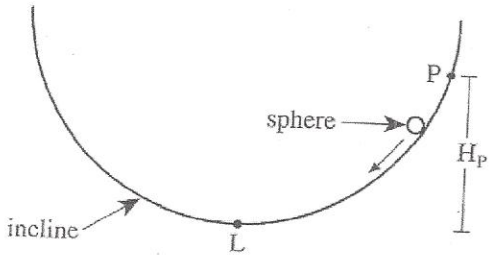


Figure 1

> Each sphere was allowed to slide as far up the left side of the incline as it could go.

Next, the teacher gave the students the following definitions:

1. GPE_P, the gravitational potential energy of a sphere at Point P, equaled mgH_P, where m was the sphere's mass and g was the acceleration of the sphere due to Earth's gravity.
2. KE_L, the kinetic energy of a sphere at Point L, equaled $\frac{1}{2}mV_L^2$, where V_L was the sphere's speed at Point L.
3. MO_L, the amount of momentum of a sphere at Point L, equaled mV_L.

Then the teacher asked 3 students to predict (giving their reasons) which sphere, if either, slid farther up the left side of the incline.

Student 1

As a sphere slid down the incline, its GPE_P was converted to kinetic energy. By the time it reached Point L, all of its GPE_P had been converted. Based on Definition 1, because Sphere Y had a greater m than did Sphere X, but the same g and H_P as Sphere X, Sphere Y had a greater GPE_P than did Sphere X. As a result, Sphere Y had a greater KE_L than did Sphere X. Thus, Sphere Y slid farther up the left side of the incline than did Sphere X.

Student 2

Because the 2 spheres had the same g and H_P, they had the same V_L. Based on Definition 3, because Sphere Y had a greater m than did Sphere X, Sphere Y had a greater MO_L than did Sphere X. Thus, Sphere Y slid farther up the left side of the incline than did Sphere X.

Student 3

Because the 2 spheres had the same g and H_P, they had the same V_L. Thus, they slid the same distance up the left side of the incline.

After hearing the students' predictions, the teacher gave them the results of the study (see Table 1).

Table 1

Sphere	H_P (m)	GPE_P (joules)	V_L (m/sec)	KE_L (joules)	Greatest height attained on left side of incline (m)
X	1.0	9.8	4.4	9.8	1.0
Y	1.0	19.6	4.4	19.6	1.0

28. Which sphere, X or Y, was subjected to the greater amount of force from Earth's gravitational field?

- **F.** Sphere X, because it had the greater mass.
- **G.** Sphere X, because it had the lesser mass.
- **H.** Sphere Y, because it had the greater mass.
- **J.** Sphere Y, because it had the lesser mass.

29. Suppose 2 other spheres, Sphere S and Sphere T, are released from Point P. The m and V_L for each sphere are given in the table below.

Sphere	m (kg)	V_L (m/sec)
S	5.0	4.4
T	3.5	4.4

Based on Definition 3 and Student 2's statements, which sphere will slide farther up the left side of the incline?

- **A.** Sphere S, because it will have a greater MO_L than will Sphere T.
- **B.** Sphere S, because it will have a lesser MO_L than will Sphere T.
- **C.** Sphere T, because it will have a greater MO_L than will Sphere S.
- **D.** Sphere T, because it will have a lesser MO_L than will Sphere S.

30. Suppose that the study were conducted on the Moon instead of on Earth. Based on Definition 1 and Student 1's statements, compared to the KE_L of Sphere X for the study on Earth, the KE_L of Sphere X for the study on the Moon would be:

F. greater, because the acceleration due to gravity on the Moon is greater than the acceleration due to gravity on Earth.
G. greater, because the acceleration due to gravity on the Moon is less than the acceleration due to gravity on Earth.
H. less, because the acceleration due to gravity on the Moon is greater than the acceleration due to gravity on Earth.
J. less, because the acceleration due to gravity on the Moon is less than the acceleration due to gravity on Earth.

31. Consider the statement "The greatest height attained by a sphere sliding up the left side of the incline does not depend on the sphere's mass." This statement is consistent with the prediction(s) of which of the students?

A. Student 1 only
B. Student 3 only
C. Students 1 and 2 only
D. Students 1, 2, and 3

32. Based on Student 3's statements, how did the *amount of time* for Sphere Y to slide from Point P to Point L compare to the *amount of time* for Sphere X to slide from Point P to Point L ? The amount of time for Sphere Y to slide from Point P to Point L was:

F. $\frac{1}{4}$ as great.
G. $\frac{1}{2}$ as great.
H. the same.
J. 2 times as great.

33. Suppose that a sphere is released from a new point on the incline, Point Q, that is between Point P and Point L. At Point Q, the sphere's gravitational potential energy is equal to mgH_Q, where H_Q is the height of Point Q relative to Point L. Based on Student 1's statements about the conversion of gravitational potential energy to kinetic energy, would the sphere's KE_L following the release from Point Q be less than or greater than the sphere's KE_L following the release from Point P ?

A. Greater, because GPE_Q would be greater than GPE_P.
B. Greater, because GPE_Q would be less than GPE_P.
C. Less, because GPE_Q would be greater than GPE_P.
D. Less, because GPE_Q would be less than GPE_P.

34. Consider the 3 students' hypotheses concerning which sphere, if either, slid farther up the left side of the incline. Based on the results of the study, which of the students' predictions, if any, was(were) correct?

F. Student 1's only
G. Student 3's only
H. Student 1's and Student 2's only
J. Neither Student 1's, Student 2's, nor Student 3's

Passage VII

Students were given 12 known compounds and 4 unidentified compounds (Unknowns A–D) to analyze.

Experiment 1

Students placed a solid sample of each known compound in a separate *capillary tube* (a thin glass tube). Samples were then heated, 4 at a time, in a *melting point apparatus* (see Figure 1).

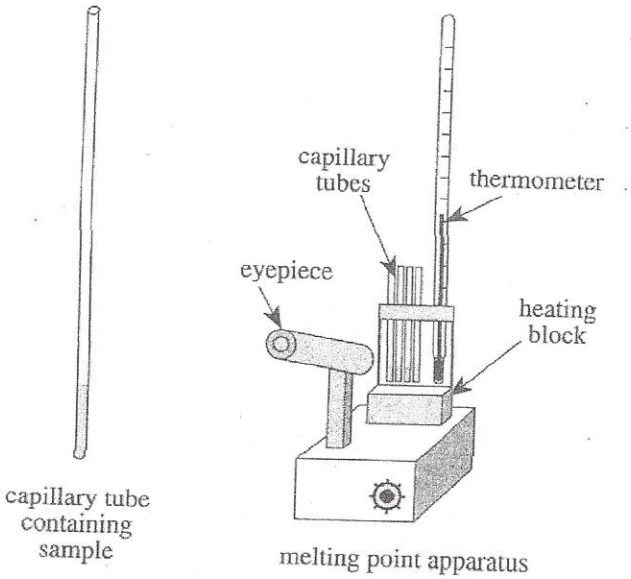


Figure 1

The samples were monitored through the eyepiece. When liquid first appeared in a sample, the temperature was recorded. When no solid remained in the sample, the temperature was again recorded. The compounds were placed in Groups I–IV based on similarity in melting point (MP).

Experiment 2

For each compound in a group, students dissolved a sample and placed a small spot of the solution 2 cm from the bottom of a 13 cm tall and 7 cm wide *thin-layer chromatography* (TLC) plate. Each spot was circled with a pencil and allowed to dry. The plate was placed in a tank containing a small amount of a particular solvent. When the solvent had moved up to 1 cm from the top of the plate, the plate was removed and allowed to dry. Four distances were measured, in cm, under UV light: distance *a* for each spot and distance *b* (see Figure 2).

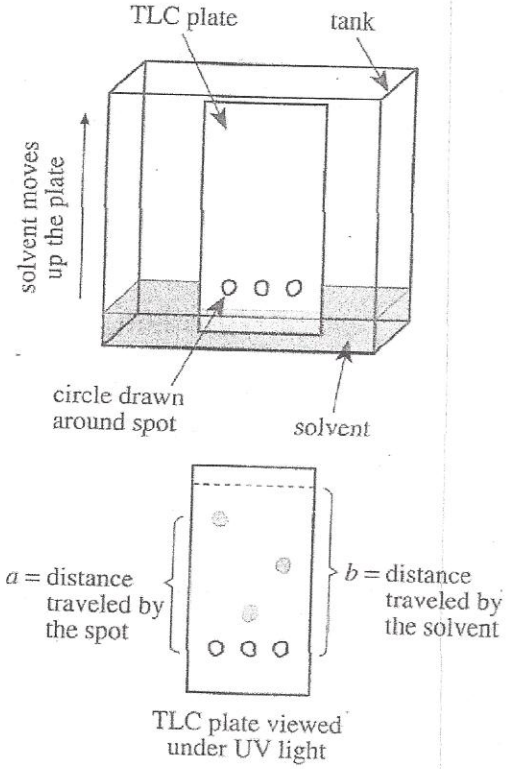


Figure 2

The R_f *value* of each compound was then calculated by dividing distance *a* by distance *b*. The results of Experiments 1 and 2 are shown in Table 1.

Table 1

Group	Compound	MP range (°C)	R_f value
I	biphenyl	69–72	0.82
	2,5-DMP	68–71	0.24
	4-NBC	70–73	0.40
II	PNCB	83–84	0.67
	naphthalene	80–82	0.85
	vanillin	81–83	0.05
III	acenaphthene	93–95	0.78
	m-toluamide	94–96	0.02
	methyl 4-nitrobenzoate	94–96	0.51
IV	benzoic acid	122–123	0.19
	trans-stilbene	122–123	0.77
	succinimide	122–124	0.00

Experiment 3

The techniques from Experiments 1 and 2 were used to analyze Unknowns A–D (see Table 2).

Table 2

Unknown	MP range (°C)	R_f value
A	93–95	0.02
B	123–125	0.74
C	68–71	0.85
D	80–82	0.06

Figures adapted from Samuel G. Levine, "Identification of Unknowns by Melting Point and Thin-Layer Chromatography in Combination." ©1990 by Division of Chemical Education, Inc., American Chemical Society.

35. In Experiment 1, liquid first appeared in the biphenyl sample at which of the following temperatures?

A. 69°C
B. 72°C
C. 82°C
D. 100°C

36. The spot for which of the following samples traveled farthest up the TLC plate?

F. 2,5-DMP
G. PNCB
H. acenaphthene
J. benzoic acid

37. One of the students calculated the R_f value for Unknown C as 1.18. There had to be an error in the student's calculation because:

A. distance *a* cannot be longer than distance *b*.
B. distance *b* cannot be longer than distance *a*.
C. distance *a* must be equal to distance *b*.
D. R_f values must be less than or equal to 1.10.

38. A chamber contains samples of each of Unknowns A–D maintained at 150°C. Suppose the temperature in the chamber is slowly cooled to 40°C. Based on the results of Experiment 3, which of the samples would most likely start to solidify first?

F. Unknown A
G. Unknown B
H. Unknown C
J. Unknown D

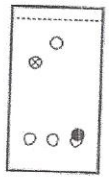
39. Based on the results of Experiments 1–3, Unknown A is most likely which of the 12 known compounds listed in Table 1 ?

A. biphenyl
B. vanillin
C. acenaphthene
D. *m*-toluamide

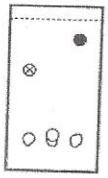
40. Which of the following diagrams best represents how the TLC plate appeared under UV light for Group II ?

Key
⊗ PNCB
○ naphthalene
● *vanillin*

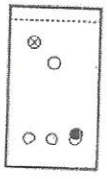
F.



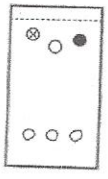
H.



G.



J.



END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.