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

Flood basalt plateaus are large areas of Earth's surface covered with thick hardened lava. It has been hypothesized that the huge outpourings of lava that formed these plateaus were produced by *plumes* of molten material rising from deep within Earth.

Study 1

A model of a typical plume was created using a computer. It was hypothesized that the "head" of the plume produced the flood basalt plateaus when its molten material reached the surface. Figure 1 shows the computer-generated plume, its diameter, and how long, in millions of years (Myr), it would take the head of the plume to reach the surface.

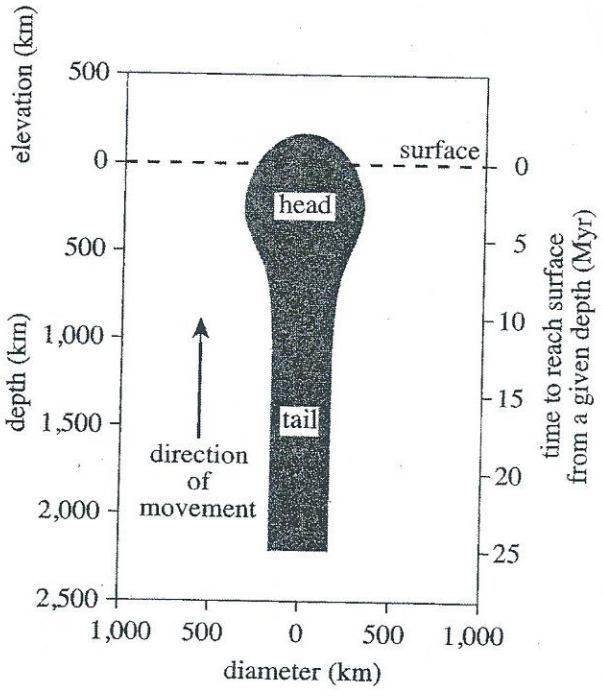

Figure 1

Figure adapted from R. I. Hill et al., *Mantle Plumes and Continental Tectonics*. ©1992 by the American Association for the Advancement of Science.

Study 2

Four flood basalt plateaus (A–D) were studied. The lava volume, in cubic kilometers (km^3), was estimated for each plateau from the area of the plateau and the average thickness of the lava. The length of time lava was being produced at each plateau, and the rate of lava production, in km^3 per year, were also estimated. The results are in Table 1.

Table 1

Plateau	Age (Myr)	Lava volume (km^3)	Length of time lava was produced (Myr)	Rate of lava production (km^3/yr)
A	60	2,000,000	1.6	1.25
B	67	1,500,000	1.3	1.2
C	135	1,440,000	1.2	1.2
D	192	2,125,000	1.7	1.25

Table adapted from Mark A. Richards et al., *Flood Basalts and Hot-Spot Tracks: Plume Heads and Tails*. ©1989 by the American Association for the Advancement of Science.

Study 3

Scientists found that 3 large extinctions of marine organisms had ages similar to those of the formation of 3 of the flood basalt plateaus; 58 Myr, 66 Myr, and 133 Myr. It was hypothesized that the production of large amounts of lava and gases in the formation of plateaus may have contributed to those extinctions.

(Note: All of these ages have an error of ±1 Myr.)

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