Science Reasoning Test Two—Scoring Key

	Key		Key
1.	C	21.	B
2.	F	22.	G
3.	A	23.	D
4.	H	24.	F
5.	D	25.	A
6.	J	26.	J
7.	B	27.	B
8.	H	28.	F
9.	A	29.	B
10.	G	30.	J
11.	C	31.	C
12.	H	32.	G
13.	D	33.	D
14.	F	34.	H
15.	D	35.	B
16.	F	36.	J
17.	C	37.	A
18.	H	38.	F
19.	B	39.	D
20.	J	40.	G

Total Number Correct for Science Reasoning Test   _____
                                                          (40)

Use the conversion chart on page 142 to convert the total number correct to the ACT Scoring Scale of 1 to 36.

Science Reasoning Test Two—Answer Explanations

Passage 1

1. Average monthly surface temperatures are represented by the solid line. Locate the highest point on the graph (about 13°C) and read the value for month off the x-axis. The highest surface temperatures occur in September. The answer is C.
2. Locate the month of October on the x -axis and then draw a vertical line that intersects the two graphs. The average monthly sea level (the dotted line) corresponds to about 2.60 meters; the average monthly surface temperature corresponds to about 12°C. The answer is F.
3. The shape of the two graphs is almost identical. This overlap indicates that, as temperatures increase, so does sea level. The converse is also true; as temperatures decrease, so does sea level. The two variables share a direct, positive linear relationship. The answer is A.
4. If sea level is constant, we would infer that monthly surface temperatures would also be constant. Why? From the figures, it seems there is a direct relationship between the two variables (see the answer to question 3). Thus, if sea level is constant at about 2.5 meters, we would expect the monthly surface temperatures to remain at a constant level. The best answer is H; temperatures "remain fairly constant in the months from June to October."
5. The clue in this question is the phrase "six months behind." This phrase can be interpreted to mean that, when it's like December in the Northern Hemisphere, it's six month behind, or like June, in the Southern Hemisphere. Thus, if it's August in the Southern Hemisphere, the conditions would be similar to February in the Northern Hemisphere. For February, the sea level is approximately 2.55 and the surface temperature is about 11.5°C. The answer is D.

Passage 2

6. The "Unshielded" condition shows the amount of rems produced without any protection. For alpha particles at a dose of 1 rad, the Unshielded condition gives a value of 10 rems. For Shield X at a dose of 1 rad for alpha particles, the amount of rems is 1. Thus, Shield X has reduced the number of rems from 1 to 10, or 9 rems. The answer is J.
7. Find the row of information for Slow Neutrons and Shield Y. The amount of rems increases from .44 for a dose of 1 rad to 3.2 for a dose of 5 rads. Thus, the amount of rems increases as the dose in rad increases. This relationship corresponds to a positive linear relationship represented by the graph in option B. The answer is B.
8. Are the values for Shield X lower than the values for Shield Y for all types of radiation? The values for Shield X are lower for four of the five types of radiation: x rays, alpha particles, slow neutrons, and fast neutrons and protons. For heavy ions, however, the values for Shield X and Shield Y are the same. Thus, the correct answer is H.
9. Focus on the rows of data for Fast Neutrons and Protons. Which shield reduces the amount of rems by "over 50%"? Fifty percent of 10 (the unshielded condition) is 5; fifty percent of 20 is 10; and so on. Shield Y does not reduce the amount of rems by over fifty percent, but Shield X does, for all dose levels. The answer is A.
10. The amount of rems for 2 rads of unshielded alpha particles is 20. Which of the options also gives a value of 20? The correct answer is G; 4 rads of fast neutrons and protons under Shield Y has a value of 20. The answer is G.

Passage 3

11. Use Table 3. From 1988 to 1998, the values for all the substances increase except for CO_2, which remains constant at 350. The answer is C.
12. Use Table 2. Site One is the area with heavy industrialization. Are the values for the five substances higher at Site One than at Site Two, the area of light industrialization? The values of all substances are higher except for N_2O, which remains constant at 315. Thus, the hypothesis is not supported. The answer is H.
13. First, focus on the row of data in Table 3 that corresponds to 1998. Then compare the values to the data in Table 2. Are the values from Table 3 closer to the values for Site One (heavy industrialization) or Site Two (light industrialization)? CO (.10) is closer to the value of Site Two (.09); SO_2 (.20) is the same as the value at Site Two; and CH_4 (1.6) is closer to the value of Site Two (1.5). The answer is D.
14. Use Table 3. The concentration of CH_4 increased from 1.4 to 1.6 from 1988 to 1998. For these same time intervals, the concentration of N_2O increased from 290 to 310. The best answer is F.

15. Use Table 1. Is there a linear relationship between C (concentration) and R (residence time). This question is difficult, because we have to distinguish between parts per million (ppm) and parts per billion (ppb). A value of 350 ppm corresponds to 500 years while a value of 1.6 ppm corresponds to 7-10 years. It looks like there's a linear relationship. But 310 ppb (which is the same as .3 ppm) corresponds to 140 years. Thus, the relationship is not a straight line. The best answer is D.

16. Normal concentration levels are given in Table 1. Compare the values at Site Two in Table 1 to the normal values in Table 1. CO is lower as is CH_4. The answer is F.

Passage 4

17. Use Table 1 and match the values. A lower flammable limit of 1.9 and an upper flammable limit of 11.0 correspond to the chemical methel ethyl ketone. The answer is C.

18. Use Table 2. The teacher wants gloves made from a material that has a rating of Fair or better. Thus, any materials that have a Poor (P) rating won't work. Natural Rubber has a poor rating, as do Neoprene and Vinyl. Nitrile is the only substance with a rating of Fair or better. The answer is H.

19. Use Table 1. Only four substances have ignition temperatures greater than 500°C: acetone, benzene, methel ethyl ketone, and toluene. Of these four, all have flash points greater than -30.0°C. The answer is B.

20. Use Table 2. Rule out any chemicals that have a Poor (P) rating. This criterion eliminates the following chemicals: benzene, carbon disulfide, cyclohexane, methel ethyl ketone, and toluene. The answer is J.

21. Use Table 1. The minimum concentration of vapor in air will be 1.5. To be "too lean to burn," the minimum concentration of vapor in air must be below the lower flammable limit. Of the chemicals listed, only methel ethyl ketone, with a lower flammable limit of 1.9, would be too lean to burn under these conditions. The answer is B.

Passage 5

22. Only Scientist 2 would agree with this statement. This Scientist states that "uses of the human genome" are "decades away," while Scientist 1 says that advances will come quickly. The answer is G.

23. Option D is not entirely correct. The passage under Scientist 2 states that "DNA" is "a long molecular chain of phosphate and sugar." The answer is D.

24. Both Scientists would agree with option F. Scientist 1 states that "the complete blueprint of the human genome should be completed soon," and Scientist 2 states that "the genome has not actually been deciphered." The answer is F.

25. Scientist 2 states that DNA has "more than three billion letters." The correct answer is A.

26. Scientist 1 claims that options F, G, and H will occur due to the decoding of the human genome. There is no mention, however, that new bases in the DNA code will be identified. The answer is J.

27. Scientist 1 would agree with option A; both Scientists agree with option D. There is no evidence that the two Scientists would disagree with option C. Both Scientists, however, would disagree with option B. Scientist 1 notes that the decipherment will quickly lead to medical advances; Scientist 2 states that "medical advances stemming from this decipherment are decades away." There is no evidence, however, that Scientist 2 would disagree with pursuing medical advances. The answer is B.

28. BAC's are 150,000 letters long. The largest fragment in the other group is 50,000 letters long. Thus, a BAC is three times larger than this largest fragment. The answer is F.

Passage 6

29. Use Figure 1. Are more pollutants emitted when vehicles are traveling at slower speeds? Or, in other words, are fewer pollutants emitted when vehicles are traveling at faster speeds? For either hypothesis to hold, the shape of graph would have be negatively sloping. The hypothesis holds for two of the pollutants, CO and NO_x. But the graph for VOC is positively sloping. Thus, the best answer is B; the hypothesis is not supported because "amounts of VOC increase as speed increases."

30. Use Figure 1. At what speeds would be the emission rates for VOC be higher than for the other two pollutants? Looking at the graph, the emission rates for VOC become higher than the other two pollutants at speeds greater than about 60 mph. Thus, the best answer is J, 80 mph.

31. Use Table 1. Focus on the 3.5 to 16 tons category and the CO column. Be careful to read the x-axis on the graphs. The x-axis places "Interstate" first, then "Rural" followed by "Urban," the reverse order from the table. The value for "Interstate" is the lowest, 4.2; the value for "Urban" is the highest, 18.8. Option C presents the best graphical representation of the data. The answer is C.

32. Use Table 1. For the 3.5 to 16 tons category, as the emission rates for NO_x decrease (from 8.7 to 6.0) , the values for VOC also decrease (from 2.75 to 0.6). This same pattern holds for the greater than 16 tons category. The answer is G.

33. From Figure 1, the relationship for noncommercial vehicles is as follows: as speeds increase, the emission rates of NO_x decrease. The vehicle traveling at the slowest speed would have the highest emissions of NO_x. Of the options listed, which vehicle/place combination has the highest emissions for NO_x? The "greater than 16 tons/ Urban" combination has a value of 16.2, the highest value for the options listed. The answer is D.

34. "Holding place constant" means to compare the types of vehicles at a constant place. For example, the 3.5 to 16 tons vehicle in the Urban place has a value of CO of 18.8; the greater than 16 tons vehicle in the Urban place has a value of CO of 18.8. The two values are the same. Thus, for CO, emission rates are not higher for vehicles greater than 16 tons. This fact eliminates options G and J. For other two pollutants, however, the values for greater than 16 tons are higher than the values for 3.5 to 16 tons, when holding place constant. The answer is H.

Passage 7

35. Use Figure 1. There are a total of 28 pieces to be placed. The Master chess player (the line with the "M" notation) had placed all 28 pieces correctly after 3 trials. The answer is B.

36. The key to answering this question correctly is looking at the results of both experiments. In the first experiment, master chess players place more pieces correctly in fewer trials than either average or beginner players. This situation is not true in Experiment 2. Both average and beginner players place more pieces correctly than do master chess players. The answer is J.

37. From Figure 1, after five trials, all three players had placed twenty or more pieces correctly. From Figure 2, after four trials, none of the players had placed as many as twenty pieces correctly. In Experiment 2, the random chess positions are harder to remember; the hypothesis is supported and the best explanation is given in option A. The answer is A.

38. After three trials, the master chess player had placed all 28 pieces correctly in Experiment 1. In Experiment 2, after three trials, the master chess player had placed a little less than five pieces correctly. The greatest difference in performance is exhibited by the master chess player. The answer is F.

39. The graphs for all three players are rising; that is, as trials increase, the players place more pieces correctly. A reasonable prediction would be that, after several more trials, all players would be able to place all the pieces correctly. The best answer is D.

40. Be careful with this question. In both Experiments, as trials increase, the number of "correct" pieces increase. The question, however, is asking for the relationship of trials with the number of "incorrect" pieces. This relationship is as follows: as trials increase, the number of incorrect pieces placed decreases. The answer is G.