

**21.** Charles, Mabel, Thomas, and Carrie are the first names of my mother, my father, my brother, and my sister. I am older than Mabel. Thomas is younger than I am. How is each member of my family related to me?

**22.** An airplane was flying at an altitude of 1,500 meters. A second airplane was flying at an altitude of 500 meters higher than the first. What conclusion can you draw from this?

**23.** In Indiana, the corn is at least knee-high by the 4th of July. Suppose today's date is July 5th. What follows from this?

**27.** Mr. Gray's wife is a trumpet player with the Detroit Symphony Orchestra. Patti has never been musically talented. What must be true?

**28.** Mr. Horlik's wife is a trumpet player with the Detroit Symphony Orchestra. Betty is a trumpet player with the Detroit Symphony Orchestra. What must be true?

**29.** Ms. Forbes' husband is the first chair violinist with the St. Louis Symphony Orchestra. The concertmaster of the St. Louis Symphony Orchestra is the person who is the first chair violinist with the orchestra. What must be true?

# TEACHER SUGGESTIONS AND ANSWERS

## PURPOSE

Students having wide ranges of ability, motivation, and achievement seem to be remarkably attracted to Mind Benders problems. Students who may or may not try to use deductive reasoning for ordinary classwork or homework seem to think Mind Benders are fun, not work. So the purpose of the Mind Benders series is to give each student what (s)he wants—fun, a happy diversion from routine—while at the same time forcing the student to organize sets of clues—some direct, some indirect—and reach logical conclusions by using pure deductive reasoning.

## GENERAL INFORMATION

There are twelve booklets in this series:

MIND BENDERS®—WARM UP	MIND BENDERS®—B2
MIND BENDERS®—A1	MIND BENDERS®—B3
MIND BENDERS®—A2	MIND BENDERS®—B4
MIND BENDERS®—A3	MIND BENDERS®—C1
MIND BENDERS®—A4	MIND BENDERS®—C2
MIND BENDERS®—B1	MIND BENDERS®—C3

Although most of the problems in Mind Benders® Warm Up vary from extremely easy to easy, there are a handful in the medium range. The idea of the problems in this booklet is to give the students practice in using deductive reasoning in very simple situations before presenting them with more clues to use and with clues which are more subtle, as in the other Mind Benders booklets.

Since some teachers will need more problems for their students than other teachers, more than one booklet is available in each of the A, B, and C categories. Within a category, there is no substantial difference in difficulty between the booklets offered. (For example, a teacher who needs only 15 problems at the easy level may order any of the four Mind Benders booklets in the A series.)

See the last page of this booklet for general comments about assumptions which can be made from clues in Mind Benders problems.

## HELPFUL HINTS ABOUT SOLVING MIND BENDERS

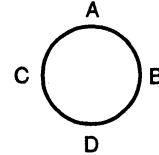
Most Mind Benders in the A, B, and C books are solved more easily if a chart is used than if the solver simply makes notes about the clues given. To help students solve problem 79, it (and nearly every Mind Bender in the A, B, and C books) is accompanied by a chart made especially for that particular problem.

The instructions (in highly abbreviated form, of course) are these: To fill in a chart, make a notation in each square that is eliminated by a clue. (The notation might be the clue number or the word "no," for example.) When there is only one blank square left in a row (or column) within a category, then "X" that square. Then note the elimination of all the other squares in the matching column (or row).

## ANSWERS

1. She is Mary Jane's grandmother. 2. She is Sarah's sister. 3. Mary is the bricklayer. James is the skycap. 4. Mr. Welch is smart. 5. Larry is not normal. 6. Ruth can't understand advanced reasoning. 7. There are clouds in the sky. 8. Nothing with regard to rain. (It might or might not be raining now.) 9. Anita learned new words. 10. Malinda's report card showed a grade higher than C in citizenship. 11. a. Francesca and Jacques b. Julia and Roberto 12. Raynor, cheese; Sartin, eggs. 13. He is her son-in-law. 14. He did not do what he should have done. 15. a. the third color b. the second color. 16. a. Drew b. Brad 17. Bryce is the waiter. Alicia is the waitress. 18. Rocky is the elephant. Terrible is the bird. 19. 84 cm. 20. 77 cm. 21. My father and mother are Charles and Carrie. My brother and sister are Thomas and Mabel. 22. The second airplane was flying at an altitude of 2000 meters. 23. The corn in Indiana is at least knee-high. 24. Danielle cannot ride a bicycle. 25. Ms. Neuman is not completely happy. 26. Mr. Darton is not Barry. 27. Mr. Gray's wife is not Patti. 28. Nothing, as far as Betty's being Mr. Horlik's wife is concerned. It is true, of course, that Betty and Mr. Horlik's wife both play the trumpet in the Detroit Symphony Orchestra, but they may or may not be the same person. 29. Ms.

Forbes' husband is the concertmaster of the St. Louis Symphony Orchestra. 30. Ms. Kaymore is not Angela. 31. Smallville is 120 km west of Big City. 32. Becky likes roast beef better than fish. 33. Skip likes ice cream better than pie. 34. Jasper's mother does not allow Jasper to drink FIZZO. 35. The rock in my yard is a boulder. 36. Karen did not win the TV set which was the raffle prize. 37. Esmerelda has green hair. 38. All boys are 3 meters tall. 39. 35 minutes after 10 o'clock (or 10:35). 40. 12 minutes after 9 o'clock (or 9:12). 41. 15 minutes before 11 o'clock (or 10:45). 42. Two of the boys row over, leaving the third one behind. On the other side, one boy gets out of the boat, and the other one rows back. He picks up the boy who was left behind in the first place, and they row over to the other side. 43.



44. a. steak b. chicken. 45. a. socks b. slacks. 46. Take any two numbers. Add them together and take half their sum. The result is between the original two numbers. 47. Allman; Braber and Casper. 48. a. Cathy b. Brenda c. Art. 49. Douglas lives in Iowa. Irene lives in Washington. Wesley lives in Delaware. 50. 10. 51. a. milk b. pop. 52. first trip, mustard; second, hamburger; third, bread. 53. LEOPARD, FASTCAR, TIGER, SUPER-8. 54. pear, apple, banana. 55. lemon, watermelon, grape. 56. Myra collects stamps. Clark collects coins. 57. Gloria had the dog. Melvin had the cat. 58. Jacob got the highest grade (in the class) on the test. 59. a. Doris b. Edith c. Ward. 60. If Terry's mother did not change her mind, then Terry was not allowed to watch TV for the rest of the week. (Ask your students if it is possible to accept everything given in the problem as true and still conclude that Terry may have been allowed to watch TV later that week. My own answer is yes, since Terry's mother may have meant what she said at the time she said it but then may later have changed her mind about it.) 61. (If your students think it must follow that all cows are horses or that all horses are cows, replace "are polka-dotted" with "have four legs" and see if they still think their conclusion must follow.) 62. Nothing. The pattern here is exactly the same as the pattern for #61. 63. 25 years old. 64. Sue Rawls and Terry Peters. 65. 14 years old. 66. 7 years old. 67. Mr. Welling is not Donna's father. 68. Rod won't watch any of the 7:00 p.m. TV programs today. 69. Nothing, as far as the interest content of today's 7:00 p.m. TV programs is concerned. (Maybe the programs are very interesting, but Rod has something even more interesting to do at 7:00 p.m.) 70. a. The fertilizer helped the grass grow. b. The fertilizer killed the grass. 71. a. 15 words a minute b. 60 words a minute. 72. The gardener committed the robbery. Everyone else's whereabouts at the time of the robbery is known. (From clue (2), the chauffeur's 10-minute absence was not enough to allow her to get to the house, rob it, and get back to the curb of the office building, even if we suppose that she had a helicopter available on the roof of the office building.) We are told the gardener went to a movie, but we are not told what time the movie started or ended or whether he stayed there once he got there. 73. a. Jude b. Luke c. Jude had 3, Esther had 2, and Luke had 1. (We know that each person had at least one piece, since we are told Jude shared the pizza with both of the others. We know from the clues that no two people had the same number of pieces. We also know that each person had a whole number of pieces. The only way to get a total of 6 under these circumstances is to add 1, 2, and 3) 74. Sheba is not a tiger. 75. No blakka is a jaffer, and no jaffer is a blakka. 76. No matter what number is thought of, there is always the "next number"—that is, the number thought of plus one. 77. No honest people are unhappy, and no unhappy people are honest. 78. See circle below. 79. Leonard is the cat. Arbuckle is the bird. Nelson is the fish. Betty is the dog.

