CIVIL SERVICE EMPLOYEES ASSOCIATION

LEAP

LABOR EDUCATION ACTION PROGRAM

Examination Preparation Booklet

Understanding and Interpreting Tabular Material II/ Quantitative Analysis

Booklet No. 15

CSEA

CIVIL SERVICE EMPLOYEES ASSOCIATION, INC.
LOCAL 1000, AFSCME, AFL-CIO
Danny Donohue, President

Booklet #15

Understanding and Interpreting Tabular Material II/ Quantitative Analysis

The OSEA Examination Preparation Booklet Series is designed to help members prepare for New York State and local government civil service examinations. This booklet is designed for practice purposes only and its content may not conform to that of any particular civil service examination.

UNDERSTANDING AND INTERPRETING TABULAR MATERIAL Il/QUANTITATIVE ANALYSIS

This section is disliked the most by almost everyone. It involves a lot of math, and can be very tedious and time consuming. Yet we've found that it is in this area that people can improve their scores the most dramatically. By cultivating the habit of "patient thinking," and practicing with the following questions, you can improve your ability to answer these types of questions.

There may be three to six tables on the exam, with three to five questions for each table, for a total of 15-30 questions. While some of the questions will not be that difficult, requiring simple averaging, or just a careful reading of the tables, others require a thorough knowledge of operations such as finding percent increase and decrease. The use of question marks in place of data in the tables is also becoming more common. This type of question involves more work, because you need to find the missing data first. (We don't recommend filling in all the question marks in the table first, since you won't need most of them$_1$)

The tabular section is usually last, when you're most tired. It's a good idea to frequently take short rest breaks during the exam in order to cut down on the building cycle of tension. It's always good to check your work, but on this section it's particularly important. If your answer is one of the choices given, don't think you won't need to check it again later. The mistakes people are most likely to make are often given as possible choices, precisely because these answers give people a false sense of security.

We suggest you check the answer key after you do each table. If you miss any questions, consult the "Answers and Explanations" section of this booklet. Carefully study the explanation before you continue on to the next question. In this way, you will gain practice and confidence as you go from table to table. In order to gain insight into what may be causing your errors, we suggest you use the Diagnostic Worksheet after you finish each set of questions with which you've had difficulty. We also suggest you do these problems <u>without</u> a calculator if your exam doesn't allow you to use one. It's important to get as much of this kind of practice as possible to eliminate careless mistakes and also to increase your speed and confidence. These questions are not easy for most people. They may seem really difficult at first. And some may seem impossible. But people who have practiced and have studied their past mistakes have improved their scores in this area considerably.

Good Luck!

DIAGNOSTIC WORXSHEET

For each question you missed, go through the checklist below and place the number of the question missed next to the trait exhibited. This exercise should give you insight into problem solving behaviors that may need work.

Question Number(s)	Trait Exhibited
_____	1. I couldn't solve the problem, so I gave up
_____	2. I had little confidence I could solve the problem
_____	3. I jumped to an incorrect conclusion.
_____	4. I made a careless error.
_____	5. I forgot how to do percent increase and decrease problems
_____	6. I had no systematic approach to solving the problem.
_____	7. I misinterpreted the question
_____	8. I "followed a hunch" without checking it through.
_____	9. I didn't step back and evaluate the reasonableness of my solution.
_____	10. I worked mechanically because I knew it was hopeless.
_____	11. I didn't check my work.
_____	12. I didn't try to visualize the problem.
_____	13. I didn't break the problem down into more easily understandable parts
_____	14. I didn't learn from previous problems
_____	15. I tried to answer the question without realizing that my understanding of a section of the question was vague.
_____	16. I was inconsistent in my interpretation of words or operations
_____	17. I made an error in long division
_____	18. I was falsely reassured because the answer I got was one of the choices, so I didn't check my work

UNDERSTANDING AND INTERPRETING TABULAR MATERIAL II/QUANTITATIVE ANALYSIS

The table on the following page gives hypothetical information regarding monthly allocations, by department, for a certain agency. Each department has begun the year with money left over from 1985. The second column gives the minimum balance allowable for each department. As soon as expenses for a given month would bring the account below this minimum, the amount entered in the third column would automatically be put into that department's account. Columns 4-9 give each department's expenses for the first half of 1986. Column 10 gives the beginning balance for the year (the amount left over from 1985); the remaining columns show how much money is left in each department's account at the end of each month.

By doing the operations necessary to fill in this table, you will be able to answer Questions 1-5 below.

1. Find the value of V.

   a. $1,200
   b. $1,000
   c. $1,100
   d. $1,300

2. Find the value of W.

   a. $450
   b. $300
   c. $350
   d. $250

3. Find the value of X.

   a. $800
   b. $950
   c. $1,600
   d. $1,500

4. Find the value of Y.

   a. $1,300
   b. $1,400
   c. $750
   d. $1,150

5. Find the value of Z.

   a. $550
   b. $1,000
   c. $700
   d. $650

DEPT	MIN BAL	AUTO ALLOC	JAN	FEB	MARCH	APRIL	MAY	JUNE	BEG BAL	JAN	FEB	MARCH	APRIL	MAY	JUNE
A	300	600	300	350	200	150	400	250	800	500	750	550	400	600	350
B	500	900	400	350	600	500	450	300	1100						V
C	200	300	150	100	200	200	100	200	400						W
D	800	1200	600	700	500	450	650	700	1600						X
E	600	900	600	700	650	400	550	700	1400						Y
F	400	700	400	350	200	450	300	250	500						Z

The paragraphs below give hypothetical information regarding the number, by age groups, of individuals using five state-run lake facilities for the months of July and August, 1986. Assume that no one participated in more than one activity. Also, if an activity is not mentioned, assume that it is not offered at that particular lake.

JULY

Seventy-five hundred people under the age of 13 swam in Lake Catharine while 50 people in that age group rowed. Of those 13-19, 5,400 swam in Lake Catharine, 170 canoed there, and 120 rowed. Sailing was more popular with people 20 and over, with 150 people over 60 and 350 people in the 20 to 60 age group using the lake for sailing. In the grouping of people over 60, 2,300 people swam, 50 people rowed, and 200 people canoed. Of those 20 to 60, 40 people rowed, 350 canoed, and 13,500 swam$_1$

Lake Herman is a much smaller and more remote lake and the figures bear this out. No one under 13 was reported using the lake, and the activities are more limited. Of those over 60, most (400) fished from the pier. The remainder used small crafts: 350 canoed and 200 sailed. In the 20-60 age group, there were also more people (1,100) fishing from the pier than were occupied in other activities. Of the remaining people in this age group, 650 canoed and 400 sailed. Those in the 13 to 19 age group didn't use the lake in great numbers, but those that did were more likely to canoe (75) than to sail (60) or to fish from the pier (10).

Lake Manichee is the largest and most developed lake of the five. The least represented group were those over 60. Thirty-five hundred swam in the lake, while 600 canoed, 600 more fished from the pier, 350 sailed, and 300 rowed. The numbers were also not as great for the 13-19 age group. Seventy-eight hundred young people swam on the lake but few people used small crafts. Only 220 canoed and 400 rowed. A very small number (30) fished from the pier. A great number of people in the other two age categories used the lake. Nine thousand children under 13 swam in the lake, 1,100 fished from the pier and 40 rowed. Of those people 20 to 60, 15,400 swam, 1,000 canoed, 600 fished from the pier, 500 rowed, and 400 sailed.

Swimming, canoeing, and rowing are possible at Dragon Lake. Forty-five hundred children under 13 swam in the lake, while 100 rowed. Of those 13-19, 3,700 swam, 400 rowed, and 350 canoed. In the 20-60 age group 7,300 swam, 900 canoed, and 750 rowed. Of those over 60, 2,300 swam, 450 canoed, and 250 rowed.

One thousand children under 13 swam in Dream Lake. Six hundred people aged 13 to 19 swam in the lake, while 25 people fished from the pier. Nine hundred people over 60 swam in the lake, 400 canoed there, and 300 fished from the pier. In the 20-60 age group, 2,500 swam, 950 canoed, and 640 fished from the pier.

AUGUST

In August, significantly more people used the facilities at the five lakes. The only exception to this was Lake Herman. Fishing in the lake was prohibited as of August first and that may have had something to do with the minimal increase in use of that facility. Of those who canoed, 80 were 13-19, 400 were over 60, and 750 were in the 20-60 age group. Of those using sailboats, 250 were over 60 years of age, 60 were 13-19, and 450 were 20-60.

Lake Manichee continued to be more popular than any other lake in the group. Record numbers of adults between the ages of 20 and 60 used the lake. Nearly nineteen thousand (18,850) swam in the lake, while 1 ,200 canoed, 600 rowed, 750 fished, and 450 sailed. The next highest group were the children under 13. More than 10,000 (10,500) swam in the lake, 50 rowed there, and 1,300 fished from the pier. Ninety-four hundred young people between the ages of 13 and 19 swam in the lake, 480 rowed, and 250 canoed, but only 45 fished from the pier. Forty-two hundred people over 60 swam in the lake. Those over 60 seemed to be the most well-rounded in terms of the other activities available. Seven hundred and twenty canoed, 650 fished, 400 rowed, and 370 sailed.

As in July, Lake Catharine was second in popularity to Lake Manichee. As usual, the largest numbers were found in the 20-60 age group. Sixteen thousand people in that age group swam in the lake, 870 canoed, 500 sailed, and 50 rowed. The lake was also very popular with children. Sixty children under 13 rowed on the lake, while 9,150 swam in it. Next, came the 13-19 age group. Two hundred young adults canoed on the lake, 140 rowed on it, and 6,450 swam in it. No one in this age group sailed on the lake. Finally, of those over 60, 2,700 swam, 220 canoed, 180 sailed, and 50 rowed.

Dream Lake also attracted significantly more people (about 19% more) in August than it had in July. Again, only those over 19 canoed on the lake (20-60: 1,000; over 60: 450). Twelve hundred children under 13 swam in the lake, while 750 of those between the ages of 13 and 19 swam there. In addition, 40 people in the 13-19 age group rowed on the lake. Of those 20 to 60, 2,900 swam in the lake, and 750 fished from the pier. Eleven hundred people over 60 swam in the lake and 350 fished from the pier.

Finally, 5,200 children under 13 swam in Dragon Lake and 150 rowed there. Of those in the 13-19 age group, 4,100 swam, 500 rowed, and 400 canoed$_1$ Of those adults 20 to 60, 7,800 swam, 1,100 canoed, and 850 rowed. In the over 60 age group, 2,500 swam, 550 canoed, and 300 rowed.

By filling in the tables on the next two pages, you will be able to answer Questions 6-10.

	0-12	13-19	20-60	0ver 60	TOTAL
Swim					A
Row					B
Canoe					C
Sail					D
Fish					E
Total					J

6 Find the value of A.

a. 190,000
c. 173,000
b. 143,000
d. 145,000

7. Find the value of C.

a. 14,855
c. 15,855
b. 13,945
d. 14,845

8. Find the value of D.

a. 4,220
c. 5,200
b. 5,620
d. 4,170

9. Find the value of G.

a. 50,850
c. 38,385
b. 42,255
d. 43,280

10. Find the value of I.

a. 28,990
c. 27,370
b. 38,230
d. 35,290

Listed below are per person fees for swimming and fishing privileges at the five lakes. Use this information and the information on pages 5 and 6 to fill in the table on page 10. Again, assume that no one participated in more than one activity, and that those activities which are not mentioned are not offered.

LAKE CATHERINE				
	0-12	13-19	20-60	over 60
Swimming	.25	.50	1.00	.50

LAKE HERMAN				
	0-12	13-19	20-60	over 60
Fishing	free	.50	1.50	.50

LAKE MANICHEE				
	0-12	13-19	20-60	over 60
Swimming	.50	1.00	1.00	.50
Fishing	free	1.00	1.00	free

DREAM LAKE				
	0-12	13-19	20-60	over 60
Swimming	free	.50	1.00	free
Fishing	free	free	1.00	free

DRAGON LAKE				
	0-12	13-19	20-60	over 60
Swimming	.50	1.00	2.00	1.00

TOTAL REVENUES IN THE FIVE-LAKE REGION: SUMMER, 1986

	0-12	13-19	20-60	over 60	TOTAL
Swimming					A
Fishing					B
Boat Rental					
Sailboat	NA	$200	$12,750	$8,800	C
Canoe	NA	$2,095	$20,000	$7,800	D
Rowboat	$350	$2,050	$3,750	$900	E
TOTAL	F	G	H	I	J

11. Find the value of A.
    a. $163,662.50
    b. $186,625.50
    c. $160,862.50
    d. $140,060.50

12. Find the value of B.
    a. $4,670
    b. $46,700
    c. $5,220
    d. $4,570

13. Find the value of G.
    a. $27,925
    b. $36,025
    c. $33,845
    d. $16,035

14. Find the value of H.
    a. $132,940
    b. $140,240
    c. $133,870
    d. $143,990

15. Find the value of J.
    a. $195,397.50
    b. $199,297.50
    c. $190,227.50
    d. $224,227.50

The hypothetical information below concerns the 1985 operating budgets for three units in a particular department. Consolidate this information in the table on page 12 and use your findings to answer Questions 16-20.

UNIT A

1st Quarter	Postal Fees: 250; Utilities, Elec: 150; Utilities, Phone: 300; Expense Accounts: 1 ,500; Maintenance: 400; Non-Paper Supplies: 450; Paper Supplies: 500.
2nd Quarter	Postal Fees: 200; Utilities, Elec: 150; Utilities, Phone: 200; Expense Accounts: 1 ,700; Maintenance: 450; Paper Supplies: 200; Non-Paper Supplies: 150.
3rd Quarter	Postal Fees: 150; Utilities, Elec: 225; Utilities, Phone: 150; Expense Accounts: 1,000; Maintenance: 400; Paper Supplies: 150; Non-Paper Supplies: 100.
4th Quarter	Postal Fees: 300; Utilities, Elec: 200; Utilities, Phone: 350; Expense Accounts: 2,100; Maintenance: 350; Paper Supplies: 250; Non-Paper Supplies: 200.

UNIT B

	1st	2nd	3rd	4th
Supplies:				
Paper	500	300	250	600
Non-Paper	450	300	250	300
Maintenance:	450	400	350	400
Utilities:				
Electricity	200	150	250	250
Telephone	350	300	200	300
Expense Accounts	2,000	3,000	1,500	3,500
Postal	350	250	200	450

UNIT C

	Exp. Acct.	Main.	P. Fees	Phone	Elec.	Paper	Non-Paper
1st Q.	4,100	800	300	800	600	300	400
2nd Q.	3,200	650	600	650	400	400	200
3rd Q.	3,000	850	300	450	450	250	350
4th Q.	3,600	750	550	700	500	350	350

	1st Q.	2nd Q.	3rd Q.	4th Q.	TOTAL
EXPENSE ACCTS					
MAINTENANCE					
POSTAL FEES					
SUPPLIES:					
Paper					
Non-Paper					
UTILITIES:					
Electricity					
Telephone					
TOTAL					

16. The only expense that decreased between the 3rd and the 4th quarter was

a. maintenance
b. electricity
c. telephone
d. non-paper supplies

17. Between the 1st and the 2nd quarter, the largest percent decrease occurred in which category?

a. telephone
b. expense accounts
c. non-paper supplies
d. paper supplies

18. If' the rate of increase for expense accounts were to be the same from the 4th quarter of 1985 to the 1st quarter of 1986 as it has been from the 3rd to the 4th quarter of 1985, what amount would be spent for expense accounts in the1st quarter of 1986?

a. $1 ,538
b. $6,164
c. $15,389
d. $6,189

19. The category which had the most stable expenses throughout 1985 is

a. electricity
b. expense accounts
c. postal fees
d. maintenance

20. On the whole, all the units are least expensive to maintain during which quarter?

a. 1st
b. 2nd
c. 3rd
d. 4th

TYPES OF PUBLIC WAREHOUSES - 1985
(hypothetical data)

Category of Operation	Number	Total Revenue ($000)	Proportion of Total Revenue in 1985
Local trucking and storage (including household goods)	4687	823,959	?
General Merchandise	?	610,566	28.74
Warehousing			
Refrigerated Goods (including food lockers)	1534	?	16.55
Farm Products	744	155,085	7.30
Special Warehousing		136,861	6.44
Household Goods	423	46,698	?
Total	10026	2,124,765	100.00

GENERAL MERCHANDISE WAREHOUSING
(hypothetical data)

Year	Number of Establishments	Public Floor Space (000 sq.ft.)	Number of Paid Employees	Revenue ($000)
1960	1,197	108,315	22,283	$171,542
1965	1,512	119,325	22,496	200,934
1970	1,483	129,170	22,880	248,282
1975	1,677	163,168	28,295	379,910
1985	2,170	296,067	32,495	610,566

21. Approximately how many square feet of public floor space were held by the average general merchandise warehousing establishment in 1985?

a. 136
b. 973
c. 97,298
d. 136,440

22. If one-third as many new general merchandise warehouses opened between December of 1960 and December of 1962 as opened between January of 1963 and December of 1965, approximately how many general merchandise warehousing establishments existed at the end of December, 1962? (Assume that the totals in the table are year-end figures and that no warehouse closed in that time.)

a. 105
b. 1302
c. 1407
d. 1276

23. What was the average amount of public space used for general merchandise warehousing from 1960 through 1975?

a. 103,995,000 sq. ft.
b. 22,149.34 sq. ft.
c. 129,995 sq. ft.
d. 129,994,500 sq. ft.

24. In which category of operation was the average revenue per establishment greatest?

a. local trucking & storage
b. general merchandise warehousing
c. refrigerated goods
d. cannot be determined from information given

CUMMINGS EMPLOYMENT TRAINING

COMPARATIVE BUDGET DATA: 1983 - 1985
(hypothetical data)

Income	1983	1984	1985
Federal Funds	57,800	64,070	?
Commodities Support Project	20,000	26,900	29,800
CSBG Grants	14,000	10,000	- 0 -
Training Contracts	?	27,170	54,840
County Funds	12,400	17,500	23,070
Grants	- 0 -	?	16,000
Smith Foundation	- 0 -	8,000	12,000
Wealth-Rite Corp.	- 0 -	5,000	?
TOTAL	70,200	?	?

?

Expenses			
Personnel:	51,750	71,300	90,850
Salaries	45,000	?	?
Benefits	6,750	?	11,850
Office	10,120	13,540	17,505
Training Materials	6,800	8,500	9,540
Transportation	1,530	2,230	3,120
TOTAL	70,200	95,570	?

25. For each dollar spent on training materials in 1985, how many dollars were spent on salaries?

a. 8.28
c. 7.9
b. .12
d. .79

26. By what percent did the program's spending increase from 1983 to 1984?

a. 73%
c. 136%
b. 36%
d. 74%

27. It is most likely that which of the following amounts was spent on salaries in 1984?

a. $45,000
c. $62,000
b. $93,000
d. $69,000

28. In 1985, 3,025 people were trained through the Cummings Program. Two women were trained for every five men. How much did it cost to train men in the 1985 Cummings Program?

a. $48,400
c. $34,560
b. $72,600
d. $86,429

NEW ENGLAND POPULATION BELOW POVERTY 1980

State	Total Below Poverty: All Ages		High Risk Age Groups Below Poverty							
			Pregnant Women		Children 0-4		Children 5-17		Age 60+	
	Number	%*	Number	%**	Number	%**	Number	%**	Number	%**
Conn.	242,650	8.0	2,325	8.0	27,346	15	65,260	10	38,846	8
Maine	140,996	13.0	1,606	13.0	13,847	18	36,015	15	27,002	15
Mass.	532,458	9.6	5,227	9.6	52,535	16	140,277	12	83,599	9
N. H.	75,364	8.5	875	8.5	6,851	11	17,130	9	14,635	11
R. I.	93,959	10.3	940	10.3	9,321	12	23,195	13	18,756	11
Vt.	59,059	12.1	706	12.1	5,961	17	13,940	13	9,476	13
Total	1,144,486	9.3	11,679	9.6	115,861	15.5	295,817	11.9	192,314	9.6

* Percent of Total Population Within State

** Percent of Total Population Within Each High Risk Group

Source: Harvard University School of Public Health

29. What proportion of the people in Massachusetts living below the poverty level are over 60 years of age?

a. 9.6%
b. 16%
c. 8%
d. 53%

30. Approximately what percent of the total New England population is shown to be in high risk age groups?

a. 54%
b. 46.6%
c. 9%
d. 5%

31. If among those individuals living below the poverty level the male to female ratio is 1:4, how many females were living below the poverty level in New England in 1980?

a. 915,589
b. 286,122
c. 228,897
d. 968,542

32. In Massachusetts, 3,473 pregnant women living below poverty level received federally-funded prenatal care. If the participation rate is consistent for Connecticut and Rhode Island, how many pregnant women living below poverty level received federally-funded prenatal health care in Connecticut?

a. 1,545
b. 3,499
c. 2,949
d. cannot be determined from information given

HYPERTENSION SCREENING PROGRAM, 1980-19841
(hypothetical data)

	1980	1981	1982	1983	1984
Persons Screened: (thousands)	3,040	3,810	2,950	2,600	2,540
% over 65	10%	12%	11%	13%	9%
% under 35	12%	14%	15%	17%	17%
Expenditures: from local, state and federal funding sources (millions)	15.55	23.05	24.00	24.50	25.65
% local	7%	8%	6%	4%	7%
% state	20%	14%	19%	22.5%	25%

33. In which three years were the amounts from federal sources approximately the same?
    a. '80, '81 , '82
    b. '81, '82, '83
    c. '82, '83, '84
    d. '80, '82, '83

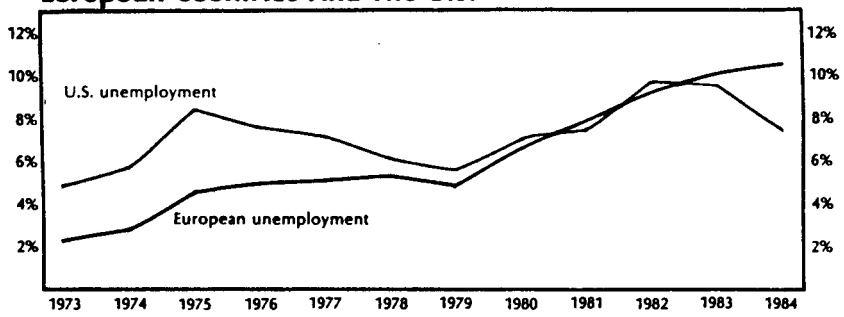
34. Between 1980 and 1981, the amount spent to screen individuals in the 35-65 age bracket increased by
    a. $.93
    b. $4,915
    c. 40.5%
    d. 45%

35. For every $10 provided by the federal government in 1983, how many dollars were spent by the state governments?
    a. $3.06
    b. $1.25
    c. $.33
    d. $4.30

36. From this table, one could conclude that
    a. there are more people under 35 who have hypertension than there people over 65 with hypertension
    b. the number of people under 35 screened for hypertension steadily increased between 1981 and 1984
    c. the amount of local funds used for hypertension screening has remained approximately the same from 1982 to 1984
    d. the amount of federal funds used for hypertension screening increased from 1980 to 1982

the ECONOMY in NUMBERS

Unemployment Rates In Major European Countries And The U.S.



Source: OECD statistics
Note: The European unemployment rate represents a weighted average of the unemployment rates of France, West Germany, and the U.K.

WHAT THE NUMBERS SAY: The economy is slowing down. GNP grew by only 1.3% in the first quarter.

MONTHLY DATA	*Mar. '85*	*Feb. '85*	*Jan. '84*	*Mar. '84*	*1967*
Employment (civilian, seasonally adjusted)					
Number of unemployed (millions)	8.396	8.399	8.484	8.783	2.975
Overall unemployment rate	7.3%	7.3%	7.4%	7.8%	3.8%
Black unemployment rate	15.2%	16.3%	14.9%	16.6%	7.4%
Wages					
Average weekly earnings: current dollars	$297.70	$295.64	$295.80	$288.40	$101.84
Average weekly earnings: 1977 dollars	N.A.	$170.99	$171.78	$172.59	$184.83
Prices					
All items Consumer Price Index	318.8	317.4	316.1	307.3	100.00
Increase from one year earlier	3.7%	3.5%	3.6%	4.7%	2.9%
Food increase from one year earlier	4.0%	2.4%	2.6%	4.0%	0.9%
Interest Rates					
Mortgage (*effective, on new homes*)	11.91%	12.21%	12.27%	12.02%	6.50%
Prime Interest Rate	10.5%	10.5%	10.61%	11.5%	5.61%

QUARTERLY DATA (*billions of dollars at annual rates, seasonally adjusted*)	*1985 1st*	*1984 4th*	*1984 1st*	*1967*
Gross National Product	3819.9	3758.7	3553.3	796.3
Balance of Trade (exports minus imports)	N.A.	-91.5	-103.1	+3.8
Wages, Salaries and Benefits	1447.8	1427.4	1354.0	471.9
Corporate Profits	N.A.	291.6	277.4	79.3
Gross National Product in 1972 dollars	1668.0	1662.4	1610.9	1007.7

NOTES: N.A. means not available. Wages are the average for private-sector nonfarm workers; no taxes have been subtracted.
SOURCES: Employment, wages and prices are from the Department of Labor, Bureau of Labor Statistics. Mortgage interest rate is from the Federal Home Loan Bank Board. GNP and its components are from the Department of Commerce, Bureau of Economic Analysis.

37. Compare the average weekly earnings, in current dollars, for February of 1985 with the average weekly earnings, in current dollars, for March of 1984.

a. $7.24 more
c. $7.40 more
b. $1.60 less
d. $9.30 more

38. The average weekly earnings in 1977 dollars, from March of

1984 to February of 1985

a. increased .009%
c. increased .25%
b. decreased .009%
d. decreased .9%

39. From 1967 to the last quarter of 1984, the Balance of Trade

a. declined 4%
c. declined 23.1%
b. declined 25.1%
d. declined 2508%

40. From this table, one could conclude that

a. black unemployment will continue to decline throughout 1985
b. buying power has increased since 1984
c. the increase in buying power has not kept pace with the increase in wages since 1967
d. from 1967 to the last quarter of 1984, corporate profits decreased more than 250%

NEW YORK STOCK EXCHANGE (hypothetical data)

	CLOSING			CHANGE		
	4/28/86	10/27/86	10/28/86	Change	Percent	Pct.6 mos
PlanResearch	18	22 3/8	31	?	?	+72.2%
Unitrode	14	13	11 3/4	- 1 1/4	- 9.6%	-16.07%
Wurlitzer	3 1/4	2 3/4	2 1/2	-1/4	- 9.1%	-23.08%
Dow Indus.	1825.37	1841.79	?	- 3 2/3	- .2%	+ .7%
IBM	159.25	119.44	120 3/4	+1.31	+ 1.1%	- 24.2%
PogoProd.	4.33	?	?	?	?	- 13.5%
Cullinet	9 1/8	8 7/8	8 3/8	- 1/2 -	-5.6%	- 8.2%
GM	81	70 1/3	70	+ 1/3	+ .5%	+ 13.6%
NYSE Composite	138.44	137.62	137.89	+ .27	+ .2%	- .4%

41. PlanResearch, from 10/27 to 10/28,
    a. increased 28.6%
    b. decreased 8.6%
    c. increased 38.6%
    d. increased 34.6%

42. On 10/28, the value of Dow industrials, compared to the NYSE Composite, was
    a. $1,704.17 greater
    b. $1,703.90 greater
    c. 13 1/3 times greater
    d. 130 times greater

43. If, on October 29, PogoProd increased 20% from the October 28 figure, its closing price on that day would have been
    a. 4%
    b. $4.49
    c. $5.90
    d. cannot be determined from information given

44. If Cullinet closed on 4/28/86 at 35% less than it closed six months before, the closing price for Cullinet on 10/28/85 would have been
    a. 10.125
    b. 12.32
    c. 14.04
    d. 15.23

ANSWER KEY

1.	a	12.	a	23.	d	34.	c
2.	c	13.	b	24.	b	35.	a
3.	c	14.	b	25.	a	36.	d
4.	b	15.	d	26.	b	37.	a
5.	d	16.	a	27.	c	38.	d
6.	a	17.	c	28.	d	39.	d
7.	a	18.	c	29.	b	40.	c
8.	d	19.	d	30.	d	41.	c
9.	b	20.	c	31.	a	42.	c
10.	a	21.	d	32.	a	43.	b
11.	c	22.	d	33.	b	44.	c

ANSWERS AND EXPLANATIONS

1. The answer is a. Answering this set of five questions is more time-consuming than difficult. It's all simple addition and subtraction, and the numbers themselves are neither long nor complicated. The main problem is that solving these questions involves a lot of tedious preparation, and since the tabular section traditionally comes at the end of the test, people can become overwhelmed if they get a question like this. Especially, because it looks so strange and intimidating. So, how do you attack a question like this? There is only one way. Read the explanation carefully, and study the table$_1$ The first line is filled in, so if you don't understand the directions, or if merely looking at the question turns your brain to mush, focus on that first line. Begin by working out that line to see how the test-makers came up with their answers. Develop a theory and work it out all along the line. Since there are six months given in this first line, you can test your theory six times. In fact, it's best to test your theory at least two or three times because your first test might have been right for the wrong reason.

If your exam contains questions like this, there is a very good chance that there will be tables in the test booklet where you can write your calculations, just as we have provided here. If not, you need to create such a chart on your scrap paper. It's worth taking the time to set this up. Without something concrete to work with, this question could drive you mad.

You can begin by looking at Department A. The way this table is set up, Department A needs to have at least $300 in its account at all times (minimum balance, column 2). Whenever an expenditure arises that would take the department below that $300 figure, a $600 allocation is automatically put into A's account (automatic allocation, column 3). Department A starts this year with $800 left over from the previous year (beginning balance, column 10). In January, the department spent $300 (column 4). This brings A's balance to $500 by the end of January. [$800 - $300 = $500] So far the calculations are very straight-forward. In the next month, the balance drops below the minimum, and things become a little trickier. February begins with the $500 left over from January. But, since $350 was spent in February, the balance would have dipped to $150. According to the guidelines set by the question this is not allowed, so $600 (the automatic allocation, column 3; is put into the account. By the end of February, the department has $750 in its account. [$500 - $350 = $150 + $600 = $750] You know you're on the right track with this method because your figure ($750) corresponds to the figure given in the table (February, column 12). In March, $200 is spent and, since this brings the balance to $550 [$750 - $200 = $550], no automatic allocation is necessary. And again, in April, the amount spent does not bring the balance below the $300 minimum balance allowed, so no further allocation is necessary. [$550 - $150 = $400] But by May, you run into complications. In May expenditures are higher -- $400. If no money were allocated, there would be nothing left in the account. [$400 - $400 = 0] Therefore, at some point in May, the automatic allocation was triggered, and by the end of May there was $600 in Department A[1]s account. [$400 + $600 - $400 = $600] There is enough money carried over to June, so things are simpler again. Only $250 is spent in June, so the account would not have dropped below the minimum balance, and $350 is left at the end of June. [$600 - $250 = $350]

The process we just performed consisted of eight operations. This same type of process has to be done five times, for Questions 1-5, in order to find values V, W, X, Y, and Z. Sometimes more than eight operations may need to be performed to find the answer. Unfortunately, there are no short-cuts. We strongly suggest that, if you are faced with a question containing multiple operations like this one, you write down every step you perform, and write them in a clear and logical manner. Unless you have the type of mind that can hold on to things in a pressure situation, you are very likely to get lost and forget what you've just done. You may even begin to panic. Below, we have provided a suggestion as to what your table might look like. If allowed, you could do this in the spaces provided in the test booklet. It may look a little cramped, but it's the safest way to negotiate this type of question. It's faster than using scrap paper and safer because you're less likely to make transcription errors. (NOTE: The figures below are those for Department B, the figures you would use to solve Question 1. We have broken the table in two so that we could fit it on this page.)

MIN. BAL. 500	ALLOC. 900	JAN 400	FEB 350	MARCH 600	APRIL 500	MAY 450	JUNE 300
BEG. BAL. 1,100		JAN -400=	FEB -350 = 350 + 900 =	MARCH -600	APRIL -500 = 150 + 90 0=	MAY -450 =	JUNE -300 = 300 + 900 =
		700	1,250	650	1,050	600	1,200

On the next page, you will find the completed table. If you still have trouble figuring out what to do after attempting Question 2, use the table to help you figure out where you went wrong.

2. The answer is c. See the answer to Question 1 and the table on the following page for a full explanation.

3. The answer is c. See above.

4. The answer is b. See above.

5. The answer is d. See above.

DEPT	MIN BAL	AUTO ALLOC	JAN	FEB	MARCH	APRIL	MAY	JUNE	BEG BAL	JAN	FEB	MARCH	APRIL	MAY	JUNE
A	300	600	300	350	200	150	400	250	800	500	750	550	400	600	350
B	500	900	400	350	600	500	450	300	1100	700	1250	650	1050	600	1200 (V)
C	200	300	150	100	200	200	100	200	400	250	450	250	350	250	350 (W)
D	800	1200	600	700	500	450	650	700	1600	1000	1500	1000	1750	1100	1600 (X)
E	600	900	600	700	650	400	550	700	1400	800	1000	1250	850	1200	1400 (Y)
F	400	700	400	350	200	450	300	250	500	800	450	950	500	900	650 (Z)

6. The answer is a. You may have thought that Questions 1-5 were impossible, and then changed your mind when you saw this set. Again, you may think you're being tested more on your ability to persevere and to keep from sinking into despair than on your mathematical ability. (Actually, you are probably being tested on your ability to maintain accuracy even when burned out.) As in the previous set of questions, the chances are good that you wouldn't be given this type of question unless you were also allowed to write in your booklet. If you can't write in the booklet, you will have to create your own table. There is no way you can do these questions in your head. You have to carefully go through the paragraphs, pick out the figures, enter them into your table, and tally them up. Then, check, and perhaps recheck, your figures. There are a lot of tricks in these paragraphs that are designed to throw you off. Numbers are spelled out rather than written in figures; age groups and activities are given in different orders; facts are buried among the words. Because of these tricks, you have to be accurate when you read the paragraphs, accurate when you write the figures down, and patient when you check your work. It takes a lot of time and energy, but it's the only way to be sure of your answers.

So, after looking at this question, and maybe panicking, you need to take a deep breath and dive in. You would most likely be allowed to use a calculator in a situation like this, but it never hurts to practice doing long columns of addition using pencil and paper. And really, that's all this question is -- long columns of addition. Whether you're using a calculator or your head, recheck your work. It's too easy to make a mistake and miss these questions which are tedious but not very difficult.

The table on the following page gives all the information you need to check your work.

7. The answer is a. See the answer to Question 6 for a full explanation and the table on the following page for the data.

8. The answer is d. See the answer to Question 6 for a full explanation and the table on the following page for the data.

9. The answer is b. See the answer to Question 6 for a full explanation and the table on the following page for the data.

10. The answer is a. See the answer to Question 6 for a full explanation and the table on the following page for the data.

	0-12	13-19	20-60	60+	TOTAL
swim	7,500	5,400	13,500	2,300	
	9,000	7,800	15,400	3,500	
	4,500	3,700	7,300	2,300	
	1,000	600	2,500	900	
	10,500	9,400	18,850	4,200	
	9,150	6,450	16,000	2,700	
	1,200	750	2,900	1,100	
	5,200	4,100	7,800	2,500	
	48,050	38,200	84,250	19,500	190,000 (A)
row	50	120	40	50	
	40	400	500	300	
	100	400	750	250	
	50	480	600	400	
	60	140	50	50	
	150	40	850	300	
		500			
	450	2,080	2,790	1,350	6,670 (B)
canoe		170	350	200	
		75	650	350	
		220	1,000	600	
		350	900	450	
		80	950	400	
		250			
		200	,200	720	
		400			
	0	1,745	8,770	4,340	14,855 (C)
sail		60	350	150	
		60	400	200	
			400	350	
			450	250	
			500	370	
			450	180	
	0	120	2,550	1,500	4,170 (D)
		25	640	300	
fish	1,100	10	1,100	400	
	1,300	30	600	600	
		45	750	650	
			750	350	
	2,400	110	3,840	2,300	8,650 (E)
TOTAL	50,900 (F)	42,255 (G)	102,200 (H)	28,990 (I)	224,345 (J)

11. The answer is c. This was a terrible thing to do to you, forcing you to go back through those pages again to find the figures you needed. But we did it to increase your stamina, and your ability to handle emotional setbacks. Can you imagine how you would have felt if this actually happened to you on an exam? We've compounded the problem by not giving you a ready-made table that is large enough to fill in with figures. In order to get the correct subtotals, you probably need to make a table of your own on a separate piece of paper. You could, of course, use the table you filled in on page 7 and just cross out figures you don't need, but that might make it more difficult if you wished to go back over those figures again to review Questions 6-10. Or you could use a calculator and just write down your totals. This is less time-consuming, if you can do it, but it also makes it very difficult to recheck your work. If you want the security of knowing what you did and why, and of being able to check up on yourself, you are better off taking the time to draw a table and fill it in.

Giving you these questions really isn't as dirty a trick as it might seem to be. By looking at the table of prices, you can see that many categories can be eliminated. Some lakes don't have both fishing and swimming, and some don't charge members of certain age groups.

Your first step might be to make a chart like the one below to let yourself know what to look for. (Of course, you would make one that was large enough for your figures. We have made this chart smaller to conserve space.)

	0-12	13-19	20-60	60+
Lake Catherine				
swim				
Lake Herman				
fish	---			
Lake Manichee				
swim				
fish	---			---
Dream Lake				
swim	---			---
fish	---	---		---
Dragon Lake				
swim				

So, as you can see, you really don't need to search for very many figures. After you go through the paragraphs, your finished table would probably look like the one on the next page.

	0-12	13-19	20-60	60+
Lake Catharine				
swim	7,500	5,400	13,500	2,300
	9,150	6,450	16,000	2,700
	16,650	11,850	29,500	5,000
Lake Herman				
fish		10	1,100	400
Lake Manichee				
swim	9,000	7,800	15,400	3,500
	10,500	9,400	18,850	4,200
	19,500	17,200	34,250	7,700
fish	---	30	600	---
		45	750	
		75	1,350	
Dream Lake				
swim	---	600	2,500	---
		750	2,900	
		1,350	5,400	
fish	---	---	640	
			750	
			1,390	
Dragon Lake				
swim	4,500	3,700	7,300	2,300
	5,200	4,100	7,800	2,500
	9,700	7,800	15,100	4,800

The next step would be to look at the price chart and multiply the figures above by the prices. By doing this, you would come up with the figures below.

	0-12	13-19		20-60		60+	
	swim	swim	fish	swim	fish	swim	fish
Catharine	4,162.50	5,925		29,500		2,500	
Herman			5		1,650		200
Manichee	9,750.00	17,200	75	34,250	1,350	3,850	
Dream		675		5,400	1,390		
Dragon	4,850.00	7,800		30,200		4,800	
TOTAL	18,762.50	31,600	80	99,350	4,390	11,150	200

Now all that remains is to put these totals into a chart like the one on page 10, and you will easily be able to answer Questions 11 through 15.

	0-12	13-19	20-60	60+	TOTAL
Swimming	$18,762.50	$31,600	$99,350	$11,150	$160,862.50(A)
Fishing	---	80	4,390	200	4,670. (B)
Boat Rental					
Sailboat	NA	200	12,750	8,800	21,750. (C)
Canoe	NA	2,095	20,000	7,800	29,895. (D)
Rowboat	350	2,050	3,750	900	7,050. (B)
TOTAL	$19,112.50 (F)	$36,025 (G)	$140,240 (H)	$28,850 (I)	$224,227.50 (J)

12. The answer is a. See the answer to Question 11 for a full explanation.

13. The answer is b. See the answer to Question 11 for a full explanation.

14. The answer is b. See the answer to Question 11 for a full explanation.

15. The answer is d. See the answer to Question 11 for a full explanation.

16. The answer is a. Dealing with the data from these three tables must have seemed easy after battling with the ones that came before. Even so, you can probably see how this set of questions could also wear you down during an exam.

As you can see, we have also changed the style of the questions. While you are again being tested for accuracy and perseverance, successfully answering Questions 16-20 requires more sophisticated thinking and computations. The first step is the same, however --carefully putting all the figures into one table in order to see what you have to work with. When you have done this, your completed table would look something like the one on the following page.

	1st	2nd	3rd	4th	TOTAL
Expense Accounts	1,500 2,000 4,100 7,600	1,700 3,000 3,200 7,900	1,000 1,500 3,000 5,500	2,100 3,500 3,600 9,200	30,200
Maintenance	400 450 800 1,650	450 400 650 1,500	400 350 850 1,600	350 400 750 1,500	6,250
Postal Fees	250 350 300 900	200 250 600 1,050	150 200 300 650	300 450 550 1,300	3,900
Paper Supplies	500 500 300 1,300	200 300 400 900	150 250 250 650	250 600 350 1,200	4,050
Non-Paper Supplies	450 450 400 1,300	150 300 200 650	100 250 350 700	200 300 350 850	3,500
Electricity	150 200 600 950	150 150 400 700	225 250 450 925	200 250 500 950	3,525
Telephone	300 350 800 1,450	200 300 650 1,150	150 200 450 800	350 300 700 1,350	4,750
TOTAL	15,150	13,850	10,825	16,350	56,175

Now, you have all the information you need to answer the questions correctly, assuming that you have copied and added correctly.

To answer Question 16, you only need to look at the figures for the 3rd and 4th quarters in the categories mentioned. Maintenance, which went from $1,600 to $1,500, shows the only decrease, so choice a is the correct answer.

17. The answer is c. As we have just said, these questions are more difficult than the first 15 It's important not to get intimidated by percent problems because they really aren't that difficult once you understand them and know how to attack them.

Actually, most people are more used to using percents than they might think. Percents are used to compare numbers or to show the relationship between them. Answering 91 correctly on an exam with 100 questions gives a score of 91% -- the percent shows how the score compares with the total number of questions. The sales tax is another common use of percents. A 7% sales tax means that for every dollar spent, seven cents is added in tax. If a jacket costs $50, the tax will be an additional $3.50. [$50 x .07 = $3.50 -- 50 dollars times 7 cents per dollar equals $3.50] Another example: If Craig spends $40 out of a $200 salary on groceries, he's using 20% of his salary for groceries. This percentage is determined by taking the amount spent on groceries and dividing it by the total amount earned: $\frac{40}{200} = .20 = 20\%$.

Most of us can do this, but, when faced with similar operations on tests, our natural abilities may disintegrate. A common problem is being unable to remember which way to move the decimal point. If you have a hard time with this, we suggest putting a familiar, "real life," example in the corner of your scrap paper. We've found that using your sales tax is a good idea. For example, if your sales tax were 7%, you might write it first as a decimal changing to a percent: .07 = 7%. Underneath that, you would write it the other way: 7% = .07.

Or, to help out with the more complicated percents:

.0825 = 8.25%
8.25% = .0825

Then, if you were required to convert a decimal like .0034 to a percent, you could refer to your sales tax example and quickly see which way to move the decimal point. Since .07 equals 7%, it's obvious that the decimal point needs to be moved two places to the right, .0034 becomes .34%. Similarly, you can convert percents to decimals more easily. For example, assume you must convert .0065% to a decimal. If 7% = .07, then the decimal point must be moved two places to the left, making .0065% equal .000065.

Percent increase or decrease problems seem to especially bother people on exams, yet they are sometimes used in "real life." For example, if a coat originally cost $150, but goes on sale and is reduced to $100, most people would be able to figure out what percentage they are saving by buying it on sale. They would take the difference saved ($50) and divide it by the original cost of the coat ($150) 50 ÷ 150 = .33 = 33% saving -- a 33% decrease in price.

Or, if an item was $200, but is now priced at $250, the percent it was marked up would be determined by taking the difference between the two prices ($50) and dividing this by the original price ($200): 50 ÷ 200 = .25 -- a 25% price increase.

It is this same combination of operations that is required to answer percent increase or decrease problems on the exams. For any percent increase or decrease question, the formula to remember is:

1) TAKE THE DIFFERENCE BETWEEN THE TWO NUMBERS, AND
2) DIVIDE THE DIFFERENCE BY THE ORIGINAL NUMBER, OR THE NUMBER THAT CHRONOLOGICALLY CAME FIRST.

Many people have saved many points on exams by committing this rule to memory.

So, in order to answer Question 17, you must determine the percent of change between the 1st and 2nd quarters for four categories: non-paper supplies, expense accounts, telephone, and paper supplies. Telephone costs went from $1,450 to $1,150, a difference of $300. [1,450 - 1,150 = 300] To determine the percent decrease, divide by $1,450 because it came first in time. [300 ÷ 1,450 = .2069] By moving the decimal two places to the right, this becomes 20.7%. Since expense accounts increased from $7,600 to $7,900, there is no need to do any further calculations -- the question asks about percent decrease. Non-paper supplies went from $1,300 to $650, a difference of $650, and a percent decrease of 50%. [1,300 - 650 = 650; 650 ÷ 1,300 = .50 = 50%] You could guess that this will be the answer by looking at your totals for paper supplies; $1,300 minus $900 is only a $400 difference. Or you could do the division for practice. [400 ÷ 1,300 = .3077 = 30.8%] The answer is choice c, non-paper supplies.

18. The answer is choice c. This is another percent increase/decrease type of problem. It doesn't say so in those words, but the phrase rate of increase" indicates that a percentage is called for here. This is not a case of just finding the difference between the 3rd and 4th quarter figures and adding this difference to the 4th quarter figure to get the right answer. If you had done that, you would have gotten $12,900 and picked choice b. [9,200 (4th Q.) - 5,500 (3rd Q.) = 3,700 + 9,200 (4th Q.) = 12,900] You have to be very careful when you do these problems because the people who make up test questions like to think about common mistakes and then provide those answers as possible choices. Read each question carefully and analyze it to be sure you know what the question is really asking.

To find the percent increase between the 3rd and 4th quarters, subtract 5,500 from 9,200. The difference, as we have seen, is 3,700. Divide this by the number that came first, 5,500. [3,700 ÷ 5,500 = .6727] You could change this to 67.3% or you could just leave it in its decimal form because you have more work to do with it. The next step can be a little confusing. You have two choices: you can either multiply 9,200 by .6727 and then add that figure to 9,200. [9,200 x .6727 = 6,188.8 + 9,200 = 15,388.8] Or you can multiply 9,200 by 1.6727. [9,200 x 1.6727 = 15,388.81 As you can see, either way you get the same answer.

When you multiply the rate of increase (67.72%, or .6727) by 9,200, you get the amount that expense accounts have increased between the 4th and the 1st quarters ($6,188.80), but you don't get the amount that would be spent in the 1st quarter. (Some people get lost in the problem and stop here, forgetting what they are actually looking for. That's why we provided choice d, $6,189. It's so easy, in a pressure-filled situation to forget to use common sense. By looking at the figure, $6,189, you can see that it is wrong because it is less than the 4th quarter figure. The question specifies that the correct answer must be larger.) For this reason, you must add the increase ($6,189) to the 4th quarter figure ($9,200) to get the right answer.

So, why does multiplying by 1.6727 work? 1.6727 is really 167.27% or 100% of the number 9,200 and 67.27% of the number 9,200 added together. 100% of 9,200 equals 9,200, 67.27% of 9,200 equals 6,188.8, 50 again 9,200 plus 6,188.8 equals 15,388.8, which rounds off to 15,389. As you can see, whether you multiply by 167.27%, or you multiply by 67.72% and then add the original 9,200, you are really doing the same thing.

19. The answer is d. Now we are back to the easy questions. Sometimes tests will be set up this way -- really difficult questions in the beginning followed by easier ones. This means that, no matter how difficult the questions become, you have to keep going. In order to answer this question correctly, you merely had to understand the question, carefully copy your figures, and then add correctly. If you had done so, you would have seen that the expenditures for maintenance stayed about the same throughout the year. They went from $1,650 to $1,500 to $1,600 to $1,500 -- they never changed more than $150. Electricity had a maximum change of $250, and expense accounts and postal fees varied wildly.

20. The answer is c. Another easy question. By looking at your table, you can see that, in nearly every category, less money was spent in the 3rd quarter. In one of these cases, non-paper supplies, the increase is very small. In the case of electricity, the difference is larger, but it's not enough to make the answer wrong. Besides, there is no other choice that is as good as choice c.

21. The answer is d. Now that we have done our best to wear you out; we've switched to simpler tables. There are two tables for this set of four questions, but for Question 21 you only need to work with the bottom table. This is a fairly easy question. It's really just an averaging question with most of the work done for you. By taking the total amount of floor space and dividing it by the number of establishments, you have your answer. [296,067,000 ÷ 2,170 = 136,440] We hope you noticed that there was one small trick. In order to answer correctly, you had to realize that the (000 sq. ft.) under the heading "Public Floor Space" meant that the figures given were in thousands. This is very important because the number of establishments for each year is the same *as* the amount written. If you were in a hurry, you might have missed this and come up with choice a. [296,067 ÷ 2,170 = 136.4] Or you might have looked at the wrong year and arrived at choice c.

22. The answer is d. This is a very confusing question; it's long, involved, and not very well written. This is one of those cases where you'd love to be able to say "it cannot be determined from the information given," but, unfortunately, that's not one of the choices. There really is enough information here to do the problem, and you don't need to know algebra to solve it either. When confronted with what seems to be a totally impossible question, you must do your best to simplify it by analyzing it. What is this question really asking? Basically, it wants you to find the total number of new general merchandising establishments that opened from the end of 1960 to the end of 1962. Start by finding something you know is contained in the table -- the number that opened between 1960 and 1965. You can find this by subtracting the 1960 figure from the 1965 one. [1,512 - 1,197 = 315] This is the total number of new establishments because the question states that you needn't worry about any having closed in that time.

Now you know that 315 new warehouses opened between 12/1960 and 12/1965. How do you find the number of new warehouses opening from 12/1960 to 12/1962? The question states that 1/3 as many opened from 12/1960 to 12/1962 as opened from 1/63 to 12/65. In our field-testing, many people made it this far and then took one wrong turn or another. Some simply divided 315 by 3 to find 1/3 of it and stopped there: 105, choice a. Others divided it by 3 and then added that to the 1960 figure to get their answer: 1,302, choice b. Those who arrived at choice b, however, made a fatal mistake. They forgot that 315 represented the total of the warehouses that opened between 1960 and 1965. They were treating it as if it were the number that opened from 1963 to 1965. The question says that 1/3 as many new merchandising warehouses opened between 12/1960 and 12/1962 as opened between 1/1963 and 12/65. It does NOT say 1/3 as many as opened between 12/1960 and 12/1965. This is a very impotant point because, as we just said, 315 represents the figure for 1960 to 1965. (This may seem like belaboring a point to some people, but please excuse us, because this can be very confusing.)

So, how do you find the right answer without using algebra? The easiest way is to put what you know into some form that will help you visualize the situation. For example:

1960 to 1962	1963 to 1965	= 315
I	I I I	= 315
I + I I I		= 315

Since the 1960 to 1962 figure is 1/3 of the 1963 to 1965 figure, you can think of each figure as having so many parts. (Here we have called each of these parts "I.") 1960 to 1962 = 1 part or I; 1963 to 1965 = 3 parts or III. Since both sets of parts added together equal 315, the illustration shows that too. By putting the information into this form, it becomes easy to see that, because there are 4 parts, you must divide 315 by 4 and then add that number to the 1960 figure (1,197). [315 ÷ 4 = 78.75 + 1,197 = 1,275.75 = 1,276]

There is a way to figure this out algebraically. The problem would look this:

$$x + 1/3x = 315$$
$$1\ 1/3x = 315$$
$$4/3x = 315$$
$$4x = 945$$
$$x = 236.25$$

Since x represents the number that opened between 1963 and 1965, you would subtract x from the 1965 figure to find the 1960 to 1962 figure. [1,512 - 236.25 = 1,275.75 = 1,276]

23. The answer is d. Again, an easy question follows an impossible one. This is another averaging question. The trick is in being careful of your math and being sure you are using the correct years. Also, it's important to note that, while the table shows the figures in thousands of square feet, the question is looking for the number of square feet. (It's fine if you do not want to work with that many zeros, but you have to remember to add them to your final answer. For those of you who forgot to do this, we kindly provided choice c.) First, add the amount of space for all the relevant years together: 108,315,000 + 119,325,000 + 129,170,000 + 163,168,000 = 519,978,000. Then divide 519,978,000 by 4 (the number of years) to obtain 129,994,500.

Some people may have been confused by the question and thought it was asking for the average amount of space per establishment (much like Question 21, but on a larger scale). People who did that would have added up the space for each year, then added up the number of establishments for each year, and then divided the space by the number of establishments. They would have gotten choice b. [129,994,500 ÷ 5,869 =. 22,149.34]

24. The answer is b. To answer this question you must divide the total revenue by the number of establishments for each of the four categories mentioned. In some cases, however, there is a question mark where the necessary figure should be. For "Refrigerated Goods," this is no problem. You merely add all the figures in the "Total Revenue" column, subtract from the total, and you have the information you need. [823,959 + 610,566 + 155,085 + 136,861 + 46,698 = 1,773,169; 2,124,765 - 1,773,169 = 351,5961 To find the number of "General Merchandise Warehousing" establishments, however, you must notice that the necessary information can be found in the lower table. Otherwise, you might have decided that there wasn't enough information available to do the problem, and picked choice d. (NOTE: Since "Special Warehousing is not one of your choices, you do not need to solve for that question mark. It's very important to look at the answer choices when doing these questions because you don't want to waste time and energy doing calculations that you don't need.)

Now that you have all the information you need, you simply divide the revenue by the number of establishments for each relevant category. Again, as in Question 21, you must be careful because each revenue figure represents thousands while each figure given for number of establishments does not. So, for local trucking and storage, divide 823,959,000 by 4,687 to equal 175,796.7. For general merchandise warehousing, divide 610,566,000 by 2,170 to equal 281,366.8. For refrigerated goods, divide 351,596,000 by 534 to equal 229,202.1. Since the figure for general merchandise warehousing is the largest, the answer is choice b.

25. The answer is a. The first thing you have to do is find out how much money was spent on salaries. This table is different from many because the subtotal is above the breakdown for each category, and it is not marked as a subtotal. You just have to figure it out from the way the headings on the left are positioned and the fact that the figures underneath add up to the one above. Also, if there weren't subtotals, it would be impossible to figure out what the question mark stood for in this case. Under the heading of "Personnel" there are two items: salaries and benefits. By subtracting the benefits from the personnel subtotal, you will arrive at the amount spent for salaries. [90,850 - 11,850 = 79,000]

Now that you have this figure, you must discover how many dollars were spent on salaries for every dollar that went to training materials. To do this, you will need to use a ratio. Many people are afraid of ratio problems. Yet, like percents, ratios are used to compare numbers, to show the relationship between them. And, like percents, people use ratios in "real life" -- inches are used to represent miles on a map; proportions in a recipe are cut down or enlarged; architectural plans are drawn according to scale. Of course, ratios become a lot more intimidating in an artificial situation like an exam or a math book.

Let's assume that in "real life," your spouse bought a TV for $450 and you bought a cassette deck for $150. Suppose you wanted to figure out how many dollars he or she spent on the TV for every dollar you spent on the cassette deck (just for future reference). Some people could figure this out just by looking at it, but we'll go through it to demonstrate the method. You would want to arrange the numbers involved in a way that would accurately reflect their relationship. For every dollar you spent on the cassette deck, you need to find out how many were spent on the TV. It's very important to realize that this final item is the only unknown. You know the cost of the TV and of the cassette deck, and you are using $1 as a means of comparison. You could set the problem up like this, using ratio language (which is underlined):

money spent on the TV is to money spent on the cassette deck as how many dollars is to one dollar?

Then substitute the dollar and number amounts for each of these.

$450 is to $150 as ? is to $1.

The way this is commonly set up in math is like this:

$$\frac{450}{150} = \frac{?}{1} \qquad \left(\frac{450}{150} \text{ is to } \text{AS } \frac{\text{what number is to}}{1}\right)$$

Some people see right away that 450 is three times 150, so the answer will be three times 1 or 3. Others see 150 as 1/3 of 450, so that 1 is 1/3 of the number they are looking for -- 3.

When the answer is not so obvious, people often use the method of cross-multiplication. As long as the numbers are set up in the proper relationship, it will always work. The trick is to keep the numbers representing the same item in the same position.

$$\frac{\text{TV set}}{\text{cassette deck}} = \frac{\text{TV set}}{\text{cassette deck}}$$

$$\frac{450}{150} \qquad \frac{?}{1}$$

You then multiply the top of one side by bottom of the other:

$$\frac{450}{150} \times \frac{?}{1} = 150 \times ? = 450 \times 1$$

$$150 \times ? = 450$$

$$? = \frac{450}{150}$$

$$?= 3$$

In the ratio, the unknown, which we have represented by using a ?, is multiplied by 150. In order to isolate it, or separate it, from the 150, we had to divide the 150 into 450 when we moved the 150 to the other side of the equal sign. There is a rule which says that whenever a number is moved from one side of an equal sign to the other, the opposite operation is performed. This means that if something is multiplied on one side, it is divided on the other; if it is subtracted on one side, it's added on the other.

? -	6 =12	becomes	? =	12	+ 6
? +	6 =12	becomes	? =	12	- 6
? x	6 =12	becomes	? =	12	÷ 6
? -	6 =12	becomes	? =	12	x 6

Even though this is algebra, most people do it automatically, many without knowing why. Don't worry if this seems confusing, there will be more opportunities for practicing this in this booklet. If you want more practice, you may want to get Booklets 1, 2, and 3 of this series. (For the full titles of these booklets, see the end of this question.)

Now, back to the question. We're trying to find the relationship between the $79,000 which was spent on salaries and the $9,540 which was spent on training materials. One way of setting this up would be:

$9,540 for training is to $79,000 for salaries as $1 for training is to ? for salaries.

OR:

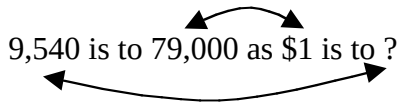
$$\frac{9450}{79{,}000} = \frac{1}{?}$$

And then cross-multiplying:

$$9540 \times ? = 79{,}000 \times 1$$
$$9540 \times ? = 79{,}000$$
$$? = \frac{79{,}000}{9{,}540}$$
$$? = 8.28$$

If you have trouble remembering which number to put on top when setting up the ratio in the first place, there is simple method to help you out: multiply the inside and outside numbers of the verbal equation. By this, we mean:

training is to salaries as $1 is to ?



Multiplying the numbers linked by arrows leads us to:

$$9{,}540 \times ? = 79{,}000 \times \$1$$

As you can see, from here on the calculations are the same as in the cross-multiplication example.

This is a difficult type of question for many people. You should not get discouraged if you have trouble with it. There will be others to practice with in this booklet, and more can be found in Booklet 2, Arithmetic Reasoning, and Booklet 3, Tabular Reasoning. More detailed explanations about ratios can a150 be found in Booklet 1, Basic Math.

26. The answer is choice b. This is another percent increase problem. As you will remember (we hope) from Question 17, the formula for percent increase/decrease is: find the difference between the two numbers and then divide the difference by the number that chronologically comes first. The 1984 figure was 95,570, the 1983 figure was 70,200. Subtracting them yields 25,370. Dividing 25,370 by 70,200 (the 1983 figure because it came first in time) yields .3614. Moving the decimal two points to the right and rounding off gives the correct answer, 36%.

27. The answer is choice c. This question called for some detective work. For 1984, this table just lists a total in the personnel column. At first, it might have looked to you as if there were no way that you could figure out the amount used for salaries because no amount was given for benefits. You are not given a choice like "none of the above," however, so you know that there must be a way to come up with the answer. Most people who do well on tests play around with likely figures if they don't know how to solve a problem. In this case, the figures to work with are those dealing with personnel for 1983 and 1985. If there is a similar relationship between benefits and salaries for those years, then it's possible to arrive at the correct answer. If you read the answer to Question 17, you may remember that we talked about percents being a relationship between two numbers. This question is a case where being familiar enough with percents to work with them comes in handy. For example, if you attempt to find out what percent salaries are of the total outlay for personnel, you will discover that in both 1983 and 1985 salaries were about 87% of personnel expenses. [1983: 45,000 ÷ 51,750 = .8696 = .87 = 87%; 1985: 79,000 ÷ 90,850 = .8696 = 87%] Because you have no other choice, you have to assume that the percentage would be the same in 1984. To find the 1984 salary figure, you would multiply the 1984 personnel figure by .87 or, to be more accurate, .8696. 79,000 times .8696 equals 62,002.48, so choice c (62,000) is correct because it is the closest to your answer.

(NOTE: If you're having trouble figuring out how to work with percents, please refer to the answer to Question 17. If you still find percents confusing, you will find more practice in Booklets 1, 2, and 3 of this series.)

28. The answer is d. In order to solve this problem correctly you have to know that it's another ratio problem. Even knowing this, you could run into trouble because there are a lot of steps to perform. And a few tricks. (For example, you are being asked to figure out how much it cost to train men in 1985, even though the proportion given (2 to 5) is for females.)

Because there is no total given for that year's expenses, your first step is to find out how much was spent on the program in 1985 by adding the expenses for that year. [$90,850 + $17,505 + $9,540 + $3,120 = $121,015] (You may be wondering why, for example, office expenditures are considered part of the student cost. Since this organization is in the business of training, their product is students, and <u>any</u> business expenses would be the cost of turning out their product.)

The next step is to find the per capita cost. By dividing $121,015 by the number of men, you get the per capita cost. [$121,015 ÷ 3,025 = $40] You have to assume from the information given that it cost as much per person to train men as it did to train women. If it cost more individually to train men, there would be no way of knowing how much was spent, and so no way of solving the problem. The question is asking how much it cost to train the group of men.

The next step, and a crucial one, is to remember that when a proportion or ratio is worded like this it shows a relationship between two numbers within a larger whole. The most common mistake people make when faced with a problem like this is to read it as 2 out of 5, instead of 2 for every 5, and take 5 as the total. You might think: "2 out of 5 equals 2/5, which equals .40, so I need to find .40 of 3,025 or .40 times 3,025." [.40 x 3,025 = 1,210]

Or you might cross-multiply:

$$\frac{2 \text{ (women)}}{5 \text{ (\# of people)}} = \frac{?}{3{,}025}$$

$$\begin{aligned} 2 \times 3{,}025 &= 5 \times ? \\ 6{,}050 &= 5 \times ? \\ \frac{6{,}050}{5} &= ? \\ 1{,}210 &= ? \end{aligned}$$

In order to answer this question correctly, you have to remember that, although the proportion is stated in terms of women, your answer must be the number of men who were trained. You also have to realize that, if there are 2 women for every 5 men, the total being compared is 7. In other words, for every 7 trainees, 2 of these are women and five of these are men -- two for every five, 2 to 5. No matter how you phrase it; it means the same thing. So, working with the figure for men, you might cross-multiply to get the right answer.

$$\frac{5 \text{ (men)}}{7 \text{ (\# of people)}} - \frac{? \text{ (men)}}{3{,}025 \text{ (total \# of people)}}$$

$$\begin{aligned} \frac{5}{7} &= \frac{?}{3{,}025} \\ 5 \times 3{,}025 &= 7 \times ? \\ 15{,}125 &= 7 \times ? \\ \frac{15{,}125}{7} &= ? \\ 2{,}160.71 &= ? \end{aligned}$$

Multiplying the number of men trained by the per capita cost gives you the total cost of training men for that year. [2,160.71 x $40 = $86,428.57 or $86,429]

If you had forgotten that you were looking for the number of men and used the ratio for women, your answer would have been choice c.

$\frac{2}{7} = \frac{?}{3{,}025}$; 2 x 3,025 = 7 x ?; 6,050 = 7 x ?; $\frac{6{,}050}{7}$ = ?; ? = 864;

864 x 40 = 34,560

If you had remembered to use men, but hadn't used 7 as the total number in the proportion, you would have chosen b.

$\frac{3}{5} = \frac{?}{3{,}025}$; 3 x 3,025 = 5 x ?; 9,075 = 5 x ?; $\frac{9{,}075}{5}$ = ?; ? = 1,815;

1,815 x 40 = 72,600

If you forgot to use men and didn't use 7 as the total, you would have chosen a.

$\frac{2}{5} = \frac{?}{3{,}025}$; 2 x 3,025 = 5 x ?; 6,050 = 5 x ?; $\frac{6{,}050}{5}$ = ?; 1,210 = ?

1,210 x 40 = 48,400

29. The answer is b. The key word here is "proportion" which signals that a comparison is being made. Looking at the answers, you can see that the comparison is made in terms of percents. So, you could just as easily phrase the question in this way: What <u>percent</u> of the people in Massachusetts living below poverty are over 60 years of age? To find this you must divide. This is the same type of problem as finding what percent of Craig's salary was spent on groceries. (See the answer to Question 17, page 34, first paragraph.)

If you block when faced with percents and can't remember how to do this type of problem, it may help you to remember that a percent can also be expressed as a fraction. Fractions and percents are different forms of writing the same proportion, of making the same comparison.

For example,

$\frac{1}{10}$	IS	1 divided by 10	IS	.10	IS	10%
$\frac{1}{5}$	IS	1 divided by 5	IS	.20	IS	20%
$\frac{5}{4}$	IS	5 divided by 4	IS	1.25	IS	125%

In this case, we are talking about what fraction the number of people over 60 who live in Mass. is of the total number of people in Mass. who live below the poverty level. Therefore, written as a fraction, the problem would look like this:

$$\frac{\text{Mass. over 60}}{\text{Mass. living below poverty}} = \frac{83,599}{532,458}$$

When expressed this way, it's easy to see that 83,599 should be divided by 532,458. This yields .157. Moving the decimal two points to the right and rounding off, this becomes 16%.

30. The answer is d. This question may seem too complex because it requires finding New England's total population. By taking the problem step by step, it is quite "do-able," however. We must compare the total New England population living below poverty in a high risk age group to the area 5 total population. Since we are working with New England totals, we go to the last row in the table. To find the total High Risk population, we add the total figure for each age group. [11,679 + 115,861 + 295,817 + 192,314 = 615,671]

Next, we must find the total New England population. According to the table, the total poverty population of 1,144,486 is 9.3% of New England's total population. You may have arrived at this point and then wondered what to do with your figures. If you multiplied 9.3% (or .093) times 1,144,486, you would have gotten 106,437.19 -- much too small a figure to be the total New England population. If so, you might have considered dividing simply because you couldn't think of anything else to do. This is correct, but it's best to have some idea of why we are doing something whenever possible. Sometimes the best thing to do, when faced with a problem that you are not sure how to solve, is to try writing out what you know in as mathematical" a form as possible. In this case, it might look something like this:

9.3% of total New England population = $1,144,486

In order to find 9.3% of something, we move the decimal point over two places to the left and multiply. (For example, 10% of $20 = .10 x $20, or $2.00; 7% of $50 = .07 x $50, or $3.50. In each case we are turning the percent into its corresponding decimal and then multiplying.)

So,

9.3% of total New England population = 1,144,486
.093 x total New England population = 1,144,486
.093 x ? = 1,144,486
? = $\frac{1,144,486}{.093}$
12,306,301

Finally, to find what percent the high risk population is of the total population, divide the high risk population by the total N.E. population. [615,671 i. 12,306,301 = .050 = 5%] (Please review the answer to Question 29 if you had trouble remembering how to find what percent something is of a larger total.)

31. The answer is a. Here is another chance to practice ratio questions. (It is standard to use a colon between the numbers in a ratio -- 1:4 means I to 4.) This question is similar to Question 28. In this case, we are looking for the relationship (or ratio) between the number of females living below the poverty level in New England and the total number of people living below the poverty level in New England. We know from the question that there are 4 females to every 1 male in this population. From the table, we know that in New England, there are a total of 1,144,486 individuals living below poverty level. How many of these people are female? Using the ratio we were given, males is to females as I is to 4, we can determine that in the total N.E. population living below the poverty level there are 4 females for every 5 people. Therefore, the total N.E. population living below poverty level can be represented by the following ratio: 4 is to 5 as the number of females is to the population living the below poverty level.

$$\frac{4}{5} = \frac{\text{Females}}{\text{Population Below Poverty}}$$

This can then be made more workable by filling in the other known quantity and cross-multiplying:

$$\frac{4}{5} = \frac{?}{1{,}144{,}486}$$

$$4 \times 1{,}144{,}486 = 5 \times ?$$

$$4{,}577{,}944 = 5 \times ?$$

$$\frac{4{,}577{,}944}{5} = ?$$

$$915{,}588.8 = ?$$

Rounding off, the answer becomes 915,589.

32. The answer is a. We have given you a string of ratio questions to practice with although it is unlikely things would work out this way on a test. In this case, the ratio is disguised by calling it a "participation rate." Many people in our field testing didn't recognize this as a ratio problem and picked choice d, "it cannot be determined from the information given." They didn't think it was possible to answer a question like this, or they gave up. It's so natural to want to give up on tabular questions because they are tedious, they have little or no bearing on the reality of everyday life, they trigger people's math-anxiety, and they come at the end of a very long day. No matter how irrelevant, exhausting, or frustrating the process of answering these questions may be sometimes, it's important to seriously work on them to the bitter end. We hope that by the time you've finished practicing with all of these tables, you'll be well prepared for whatever comes up on the test and used to the tedium and frustration that tables can induce.

The stem of this question tells us how many pregnant women living below poverty level in Massachusetts received federally-funded prenatal care. We're asked to find out how many pregnant women in Connecticut received prenatal care if the participation rate were the same.

(NOTE: Of Questions 29-32, this is the only one which uses hypothetical data. All the figures used in the table and the ratio used in Question 31 were true. We used a hypothetical situation and figures in order to provide a participation rate question.)

Let's try a "real life" example to make the nature of this problem clearer. Assume that 9 out of every 12 people in your office love chocolate, and you were told that the same rate of chocolate-loving applied to the entire department which employs 3,600 people. You probably would know how to figure out how many people in your department loved chocolate.

There are, in fact, lots of ways to go about solving this type of problem. You could use fractions: 9/12 of the department were chocolate lovers. 9/12 can be reduced to 3/4. The participation rate in chocolate loving is 3 out of every 4 people. 3/4 of 3,600 would equal 3/4 x 3,600 = 10,800/4 = 2,700.

Or, you could use decimals: $\frac{9}{12} = 12\overline{)9.00}$ (.75)

.75 of 3,600 people would equal 3,600 x .75 = 2,700 chocolate-lovers.

You are being asked to do the same thing with this question, but you are being asked to do it with larger numbers. You are told that 3,473 out of 5,227 Massachusetts women received federally-funded prenatal care. You are also told that, out of the 2,325 pregnant Connecticut women who are living below poverty level, a similar rate of women received federally-funded prenatal care. When stated this way, it becomes more obvious that there is only one unknown here (the number of Conn. women living below poverty level who received federally-funded prenatal care), and that the figures have a relationship to each other that makes a ratio possible.

$$\frac{3{,}473}{5{,}227} \qquad \frac{2{,}325}{?}$$

Because this is a ratio, you can solve this problem by cross-multiplying.

$$\frac{3{,}473}{5{,}227} = \frac{?}{2{,}325} = 3{,}473 \times 2{,}325 = 5{,}227 \times ?$$

$$8{,}074{,}725 = 5{,}227 \times ?$$

$$\frac{8{,}074{,}725}{5{,}227} = ?$$

$$1{,}544.8 = ? \quad = 1{,}545$$

Or, you can use decimals to solve this problem. In our "real life" example, we found the rate of participation by dividing 3 by 4 to find the decimal of chocolate-lovers. You could do the same thing here, divide the number receiving care in Mass. by the number of pregnant women in Mass. Dividing 3,473 by 5,227, you get .664. This is the rate of participation, which you can then use to find the number of women in Connecticut who participated in the federally-funded program. [.664 x 2,325 = 1,543.8 = 1,544]

Again, you may have had trouble because you didn't know which number to put on top. Usually, looking at your answer to see if it makes sense will keep you on the right track. In this case, if you had divided 5,227 by 3,473, you would have gotten a participation rate of 1.505. This doesn't look too bad until you multiply it by 2,325 and get 3,499. This can't be correct because it's greater than the total number of pregnant women in Conn. who were living below the poverty level. It's an illogical answer, but nonetheless, some people in our field-testing chose choice b because they didn't stop to think about the logic of their answer.

33. The answer is b. This is another complex question that requires a number of steps. Next to Expenditures, it says "from local, state, and federal funding sources," but underneath are percentages for only local and state funding. You have to assume that the funding only came from these three sources because of the caption, and because, otherwise, you wouldn't be able to do the problem. In order to find the federal percentages, you must add the state and local together and then subtract from 100%, 100% being the total of all possible percentages in this case. The total expenses for each year must then be multiplied by the federal percentage for that year in order to find out how much was funded by the federal government. And you have to do this four or five times to find out which three are the mostly nearly the same. So, beginning with 1980, add the local and state. (7% + 20% = 27%] Then subtract from 100% (100% - 27% = 73%]. Therefore, the federal funding amounted to 73% of the total funding. A percent is unworkable, so it must be converted to a decimal (.73) before multiplying it by the total spent that year. [.73 x 15.55 million = 11.3515 million or 11,351,500] For the years 1981-1984, you get the following answers:

1981: 8% + 14% = 22%; 100% - 22% = 78% = .78; .78 x 23.05 =
17.979 million or 17,979,000

1982: 6% + 19% = 25%; 100% - 25% = 75% = .75; .75 x 24.00 = 18 million or 18,000,000

1983: 4% + 22.5% = 26.5%; 100% - 26.5% = 73.5% = .735; .735 x 24.5 = 18.0075 million or 18,007,500

1984: 7% + 25% = 32%; 100% - 32% = 68% = .68; .68 x 25.65 = 17.442 million or 17,442,000

So, for the years 1980 to 1984, we have 11.35, 17.98, 18, 18.01, and 17.4 millions respectively. From looking at this, it's obvious that federal funding was most nearly the same for the years 1981 1982, and 1983.

34. The answer is c. This is another percent increase problem. First, you must figure out how much it cost to screen each individual in those two years. This is the per capita cost. Then, you have to find out how many people in the 35-65 age group were screened in the program in 1980 and in 1981. You then multiply the per capita cost by the number of people in the age group screened in that year to discover the amount spent to screen this age group each year. Only after all this is done can you figure out the percent increase.

In order to figure out the per capita cost, divide the amount spent for screening by the number of individuals screened each year --being careful to use the proper number of zeros for each figure because the number of persons is given in thousands but the money is in millions. In 1980, the per capita cost was $5.12. [15,550,000 ÷ 3,040,000 = 5.115 or 5.12] In 1981, the per capita cost was $6.05. [23,050,000 ÷ 3,810,000 = 6.0498 or 6.05] You could, of course, have only moved the decimal point three places to the right for the dollar amounts and still arrived at the right answer because then both would be "in thousands." [15.55 million -15,550 thousand]

To find out how many people are in the 35 to 65 age group, first add the percentages in the other age brackets, then subtract this from 100%. Since there are no other age brackets possible, the answer you get is the percentage of people between 35 and 65. For 1980, this is 2,371 thousand. [10% + 12% = 22%; 100% - 22% = 78% or .78; .78 x 3,040 = 2,371] For 1981, the figure is 2,819 thousand. [12% + 14% = 26%; 100% - 26% = 74% or .74; .74 x 3,810 = 2,819] To find the cost for this age group for 1980 and 1981, you then multiply the cost per person by the number of people screened each year. In 1980, the total cost was $12,139,520. [$5.12 x 2,371,000 = $12,139,520] In 1981, the total cost was $17,054,950. [$6.05 x 2,819,000 = $17,054,950]

Now, you are ready to do the percent increase part of the problem. First, subtract the 1980 figure from the 1981 figure. [17,054,950 - 12,139,520 = 4,915,430] Then divide this figure by the 1980 figure. [4,915,430 ÷ 12,139,520 = .4049 = .405] By moving the decimal point two places to the right, the answer becomes 40.5%.

35. The answer is a. This is another ratio question and the method of solving it is much like that used to solve Question 25. But, first you have to find out exactly how much money was provided by the Federal government and the state governments. Because the heading says that the expenditures came from federal, state, and local sources, and because the percentages for two of these are given directly below this figure, you have to assume that all of what is left was contributed by the Federal government. There is nothing to indicate anything to the contrary (for example, a "miscellaneous funding" percentage). In order to find out the amount, add the percentages, subtract from 100, and then multiply this number by the amount spent on screening in 1983. [4% local + 22.5% state = 26.5%; 100% - 26.5% = 73.5% or .735; .735 x 24,500,000 = $18,007,500.] After this, finding the amount contributed by the states is fairly easy. 22.5% of the total funding ($24,500,000) came from the state, so multiply 22.5% or .225 by $24,500,000. (.225 x 24,500,000 = $5,512,500]

Now, you are ready to find out how much the state contributed for every $10 that came from the federal government. Expressed as a ratio, this would be:

federal funds is to state funds AS $10 is to ?

Using the figures you just solved for, this becomes:

$18,007,500 is to $5,512,500 AS $10 is to ?

OR:

$$\frac{18{,}007{,}500}{5{,}512{,}500} = \frac{10}{?}$$

Cross multiplying, this becomes:

18,007,500 x ? = 5,512,500 x 10
18,007,500 x ? = 55,125,000
? = $\frac{55{,}125{,}000}{18{,}007{,}500}$
= $3.06

36. The answer is d. This is a slightly different kind of tabular question because it requires you to analyze all the answers before picking the right one. Choice a looks right, but, if you think about it, is the table concerned with how many people have hypertension? No. It simply tells you how many people have been screened for hypertension. Maybe the program really "pushed" the screening of certain groups, or maybe fewer people over 65 were screened in this program because they were harder to reach (retired or otherwise out of the mainstream). Or maybe fewer people over 65 were screened because they were more likely to have already been diagnosed. You just don't know. Now, we are not saying that a "bad[1]" answer like this one is never the right answer. That's the rub. Sometimes you are supposed to take the choice that is the best of a rotten lot. For this reason, always check out all the answers when you have a question like this one. Choice b looks correct because the percentages have risen steadily over the years. Looks can be deceiving, however, especially because the question is not asking for

percents; it's asking for the actual number of people screened. You have to do the math for the years in question to find out if the number of people actually did increase. By multiplying the percent by the number of people screened in that year, you get the information you need.

1981	--	14%	x 3,810,000	= 533,400
1982	--	15%	x 2,950,000	= 442,500
1983	--	17%	x 2,600,000	= 442,000
1984	--	17%	x 2,540,000	= 431,800

From this, it is easy to see that choice b is also incorrect because the actual numbers of people under 35 that were screened for hypertension steadily decreased in those years.

Choice c also looks as if it could be correct, but again the answer is concerned with actual amounts, not with the percents involved. You would use the same operation you just used above to find the information you need -- multiplying the dollar amounts by the percentages to see how much was contributed by local governments.

1982	--	6%	x 24.00	=	$1.44	million
1983	--	4%	x 24.50	=	$ .98	million
1984	--	7%	x 25.65	=	$1.80	million

From this, you can see that the dollar amounts contributed by local government varied quite a bit in these three years.

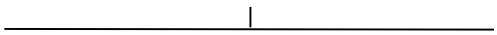
You might be tempted to pick choice d without doing any further work, simply because it is the only one left. We advise you not to do this, however. Choice a may still be the best answer even though it has a flaw, or you may have not analyzed the other answers correctly (not true in this case, but it can happen in a test situation). You really don't have to do any more mathematical work, however, because you acquired the necessary information while working on Question 33. It sometimes happens, as it did in this case, that test questions build on each other. This is a very good reason for keeping your scrap paper neat and well organized. There is nothing more frustrating than knowing you've already done something and not being able to find it. Looking back at this information, you can see that the federal government contributed $11.3515 million in 1980; $17.979 million in 1981, and $18 million in 1982. Since this represents an increase over the years, choice d is correct.

37. The answer is a. This question is much simpler in regard to the math involved than recent ones, but it requires careful reading, especially since the table and the questions are on different pages and you must keep flipping back and forth. Under these circumstances, it is easy to forget what you are really looking for. You are asked to compare the average weekly earnings, in current dollars, for February, 1985 with those of March, 1984. Under the heading for wages, you'll find the figure for February, 1985 is $295.64. The figure for March, 1984 is $288.40. The difference between these two is $7.24. [$295.64 - $288.40 = $7.24] Note that choice b is there to falsely reassure those who used 1977 dollars.

38. The answer is d. This is another percent increase problem. (For more background, see Question 17.) The procedure is always the same. You take the difference between the two numbers you are comparing, and divide that by the original number. The average weekly earnings, in 1977 dollars, in March of 1984 was $172.59. This figure decreased to $170.99 in February of 1985. Subtracting, you find the difference between them is $1.60. The difference, $1.60, is then divided by the original number, the number that came first in time -- March, 1984. (1.60 ÷ 172.59 = .00927 = .9%).

39. The answer is d. This is a percent decrease problem. The procedure is the same as in previous problems of this sort. The complicating factor is that you're going from a positive number to a negative number. The balance of trade for 1967 was +3.8 billion dollars. For the last quarter of 1984, it was a -91.5 billion dollars. So it went from a +3.8 to a -91.5. In this case, you can drop the billions without worry because both numbers are in billions and because the question is asking for a percent. Again, you would take the difference and divide it by the original number. Some people have trouble finding the difference because they're going from a positive to a negative number. They usually want to subtract the larger number from the smaller one. If you have this tendency, try envisioning the following "real life" example. Let's say it's -8 degrees outside when you get up at 6:00 AM and by noon it has risen to 9 degrees above zero. You probably would have no trouble realizing that the temperature has risen 17 degrees, not one $degree_1$ You automatically would have added the two numbers together to find the difference in temperature. This makes it obvious that finding the difference is making a comparison; it's not always just subtracting.

You would use the same procedure to answer this question. To find the difference between a +3.8 and a -91.5, you would add them together.



-91.5 0 +3.8 91.5 + 3.8 = 95.3

So, there was a change, a difference, of 95.3 between the two figures. This change is then divided by the original number, the number that chronologically came first, the 1967 figure (+3.8). So 95.3 divided by 3.8 = 25.0789, or a 2,507.9% decline. Many people get confused at this point because it seems that it must be wrong. They feel more comfortable dividing 3.8 by 95.3 (choice a) or 87.7 by 3.8 (choice c). Choice b is selected when people aren't sure what to do with the decimal point. Yet if one can step back and evaluate the reasonableness of each possible answer, it becomes clear that such a huge decrease in the balance of trade is much more accurately represented by 2,508%, than by 25.1% (25.08% rounded off).

40. The answer is c. This is another question like Question 36, and you again have to look at all the answers. Choice a is incorrect because it doesn't seem safe to assume that black unemployment will go down in 1985. While, it's true that the figures seem to show that black unemployment has slowly gone down since March of 1984, there is nothing in the table that actually tells you that it will continue to go down. And since not every month is given, it's possible that, if you had figures for all the months, you would see a different pattern. You just don't know. You may have had trouble with choices b and c if you didn't know what buying power was. But if you thought about it, you could make a good guess. It's very important when taking exams not to be thrown by what you don't know. Many times you can figure out an answer even if you don't know the meaning of all the words or the formula for solving the problem. In this case, thinking about it would help you to realize that buying power probably has something to do with how much one can buy. By studying the table, you would realize that there has to be some reason why they included 1977 dollars. With these clues, and the fact that you probably know that inflation has made the dollar worth less, you can see that, although the dollar amounts of wages have risen substantially, weekly earnings in 1977 dollars have declined. This means you could have bought more with your paycheck in 1967 than you could in 1985. This makes choice b false and choice c true. Choice c simply means that there has not been an increase in buying power to go along with the increase in wages. Buying power has not moved along at the same rate, or kept pace with, wages.

If you were discouraged, frustrated, or tired when you first looked at this question, you might have scanned the answer choices and picked d. It looks good but corporate profits <u>increased</u> about 250%; they did not decrease. [291.6 - 79.3 = 212.3; 212.3 ÷ 79.3 = 2.677 = 268%]

41. The answer is c. This question is a standard percent increase type of problem; the only difficulty is that it is in fractions. You could do this as a fraction, or as a decimal. It's generally easier to change the fraction into a decimal, but in some cases, rounding off fractions can change the final answer. This is especially true when you have to do a lot of calculations and a lot of rounding off. Each time you round off, you may compound the degree of inaccuracy. But usually the answer choices are not so close that this is a problem.

PlanResearch went from 22 3/8 to 31. In order to change 3/8 to a decimal, divide 3 by 8. The decimal is .375. Now, add the .375 to 22 to get 22.375. When you subtract this from 31, the difference is 8.625. Dividing 8.625 by 22.375, you get .3855 or 38.6%.

42. The answer is c. The first thing you have to do is find out what the closing price for Dow industrials was on Oct. 28, 1986. The closing price for Oct. 27 is given as 1841.79. Two columns over is the column marked "Change." This is the change between the Oct. 27 closing price and the Oct. 28 closing price. (If you weren't sure that this is what "Change" meant, you could have checked by working with a company like Unitrode for which all the figures are given.) It says that the change was a -3 2/3, this means that it closed at 3 2/3 less on Oct. 28. The problem is that one figure is a fraction and the other is a decimal. To subtract the change from the Oct. 27 closing price, you have to convert the fraction to a decimal. To find the decimal, divide 2 by 3 to get .6666 which rounds off to .67. You then add .67 to 3 (3.67) and subtract 3.67 from 1841.79 to get 1838.12, the Oct. 28th closing price. Now you are ready to solve the problem.

The question asks you to compare the Dow industrials price (1838.12) with the NYSE Composite (137.89). If you look at the answer choices, you'll realize that there are two forms. Choices a and b are straight dollar for dollar comparisons. They are the kind of answers you would get if you simply subtracted one number from the other. Since this type of operation is easier, you would probably want to subtract 137.89 from 1838.12 to see if it yielded any of the answers. 1838.12 - 137.89 = 1700.23 -- not one of the answers. (NOTE: If you had worked with the Oct. 27 prices, you would have come up with choice a. 1841.79 - 137.62 = 1704.17])

Choices c and d are telling you how many times greater Dow was than the composite. If you didn't immediately understand how this was arrived at, but thought about it, you might realize that the word "times" is the same word you use when talking about multiplication. So in regard to these choices, you are looking for how many times the Dow price is of the composite price. In other words, what number, if multiplied by the composite price, would give you the Dow price. You may know that to find an unknown multiplier you do the opposite operation -- divide.

$$\frac{1838.12}{137.89} = 13.33 \text{ or } 13\ 1/3.$$

But if you didn't know how to work this problem, you might have tried setting down the known and unknown facts in as "mathematical" a form as possible, in hopes that the way would become clearer.

NYSE Composite multiplied by unknown equals Dow

$$137.89 \times ? = 1838.12$$

$$? = \frac{1838.12}{137.89} = 13.33 = 13\ 1/3$$

43. The answer is b. You first need to find the figure for Oct. 28. This time it seems more difficult to solve, and you may have been tempted to choose choice d and be done with it. But, if you look at what you are given, you'll see that you have the price six months ago (4.33) and the percent change from six months ago (-13.5%). You may have realized that this was no accident. Next, you must discover that the last column gives the percent change from six months ago to Oct. 28, 1986, not to Oct. 27, 1986. (It doesn't say this in the table, but it seems logical, and you could have checked by working with one of the companies like Unitrode for which all the figures are given. To check, you would figure the percent decrease for Unitrode using both the 10/27/86 figure and the 10/28/86 figure. Since 10/28/86 yields a percent decrease for Unitrode of -16.07%, it is the date to work with.)

Because the 6-month figure for FogoProd. is -13 5%, it's a percent decrease, so you have to make sure that your answer is less than the figure of six months ago. First, change 13.5% into a decimal, .135, then multiply this by the 6 months figure, 4.33. [.135 x 4.33 = .58455 = .585] By subtracting this from the 6 months price, you have the price for October 28th -- 3.745* The question asks what a 20% increase over this figure would be, so again change the percent to a decimal and multiply. [3.745 x .20 = .749] Because this new change is a percent increase, add .749 to 3.745 (the Oct. 28 price) to get the answer -- 4.494 or 4.49.

*NOTE: If you had added .585 to 4.33 instead of subtracting, your answer would have been choice c, 5.90. [4.33 + .585 = 4.915 x .20 = .983 + 4.915 = 5.898 = 5.90.)

44. The answer is c. This question is difficult for most people. There are several different ways to approach it. One way which can be helpful, especially if you're stuck, is to go through the possible choices and work backwards to find the answer. (The one good thing about this set of multiple choice answers is that there is no "it cannot be determined" option.) It's perfectly legitimate to solve problems by working backwards from the answer choices. If the 4/28/86 figure is 35% less than the 10/28/85 figure, you could go through each of the possible answers, multiply by 35% to find out what the difference is between them, then subtract this difference from the choice to see if you get 9 1/8 which is 9.125 in decimal terms. (1 , 8 = .125 + 9 = 9.125). For example:

Choice a. 10.125 x 135 = 3.54375; 10.125 - 3.544 = 6.581

Choice b. 12.32 x .35 = 4.31; 12.32 - 4.31 = 8.01

Choice c. 14.04 x .35 = 4.914; 14.04 - 4.914 = 9.126

Choice d. 15.23 x .35 = 5.33; 15.23 - 5.33 = 9.9

By doing this, you can see that choice c is the answer because it is most nearly 9 1/8 or 9.125.

Or, you could say 9.125 is 35% less than the 10/28/85 figure, or 9.125 is 65% of 10/28/86's figure (100% - 35% = 65%). To find the 10/28/86 figure, you would then divide the 4/28/86 figure by 65%.

$$\frac{9.125}{.65} = 14.038 \text{ or } 14.04.$$

(Perhaps you weren't sure whether to multiply or divide here. If you tried both, you would have seen that the figure you got from multiplying is smaller than the 4/28/86 figure, so it couldn't be correct.)

After working backwards, you might want to check your answer by seeing if 14.04 is really 35% more than 9.125. You could do this by taking 35% of 14.04 (4.914) and subtracting this from 14.04 to see if the result was 9.125.

35% x 14.04 = .35 x 14.04 = 4.914

$$\begin{array}{r} 14.04 \\ -\ 4.914 \\ \hline 9.126 \end{array}$$

Or you could set it up as a ratio problem, and then cross multiply.

$$\frac{65}{100} = \frac{9.125}{?}$$

$$65 \times ? = 9.125 \times 100$$
$$65 \times ? = 912.5$$
$$? = \frac{912.5}{65}$$
$$? = 14.038$$

OR, reducing the fraction

$$\frac{13}{20} = \frac{9.125}{?}$$

$$13 \times ? = 9.125 \times 20$$
$$13 \times ? = 182.5$$
$$? = \frac{182.5}{13}$$
$$? = 14.038$$

What you should <u>not</u> do, and what many people do, is take 35% of 9.125, and then add it on to get the 10/24/85 figure. This won't work because it isn't an accurate representation of the relationship between the 10/28/85 figure and the 4/28/86 figure. But if you always check your answer in problems of this type, you'll catch yourself even if you make this mistake, because

your answer won't check out correctly. For example, if you did multiply 9.125 by .35 and then-added your result to 9.125 you would have gotten 12.32, choice b. [9.125 x .35 = 3.19 + 9.125 = 12.315 = 12.32] Yet, for this to check out properly, you should be able to take 35% from the 10/28/85 figure and get the 4/28/86 figure of 9.125. [12.32 x .35 = 4.305; 12.32 - 4.305 = 8.015] Since it does not equal 9.125, it cannot be correct.

As we said, this is a difficult question for most people, but if you remember to check your work to see if the answer makes sense, or to work backwards from the choices, you can answer this type of question correctly.