CIVIL SERVICE EMPLOYEES ASSOCIATION

LEAP

LABOR EDUCATION ACTION PROGRAM

Examination Preparation Booklet

Tabular Reasoning

Booklet No. 3

CSEA

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

Booklet #3

Tabular Reasoning

The CSEA 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

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 are usually three or four tables on the exam, with three to five questions for each table, for a total of fifteen 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. These types of questions involve more work as you'll need to find the missing data first. (We don't recommend filling in all the question marks in the table first, as you won't need most of them.)

The tabular section is usually last, when you're most tired. It's a good idea to take frequent 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. Test makers often put the most common mistakes people are likely to make as possible choices, to give a false sense of security.

We suggest you check the answer key after you do each table. If you've missed any questions, consult the Self-Study Guide and go through the explanation before you continue on to the next table. This way you will gain practice and confidence as you go from table to table. We suggest you use the Diagnostic Worksheet after each table, to gain insight into your problem areas. We also suggest you do these problems without a calculator, if your exam won't allow you to use one. It's important to get as much 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. If, however, a real effort is made to practice and learn from mistakes made, scores in this area can improve considerably. Good luck!

CENSUS DATA
TOWNSHIPS IN ROCK COUNTY

	1975			1980		
Townships	pop.	% 65 yrs. and over	% under 18 years	pop	% 65 yrs. and over	% under 18 years
Smallville	43,095	27	?	45,045	30	?
Bedford	35,600	?	26	37,152	17	30
Hyatt	15,418	30	15	15,398	32	12
Burgess	75,400	21	?	82,504	?	?
Rock Co. Total	?	18	23	180,099	25	21

1. Approximately what was the average population of the four townships in Rock County in 1975?

a) 42,378
b) 42,587
c) 45,025
d) cannot be determined from information given

2. Which township experienced the 1east percentage growth from 1975 to 1980?

a) Smallville
b) Bedford
c) Burgess
d) cannot be determined from information given

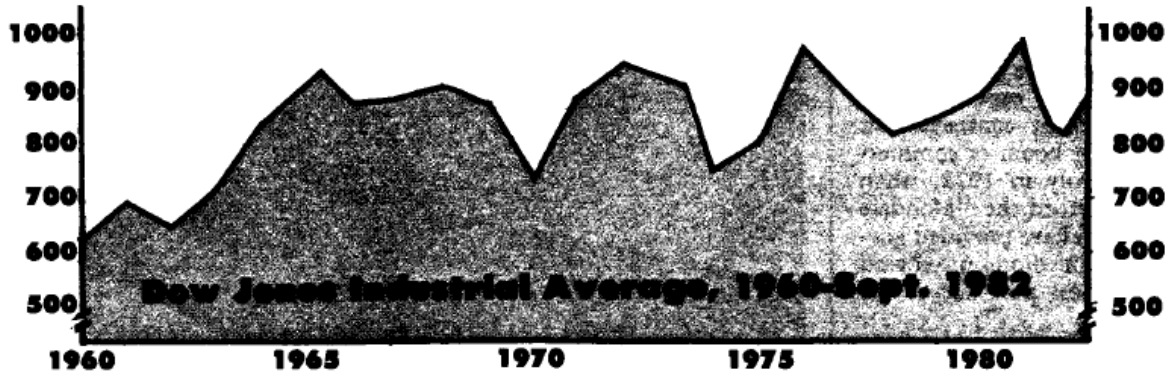
3. In Rock County, in 1980, two out of every five individuals 18 years of age and over earn less than $8, 000 a year. Approximately how many individuals are in this category?

a) 37,821
b) 142, 278
c) 56,911
d) 52,040

4. In Rock County, in 1980, 12,966 people over 65 receive meals from the Senior Meals program. If the participation rate is consistent throughout the county, approximately how many people over 65 are receiving meals in the Town of Hyatt?

a) 1,232
b) 1,419
c) 2,879
d) cannot be determined from information given

the ECONOMY in NUMBERS



Dow Jones Industrial Average, 1960-Sept. 1982

Note: 1960-80, annual averages; 1981-82, quarterly averages.

WHAT THE NUMBERS SAY: Both the prime rate and the mortgage interest rate are going down, and inflation is slowing somewhat. Unemployment keeps rising though, faster for blacks than for whites.

MONTHLY DATA	*Sept. '82*	*Aug. '82*	*July '82*	*Sept. '81*	*1967*
Employment (seasonally adjusted)					
Number of unemployed (millions)	11.260	10.710	11.036	7.966	2.975
Overall unemployment rate	10.1%	9.6%	9.8%	7.5%	3.8%
Black unemployment rate	20.2%	18.8%	18.5%	15.1%	7.4%
Wages					
Average weekly earnings: current dollars	$270.05	$270.69	$269.98	$222.92	$101.84
Average weekly earnings: 1977 dollars	N.A.	$168.50	$167.90	$144.94	$184.83
Prices					
All items Consumer Price Index	N.A.	292.8	292.2	279.3	100.00
Increase from one year earlier	N.A.	5.9%	6.5%	11.0%	2.9%
Food increase from one year earlier	N.A.	3.6%	4.5%	6.5%	0.9%
Interest Rates					
Mortgage	14.99	15.68%	15.74%	15.37%	6.50%
Prime Interest Rate	13.50	14.39	16.26%	20.08%	5.61%

QUARTERLY DATA (billions of dollars at annual rates, seasonally adjusted)	*1982 2nd*	*1982 1st*	*1981 2nd*	*1967*
Gross National Product	3041.2	2995.5	2885.8	796.3
Balance of Trade (exports minus imports)	-20.47	-23.78	-24.9	+3.8
Wages, Salaries and Benefits	1849.9	1830.8	1752.0	471.9
Corporate Profits	154.9	157.1	190.3	79.3
Gross National Product in 1972 dollars	1475.3	1470.7	1510.4	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.

5. The average weekly earnings, in 1977 dollars, for August of 1982, compared to the average weekly earnings, in 1977 dollars, for September of 1981 were:

a. $47.77 more
b. $.60 more
c. $47.77 less
d. $23.56 more

6. The average weekly earnings, in current dollars, from September of 1981 to August of 1982:

a. increased 17.4%
b. increased 21.4%
c. increased 48%
d. increased 16%

7. The Balance of Trade from 1967 to the 1st quarter of 1982 had:

a. declined approximately13.8%
b. declined approximately 626%
c. declined approximately 726%
d. declined approximately 7.26%

8. From 1967 through September of 1982, the one category that has always shown an increase, of the following, is:

a. number of unemployed
b. mortgage rates
c Black unemployment rate
d. average weekly earnings: current dollars

PUBLIC LAW 480, TITLE II: VALUE OF EXPORTS AND NUMBER OF RECIPIENTS[1] BY PROGRAM, FISCAL YEARS 1969-76

Program	1969	1970	1971	1972	1973	1974	1975	1976
				Million Dollars				
Food for development								
School lunch	137.3	106.9	123.3	102.5	79.1	69.8	66.3	?
Maternal and pre-school feeding	31.4	37.4	51.3	48.8	45.0	54.3	90.5	146.3
Food for work	52.3	71.4	68.0	64.8	62.2	68.9	102.1	67.1
Total	221.0	215.7	242.6	215.1	187.3	194.8	258.9	268.4
Emergency & Relief	55.7	47.3	60.2	182.7	?	88.1	57.9	45.3
Total, all programs	276.7	263.0	?	397.8	?	282.9	?	313.7
				Thousand Persons				
Food for development								
School lunch	35,376	34,437	33,696	35,645	36,584	27,045	18,940	12,976
Maternal and pre-school feeding	10,374	10,932	13,168	10,843	15,621	13,159	11,126	14,849
Food for work	12,884	14,193	10,992	15,260	10,970	8,799	8,481	8,175
Total	58,636	59,562	57,856	61,748	63,175	49,003	38,547	36,000
Emergency & Relief	14,012	18,083	17,467	28,143	23,715	6,406	12,759	4,025
Total, all programs	72,648	77,645	75,323	89,891	?	55,409	51,306	40,025

9. From 1970 to 1976, the value of exports designated for School lunches:
   a) decreased 82 million dollars
   b) decreased 56%
   c) decreased 48.5%
   d) decreased 94.4%

10. The value of food exported for Maternal and pre-school feeding amounted to the greatest per person in:
   a) 1969
   b) 1970
   c) 1972
   d) 1976

11. If the total value of exports in 1977 decreased from the year before at the same rate as it changed from 1971 to 1972, the 1977 total equals: (most nearly)
   a) 100 million
   b) 413.7 million
   c) 210.2 million
   d) 417.2 million

12. The value of exported food for Emergency and relief was $2.12 greater per person served in 1972 than in 1973. What is the approximate value of food exported for Emergency and relief in 1973?
   a) 103.6 million
   b) 204.2 million
   c) 10 million
   d) 91.3 million

THE 1982 BUDGET CUTS
(billions of dollars)

	1982 Original Budget	1982 Projected Outlays Reagan Administration	
	Current Services[1] (Outlays)	Amount[2]	Change from Current Services
National Defense	$177.8	$187.5	$?
International Affairs	11.9	11.1	- 0.8
General Science, Space & Technology	7.3	6.9	- 0.4
Energy	11.8	6.4	- 5.4
Natural Resources & Environment	13.8	12.6	- 1.2
Agriculture	4.8	8.6	+ 3.8
Commerce & Housing Credit	5.1	3.3	-1.8
Transportation	21.9	21.2	- 0.7
Community & Regional Development	?	8.4	- 0.8
Education, Training, Employment & Social Services	35.0	27.8	- 7.2
Health	75.5	73.4	- 2.1
Income Security	259.3	?	- 8.4
Veterans Benefits & Services	24.4	24.2	- 0.2
Administration of Justice	4.8	4.5	- 0.3
General Government	5.2	5.1	- 0.1
General Purpose Fiscal Assistance	6.5	6.4	- 0.1
Interest	89.9	99.1	?
Contingencies for Other Requirements	-	1.0	-1.0
Allowances for Civilian Agency Pay Raises	3.2	0.4	- 2.8
Undistributed Off-setting Receipts	-31.4	-31.6	- 0.2
			+22.7 gains
			-33.5 cuts
TOTAL	$?	$725.2	$? net cut

[1]Source: Special Analysis, Budget of theUnited States Government, Fiscal Year 1982, amounts shown are necessary to maintain programs at the on-going levels.
[2]Source: Budget of theUnited States Government, Fiscal Year 1983

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13. By what percent did the 1982 Projected Outlays for National Defense increase from the 1982 original budget?

a) 9.7%
b) 5.2%
c) 5.5%
d) 52%

From: The AFL-CIO, The Federationist

14. What is the difference in outlays for Interest from the 1982 Original Budget to the 1982 Projected Outlays?

a) 1.2 billion dollars
b) $910,000
c) 9.2 million dollars
d) $9,200,000,000

15. For each dollar spent on Education, Training, Employment and Social Services, according to the “1982 Original Budget,”, how much was to have been spent on National Defense?

a) $2.35
b) $.29
c) $.42
d) $5.08

16. The total change from Current Services *is:*

a) 736 billion dollars
b) -10.8 billion dollars
c) 10.2 billion dollars
d) 56.2 billion dollars

(hypothetical data)
TOWN RECREATION EXPENDITURES 1979-1981

	1979	1980	1981
Personnel	$75,000	$82,000	$110,500
Special Events	6,110	6,730	6,860
MayDayFestival	2,920	2,530	2,700
Baseball Marathon	3,190	4,200	4,160
Regular Programming	4,770	4,100	4,420
Music in the Park	1,200	1,200	1,350
Children's Theatre	1,580	1,300	1,320
Other	1,990	1,600	1,750
Park Maintenance	5,630	6,070	6,090
Playground Supplies	2,980	3,120	3,090
Landscaping	2,650	2,950	3,000
Total	$91,510	$98,900	$127,870
% Town Budget	3.8%	3.7%	3.6%

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17. Of every ten dollars the town spent in 1980, approximately how much was spent on the Regular Programming category?

a) $0.37
b) $0.015
c) $0.255
d) cannot be determined from information given

18. Town officials anticipate a 5% greater increase for 1982 personnel expenditures than the increase from 1980 to 1981. Approximately what are the estimated 1982 personnel expenditures?

a) $154,479
b) $43,979
c) $143,979
d) $144,534

19. Approximately what percent of the entire town budget was spent on recreational Special Events in 1981?

a) 3.6%
b) 0.46%
c) 0.2%
d) cannot be determined from information given

20. What area has seen the greatest rate of increase in expenditures between 1980 and 1981?

a) Personnel
b) Special Events
c) Programming
d) Park Maintenance

COMPARISON OF HOURLY WAGE RATES FOR FARMWORKERS
AND PRODUCTION WORKERS IN MANUFACTURING, 1978-1980

	Production Workers in Mfg.			All Hired Farmworkers		Farmworker Wages as a Percentage of Mfg. Wages
	All Mfg.	Durable Goods	Non-Durable Goods			
	-- NEW YORK --			New York	U.S.	
1978						(In New York)
January	$5.93	$6.46	$5.41	$2.85	$3.18	48%
April	5.99	6.52	5.46	2.71	3.09	45%
July	6.09	6.61	5.54	2.7Z	2.93	45%
October	6.14	6.77	5.49	2.90	3.18	47%
1979						
January	6.41	6.98	5.78	2.90	3.38	?
April	6.45	7.03	5.82	2.98	3.40	46%
July	6.58	7.17	5.95	2.80	3.23	43%
October	6.71	7.37	6.02	2.85	3.57	42%
1980						
January	6.91	7.50	6.26	3.10	3.69	45%
April	7.02	7.63	6.34	2.95	3.61	42%
July	7.11	7.76	6.42	2.86	3.52	?
October	-	-	-	3.54	3.85	-

Source: New York State Department of Labor, Employment Review; USDA-CRB-ESCS, Farm Labor.

Farmworkers piece rates are included in the above-listed figures.

FARMWORKERS - HOURLY WAGE COMPARISON

21. For the four months given in 1980, hired farrnworkers in the U.S. earned an average of:

a) $4.63
b) $3.57
c) $3.50
d) $3.67

22. In New York, in July of 1980, the hourly wage paid hired farrnworkers was what percent of the wage paid production workers in non-durable goods manufacturing?

a) 41.3%
b) 44.5%
c) 54.8%
d) 40.2%

23. The average wage for the four months given in 1978 of farmworkers hired in New York, as compared to all those hired in the U.S., was:

a) $ .30 greater
b) approximately 90% less
c) approximately 10% greater
d) approximately 10% less

24. The hourly wages of hired farmworkers in New York in January of 1980, compared to the hourly wages of hired farmworkers in New York in October of 1979:

a) increased 45%
b) increased 42%
c) increased $. 25
d) increased 15%

MULTIPLE JOBHOLDERS BY SEX, MARITAL STATUS, MAY 1980

COUNTY X

Characteristic	Both Sexes			Men			Women		
	Total Employed	Multiple jobholders		Total Employed	Multiple jobholders		Total Employed	Multiple jobholders	
		Number	Percent		Number	Percent		Number	Percent
Marital Status									
Single	23,123	1,015	?	13,031	616	4.7	10,092	398	3.9
Married, spouse present	61,121	3,142	5.1	38,080	2,356	6.2	23,041	786	3.4
Other marital status	12,565	602	4.8	4,671	237	5.1	7,894	364	?

MULTIPLE JOBHOLDERS BY TYPE OF INDUSTRY AND CLASS OF WORKER, MAY 1980

COUNTY X

Primary Job	Total Employed	Multiple Jobholders		Second job in Agriculture			Second job in Nonagriculture		
		Number	Percent of Employed	Total	Wage and Salary	Self-Employed	Total	Wage and Salary	Self-Employed
Total	96,809	4,758	4.9	722	173	549	4,036	3,024	1,012
Agriculture	3,458	180	5.2	?	42	25	113	107	6
Wage and Salary	1,455	67	4.6	44	19	25	23	17	6
Self-employed	1,677	94	5.6	23	23	(1)	71	71	(1)
Unpaid Family	326	20	6.1	0	0	(2)	20	20	(2)
Nonagriculture	93,351	4,578	4.9	?	131	524	3,923	2,917	1,006
Wage and Salary	86,024	4,328	5.0	649	124	524	3,680	2,674	1,006
Self-employed	6,847	236	3.4	6	6	(1)	229	229	(1)
Unpaid Family	479	?	?	0	0	(2)	?	14	(2)

(1) Self-employed persons with secondary businesses or farms, but no wage or salary jobs, were not counted as multiple jobholders.

(2) Persons whose primary jobs were as unpaid family workers, were counted as multiple jobholders only if they also held wage or salary jobs.

25. The ratio of married women with more than one job to all married multiple jobholders is:
    a) 1:3
    b) 1:4
    c) 3:1
    d) 1:75

26. If 50% of those holding a second job in agriculture are men_1 how many men hold a second job in non-agriculture?
    a) 2,848
    b) 3,209
    c) 2,488
    d) 2,777

27. The percentage of agricultural workers who are Self-employed compared to the percentage of non-agricultural workers who are Self-employed is approximately:
    a) two times greater
    b) seven times greater
    c) one third less
    d) four times greater

28. 3.8% of the women, and 5.8% of the men in the total labor force were multiple jobholders in May of 1980. If, in 1981, the total labor force increased by 10,955, with 40% of the new workers being women, but the percentage of male and female multiple jobholders remaining the same, how many more men than women were multiple jobholders in 1981?
    a) 3,617
    b) 6,572
    c) 1,891
    d) 2,191

WORKERS AND DEPENDENTS, 1950-2050 AND BEYOND
CENSUS BUREAU TRENDS AND PROJECTIONS

Year	Percentage of Total Population That Is:				Number of Dependents (non-workers) Per Worker
	0-17	65+	18-64	working	
1950	?	8.1	60.9	39.8	1.51
1960	35.7	9.2	55.1	37.8	1.65
1970	34.0	?	56.2	39.9	1.51
1979	?	11.2	60.4	44.9	1.23
2000	26.1	12.7	?	45.5	?
2025	24.0	18.2	57.8	43.0	?
2050	23.8	18.5	57.7	?	1.33

29. In the year 2050, dependents per worker is expected to have decreased from the number of dependents per worker in 1960 by:
    a) .32 workers
    b) approximately 32%
    c) approximately 2%
    d) approximately 19%

30. If the percentage of the total population that is working in 2060 is 4.4% more than the percentage of the total population working in the year 2000, the percentage of the total population working in 2060 would be:
    a) 49.9%
    b) 42%
    c) 41%
    d) 8%

31. If in 1982 the percentage of the total population that was 0-17 years of age had increased by 2% from the 1979 figure for this group, what was the percentage of the total population 0-17 years of age in 1982?
    a) 45.6%
    b) 12.3%
    c) 30.4%
    d) cannot be determined from information given

32. In the year 2000, the number of dependents per worker is projected to be:
    a) approximately 1.18
    b) approximately 1.20
    c) approximately .83
    d) cannot be determined from information given

U.S. BALANCE OF TRADE, BY REGION, 1960, 1972, and 1977

(billions of dollars)

				Change from	
	1960	1972	1977	1960-72	1972-77
World total	?	-5.8	-26.7	-11.7	-20.9
West Germany	+0.4	-1.4	?	?	+0.2
Other West Europe	+2.6	+1.4	+7.6	?	+6.2
Japan	+0.3	-4.1	-8.1	4.4	-4.0
Other developed	-1.1	-2.0	-1.8	-3.1	+0.2
Oil countries	-0.6	-0.5	?	+0.1	-22.1
Taiwan, Hong Kong and South Korea	+0.5	-1.4	-4.0	?	-2.6
Other Third World	+1.1	+1.7	?	+0.6	-0.2
Communist countries	+0.1	?	+1.6	+0.4	?

33. The U.S. Balance of Trade with Taiwan, Hong Kong and South Korea, from 1960 to 1977:
    a) decreased 1.9%
    b) decreased 2.6 billion dollars
    c) decreased 90%
    d) decreased 900%

34. In 1972, the value of the U.S. Balance of Trade with Communist countries, compared to the value of the U.S. Balance of Trade with the World total, was:
    a) 6.3 billion dollars greater
    b) 10% greater
    c) 5.3 billion dollars greater
    d) cannot be determined from information given

35. If, in 1982, the U.S. Balance 0£ Trade with West Germany decreased by 40% from the 1977 figure, the U.S. Balance of Trade with West Germany in 1982:
    a) decreased 48%
    b) was -1.68 billion dollars
    c) was -1.8 billion dollars
    d) decreased by.78 billion dollars

36. If the 1960 World total of the U.S. Balance of Trade was 20% less than the World total of the U.S. Balance of Trade the year before it, then the U.S. Balance of Trade, World total, for 1959 was:
    a) +7.080 billion dollars
    b) +6.431 billion dollars
    c) 7.375 billion dollars
    d) cannot be determined from information given

MARKET BASKET COMPARISON (JUNE 1, 1978)

City	Food Cost	Tax (if any)	Total	Approximate difference from U.S. average
Tampa	$32.58	0-0	$32.58	?
Des Moines	$33.80	0-0	$33.80	?
San Diego	$34.02	0-0	$34.02	?
Phoenix	$33.19	?	$34.85	?
Atlanta	$34.60	4%-1.38	$35.98	-2.7%
Cleveland	$36.08	?	$36.08	-2.4%
Dallas	$36.41	0-0	$36.41	-1.5%
New York	$37. 72	0-0	$37.72	+2.1%
Portland, Ore.	$38.10	0-0	$38.10	+3.1%
Chicago	$36.47	?	$38.29	+3.4%
Little Rock	$37.36	3%-1.12	$38.48	+4.1%
San Francisco	$38.82	0-0	$38.82	+5.0%
Philadelphia	$38.88	0-0	$38.88	+5.2%
Salt Lake City	$37.12	5%-l.86	$38.98	+5.5%
Washington, D.C.	$38.99	0-0	$38.99	+5.9%
Boston	$39.40	0-0	$39.40	+6.6%
Anchorage	$50.21	0-0	$50.21	+35.9%

37. The percentage of cities in the table that had no tax was approximately:
    a) 29%
    b) 71%
    c) 79%
    d) 21%

38. If Portland, Oregon's Food Cost was approximately 3.1% more than the U.S. average, approximately what was the average Food Cost?
    a) $35.70
    b) $36.92
    c) $37.14
    d) $36.95

39. In Phoenix, the amount of tax on the Food Cost category totaled:
    a) 6%
    b) 5%
    c) 4%
    d) cannot be determined from information given

40. If the Food Cost of a market basket in San Francisco was $59.52 in 1982, then the Food Cost in San Francisco, in 1982 compared to June 1 of 1978:
    a) increased 20.7%
    b) increased $10.70
    c) increased 53.3%
    d) increased 34.8%

ANSWER KEY

UNDERSTANDING AND INTERPRETING TABULAR MATERIAL

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

DIAGNOSTIC WORXSHEET
UNDERSTANDING AND INTERPRETING TABULAR MATERIAL

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

SELF STUDY GUIDE

UNDERSTANDING AND INTERPRETING TABULAR MATERIAL

You should consult this guide whenever you miss a question or aren't sure why you got the answer you did.

For most people, this is by far the most difficult section of the exam. You shouldn't get discouraged if you seem totally lost at first, with practice you will improve. In most cases these questions require using methods you may not have used in years, if ever. We have tested this guide with many people, however, and all of them have been able to improve their ability to answer tabular questions by conscientiously using it. We don't mean to suggest that sometimes it won't be hard work - you may need to re-work and re-read some of the problems many times before they make sense. You will get out of this guide the fruits of whatever effort you put in, and perseverance in problem solving is always critical.

No knowledge of advanced math is required, however, and we have kept our explanations free of jargon and intimidating formulas. Basically, what you need is a knowledge of basic math and perseverance. In explaining the answers, we briefly review working with fractions, percents and ratios. If you have acute math phobia, or feel you need a more thorough review of these, you can order Booklet Number One in the series, Basic Mathematics, or you can consult one of the large number of basic math textbooks that exist.

It's also important to remember that there are often many ways to do a particular problem. We are presenting methods that are the easiest for most people. If you have a different approach, and you consistently get the right answer using it, there's certainly no need to change.

GOOD LUCK!

UNDERSTANDING AND INTERPRETING TABULAR MATERIAL

CENSUS DATA: TOWNSHIPS IN ROCK COUNTY

Overview: This table describes certain demographic characteristics of Rock County. The information is given by townships. Note that the actual population figures are given, but that the categories *"65* years and over" and "under 18 years" are given as percentages, not as actual population figures.

1. The answer is a. This table begins innocently enough with an averaging question. Since there is a question mark in the total column, to find the average, you must add up the 1975 total population of each of the townships: 43,095 + 35,600 + 15,418 + 75,400 = 169,513, and divide this by the total number of townships you are considering, four. If your exam doesn't allow you to bring a calculator, you'll be doing this by hand, and this is where some people make careless errors. The more you practice the better you'll get.

```
      42,378.25
   ┌──────────
4  │ 169,513.00
    16
     9
     8
     15
     12
      31
      28
       33
       32
        10
         8
         20
         20
```

We've included the above, in case you're a little rusty in long division. A lot of people get worn down with all the long division and other hand computations that are often required. The more you practice without a calculator, the less fatigued you'll be the day of the exam. Note that if you had incorrectly used the 1980 table, choice c would have falsely reassured you.

2. The answer is b. This is a very common kind of exam question. It's important not to get intimidated by percent problems, because they form a major part of the tabular section. A percent represents the relationship between two numbers. Obtaining a score of 91 on an exam with 100 questions would give you a score of 91%, reflecting the relationship between 91 and 100. Similarly, a sales tax of 4% indicates that for every dollar spent, a tax of four cents is added. If you answered 48 questions correctly on a test which contained 60 questions, your score and your rank would be determined by using percents. You would take the 48 questions you got right, and divide by the total number of questions on the test:

$$48 \div 60 = .80 = 80\%$$

Most of us can do this, but when we're faced with similar operations on tests, we often lose perspective. (Note: If you have a hard time remembering where to move the decimal, we suggest putting an example from "real life" up in the corner of your scrap paper. For instance, you can use whatever your sales tax is. Write it first as a decimal and then as a percent: .07 = 7%. Then write it the other way: 7% = .07 Or: .0825 = 8.25% and 8.25% = .0825. If you're required to convert a decimal like .0034 to a percent by referring to your sales tax example, you should have no doubt which way to move the decimal points. Since .07 equals 7%, moving the decimal two places to the right, .0034 would equal .34%. Similarly, you can convert percents to decimals more easily. For example, a percent like .0065% converted to a decimal can be found more easily by using the sales tax. If 7% = .07, the decimal moved two places to the left, so .0065% would equal .000065. This may be totally unnecessary for you, but we have found some people often lose points on this section because of carelessness, nervousness, or uncertainty in moving decimal points. If you have this problem, this method works.

Percent increase or decrease problems also often give people trouble on the exam, yet in real life we perform these operations with little difficulty. For example, if a coat originally cost $1.50, but goes on sale and is reduced to $100, most people would be able to say what kind of a savings they would get,

in terms of a percent saved. They would take the difference saved, $50, and divide it by the original cost of the coat, $150: $\frac{50}{150}$ = .33 = 33% savings, or decrease in price. Or, if an item was $200, but is now priced at $250, we'd be able to calculate the percent the item has been marked up by taking the difference between the two prices, $50, and dividing it by the original price: $\frac{50}{200}$ = .25 = a 25% increase. This type of operation is required often on these exams, and is also required to successfully answer this next question. The rule to remember, for both percent increase and decrease problems, is to: 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 points have been saved by people who have remembered this.

So, in this question we must determine the percentage increase for each town that is listed as a possible choice. Then we must compare, and select the town with the least growth.

Beginning with Smallville, we would find the percentage increase by comparing the 1975 and 1980 populations and finding the difference between them: 45,045 - 43,095 = 1950. Then we would do the second step of the rule outlined above, and divide this difference by the original number, 43, 095. So, $\frac{1950}{43,095}$ = .0452 or 4.5%. This means the population of Smallville increased 4.5%. (Of course there are many ways to solve these problems. We're giving you the method that is easiest for most people. If your method is different, but always works, there's no need to change.)

We would repeat this procedure for Bedford and Burgess, in order to find which township experienced the least percentage growth from 1975 to 1980. For Bedford, the population increased from 35,600 to 37,152. We would first find the difference between these two numbers: 37,152 - 35,600 = 1552. Then we would take this difference, 1552, and divide it by the original number, the number that chronologically came first, 1975's 35,600. $\frac{1552}{35,600}$ = .0435 or 4.4%. To find the increase in the town of Burgess, you would use the same method. The difference between the 1975 and 1980 figures is 82,504 - 75,400 = 7104. If we divide the difference, 7104, by the original number, 75,400: $\frac{7104}{75,400}$ = .0942 = 9.4%. Of the three choices, Bedford, with an increase of 4.4% is the township with the smallest percentage increase. Some of you may have been able to eliminate choice c, Burgess, just by estimating. If you aren't sure, however, it's better to go through the calculations. In our field testing, many people missed this question because they thought the question was asking for the largest increase. It's important to double check what the question is asking. Some people also miss this question because they "round off" the numbers used in long division too soon, and then don't have accurate information to choose from. In some questions, where the difference between possible choices is quite large, it's possible to "round off" long division. In other problems, like this one, the difference between two or more of the choices is too small to take the chance. If you have problems in this area, you'll be able to develop a sense of when to "round off" and when not to by practicing. We'll also be giving you lots of practice with percent increase and decrease, as it is a significant part of many exams.

3. The answer is c. To answer this question we must first determine how many people 18 years and older live in Rock County. This will be the total population of the township minus the total population under 18 years of age. The total population is 180,099. In Rock County, 21% of the population is under 18 years of age. To find what the population of this group is, we would multiply the total population by 21%: 180,099 x 21% = 180,099 x .21 = 37,820.79. This means that there are approximately 37,821 people under the age of 18 in the county. (Notice this is one of the answers. Test makers here are hoping that you might lose sight of what you're looking for, and select this choice. But this isn't what the question is asking.)

To find what the question is asking, we need to first find the population 18 and over. If the total population is 180,999, and the population under 18 is 37,821, the population 18 and over must be the total population minus the population under 18: 180,099 - 37,821 = 142,278.

The problem states that two out of five people 18 and over earn less than $8,000 a year. To find how many people this is, we will need to use a ratio. Many people are afraid of ratio problems. Yet, like percents, a ratio shows the relationship between two numbers. We use ratios in "real life" - inches to miles on a map, or the ratio of ingredients in recipes in cooking. Yet, ratios become a lot more intimidating in this setting. In "real life" if we knew that two out of every five people in our office had a dog, and there were 50 people in our office, we'd probably be able to figure out how many people had dogs with little difficulty. Some of us might think "2/5 of the people is 40% of the people (2/5 = 40%), so I'd multiply 50 people by .40, and I'd know 20 people have dogs." Others might multiply by the fraction 2/5, 50 x 2/5 = 20.

Similarly, here, we need to find how many people 2/*5* of 142,278 is. If we use a decimal, we would use

$$.40\ (2/5 = 5\overline{)2} = 5\overline{)2.00}\ \begin{array}{r}.40\end{array} \qquad 142{,}278 \times .40 = 56{,}911.20$$

Or, we could use the fraction 2/5.

$$2/5 \times \frac{142{,}278}{1} = \frac{284{,}556}{5} = 56{,}911.20$$

From this, we would know that 56,911 people 18 and over make less than $8,000.

4. The answer is b. Just when you may start to feel a little more comfortable, something different is thrown in. Now you have to find the "participation rate." It's often at this point in the exam that people start getting really discouraged, wondering when in real life they would ever need to do these tables, (especially without a calculator) anyway, and they then just "go through the motions" of finishing the test. No matter how irrelevant or frustrating the process may be sometimes, it's still important to stick with it as much as possible while you're taking the test. Hopefully, 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 the tables can produce. Unfortunately, it's a "game" we need to play well, no matter how frustrating it can be sometimes. Back to the question.

The question tells us how many people over *65* receive meals from the senior meals program in the entire county, 12,966 people. We're asked to find out how many people over 65 are receiving these meals in the town of Hyatt, if the participation rate is the same as the county's.

In our field testing, many people picked choice d, "cannot be determined." They didn't think it was possible to answer a question like this, or they gave up. Let's try a "real life" example. If 3 out of every 12 people in an office had acute math anxiety, and you were told that the same rate of acute math anxiety applied to the department as a whole, which employs 3600 people, it would be possible to determine how many people in the whole department had acute math anxiety (unless, of course, you had acute math anxiety).

There are, in fact, lots of ways to go about solving this type of problem. You could use fractions: 3/12 of the department had acute math anxiety. 3/12 can be reduced to 1/4. The rate of acute math anxiety is one out of every four people. 1/4 of 3600 people would equal 1/4 x $\frac{3600}{1} = \frac{3600}{4} = 900$.

Or, you could use decimals: $3/12 = 12\overline{)3.0}$ (.25)

.25 of 3600 people would equal 3600 x *.25* = 900 people who had acute math anxiety.

You are basically doing the same thing here, except you have a little less information to work with. Naturally. Also in this problem, the "participation rate" isn't as clearly stated. In the above example, it's 3 out of every 12 workers. In this problem, it's 12,966 people over 65 out of the total number of seniors in the county. Unfortunately, the total number of seniors in the county is not provided. What is provided is the total number of people in the county. So if we know there are 180,099 people in the county, and 25% of them are 65 or over, we can find the number of seniors by multiplying 180,099 by 25%. 180,099 x .25 = 45,024.75 which equals 45,025 people *65* and over. (The question states "approximately", so it can get away with *.25* of a person).

Or, if you used fractions: $\frac{180,099}{1} \times \frac{1}{4} = \frac{180,099}{4} = 45,024.75 = 45,025$

We now know that there are 45,025 people 65 and over in the county. Of the 45,025, 12,966 receive meals from the senior meals program. We need to determine what kind of rate of participation this is. In the above problem, we found the rate of participation by examining 3 out of every 12 people, and dividing the 3 by the 12, to find the rate of math anxiety. We would do the same thing here, dividing the smaller population (the "part") by the total population (the "whole"). So we would divide 12,966 by 45,025. (If you get stuck on math questions, it's often very helpful to try and think of simpler, "real life" situations to help you determine what to divide or multiply by what, when.) Dividing 12,966 by 45,025, we get .2879. (You could continue to work with fractions here, but the size of the fractions would be very large, and difficult to work with. Decimals are faster in this case.) .2879 or 28.79% is the rate of participation, just like 3/1 2 and/or *25%* was the rate of participation in the office example given above. (We're sorry if we are over explaining this for some of you, but so many people miss this type of question.)

We know the rate of participation by seniors is 28.79%. So we should be able to apply this rate to the number of seniors in Hyatt and get the answer. Naturally the number of people 65 and over in Hyatt is not given. We are given the total population, 15,398, and the percentage of people 65 and over, 32%. So we can find the number of people 65 and over by multiplying the percent of seniors, 32%, by the total population, 15,398. 15,398 x 32% = 15,398 x .32 = 4927.36 = 4927.

There are approximately 4,927 people over 65 in Hyatt, and we know they participated in the senior meals program at a rate of 28.79%. So to find how many of these people participated in the program, we would find 28.79% of 4,927. .2879 x 4927 = .288 (it's fine to round off here) x 4927 = 1418.97 = 1419. So 1,419 people 65 and over participated in the senior meals program in Hyatt. This is the same operation as in the above example, when we multiplied the rate of people with math anxiety, 3 out of 12 or 25%, by the number of people we were concerned with, 3600, to find the actual number of people affected.

This was a lot of work for what is usually worth about a point and a half on the test. The more you work with these kinds of questions, the less time it will take. If you're stuck, you can always put a check mark next to it and come back to it later. It's good to note that the most commonly made mistakes were also listed as other choices. People who misinterpreted the question as saying there was a participation rate of 25% would select choice a, and those who stopped at finding just the participation rate would select choice c and both might feel secure , because their choice was listed. Also, some people work with the 1975 table instead of the 1980 table. Again, the importance of checking work in this section. Also note, that although this table has a number of question marks, you only needed to fill in one of them. This happens occasionally, and it's good to keep in mind, so you don't become intimidated by their presence, or automatically try to fill all the question marks in.

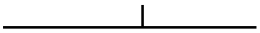
THE ECONOMY IN NUMBERS

5. Choice d is the answer. Sometimes a table takes up a whole page. This means constant flipping back and forth between pages. We've included some tables like this, to give you more practice in handling this successfully as very careful reading and a lot of patience, is required. Also note that a graph is included, even though it won't be used at all.

Question five requires careful reading. Y_9u are asked to compare the average weekly earnings, in 1977 dollars, of August, 1982 and September, 1981. Under the heading for wages, you'll find the figure for August of 1982 is $168.50. The figure for September of 1981 was $144.94. The difference between these is $ 168.50-144.94 = $23.56. Sometimes people aren't sure which number to subtract. Careful reading of what is asked in the question will always tell you. In this case, August of 1982 is mentioned first, and is the figure the September of 1981 wages will be compared to. Note choice a is there to falsely reassure those people who incorrectly used the current dollar figures for those months.

6. The answer is b. This is another percent increase problem. (For more background, see Question 2.) The procedure is always the same. You will take the difference between the two numbers you are comparing, and divide that by the original number. The average weekly earnings, in current dollars, in September of 1981 were $222.92. This figure increased to $270.69 in August of 1982. Subtracting, we find the difference between them is $47.77. The difference, $47.77, is then divided by the original number, the number that chronologically came first, 1981's $222. 92. $4777 ÷ $222.92 = .214 = 21.4%. Note that if you had divided the difference by the wrong number, $270.69, choice a would have falsely reassured you. If you had used 1977 dollar figures, choice d would have incorrectly reassured you.

7. This is a percent decrease problem. The procedure is the same as in the above problem, (and in question 2). The complicating factor is that you're going from a positive number to a negative number, The balance of trade for 1967 was a +3.8 billion dollars. For the 1st quarter of 1982, it was a -23.78 billion dollars. So it went from a +3.8 to a -23.78 (you can drop the billions, as they're asking for an answer in percents;). Again, you would take the difference and divide it by the original number. Some people have trouble taking the difference, because they're going from a positive to a negative number. Again, you can always try and envision an example from "real life". If, when you get up at 6:00a.m. it's -8 degrees outside, and by noon it's 9 degrees above zero, to find the difference, or how high the temperature had risen, you would add them together, and get a change of 17 degrees. You would do the same thing in this case. To get the difference between a +3.8 and a -23.78 you would add them together.



23.78 + 3.8 = 27.58

So there was a change, a difference, of 27.58 between the two figures. This change is then divided by the original number, the number that chronologically came first, 1967's 3.8. So 27.58 ÷ 3.8 = 7.258, or a 726% decline. Many people miss this part, because it feels strange. They feel more comfortable dividing 3.8 by 27.58 (choice a), or 23.78 by 3.8. Choice d is selected when people aren't sure what to do with the decimal point (see Question 2 for help on this). 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 the 726% figure, than by the 7.25% figure.

8. The answer is c. This question requires a careful reading of the table. Choice a is incorrect because the number of unemployed dropped in August of 1982. Choice b is incorrect because mortgage rates also dropped in August of 1982. Choice d is incorrect because the average weekly earnings in current dollars dropped in September of 1982. The one category that has always shown an increase is c, the Black unemployment rate.

PUBLIC LAW 480, TITLE H

9. The answer is c. This is the kind of table many people really dislike, with lots of categories and sub-categories. In this question you are asked to note the change from 1970 to 1976 in the value of exports designated for school lunches. The top half of the table deals with the export value, while the lower half is concerned with the recipients. For this problem it's important to be using the top half of the table. In 1970,106.9 million dollars is designated for school lunches. The 1976 figure is missing. A subtotal is provided, however, under the broader category of "Food for Development". This total, three lines down from the missing figure, is $268.4 million. Since we know the amount for 1976 for the other two categories, Maternal and Pre School Feeding, and Food for Work, we can add them together, then subtract them from the total to find the missing figure for School lunches, 146.3 + 67.1 = 213.40. Since the total is 268.4, the missing figure must be the total, 268.4, minus the 213.4 sum of the other two categories: 268.4 - 213.4 = 55. So we know the figure for School lunches is 55 million dollars. The program had 106.9 million in 1970, and decreased to 55 million in 1976. 106.9 - 55 = 51.9 million dollars. Unfortunately, when we look at the answers, this isn't listed. There is only one actual dollar figure, which isn't 51.9 million dollars. The rest of the choices are all percent decreases. This means that they want the answer in terms of how many percent the value of exports has declined. Another percent decrease problem. Again, this is always done the same way (see Question 2 for a more detailed explanation). The difference between the two numbers is divided by the original number. So the difference,

51.9, is divided by the number that chronologically came first, 1970's 106.9.51.9 ÷ 106.9 = .485 = 48.5%.

10. Since you are asked the value of food exported *per person,* you must work with both parts of the table. The top part of the table deals with the value of exports and the figures are all in millions of dollars. The lower half of the table deals with persons and the figures are all in thousands of persons. The category we're concerned with here is Maternal and Pre School Feeding, in both parts of the table. The amount of money in the top part of the table divided by the number of persons in the bottom part of the table will tell you how much was spent per person. For 1969, 31.4 million dollars is written out $3 1,400,000. The number of recipients, 10,374 in thousands, is written out as 10,374,000 (you add three zeros whenever they use thousands in tables like this). So, $31,400,000 was spent on 10,374,000 people. To find out how much the cost was per person, we would divide the total cost by the total number of people:

1969 31,400,000 ÷10,374,000 = $3.03 per person

1970 37,400,000 ÷10,932,000 = $3.42 per person

1972 48,800,000 ÷10,843,000 = $4.50 per person

1976 146,300,000 ÷14,849,000 = $9.85 per person

The greatest amount was spent in 1976, choice d. Some people may have been able to do this by estimating, since the 1976 figure of 146.3 million was so large compared to the others, while the rise in numbers of people served was not proportionately as large an increase. If you can't be positively sure when estimating, it's better not to. It also would be fine to eliminate the last three zeros from each set of numbers to make division easier. If you were pretty sure the difference in the resulting numbers would be large enough, estimating by eliminating more numbers than just the three zeros and then dividing would also be permissible. You need to be especially careful of estimating, when the differences between the possible answers is very very small. Estimating techniques vary with the individual, you should do whatever feels comfortable, and works, for you.

11. The answer is c. This question requires the same methods to determine a rate change as those used in Question number 4, where the reasoning is explained in greater detail. In this problem, we're told that the total value of exports in 1977 decreased from the year before at the same rate as it changed from 1971 to 1972. We're given the 1976 figure, but have to find the 1977 figure. We can only do this by determining the rate of change from 1971 to 1972. Naturally, the total for 1971 is missing. But all of the other figures in that column are listed, so we can find the total by adding the column. Since there is already a subtotal within the column, 242.6, this saves some time. Adding 242.6 + 60.2, we get 302.8 as the total for 1971. We're given the total for 1972,403.7. So the program went from spending $302.8 million dollars in 1971 to 403.7 million dollars in 1972. (It doesn't matter that this is an increase, and the question states there was a decrease from 1976 to 1977, you're just looking for the rate.) To find this rate, this once again becomes a percent decrease problem. To find percent decrease, you find the difference between the two numbers and divide it by the original number, the number that chronologically came first. 403.7 - 302.8 = 100.9. The difference, 100.9, is then divided by the 1971 figure, 302.8. 100.9 ÷ 302.8 = .33 = 33%. So the rate of change is 33%.

We need to now apply this to the 1976 figure. The *decrease* from 1976 to 1977 is at the same rate as the change from 1971 to 1972, 33%. Note that if you had mistakenly thought it should be an increase, as in 1971-72, choice d was there to falsely reassure you. To find the 1977 figure, you would multiply the 1976 figure, 313.7 by 33%, and then subtract it from 313.7, because 1977's figure is going to be 33% *less* than the amount spent in 1976. .33x 313.7=103.521

313.7 - 103.5 = 210.2.

(Or, you could say that 1977's figure will be 67% of 1976's (100%- 33% = 67%) and multiply 313.7 by .67.) Whichever method is easiest for you. Usually the first method is the most comfortable. If you have a particular way of doing things that you feel most confident with, it's not necessary to change to take "shortcuts". If you're not comfortable with shortcuts, they could lead to mistakes.

12. The answer is a. This question is asking for the approximate value of food exported for Emergency and Relief in 1973. Unfortunately, when we go to that category, there is a question mark. There is also a question mark under the Total column, so that route appears hopeless. (In our field testing, we found many people gave up very quickly on this question. While practicing, it's important to spend a while on each question. Sometimes the answer or a good approach will come to you. You may find while you're doing these that you turn to the Study Guide or the Answer Key immediately, after giving yourself little time to think about the problem. While practicing, it's important to spend a while with each question. Even if you don't solve it, you will familiarize yourself with it enough to get the full benefit of the explanation, and the right approach to use may come to you more easily the next time.)

In this table, things may start to look pretty grim. If you're stuck, it's a good idea to go back and study the table and question for clues. Of course the last thing you feel like doing is hunting for clues. If you're really tired, a short rest or food break may help. Or, perhaps you can come back to the problem later. But it's important to come back to it if you can, as every point is important. They have a way of adding up. Of course, if there's no time it's better not to waste precious time frustrated. You should then take your best guess. (Never leave an answer blank.) Most often, however, people don't run out of time on these exams, they run out of patience. It's understandable, but not helpful if you're serious about improving your score. In this case, if you go back and look at the question, you will notice that they mention "the value of exported food for Emergency and Relief was $2.12 greater per person served in 1972 than in 1973." This is mentioned for a reason, and is a good clue that the answer will have to be found by incorporating the lower part of the table, as that is where the number of people served are listed. And, if you can find what the value per person in 1972 was, you'll be able to solve the problem, as this cost was $2.12 greater per person in 1972 than 1973. Finding the value per person was what we did in Question 10, for a different category. Here, we would do the same type of operation. In 1972, 182.7 million dollars was spent on Emergency and Relief, for 28,143,000 (remember, the people are in thousands) people.

$ l82,700,000 ÷ 28,l43,000 = $6.49 per person

The problem states that the value was $2.12 greater per person served in 1972 than in 1973. This means that the 1973 figure will be $2.12 *less* than the 1972 figure (again, the importance of reading carefully). $6.49 (1972's figure) - 2.12 = $4.37 per person for 1973.

Now that we know the cost per person, $4.37, if we can find out the number of people involved, and multiply this figure by $4.37, we will finally have our answer. In 1973, 23,715,000 people were

served. At $4.37 per person, the total cost of the program was 23,715,000 x 4.37 = 103,634,500, or 103.6 million dollars. This is a lot of work for about a point and a half. The tedium of this section is as difficult to deal with as the questions themselves, which is why it's so important to take. short rest breaks, and practice a great deal ahead of time.

The 1982 BUDGET CUTS

13. It is always a good idea to take a few minutes to first examine each table, to get a sense of what it contains. If you do that for this question, answering it becomes a lot simpler and less intimidating. We're asked to find by what percent the Projected Outlays for National Defense increased from the original bud-get. National Defense is the first category shown. Naturally, there's a question mark. If you're not sure how to proceed, you can examine what's been done in the other categories. For instance, the next category, International Affairs, makes it clear what the last column represents. It represents the net change from the original budget to the new budget. 11.9 - 11.1 equals a change of a -.8billion dollars. So, if out-lays for National Defense in the original budget were $177.8 billion dollars, and this increased to a $187.5 billion dollar projection, the net change would be 187.5 - 177.8, which equals a 9.7 billion dollar increase. However, they aren't asking for the increase in terms of number of dollars. They want to know by what percent this category was increased from the 1982 original budget. So, another percent increase problem (see Question 2 for a more detailed explanation). We would take the difference between the two numbers, 9.7, and divide it by the original number, the number that chronologically came first, the original budget's 177.8.* 9.7 divided by 177.8 equals .0545, or an increase of 5.45%. Note that if you had incorrectly divided by the new number, 187.5, you would have been falsely reassured by choice b.

14. The answer is d. For this question, you need to subtract the 1982 original budget figure for Interest from the 1982 Projected Outlays figure for Interest. 99.1 - 89.9 = 9.2 billion dollars, which is expressed as ~9,200,000,000, choice d.

15. The answer is d. This is another ratio question (see Question 3 for a more detailed explanation of ratios). You are asked to determine how many dollars for National Defense would have been spent for every dollar spent on Education, Training, Employment and Social Services, in the "1982 Original Budget." 35 billion dollars would have been spent on Education, Training, Employment and Social Services, and $177.8 billion dollars on National Defense. You would go about solving this in the same way you would approach solving standard ratio problems. Again, it can help to picture simpler examples from "real life" situations. Assume you bought a tv. set for $450, and a cassette deck for $150, and you wanted to figure out how many dollars you spent on the t.v. for every dollar you spent on the cassette deck. (We realize most people could care less about what this relationship would be, but let's pretend.) Anyway, the t.v. set cost $450, the cassette deck $150. Some people can figure this out just by looking at it, but let's go through it for the method. You would want to arrange the numbers involved in

*It's important to remember that by "original number" we mean the original number that chronologically came first in the table, not in the question itself.

a way that would accurately reflect their relationship. For every dollar you spent on the cassette deck, you need to find how many were spent on the t.v., the only unknown. You could set it up like this: money spent on the t.v. is to money spent on the cassette deck as how many dollars is to one dollar? Then substitute in 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:

$\frac{450}{150} = \frac{?}{1}$ 450 is to 150 as what number is to one?

Some people see right away that 450 is three times 150, 50 the answer will be three times $1, or $3. Others see 150 as 1/3 of 450, so 1 will be 1/3 of what number? Another method people often use with these types of ratios is cross-multiplication. As long as the numbers are set up in the proper relationship, it will always work.

$\frac{\text{t.v. set}}{\text{cassette deck}}$ as $\frac{\text{t.v. set}}{\text{cassette deck}}$

$\frac{450}{150} = \frac{?}{1}$ You then multiply the top of one side by the bottom of the other:

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

l50 x ? = 450 x 1
150 x ? = 450
$? = \frac{450}{150}$ (Because the ? was being multiplied by 150, in order to isolate the ?, we would have to divide the 150 into 450 when we moved it to the other side of the equal sign. Most people do this automatically, though they may not know it. You'll be getting lots of practice with it.)
? = 3

Don't worry if it seems confusing, there will be opportunities for practicing throughout. Remember, there are many ways to do these. You should choose what is comfortable for you.

In this question, we're trying to find the relationship between these numbers: $177.8 billion to be spent on National Defense and $35 billion for Education, Training, etc. This is a good way to set it up, although there. are several: $177.8 billion for Defense is to $35 billion for Education, etc. as ? for Defense is to $1 for Education, etc. $\frac{177.8}{35} = \frac{?}{1}$

One way to do this is to see that the relationship of the bottom numbers is 35 to one. This means, because it's a ratio, that the top numbers must also have the same relationship, 35 to one. So 177.8 is 35 times what number?

177.8 = 35 times what number?
$\frac{177.8}{35}$ = what number
5.08 = the answer

Or, 1 is 1/35 of 35, so the answer will be 1/35 of 177.8

$$\frac{1}{35} \times 177.8 = \frac{1}{35} \times \frac{177.8}{1} = \frac{177.8}{35} = 5.08$$

Or, you could cross-multiply:

$$\frac{177.8}{35} = \frac{?}{1}$$

$35 \times ? = 177.8 \times 1$

$35 \times ? = 177.8$

$? = \frac{177.8}{35}$

$? = 5.08$

There are other ways to do it as well. This is a difficult type of question for many people. You shouldn't get discouraged if you have trouble with it. There will be others to practice with, and they are also included in Booklet No.2, Arithmetic Reasoning.

16. The answer is b. We can answer this question in at least two different ways. By looking to the bottom of the column, "Change from Current Services", we see that the total gains and losses are shown. By finding the difference between the gains (+22.7) and the losses (-33.5), we have the total change from Current Services. (-33.5) - (+22.7) = -10.8. Or, we could find the difference between the total shown for the "1982 Original Budget", (which is a lot of addition), but you would get 736 billion dollars, and the 1982 "Projected Outlays. . .". 725.2 billion dollars. 736.0 - 725.2 = 10.8 billion dollars. Since this is a cut from the original budget, we would label it a negative 10.8 billion dollars.

17. The answer is b. This question is very similar to question 15, because both require you to use a ratio to determine the relationship between the numbers of dollars spent on certain programs. In this case, you have to find how much the town spent on Regular Programming in 1980, for every ten dollars the town spent that year. (For a more detailed explanation of how to do this, see question 15.) We need to first compare the amount of money spent on Regular Programming to the entire amount spent by the town in 1980. The table tells us that $4100 was spent on Regular Programming in 1980. Note that in this table, there are subtotals in each category. Indentations are a good clue that there are subtotals within tables. The table does not give the town's budget, but we can't figure the problem out without it. Of course it's tempting to put choice d, but "cannot be determined from information given" is not often the answer, so we should investigate further.

Often in tables, data that doesn't quite "fit in" may serve as important clues. In this case, the last line, which gives the percent of the Town Budget, seems like extra information not as directly related to the categories above it. This often means we should examine it more carefully, to see if it can give

information relevant to solving the problem. It tells us that the town spent 3.7% of its budget on Recreation Expenditures. Since the line above it gives the total spent in dollars, we know that the $98,900 spent is 3.7% of the town's budget. We can't solve this problem unless we can determine what the total budget of the town is. But since we know that $98,900 is 3.7% of the budget, we can find the total budget.

3.7% of the town budget = $98,900
3.7% of what number equals $98,900
3.7% x ? = $98,900
.037 x ? = 98,900
? = 98,900 / .037 (see Question 15 for detailed explanation)
= 2,672,972.9

Or, you can cross-multiply (also described in Question 15):

98,900 / ? = 3.7% / 100% (98,900 is 3.7% of the town budget, 3.7% is 3.7% of 100%)

98,900 / ? = .037 / 1

98,900 / ? = .037 / 1

.037 x ? = 98,900 x 1

? = 98,900 / .037

? = 2,672,972.9 = $2,672,973

There are, of course, other ways to do this. Some people use the phrase "the product of the means equals the product of the extremes". We'll discuss this in the next part of the question. (Now, if the above totally confuses you, and if once you get to the point of asking "3.7% of what number equals $98,900?" or "98,900 is 3.7% of what number?" you're not sure what to do next, there's still hope.) You can set it up by substituting an equal sign for the word "is", and a "?" for "what number". So, you would have 3.7% of ? = $98,900 or $98,900 = 3.7% of? Here's where some people get lost. They're not sure whether to multiply or divide by 3.7%. If you can't remember, all is not lost: try both ways, and see which way makes sense. There will be a big difference in the answer you get by multiplying or dividing, and common sense can tell you which would be right. For instance in this case, dividing would give you $2,672,973, while multiplying would give you $3,659. Common sense would tell you the total budget couldn't be such a small number, $3,659, or less than a part of the budget. With practice, you'll remember which to do in this case. But when you don't, you can still reason it out and get the correct answer.

It would be nice if the question was asking what the town's total budget was. Instead, we need to find out how much the town spent on Regular Programming for every ten dollars it spent in 1980. Once again, we need to set up a ratio.

$$\frac{\text{\$ spent on Regular Programming}}{\text{Town Budget}} = \frac{?}{\$10}$$

$$\frac{4100}{2{,}672{,}973} = \frac{?}{10}$$

Or, 4100 is to 2,672,973 as? is to 10

Some people do this by remembering a rule called "The product of the means equals the product of the extremes" which means the two inner numbers, when multiplied together, equal the two outer numbers when multiplied together. As long as you set it up correctly, like cross multiplying, it will always work. So, 2,672,973 x ? = 4100 x 10 2,672,973 x ? = 41,000

$$? = \frac{41{,}000}{2{,}672{,}973} = .0153$$

(Pray that your exam will allow a calculator. If not, once again, it's so important to practice by hand.) If you weren't sure whether to multiply or divide in the above case, again, the difference would have made it obvious what to do. If you had multiplied, your answer would have been in the millions of dollars. But sometimes people are so nervous that they don't step back and evaluate the reasonableness of their solution. If you cross multiplied:

$$\frac{4100}{2672973} = \frac{?}{10}$$

4100 x l0 = 2,672,973 x ?

$$\frac{41{,}000}{2{,}672{,}973} = ?$$

.015 = ?

So, for every $10 the town spent in 1980, $.015 was spent on Regular Programming.

18. The answer is a. Once again, a percent increase problem. Several steps are involved here. The first is to determine what the increase from 1980 to 1981 is so that the information "a 5% *greater* increase" will be useful. 1981 personnel expenditures were $110,500. The 1980 personnel expenditures were $82,000. Once again, to find a percent increase, we find the difference between the two numbers, and divide that difference by the original number, the number that chronologically came first. 110,500 - 82,000 is $28,500. Then divide 28,500 by the earlier year (we're finding what percent the difference is of the earlier year). $\frac{28{,}500}{82{,}000} = .348 = 34.8\%$. So the expenditures for personnel increased 34.8% from 1980 to 1981. The increase from 1981 to 1982 is predicted to be 5% greater than this figure, or 39.8%. So the 1982 figure will be 39.8% larger than the 1981 figure. The 1981 figure is 110,500. A 39.8% increase would be 110,500 x 39.8% = 110,500 x .398 = an increase of $43,979. So the 1982 figure would be the 1981 figure, $110,500 + the increase of $43,979, for a total of $154,479. Note that choice d is there to falsely reassure you if you had divided by the 1981 number instead of the 1980 number in the first step, and b would falsely reassure you if you had forgotten to add the increase onto the 1981 figure. Because b and care so similar, $43,979, and $143,979, if people are stuck in a case like this, they will often select one of these, thinking one of them must be right. As you can see from this question, and others in this booklet, the fact that the numbers are so similar isn't helpful at all.

19. The answer is c. As in question 17, we can't answer this question until we determine what the entire town budget was for 1981. We would follow the same procedures we used in question 17 for this. Since we know that the total for Recreational Expenditures was $127,870 in 1981, and that this was 3.6% of the total town budget, we can determine what that budget was.

3.6% of the town budget is $127,870.
.036 of the town budget is 127,870.
.036 of ? = 127,870.
.036 x ? = 127,870
? = $\frac{127,870}{.036}$
= $3,551,944.4

Or, cross multiplying:

$\frac{127,870}{?} = \frac{3.6\%}{100\%}$ $\frac{127,870}{?} = \frac{.036}{1}$ $\frac{127,870}{?} = \frac{036}{1}$

.036 x ? = 127,870
? = $\frac{127,870}{.036}$ = $3,551,944.4

Or, you might have used the product of the means equals the product of the extremes:

127,870 is to? as 3.6% is to 100%
127,870 is to ? as .036 is to 1

The product of the inner two numbers equals the product of the outer two:

.036 x ? = 127,870 x 1
.036 x ? = 127,870
? = $\frac{127,870}{.036}$
? = $3,551,944.4

Now we know the town budget equals $3,551,944. The amount spent on recreational Special Events in 1981 was $6,860. You are asked to find what percent this figure is of the total 1981 budget. We need to find what percent $6,860 is of $3,551,944. We would do this by dividing 6,860 by 3,551,944. We would get .0019, or .19%. There are other methods you could have used, as long as you get the right answer consistently, it doesn't matter how you do a problem.

20. This table proves that a table doesn't need to have question marks to be tedious. On this question, you will have to calculate the percent increase for each of the four categories. Again, to do percent increase you will take the difference between the two numbers you are comparing, and divide it by the number that chronologically came first. In Personnel, $82,000 was spent in 1980 and $110,500 in 1981. (If you have labeled your scrap paper, you'll save some calculating, because the percent increase for this category was found in question 18.) $110,500- 82,000 = 28,500. 28,500 ÷ 82,000 = .3475 = 34.8%. We need to do the same for the other categories.

Personnel = 34.8%
Special Events: 6730 - 6860
6860 - 6730 = 130
130 ÷ 6730 = .0193 = 1.9%
Programming: 4100 - 4,420
4420 - 4100 = 320
320 ÷ 4100 = .078 = 7.8%
Park Maintenance: 6070 - 6090
6090 - 6070 = 20
20 ÷ 6070 = .0032 = .32%

Personnel has by far had the greatest increase. Some of you may have gotten the answer just by estimating, as there was such a big difference between the answers.

21. The answer is d. Once again, we have a page long table that requires flipping back and forth between pages. This is an averaging question. We need to find the average farmworkers in the U.S. earned in 1980. The next to last column will tell us this information. We would add the hourly wages: $3.69 + 3.61 + 3.52 + 3.85 = $14.67. Because there are four figures involved, we would then divide by four. $14.67 ÷ 4 = $3.667 = $3.67, choice d.

22. The answer is b. This is another percent problem. To answer this, we need to compare the $2.86 paid farmworkers in N.Y. in July of 1980 with the $6.42 paid production workers in non-durable goods manufacturing. The question we need to ask is: what percent is $2.86 of $6.42? To find this, we divide 2.86 by 6.42 (see question 2). $\frac{2.86}{6.42} = .445 = 44.5\%$

Note that if you had incorrectly taken figures from other categories in July of 1980, the other choices would have falsely reassured you.

23. The answer is d. Another percent problem. First we need to find the average wage of farmworkers in N.Y. and the U.S. for the four months given in 1978. In N.Y., the hourly wages for the four months in question were $2.85 +2.71 +2.72 +2.90. Adding these together, we get $11.18. Dividing by four, because we are considering four numbers, we get $2.795 = $2.80. The figures for the U.S. column are $3.18 +3.09+2.93+3.18. Adding these together, we get $12.38. Dividing by four, the average is $3095 = $3.10. So we know the U.S. rate was $3.10, and the N.Y. rate $2.80. We should look back at the question, to see how they want us to express this difference, either in dollars or as a percent. Choice a states that N.Y. farmworkers made 30¢ more. We've found they made 30¢ */ess*, so a is incorrect. The rest of the choices are expressed in percents. We'll need to find what percent the N.Y. figure was of the U.S. figure. We can do this several ways. The N.Y. figure, divided by the U.S. figure, will tell us what percent the N.Y. figure was of the U.S. figure just like, in determining your score on an exam, the number you got correct is divided by the number of questions, to find out what percent your score is).

$\frac{2.80}{3.10} = .903 = 90.3\%.$

This would mean the N.Y. wages were 90% of the U.S. wages, or the U.S. wages were 10% more (100% - 10% = 90%). So, the N.Y. wages were 10% less.

Or, you could take the difference, .30, and divide it by the number you are comparing the N.Y. numbers against, the U.S. figure of $3.10. (If you took the difference and then compared it to the N.Y.

figure, you'd be comparing the difference to the wrong number, as you're trying to find what percent the difference between the two numbers was of the U.S. figure, not the N.Y. figure.) So, .30 ÷ 3.10 = .0967, approximately 10% of the U.S. figure. So the difference between the two wages was 10%. New York farmworkers wages were 10% less, choice d.

24. The answer is c. It's surprising how many people miss this question. Once in a while you'll get a question that only requires a simple comparison, but we're so used to doing more complicated procedures that we are suspicious of the answer that seems uncomplicated. It appears to be another percent problem, as all of the choices but one are listed in percents, and we've been doing so many of these. But, all that is required here is to compare the January of 1980 rate with the October of 1979 rate. The hourly rate went from $2.85 in October of 1979 to $3.10 in January of 1980, an increase of $.25, choice c. All of the possible percent answers given are incorrect. Sometimes people automatically go through and calculate the percent increase first, (in this case, ignoring the $.25 difference they calculated, choice c) then discover their choice is not there, and realize the answer given in dollars (or cents) was the correct one. When you get questions like this, that mix the possible answers in both percents and dollars, it's not a bad idea to pay extra attention to the dollar figures, just in case you can save yourself some work, as in this question.

25. The answer is b. This type of table requires very careful reading. We're asked to find the ratio of married women with more than one job to all married multiple jobholders (see questions 3, 15 and 17 for more work with ratios). The most difficult part of this table for most people is figuring the table out. Since the question isn't asking anything about industry, you can concentrate on the top half of the table. We need to find the data for married women with more than one job. The next to last column gives us the number of women multiple jobholders, and if we also look at the categories under the heading Marital Status, and read across, we can find this number, 786. We're asked to compare this figure to the number of all married multiple jobholders. This is found under the second column, and if we look at the married category once again, we'll find this number, 3,142. We need to find the relationship between 786 and 3,142. There are many ways to do this. One of the easiest is to divide 786 by 3142.

$$\frac{\text{Married women multiple jobholders}}{\text{All married multiple jobholders}} = \frac{786}{3142}$$

Dividing, you'll get .25, or 25%. This means that 25%, or 1 in 4 married multiple jobholders are women.

26. The answer is a. This question requires using information from both tables. In the second table, the fourth column shows that 722 people hold a second job in agriculture. The seventh column shows that 4,036 people hold a second job in non-agriculture What we don't know is how many of either group is male. The question tells us, however, that 50% of those holding a second job in agricultural work are men. We can find the number of the men holding a second job in agriculture by taking half of 722, or multiplying 722 x .50 = 361. But we still don't know how many men are holding a second job in non-agriculture. If, however, we could find the total number of male multiple jobholders, we could subtract the number of men holding second jobs in agriculture from this total and we would have the number of men holding second jobs in non-agriculture, as there are only two categories involved, agriculture and non-agriculture. Looking at the top table, the fifth column gives the number of male multiple jobholders: 616 single men, 2,356 married and 237 other. Adding them, we find there are 3,209 men holding more

than one job. If there are 3,209 men with more than one job, and 361 of them have second jobs in agriculture, then subtracting this number from the total will give us the number of men holding second jobs in non-agriculture, 3,209 - 361 = 2,848. This question is difficult for most people, you shouldn't get discouraged if you missed it.

27. The answer is b. The bottom table gives us the number of self-employed agricultural and non-agricultural workers. According to this table, 1,677 agricultural workers are self-employed, out of a total of *3,458* agricultural workers. We need to find what percent the number of self-employed workers is, so that we can later compare it to the percent for non-agricultural workers. To find what percent 1,677 is of 3,458,we will divide it by 3,458. $\frac{1677}{3458} = .48 = 48\%$.

We're told that 6,847 non-agricultural workers are self-employed out of a total of 93,351 Again, to find what percent this is, so we can compare it to the percent for agricultural self-employed workers, we divide 6,847 by the larger number, 93,351. $\frac{6847}{93,351} = .07 = 7\%$. The question is asking us to compare the percentage of agricultural workers who are self-employed to non-agricultural workers who are self-employed. 48% of agricultural workers are self-employed, compared to 7% for non-agricultural workers. Looking at the possible answers, we see that choice b, seven times greater, is the closest of the four possible choices, as 48% is almost seven times 7%. (Note you would use the first column because you are considering the total number of workers, not just multiple jobholders.)

28. The answer is c. This is another difficult question for a lot of people. Again, it's so important to break problems down into more easily solvable parts. If you take this question a step at a time, it's much easier to do. We'll be using the top table, since the question is concerned with finding how many more men than women multiple jobholders would exist in 1981. You are given the increase in the total labor force (10,955*)* in 1981, but need to calculate the increase in both the numbers of men and women. If 40% of the new workers are women, you can multiply 10,955 by 40% or .40 to find the increase in women, 10,955 x .40 = 4382. This represents an increase of 4,382 women. Adding this number to the number of women employed in May of 1980, we will be able to find how many women were employed in 1981. We can find the total number of women employed in 1980 by adding up the number of single, married, and other women in column seven. 10,092 + 23,041 + 7,894 = 41,027 total women employed in 1980. So 41,027 plus the increase of 4382 = 45,409.

In order to find the number of men employed in 1981, subtract the increase in women from the total increase and add that amount to the 1980 number of employed men. 10,955 = 4382 = 6,573. 6,573 is the increase in men employed from 1980 to 1981. To find the total number of men employed in 1980, we would add the number of single, married and other men in column four: 13,031 + 38,080 + 4,671 = *55,782*. 55,782 is the total number of employed men in May of 1980. We know the increase of men employed from May of 1980 to 1981 was 6,573. Adding the increase to the total number, for May of 1980, (55,782 + 6,573), we get 62,355. So we know there were 62,355 men and 45,409 women employed in 1981. According to the question, 3.8% of the women, and 5.8% of the men in the total labor force were multiple jobholders in May of 1980, and this percentage remained the same in 1981. Now that we know how many women and men were employed in the total labor force, we can finally answer the question. 3.8% of the women in the total labor force in 1981,45,409, were multiple jobholders in

1981. We can find the number of women multiple jobholders by multiplying 45,409 x 3.8%. 45,409 x .038 = 1725.5 women (this happens in tables) = 1726 women with multiple jobs. We know that 5.8% of the total employed men, 62,355, are multiple jobholders. To find how many men are multiple jobholders, again we would multiply the total employed men by the percent that are multiple jobholders, 5.8%. 5.8% of 62,355 = .058 x *62,355* = 3616.59 = 3617 men who hold multiple jobs. The question asks how many more men than women were multiple jobholders in 1981. There were 3,617 men and 1,726 women with multiple jobs in 1981. The difference between them (3,617 - 1,726) which equals 1891, is the answer. It's important to not lose sight of what is being asked, and to take a problem like this one a step at a time. Again, a lot of work for about a point and a half.

WORKERS AND DEPENDENTS

29. The answer is d. Choice a is incorrect because, while the difference between the 2050 and 1960 figure is .32, this figure does not refer to .32 workers, it refers to .32 dependents per worker. Since all of the other answers are in percents, this means this is another percent decrease problem. Again, to do these, we take the difference between the two numbers we are considering, and divide this difference by the original number, the number that chronologically came first, 1.65-1.33 = .32 .32 divided by the 1960 figure, l.65,equals.1939= 19%.

30. The answer is a. Often when people begin this problem they begin, out of habit, to do the steps necessary when calculating percent increase, taking the difference between the two numbers and dividing it by the original number. In cases like this, however, where everything is already expressed in terms of percents, all that is required to find a percent increase is addition of the percent involved. If 45.5% of the total population is working in the year 2000, and there is an expected increase of 4.4% for 2060, all we would have to do to get the answer is add 45.5% and 4.4%, which equals 49.9%. Don't be discouraged if you went ahead and calculated incorrectly, you were "set up" by previous problems. Just remember that if the data in a table is already being expressed in percentages, then there's no need to do the more elaborate percent increase and decrease procedures, these apply to numbers *not* in percents. If all the numbers in a table are in percents, all you need to do is add, or subtract, like in this problem.

31. The answer is c. We first need to find the 1979 figure for 0-17 years of age, but there is a ? there. Many people get stuck at this point. An important thing to remember in tables that are based on data expressed in percents, is that they are all numbers based on 100. For example, the number next to the ?, 11.2, represents 11.2% or 11.2 out of every hundred people are 65+. People often forget this on exams, because of nervousness. For instance, looking at 1960's figures, (if you're stuck, it can be *very* helpful to look at other categories for clues), we see figures for three different age groups: 0-17, *65+*, and 18-64. If we think about it, these represent all the possible age groups. Adding the numbers up in these three categories, 35.7 + 9.2+55.1, we get 100. So even if we didn't remember that percents are based on 100, we could have gotten a clue from examining another category in the table. This means the 1979 figures will also equal 100, 18-64is60.4, and *65+* is 11.2. Adding them, we get 71.6. What we're trying to find, ages 0-17, will be the difference between 100 and 71.6, which is 28.4. The question tells us the percentage of the total population in 1982 in this age group increased by 2%. Adding 2% to the 1979 figure, 28.4%, we get 30.4%.

32. The answer is b. Looking at the table, we see there is a ? under Dependents Per Worker in the year 2000. We know from the column next to it, however, that 45.5% of the total population is projected to be working in the year 2000. To find the number of dependents per worker, it makes sense that we would have to find out how many dependents there are. It's clear from the heading of the last column that the people who wrote the table consider dependents to be non-workers. Whether you can think of people who don't work and yet aren't dependent on anyone is irrelevant here, because on these exams we have to work with whatever we're given, even if it seems a little strange. So, to find the number of non-workers, since all of these numbers are percents, we would subtract the percent of those working from 100 percent (the total) to find the non-working dependents. 100 - 45.5 = 54.5. So, 54.5% of the total population are dependent non-workers, and 45.5% are workers. We're asked to find dependents per worker. To do this, we'll divide 54.5 by 45.5, which equals 1.197. If you're still not sure whether to multiply or divide, it's not a problem as long as you can keep a perspective on the problem. For instance, if you had mistakenly divided $\frac{45.5}{54.5}$, choice c, the answer, .83, wouldn't have made sense, since the number of dependents per worker should be larger than 1, since there are more dependents than workers. Also, by looking at the table and comparing .83 with the other choices, it would have become obvious that something was wrong. Some people don't have any idea how to do this, but by playing around with the numbers that are given in categories with no question marks, like 1960, they are able to figure out how to do the problem. This is a perfectly legitimate way to solve problems. If you're stuck on a question, and have time to come back to it, we strongly suggest you study the table very carefully and experiment with information you *are* given. In this case, if someone had played with the 1960 working figure of 37.8, subtracted it from 100 to get the non-workers, 62.2 but then got stuck, they may have gotten insight by experimenting. If they tried dividing 62.2 by 37.8, they would have gotten 1.65, which is the figure in the dependents per worker column for 1960. This then would have told them how to solve the problem for the year 2000. To do this, we have to fight against our very natural tendencies to get frustrated, tired and/or bored.

33. The answer is d. The U.S. Balance of Trade with Taiwan, Hong Kong and South Korea went from a +0.5 in 1960 to a -4.0 billion dollars in 1977. (Question 7 gives information on how to deal with positive and negative numbers in a situation like this, if you need a reminder.) This reflects a difference of 4.5 billion dollars. Looking at the answers, only one dollar amount is listed, and it isn't this amount. The rest of the answers are in percents, so we'll have to figure the percent decrease. Once again, we'll take the difference, and divide it by the original number, the number that chronologically came first. 4.5 divided by .5 = 9.0 = 900%. This may seem strange, but it accurately reflects a very large decrease in the balance of trade. Some people miss this because they aren't sure what to do with the decimal point. If you're unsure, you can use the sales tax method described in Question 2.

34. The answer is a. The Balance of Trade for the Communist countries in 1972 is not given. If, however, we consult the "Change from 1960-72" column, we find that there was a change of a +0.4 between 1960 and 1972. Since the 1960 figure was +0.1, a change of +0.4 would mean the 1972 figure was +0.5, (0.1 + 0.4). We're asked to compare this with the World total, which was -*5.8* billion dollars. The Balance of Trade with Communist countries was +0.5 billion dollars, compared to the -5.8 billion dollar World to tat. By adding them (see question 7), we would find that the value of the Balance of Trade with Communist countries was 6.3 billion dollars greater, choice a. Note that if you had incorrectly subtracted them, choice c would have falsely reassured you.

35. The answer is b. We first need to find the 1977 figure for West Germany. We know the change from 1972 to 1977 is +0.2, and the 1972 figure is -1.4. This means the 1977 figure will be a+0.2 more than the 1972 figure, or-l.2 billion dollars. If the Balance of Trade in 1982 decreased 40% from this 1977 figure, we can find the decrease by multiplying 1.2 billion x 40%. (If you weren't sure whether to multiply or divide, common sense would tell you dividing would be wrong, since you would get 3 billion dollars as an answer, which is far too large). 1.2 x .40 = .48 billion dollar decline. Since the Balance of Trade with West Germany is already in negative numbers, -1.2 billion dollars, a 40% decrease would mean the answer would be a -1.2 billion *plus* the 40% decline, of -.48 billion, for a total of-1.68 billion dollar Balance of Trade with West Germany.

36. The answer is c. This question is difficult for most people, and you may need to read the explanation of it several times. We are told that the 1960 World total of the U.S. Balance of Trade was 20% less than the year before it, 1959. We first need to find 1960's World total. We know, from the fourth column, that the change from 1960-72 was a -11.7 billion dollars. Since 1972's figure was -*5.8* billion dollars, 1960's would have to have been 11.7 billion dollars greater than -5.8 (see question 7 for more work with positive and negative numbers). 11.7 - 5.8 = +5.9. So the Balance of Trade for 1960 would total 11.7 billion dollars more than -*5.8* billion dollars. We've been told the 1960 figure is 20% less than the year before it. So +5.9 billion dollars is 20% less than 1959's total. There are several different ways you could approach this. One way which can be helpful, especially if you're stuck, is to go through the possible choices (the one good thing about multiple choice math problems is that the answer *has* to be there), and work backwards to find the answer. This is a legitimate way to solve problems of this kind. If 1960's figure is 20% less than 1959's, we could go through each of the possible answers, multiply by 20%, and then subtract that 20% from each choice to see iswe get 5.9 as an answer. For example; Choice a: 7.080x .20=1.416:7.080- 1.416=5.664, not 5.9, so it's incorrect

Choice a: 7.080 x .20 = 1.416 : 7.080 - 1.416 = 5.64, not 5.9, so it's incorrect

Choice b: 6.431 x .20 = 1.2862 : 6.431 - l.2862 = 5.145 ,not 5.9

Choice c: 7.375 x .20 = 1.475 : 7.375 - 1.475 = 5.9, the answer

Or, we could say 5.9 is 20% less than 1959's total, or 5.9 is 80% of 1959's total (100% - 20% = 80%). To find 1959's total, we would then divide 1960's total, 5.9, by 80%. $\frac{5.9}{.80}$ = 7.375. (If you weren't sure whether to multiply or divide here, the figure from multiplication would have been *smaller* than the 1960 figure, so it wouldn't have been correct.) You could then check this by taking 20% of 7.375, 1.475, and subtracting to see if the number that was 20% less was 5.9. Or you could set it up as a ratio problem question, and then cross multiply:

$\frac{5.9}{?} = \frac{80}{100}$ or $\frac{5.9}{?} = \frac{4}{5}$

80 x ? = 5.9 x 100 or 4 x ? = 5 x 5.9

80 x ? = 590 4 x ? = 29.5

$? = \frac{590}{80} = 7.375$? = 7.375

Or, you could divide 5.9 by $\frac{4}{5}$, instead of 80%

5.9 divided by $\frac{4}{5}$ = 5.9 x $\frac{5}{4}$ = $\frac{29.5}{4}$ = 7.375

What you should *not* do, and what many people do, is take 20% of 5.9, and then add it on to get the 1959 figure. This won't work, because it isn't an accurate representation of the relationship between the 1959 and 1960 figure. If, however, you always check your answer in problems of this type, even if you make this mistake you'll catch yourself, because your answers won't check out correctly. For example, if someone did take the 5.9 figure, and multiplied it by .20, they would get 1.18. Adding 1.18 to 5.9, they'd find the 1959 World total to be 7.08 billion dollars, choice a. Yet, to check out properly, we should be able to take 20% from the 1959 figure and get the 1960 total of 5.9 billion. 7.08 x .20 = 1.416. 7.08-1.416 = 5.664, not 5.9 50 it can't be the right answer.

This is a difficult question for most people, but if you remember to check your work to see if the answer makes sense, or work backwards from the choices, you can answer this type of question correctly. You'll have another chance on the next table.

37. The answer is b. We need to find the percentage of cities with no tax. Adding the total number of cities, we find there are 17 cities, and that there are question marks in three of the tax categories. By looking at the Total column, and comparing it with the Food Cost column, however, we can see if any tax was involved. In Phoenix, and Chicago there was a tax, and the Total column reflected an increase, while there was no increase in the Cleveland column. So that means 5 of the 17 cities have a tax, and 12 have no tax. So the percent of cities that had no tax would be $\frac{12}{17}$ = .7058 = 71%.

38. The answer is d. Here's another problem like Question 36. Again, if you got stuck you could have worked backwards to get the answer. If Portland's Food Cost was 3.1% more than the average, we could work backwards by taking 3.1% of each of the possible choices, then adding it to the choice to see if we would get $38.l0.

Choice a: 35.70 x .031 = 1.106 : 35.70 + 1.106 (we could round off) = 36.806 ,not 38.l0.

Choice b: 36.92 x .031 = 1.14 : 36.92 + 1.14 = 38.06 (Not 38.10, but we'll see if other choices are closer, as the answer says approximately. If another choice is closer to 38.10, this choice will become incorrect.)

Choice c: 37.14 x .031 = l.15 : 37.14 + l.15 = 38.29

Choice d: 36.95 x .031 = 1.145 : 3695 + 1.145 = 38.095. This is the closest to $38.10, so d is the answer.

Like Question 36, this problem could be solved by working backwards. It also could be solved by using the same methods used in Question 36. In Question 36, we knew that 5.9 was 80% of some number. Here, we know that 38.10 is 3.1% greater than the number we're trying to find. 38.10 divided by 103.1% (100% + 3.1%. 100% represents the number, we're trying to find, and the 3.1% represents the amount that the Portland figure exceeds it by).

$\frac{38.10}{103.1\%} = \frac{38.10}{1.031} = \$36.95$

This method is difficult for most people, however, to set up. A clearer way to do this is to set up a ratio and then cross multiply. Although it's the same basic operation, it "clicks" for more people.

$\frac{38.10}{?} = \frac{103.1\%}{100\%}$

$\frac{38.10}{?} = \frac{1.031}{1}$

l.03 x ? = 38.l0 x 1

$? = \frac{38.10}{1.031}$

? = 36.95

We can check this by multiplying 36.95 x .031 = 1.145, and then adding this to 36.95 to see if we get 38.10. 36.95 + 1.145 = 38.095, so it's correct. (The question says approximately, and the other choices are farther off.) Or, we could check by putting the Portland total over the average, to see what percent it is.

$\frac{38.10}{36.95} = \frac{1.031}{} = 103.1\%$

Or the average over the Portland total: $\frac{36.95}{38.10}$ = .969, which means the average is 96.9% of the Portland total, or 3.l% less than the Portland total. (100%- 96.9%=3.l%).

What should *not* be done in this type of question is the same type of mistake we made often on Question 36. That is, multiplying 38.10 by .031 = 1.18, and then subtracting 1.18 from 38.10 (which equals 36.92, choice c). This method does not set up the correct relationship between the Portland figure and the U.S. average. If you're not sure, try checking it through. 36.92 x .031 = 1.14. 36.92 + 1.14=38.06, not 38.10.

Although the question states "approximately", it seems very possible that there will be another choice that will be closer. If you weren't sure, you could take the next closest choice, $36.95, and work back wards to confirm that 36.92 is incorrect. If you are still having a hard time with which method to use in this type of question, we suggest you work backwards whenever you encounter them. The answer will have to be there, and you won't have to get confused over which method to use. There are also other examples of this type of percent question in Booklets 1 and 2. One consolation is that this type of question is not on the exams as frequently as the other kinds of percent problems.

39. The answer is b. We're asked to find the amount of tax on the Food Cost category in Phoenix. We know that before the tax the cost was $33.19, and after the tax it was $34.85. We need to find the tax, or what the percent of the increase was. We would do this like percent increase problems. The difference, $1.66, will be divided by the original number, the number that chronologically came first, the pre-tax figure of $33.19. 1.66 divided by 33.19 = .05 = 5%. We can check this by taking the original cost, $33.19 and multiplying it by 5%. (33.19x *.05* = 1.66), and then adding the 1.66 to the 33.19 to see if we get 34.85. 33.19+1.66=34.85.

40. The answer is c. We need to compare the cost of a market basket in San Francisco given in the table to the 1982 cost given in the question. In the table, San Francisco's Food Cost is given as $38.82. This increased to *$59.52.* To solve this problem, we will take the difference between the two figures, and divide it by the original number, the number that chronologically came first. $59.52 -38.82 = $20.70.
$\frac{20.70}{38.82}$ = .533 = 53.3% increase, choice c.

This concludes the tabular section. We hope that you will practice with these questions over time, and use them in the future to refresh your memory and sharpen your skills for other exams as well. You also may find it helpful to practice and discuss these questions with friends, as that may give you additional insights into the problem solving processes required. Once you understand how to approach these problems, the major obstacles on the exam become the tediousness of the questions, which can lead to carelessness, and zombie-like responses. By practicing with this material before the exam, and taking short food and rest breaks, you should be able to escape those pitfalls.