

# Understanding and Interpreting Tabular Material II/Quantitative Analysis

Book #15

*Examination Preparation Book*



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Local 1000 AFSCME, AFL-CIO  
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# **Understanding and Interpreting Tabular Material II/ Quantitative Analysis**

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## **Understanding and Interpreting Tabular Material II / Quantitative Analysis**

This booklet is intended to help you prepare for specific New York State civil service exams. The 54 practice questions that follow are the kinds of questions you're likely to find on exams that test your ability to interpret tables and perform complex math operations.

Questions in this section of tests involve tables that may be formatted in ways you are not accustomed to seeing. For example, the total for a column may be at the top of the column rather than at the bottom.

The math operations you will need to perform may also be unfamiliar to you. You may have to work with percents, ratios, and averages to answer these questions. But you do not have to be a math genius. With a little practice, you can master the basic math concepts you will need. For additional help, see the Appendix: Working with Percents and Ratios.

Be sure to read the questions and study the tables carefully. If you are given an explanation of what certain items on a table mean, be sure you understand the explanation. One good way to improve your score on this part of the test is to take the time to understand exactly what you are being told about the tables and what you are being asked to do.

Each table in this booklet is followed by a set of questions. Stop after each set and review your answers in the back of the booklet. If you answer a question incorrectly, try to analyze why you chose the wrong answer.

Good luck!

Use the table below to answer questions 1 through 3.

**Highest Educational Attainment, U.S. Population (in thousands)**

	Total	Male	Female
Population, age 25 and older	208,730	100,630	108,100
Less than 9th grade	5.8%	5.9%	5.7%
9th to 12th grade, no diploma	7.9%	8.4%	7.4%
High school graduate	28.0%	28.6%	27.5%
Some college, no degree	21.3%	20.9%	21.6%
Associate's degree	8.0%	7.1%	8.8%
Bachelor's degree	18.2%	18.0%	18.3%
Graduate or professional degree	10.9%	11.1%	10.7%

1. Approximately what percent of women age 25 and older do not have at least a bachelor's degree?
  - a. 81.7%
  - b. 18.3%
  - c. 10.7%
  - d. 71.0%
2. Approximately how many people age 25 and older do not have at least a high school diploma?
  - a. 28,596
  - b. 16,490,000
  - c. 28,596,000
  - d. 58,440,000
3. Which of the following statements is best supported by the data on this table?
  - a. There are more men than women in this age group who have a graduate or professional degree.
  - b. There are more men than women in this age group who have at least a bachelor's degree.
  - c. There are more men than women in this age group who do not have a high school diploma.
  - d. There are more men than women in this age group who have less than a 9th grade education.

Use the table below to answer questions 4 through 7.

**Health Insurance Data for U.S. Population (numbers in thousands)**

	2011			2012		
	Total	Uninsured		Total	Uninsured	
		Number	Percent		Number	Percent
Under Age 65	267,320	47,923	17.9	267,829	47,312	17.7
Under Age 19	78,384	7,634	9.7	78,177	7,193	9.2
Age 19 to 25	29,909	8,272	27.7	30,207	8,205	27.2
Age 26 to 34	37,174	10,237	27.5	37,631	10,228	27.2
Age 35 to 44	39,927	8,399	21.0	39,877	8,428	21.1
Age 45 to 64	81,926	13,382	16.3	81,937	13,257	16.2
Age 65 and up	41,507	690	1.7	43,287	639	1.5

4. What percent of the population under age 19 had health insurance in 2012?
  - a. 9.7%
  - b. 9.2%
  - c. 91.8%
  - d. 90.8%
  
5. In 2011, approximately what percent of the total population was under age 19?
  - a. 29%
  - b. 25%
  - c. 21%
  - d. 18%
  
6. Which of the following age groups had the smallest change in the number of uninsured from 2011 to 2012?
  - a. Under Age 19
  - b. Age 19 to 25
  - c. Age 26 to 34
  - d. Age 35 to 44
  
7. In 2012, what percentage of the uninsured population was between the ages of 19 and 34?
  - a. 54.4%
  - b. 55.2%
  - c. 38.4%
  - d. 38.6%

Use the table below to answer questions 8 through 12.

### New England Population Below Poverty

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

\* Percent of total population within state

\*\* Percent of total population within each high risk group

8. What proportion of the people in Massachusetts living below the poverty level are over 60 years of age?
  - a. 9.6%
  - b. 16%
  - c. 8%
  - d. 53%
  
9. Approximately what percent of the total New England population is shown to be in high risk age groups?
  - a. 54%
  - b. 46.6%
  - c. 9%
  - d. 5%



10. If among those individuals living below the poverty level the male to female ratio is 1:4, how many females are living below the poverty level in New England?
- a. 915,589
  - b. 286,122
  - c. 228,897
  - d. 968,542
11. In Massachusetts, 3,473 pregnant women living below poverty level received federally-funded prenatal care. If the participation rate is consistent for Connecticut and Rhode Island, approximately how many pregnant women living below poverty level received federally-funded prenatal health care in Connecticut?
- a. 1,544
  - b. 3,499
  - c. 2,949
  - d. cannot be determined from the information given
12. Which state has the highest percentage of pregnant women in its population?
- a. Rhode Island
  - b. Massachusetts
  - c. New Hampshire
  - d. Vermont

Use the table below to answer questions 13 through 17.

### NEW YORK STOCK EXCHANGE

	CLOSING			CHANGE		
	10/9/14	3/8/15	3/9/15	Change	Percent	Pct. 5 months
Disney	85.71	103.82	105.26	?	?	?
Target	61.60	77.21	78.57	1.36	1.76%	27.55%
Boeing	122.76	153.12	154.75	1.63	1.06%	26.06%
Dow Industrials	16,659.25	17,856.78	?	138.94	0.778%	8.02%
Fed Ex	156.51	173.19	172.91	-0.28	-0.162%	10.48%
Coca Cola	43.87	?	?	?	?	-5.65%
3M	138.64	164.36	166.37	2.01	1.22%	20.00%
GM	31.03	36.84	37.66	0.82	2.23%	21.37%
S&P 500	1,928.20	2,071.30	?	?	0.392%	?

13. From 3/8 to 3/9, Disney
  - a. increased 1.39%
  - b. decreased 1.39%
  - c. increased 1.37%
  - d. decreased 1.37%
  
14. On 3/9, the value of Dow Industrials, compared to the S&P 500, was
  - a. \$15,785.48 greater
  - b. \$15,638.42 greater
  - c. approximately 8.65 times greater
  - d. approximately 86 times greater

15. If, on March 10, Coca-Cola increased 20% from the March 9 figure, its closing price on that day would have been
- a. \$52.65
  - b. \$49.67
  - c. \$55.62
  - d. cannot be determined from information given
16. If 3M closed on 10/9/14 at 35% less than it closed seven months before, the closing price for 3M on 3/9/14 would have been
- a. \$102.696
  - b. \$213.29
  - c. \$214.04
  - d. \$187.16
17. According to the chart, about how much did Disney grow over the five months compared to the S&P 500?
- a. 2.6 times faster
  - b. 26.7% slower
  - c. 2.8 times faster
  - d. 15% more

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

By doing the operations necessary to fill in the table, you will be able to answer questions 18–22.

Dept	Min Bal	Auto Alloc	Jan	Feb	Mar	Apr	May	June	Beg Bal	Jan	Feb	Mar	Apr	May	June
A	300	600	300	350	200	150	400	250	800	500	750	550	400	600	350
B	500	900	400	350	600	500	450	300	1100						V
C	200	300	150	100	200	200	100	200	400						W
D	800	1200	600	700	500	450	650	700	1600						X
E	600	900	600	700	650	400	550	700	1400						Y
F	400	700	400	350	200	450	300	250	500						Z

18. Find the value of V.

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

19. Find the value of W.

- a. \$450
- b. \$300
- c. \$350
- d. \$2,500

20. Find the value of X.

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

21. Find the value of Y.

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

22. Find the value of Z.

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

The tables below contain information about the 2014 operating budgets for three units in a department. Consolidate this information in the table on the next page and use your findings to answer questions 23–28.

**Unit A**

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

**Unit B**

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

**Unit C**

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

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
Expense Accounts					
Maintenance					
Postal Fees					
Supplies: Paper					
Supplies: Non-Paper					
Utilities: Electricity					
Utilities: Phone					
Total					

23. The only expense that decreased between the 3rd and 4th quarter was
- maintenance
  - electricity
  - phone
  - non-paper supplies
24. Between the 1st and the 2nd quarter, the largest percent decrease occurred in which category?
- phone
  - expense accounts
  - non-paper supplies
  - paper supplies

25. If the rate of increase for expense accounts were to be the same from the 4th quarter of 2014 to the first quarter of 2015 as it was from the 3rd quarter to the 4th quarter of 2014, what amount would be spent for expense accounts in the 1st quarter of 2015?
- a. \$1,538
  - b. \$6,164
  - c. \$15,389
  - d. \$6,189
26. The category that had the most stable expenses throughout the year was
- a. electricity
  - b. expense accounts
  - c. postal fees
  - d. maintenance
27. On the whole, all the units are least expensive to maintain during which quarter?
- a. 1st
  - b. 2nd
  - c. 3rd
  - d. 4th
28. For every dollar the three units spent on paper supplies during the year, approximately how much did they spend on non-paper supplies?
- a. \$1.18
  - b. \$2.12
  - c. \$1.75
  - d. \$0.86



Use the following tables to answer questions 29 through 32.

**Table 1: Types of Warehouses, 2010**

Category of Operation	Number of Establishments	Revenue (\$000)	Percent of Total Revenue
Local trucking & storage	4,687	823,959	?
General merchandise	?	610,566	28.74
Refrigerated goods	1,534	?	16.55
Farm products	744	155,085	7.30
Special warehousing	?	136,861	6.44
Household goods	423	46,698	?
TOTAL	10,026	2,124,765	100.00

**Table 2: General Merchandise Warehouses**

Year	Number of Establishments	Public Floor Space (000 sq. ft.)	Number of Paid Employees	Revenue (\$000)
1990	1,197	108,315	22,283	171,542
1995	1,512	119,325	22,496	200,934
2000	1,483	129,170	22,880	248,282
2005	1,667	163,168	28,295	379,910
2010	2,170	296,067	32,495	610,566

29. How many square feet of public floor space were held by the average general merchandise establishment in 2010?
- 136
  - 973
  - 97,298
  - 136,436

30. In which of the following categories of operation was the average revenue per establishment greatest in 2010?
- a. local trucking and storage
  - b. general merchandise warehousing
  - c. refrigerated goods
  - d. it cannot be determined from the information given
31. How many special warehousing establishments were there in 2010?
- a. 801
  - b. 468
  - c. 344
  - d. it cannot be determined from the information given
32. In 2010, which category of warehouses generated the least revenue per establishment?
- a. local trucking & storage
  - b. general merchandise warehousing
  - c. farm products
  - d. household goods

Use the following tables to answer questions 33 through 37.

**Employee Training Program**

INCOME	2013	2014	2015
Federal Funds	57,800	64,070	?
Commodities Support	20,000	26,900	29,800
CBG Grants	14,000	10,000	0
Training Contracts	?	27,170	54,840
County Funds	12,400	17,500	23,070
Grants	0	?	16,000
Smith Foundation	0	8,000	12,000
Wealth-Rite Corp.	0	5,000	?
<b>TOTAL</b>	<b>70,200</b>	<b>?</b>	<b>?</b>

EXPENSES	2013	2014	2015
Personnel	51,750	71,300	90,850
Salaries	45,000	?	?
Benefits	6,750	?	11,850
Office	10,120	13,540	17,505
Training Materials	6,800	8,500	9,540
Transportation	1,530	2,230	3,120
<b>TOTAL</b>	<b>70,200</b>	<b>95,570</b>	<b>?</b>

33. By approximately what percent did the training program's expenses increase from 2013 to 2014?
- 73%
  - 36%
  - 27%
  - 54%
34. By approximately what percent did the training program's income increase from 2013 to 2014?
- 35%
  - 29%
  - 27%
  - 24%

35. Which of the following categories of expenses had the greatest percent increase from 2013 to 2014?
- a. Personnel
  - b. Office
  - c. Training Materials
  - d. Transportation
36. From 2013 to 2014, salaries increased by the same percent as total personnel expenses. What was the amount of salaries in 2014?
- a. \$62,010
  - b. \$68,760
  - c. \$64,550
  - d. it cannot be determined from the information given
37. For each dollar spent on training materials in 2015, approximately how many dollars were spent on personnel?
- a. \$7.64
  - b. \$9.52
  - c. \$7.90
  - d. \$0.79

Use the following table to answer questions 38 through 40.

**Budget Summary: Public Safety Program**

Sub-Program	Expended 2014	Departmental Request 2015	City Manager Recommendation 2015	Adopted 2015
Administration	268,249		317,118	318,358
Law Enforcement	13,243,897	14,437,183	14,201,302	14,202,121
Traffic Safety	302,109	362,871	A	361,067
Other Protection	389,765	401,905	395,291	398,777
TOTAL		15,519,587	15,273,915	15,280,323

38. What is the value of A?
- a. 360,204
  - b. 677,322
  - c. 664,980
  - d. 306,402
39. What was the percentage change between the total expenditures in 2014 and the total budget adopted in 2015?
- a. 7.0%
  - b. 7.6%
  - c. 0.76%
  - d. 6.7%
40. What was the difference between the amount requested for administration and the amount recommended by the city manager?
- a. 50,109
  - b. 48,869
  - c. 730
  - d. 510

Use the following table to answer questions 41 through 44.

**Hypertension Screening Program, 2010–2014**

	2010	2011	2012	2013	2014
Persons screened (thousands)	3,040	3,810	2,950	2,600	2,540
% over 65	10%	12%	11%	13%	9%
% under 35	12%	14%	15%	17%	17%
Expenditures for local, state, and federal funding sources					
Total (\$ millions)	15.55	23.05	24.00	24.50	25.65
% local	7%	8%	6%	4%	7%
% state	20%	14%	19%	22.5%	25%

41. In which three years were the amounts from federal sources approximately the same?
- 2010, 2011, 2012
  - 2011, 2012, 2013
  - 2012, 2013, 2014
  - 2010, 2012, 2013
42. Between 2010 and 2011, the number of individuals in the 35–65 age bracket increased by
- 448,000
  - 224,000
  - 124,000
  - 512,000
43. For every dollar provided by the federal government in 2013, approximately how much was spent by the state governments?
- \$3.06
  - \$1.25
  - \$0.90
  - \$0.30

44. From this table, one could conclude that
- a. there are more people under 35 who have hypertension than there are people over 35 who have hypertension
  - b. the number of people under 35 screened for hypertension increased from 2011 to 2012.
  - c. the amount of local funds used for hypertension screening remained approximately the same from 2012 to 2013
  - d. the amount of local funds used for hypertension screening increased from 2010 to 2012.

The following paragraphs below give hypothetical information regarding the number, by age groups, of individuals using five state-run lake facilities for the months of July and August, 2014. Assume that no one participated in more than one activity. Also, if an activity is not mentioned, assume that it is not offered at that particular lake.

## JULY

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

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

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

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

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



## AUGUST

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

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

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

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

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

By filling in the table on the next page, you will be able to answer Questions 45-49.

	0-12	13-19	20-60	Over 60	TOTAL
Swim					A
Row					B
Canoe					C
Sail					D
Fish					E
Total	F	G	H	I	J

45. Find the value of A.

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

46. Find the value of C.

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

47. Find the value of D.

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

48. Find the value of G.

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

49. Find the value of I.

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

Listed below are per person fees for swimming and fishing privileges at the five lakes. Use this information and the information on pages 20 and 21 to fill in the table on page 25. Again, assume that no one participated in more than one activity, and that those activities which are not mentioned are not offered.

LAKE ARTHUR				
	0-12	13-19	20-60	over 60
Swimming	1.25	2.50	5.00	2.50

LAKE GLEASON				
	0-12	13-19	20-60	over 60
Fishing	free	2.50	7.50	2.50

LAKE RANDOLPH				
	0-12	13-19	20-60	over 60
Swimming	2.50	5.00	5.00	2.50
Fishing	free	5.00	5.00	Free

MOON LAKE				
	0-12	13-19	20-60	over 60
Swimming	free	2.50	5.00	Free
Fishing	free	free	5.00	Free

MEADOW LAKE				
	0-12	13-19	20-60	over 60
Swimming	2.50	5.00	10.00	5.00

TOTAL REVENUES IN THE FIVE-LAKE REGION: SUMMER, 2014

	0-12	13-19	20-60	over 60	TOTAL
Swimming					A
Fishing					B
Boat Rental					
Sailboat	NA	\$1,000	\$63,750	\$44,000	C
Canoe	NA	\$10,475	\$100,000	\$39,000	D
Rowboat	\$1,750	\$10,250	\$18,750	\$4,500	E
TOTAL	F	G	H	I	J

50. Find the value of A.

- a. \$700,302.50
- b. \$818,312.50
- c. \$933,127.50
- d. \$804,312.50

51. Find the value of B.

- a. \$233,500
- b. \$22,850
- c. \$26,100
- d. \$23,350

52. Find the value of G.

- a. \$169,225
- b. \$80,175
- c. \$180,125
- d. \$139,625

53. Find the value of H.

- a. \$669,350
- b. \$664,700
- c. \$719,950
- d. \$701,200

54. Find the value of J.
- a. \$996,487.50
  - b. \$1,121,137.50
  - c. \$976,987.50
  - d. \$951,137.50

## Answer Key

1. d	19. c	37. b
2. c	20. c	38. a
3. c	21. b	39. b
4. d	22. d	40. d
5. b	23. a	41. b
6. c	24. c	42. a
7. c	25. c	43. d
8. b	26. d	44. d
9. d	27. c	45. c
10. a	28. d	46. b
11. a	29. d	47. b
12. d	30. b	48. a
13. a	31. b	49. d
14. c	32. d	50. d
15. b	33. b	51. d
16. b	34. a	52. c
17. d	35. d	53. d
18. a	36. a	54. b

## Answers and Explanations

1. The correct answer is d. The table tells us that 18.3% of women in this age group have a bachelor's degree and 10.7% have a graduate or professional degree. So 29.0% have at least a bachelor's degree ( $18.3\% + 10.7\% = 29.0\%$ ). If 29.0% have at least a bachelor's degree, then 71.0% do not ( $100\% - 29.0\% = 71.0\%$ ). You could also have answered this question by adding the percents in these categories:

Less than 9th grade:	5.7%
9th to 12th grade, no diploma:	7.4%
High school graduate:	27.5%
Some college, no degree:	21.6%
Associate's degree:	<u>8.8%</u>
	71.0%

2. The correct answer is c. The table tells us that 5.8% of the population have less than a 9th grade education and 7.9% have a 9th to 12th grade education but no high school diploma. So 13.7% of the population do not have a high school diploma ( $5.8\% + 7.9\% = 13.7\%$ ). Convert 13.7% to a decimal by moving the decimal point two places to the left:

$$13.7\% = .137$$

Then multiply this number by the total population in this age group.

$$.137 \times 208,730 = 28,596$$

Remember that the population numbers are in thousands, so this number is actually 28,596,000. See the Appendix for more information about working with percents.

3. The correct answer is c. The table tells us that 5.9% of men in this age group have less than a 9th grade education and 8.4% have a 9th to 12th grade education but no high school diploma. So 14.3% do not have a high school diploma ( $5.9\% + 8.4\% = 14.3\%$ ). Convert 14.3% to a decimal by moving the decimal point two places to the left.

$$14.3\% = .143$$

Then multiply this number by the male population in this age group.

$$.143 \times 100,630 = 14,390$$

Now do the same calculation for women. The table tells us that 5.7% of women in this age group have less than a 9th grade education and 7.4% have a 9th to 12th grade education but no high school diploma. So 13.1% do not have a high school diploma ( $5.7\% + 7.4\% = 13.1\%$ ). Convert 13.1% to a decimal by moving the decimal point two places to the left.

$$13.1\% = .131$$

Then multiply this number by the female population in this age group.

$$.131 \times 108,100 = 14,161$$

So there are more men than women in this age group who do not have a high school diploma.



4. The correct answer is d. In 2012, 9.2% of the population under age 19 were uninsured. This means that 90.8% had insurance ( $100\% - 9.2\% = 90.8\%$ ).
5. The correct answer is b. To determine what percent of the population was under 19, you first need to know the total population. To find the total population, add the number under age 65 and the number age 65 and older

$$267,320 + 41,507 = 308,827$$

Now divide the number under age 19 by the total population

$$78,384 \div 308,827 = .25381$$

$$.25381 = 25.38\%$$

6. The correct answer is c. For each of these age groups, subtract the number of uninsured in 2011 from the number of uninsured in 2012.

$$\text{Under age 19: } 7,193 - 7,634 = -441$$

$$\text{Age 19 to 25: } 8,205 - 8,272 = -67$$

$$\text{Age 26 to 34: } 10,228 - 10,237 = -9$$

$$\text{Age 35 to 44: } 8,428 - 8,399 = 29$$

Notice that the question asks which group had the greatest *change*, not the greatest increase or decrease.

7. The answer is c. To find this answer, you need to figure out the total number of uninsured in the specified age range (19 to 34) and divide it by the total number of uninsured. Combine the 19 to 25 and 26 to 34 ranges:

$$10,228,000 + 8,205,000 = 18,433,000$$

The easiest way to find the total number of uninsured is to add the under age 65 and the 65 and older ranges.

$$47,312,000 + 639,000 = 47,951,000$$

To find the percent of the uninsured population that was in the 19 to 34 age range, divide the number of uninsured in this range by the total number of uninsured.

$$18,433,000 \div 47,951,000 = 0.384 = 38.4\%$$

If you used the figures for 2011, you would have come up with option d.

8. The answer is b. The key word here is “proportion” which signals that a comparison is being made. Looking at the answers, you can see that the comparison is made in terms of percentages. So, you could just as easily phrase the question in this way: What percent of the people in Massachusetts living below poverty are over 60 years of age? To find this you must divide the number of people over 60 living in poverty in Massachusetts (83,599) by the total number of Massachusetts residents living in poverty (532,458).

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

This yields .157. Moving the decimal two points to the right and rounding off, this becomes 16%.

9. The answer is d. To answer this question, you need to know New England’s total population. You are not given this number, but you are given the number below the poverty level and the percent below the poverty level.

According to the table, the total number below the poverty level is 1,144,486, and this number is 9.3% of New England’s total population. In other words,

$$1,144,486 = 9.3\% \text{ of total New England population}$$

Let’s use the letter  $x$  to represent the total New England population. So we can say

$$1,144,486 = 9.3\% \text{ of } x$$

If we convert 9.3% to a decimal, we have

$$1,144,486 = .093x$$

To find  $x$ , divide both sides of the equation by .093. The answer is 12,306,301. This is the total population of New England.

Now you need to know what percent of the total population is in high risk age groups. To find the total high risk population, add the total figures for each age group. [11,679 + 115,861 + 295,817 + 192,314 = 615,671]

Now to find what percent of the population is high risk, divide the high risk population by the total population.

$$615,671 \div 12,306,301 = .05 = 5\%$$

10. The answer is a. This is a ratio question. You are told that the male to female ratio of individuals living below the poverty level is 1 to 4. In other words, 1 out of every 5 individuals in this group is a man and 4 out of every 5 are women. The total number of individuals in this group is 1,144,486. To express the number of women as a ratio, you would write this equation:

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

To solve this equation, you “cross multiply.” Multiply 4 times 1,144,486 and multiply 5 times  $x$ . You get:

$$5x = 4,577,944$$

To find  $x$ , divide both sides of the equation by 5.

$$x = 915,589.$$

This is the number of women living below the poverty level.

11. The answer is a. The simplest way to solve this question is to use percentages. You are told that in Massachusetts 3,473 pregnant women receive federally funded assistance. There are a total of 5,227 pregnant women in Massachusetts. To find the percent who receive assistance, divide 3,473 by 5,227.

$$3,473 \div 5,227 = .664 = 66.4\%$$

This is the “participation rate” in Massachusetts. You are told that the rate is the same in Connecticut. To find the number of women in Connecticut who receive federal assistance, multiply the participation rate times the number of pregnant women.

$$.664 \times 2,325 = 1,544$$

12. The answer is d. Much like the second problem in this section, this one requires us to use what we have to get what we need. We know the number below the poverty level and the percent below the poverty level for each of the four states.

10.3% of total RI population = 93,959  
 9.6% of total Mass. population = 532,458  
 8.5% of total NH population = 75,364  
 12.1% of total VT population = 59,059

Let’s use Rhode Island as an example. We know that 10.3% of the population equals 93,959. Let’s use  $x$  to represent the total population. When we convert 10.3% to a decimal, we get this equation:

$$.103x = 93,959$$

To find  $x$ , divide both sides of the equation by .103.

$$x = 912,223$$

When you use this procedure for the other states you get these results for total population:

RI: 912,223  
 MA: 5,546,438  
 NH: 886,635  
 VT: 488,090

Now you need to find what percent of the population is represented by pregnant women. Divide the number of pregnant women in each state by the total population of the state.

For RI:  $9,126 \div 912,223 = .0100 = 1.00\%$   
 For MA:  $54,448 \div 5,546,438 = .00982 = .982\%$   
 For NH:  $10,294 \div 886,635 = .0116 = 1.16\%$   
 For VT:  $5,835 \div 488,091 = .0120 = 1.20\%$

And you see that Vermont has the highest percentage of pregnant women.

13. The answer is a. This question is a standard percent increase type of problem. Disney went from 103.82 to 105.26. The difference is 1.44. Dividing 1.44 by 103.82, you get .01387 or 1.39%.

14. The answer is c. The first thing you have to do is find out what the closing price for Dow industrials was on March 9, 2015. The closing price for March 8 is given as 17,856.78. Two columns over is the column marked "Change." This is the change between the March 8 closing price and the March 9 closing price. (If you weren't sure that this is what "Change" meant, you could have checked by working with a company like Target for which all the figures are given.)

Next, find the closing price of the S&P by multiplying the percentage change (.392%, or .00392 in decimal form) by the March 8 value (2,071.30) to get the value 8.119 (or 8.12) for the column marked "Change." Now add this value to the March 8 value to get the March 9 value (2,079.42) for the S&P 500. Now you are ready to solve the problem.

The question asks you to compare the Dow Industrials price (17,995.72) with the S&P 500 (2,079.42). If you look at the answer choices, you'll realize that there are two forms. Choices a and b are straight dollar-for-dollar comparisons. They are the kind of answers you would get if you simply subtracted one number from the other. Since this type of operation is easier, you would probably want to subtract 2,079.42 from 17,995.72 to see if it yielded any of the answers.  $17,995.72 - 2,079.42 = 15,916.3$  is not one of the answers.

Choices c and d are telling you how many times greater Dow was than the S&P. Try out each answer. Choice c says the Dow was approximately 8.65 times greater than the S&P. Multiply 8.65 times the price of the S&P (2,079.42). You get 17,987, which is approximately the value of the Dow Industrials. So choice c is correct.

15. The answer is b. You first need to find the figure for March 9. This time it seems more difficult to solve, and you may have been tempted to choose choice d and be done with it. But, if you look at what you are given, you'll see that you have the price five months ago (43.87) and the percent change from five months ago (-5.65%). You may have realized that

this was no accident. Next, you must discover that the last column gives the percent change from five months ago to March 9, 2015, not to March 8, 2015. (It doesn't say this in the table, but it seems logical, and you could have checked by working with one of the companies like Target for which all the figures are given. To check, you would figure the percent decrease for Target using both the 3/8/15 figure and the 3/9/15 figure. Since 3/9/15 yields a percent increase for Target of 27.55%, it is the date to work with.)

Because the 5-month figure for Coca-Cola is -5.65%, it's a percent decrease, so you have to make sure that your answer is less than the figure of five months ago. First, change 5.65% into a decimal, .0565, then multiply this by the 10/9/14 figure, 43.87.  $[.0565 \times 43.87 = 2.48]$  By subtracting this from the 10/9/14 price, you have the price for March — 41.39. The question asks what a 20% increase over this figure would be, so again change the percent to a decimal and multiply.  $[41.39 \times .20 = 8.278=8.28]$  Because this new change is a percent decrease, add 8.28 to 41.39 (the March 9 price) to get the answer — 49.67.

16. The answer is b. The question says that the price on 10/9/14 (138.64) was 35% less than the price on 3/9/14. In other words, the price on 10/9/14 was 65% of the price on 3/9/14. Convert 65% to a decimal. Use  $x$  to represent the price on 3/19/14. Now you can say:

$$138.64 = .65x$$

To find  $x$ , divide both sides of the equation by .65.

$$x = 213.29$$

17. The answer is d. This question is asking you to compare the rate of growth of Disney and the S&P. We can do this by relating the percentage change rates of Disney and the S&P over five months, neither of which is given by the table.

First calculate the change for Disney. It went from 85.71 to 105.26, so this is an increase of 19.55. To find the percent increase, divide the amount of the increase by the original amount:

$$19.55 \div 85.71 = .22809 = 22.81\%$$

Three problems ago we used the percentage change from March 8 to March 9 to figure out the S&P value on March 9 (2,079.42). The value of the S&P went from 1928.20 to 2,079.42, so this is an increase of 151.22. To find the percent increase, divide the amount of the increase by the original amount:

$$151.22 \div 1,928.20 = .07842 = 7.84\%$$

Now to compare the growth of the two, divide the Disney rate by the S&P rate:

$$22.81 \div 7.84 = 2.908$$

This is not one of our options, but it allows us to eliminate options a and c. If instead of looking at how much faster the growth was we look at how much more there was in percentage terms, we would subtract the S&P 5-month rate from Disney's to get

$$22.81\% - 7.84\% = 14.97\%$$

This is closest to option d.

18. The correct answer is a. Questions 18 through 22 all follow the same basic format. To answer these questions, you need to fill in the blanks in the table on page 8. But first you have to understand how the table is set up. Let's look at the row for Dept. A, which is provided to you as an example.

Department A needs to have at least \$300 in its account at all times (minimum balance, column 2). Whenever an expenditure arises that would take the department below that \$300 figure, a \$600 allocation is automatically added to the department's account (automatic allocation, column 3). Department A starts the year with \$800 left over from the previous year (beginning balance, column 10). In January, the department spends \$300 (column 4). This brings the department's balance down to \$500 ( $\$800 - \$300 = \$500$ ). So the department begins the next month, February, with \$500. In February, the department spends \$350. This brings the balance down to \$150. This amount is below the minimum balance, so the department receives an automatic allocation of \$600. Now the department has a balance of \$750. In March, the department spends \$200, so the balance becomes \$550. In April, the department spends \$150, so the balance becomes \$400. In May, the department spends \$400, so the balance is reduced to \$0. Because the balance goes below the minimum balance, the department receives an automatic allocation of \$600, so the balance is now \$600. In June, the department spends \$250, so the balance becomes \$350.

This is a lengthy process, but the math is fairly simple. The key to answering these questions is to understand how the table is set up. When you fill in the blanks the table will look like this:

Dept	Min Bal	Auto Alloc	Jan	Feb	Mar	Apr	May	June	Beg Bal	Jan	Feb	Mar	Apr	May	June
A	300	600	300	350	200	150	400	250	800	500	750	550	400	600	350
B	500	900	400	350	600	500	450	300	1100	700	1250	650	1050	600	1200
C	200	300	150	100	200	200	100	200	400	250	450	250	350	250	350
D	800	1200	600	700	500	450	650	700	1600	1000	1500	1000	1750	1100	1600
E	600	900	600	700	650	400	550	700	1400	800	1000	1250	850	1200	1400
F	400	700	400	350	200	450	300	250	500	800	450	950	500	900	650

19. The correct answer is c. (See the explanation for question 18).
20. The correct answer is c. (See the explanation for question 18).
21. The correct answer is b. (See the explanation for question 18).
22. The correct answer is d. (See the explanation for question 18).

23. The correct answer is a. To answer questions 23 through 28, you will need to complete the table on page 11. This is a time-consuming process, but the math involved is simple. You just need to add the amounts spent by each unit in each quarter. When you complete the table, you will find that the only expense that decreased between the third and fourth quarter was Maintenance. You can see the completed table below.

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
Expense Accounts	1,500 2,000 <u>4,100</u> 7,600	1,700 3,000 <u>3,200</u> 7,900	1,000 1,500 <u>3,000</u> 5,500	2,100 3,500 <u>3,600</u> 9,200	30,200
Maintenance	400 450 <u>800</u> 1,650	450 400 <u>650</u> 1,500	400 350 <u>850</u> 1,600	350 400 <u>750</u> 1,500	6,250
Postal Fees	250 350 <u>300</u> 900	200 250 <u>600</u> 1,050	150 200 <u>300</u> 650	300 450 <u>550</u> 1,300	3,900
Supplies: Paper	500 500 <u>300</u> 1,300	200 300 <u>400</u> 900	150 250 <u>250</u> 650	250 600 <u>350</u> 1,200	4,050
Supplies: Non-Paper	450 450 <u>400</u> 1,300	150 300 <u>200</u> 650	100 250 <u>350</u> 700	200 300 <u>350</u> 850	3,500
Utilities: Electricity	150 200 <u>600</u> 950	150 150 <u>400</u> 700	225 250 <u>450</u> 925	200 250 <u>500</u> 950	3,525
Utilities: Phone	300 350 <u>800</u> 1,450	200 300 650 1,150	150 200 <u>450</u> 800	350 300 <u>700</u> 1,350	4,750
Total	15,510	13,850	10,825	16,350	56,175

24. The correct answer is c. This question asks which of the options had the largest percent decrease between the first and second quarters. One of the choices, Expense Accounts, actually had an increase, so you can ignore it. For the remaining three choices, first calculate the amount of the decrease.

Phone	Non-Paper Supplies	Paper Supplies
1st Quarter: 1,450	1st Quarter: 1,300	1st Quarter: 1,300
2nd Quarter: <u>1,150</u>	2nd Quarter: <u>650</u>	2nd Quarter: <u>900</u>
Decrease: 300	Decrease: 650	Decrease: 400

Now, to calculate the percent decrease, divide the decrease for each category of expenses by the amount in the first quarter. (See the Appendix for more information about working with percents.)

$$\text{Phone: } 300 \div 1,450 = .21$$

$$\text{Non-Paper Supplies: } 650 \div 1,300 = .50$$

$$\text{Paper Supplies: } 400 \div 1,300 = .31$$

Convert these decimals to percents by moving the decimal point two places to the right.

$$\text{Phone: } 300 \div 1,450 = 21\%$$

$$\text{Non-Paper Supplies: } 650 \div 1,300 = 50\%$$

$$\text{Paper Supplies: } 400 \div 1,300 = 31\%$$

25. The correct answer is c. This is a percent increase question. First figure the percent increase in Expense Accounts from the 3rd quarter to the 4th quarter of 2014. To do this, first find the amount of the increase:

4th quarter:	9,200
3rd quarter:	<u>5,500</u>
Increase:	3,700

Now, to find the percent increase, divide the amount of the increase by the amount in the third quarter:

$$3,700 \div 5,500 = .6727$$

The question says that the rate of increase from the 4th quarter of 2014 to the 1st quarter of 2015 is expected to be the same as the rate of increase from the 3rd quarter of 2014 to the 4th quarter of 2014. To find the *amount* of the increase from the 4th quarter of 2014 to the 1st quarter of 2015, multiply the rate of increase times the amount in the 4th quarter of 2014.

$$9,200 \times .6727 = 6,188.8$$

Now, to find the amount for the 1st quarter of 2015, add the amount of the increase to the amount in the 4th quarter.

$$9,200 + 6,188.8 = 15,388.8$$

You can round this number to 15,389.



26. The correct answer is d. This question asks which category had the most stable expenses throughout the year. To answer this question, look for the high and low quarterly totals for the four choices. The differences between the high and low quarterly totals are:

Electricity: 250  
Expense Accounts: 3,700  
Postal Fees: 650  
Maintenance: 150

So Maintenance has the smallest variation in expenses during the course of the year.

27. The correct answer is c. This is a very simple question. Just look at the totals for each quarter. The 3rd quarter has the lowest total.

28. The correct answer is d. This is a ratio question. In ratio language, the question is:

Paper Supplies is to Non-Paper Supplies as 1 is to  $x$ , *or*  
4,050 is to 3,500 as 1 is to  $x$

You would set up this problem like this:

$$\frac{4050}{3500} = \frac{1}{x}$$

To solve this problem, you “cross multiply.” That is, multiply 4050 times  $x$  and multiply 1 times 3500 times 1. You get

$$4050x = 3500$$

To solve for  $x$ , divide both sides of the equation by 4050. You find that  $x = .864$ . So for every dollar spent on paper supplies, \$0.86 was spent on non-paper supplies.

29. The answer is choice d. To find how many square feet of floor space were held by the average establishment in 2010, divide the public floor space, 296,067, by the number of establishments, 2,170. You get 136. But notice that the heading of the “Public Floor Space” column says, in parentheses, (000 sq. ft.). This means that the numbers in the column have three additional zeros on them. So now instead of the number of square feet being 296,067, it is 296,067,000. If you divide this number by the number of establishments, you get 136,436.
30. The answer is choice b. This question asks, “In which category of operation was the average revenue per establishment greatest in 2010?” To find the average revenue per establishment for each category, you need to divide the total revenue by the number of establishments. For example, to find the average revenue per establishment for local trucking and storage, you have to divide \$823,859 by 4,687.

But there's a problem here. Some of the information you need is missing from the table. Does this mean you should choose d, it cannot be determined? No, because with a little work, you can fill in the missing information. Let's see how we can fill in the blanks.

The number of establishments for general merchandise warehousing is missing, but you can find this number on the second table. It's 2,170.

The number of establishments for special warehousing is also missing, but if you look at the possible answers you see that special warehousing isn't one of the choices. So you don't need to worry about that number.

But there is still one important number missing. What is the total revenue for refrigerated goods? We know the revenue for all the other categories in this column, so the first step is to add these numbers. The total for all the other categories is 1,773,069. Now subtract this number from the total at the bottom of the column and you get 351,696.

Now divide the total revenue for each category by the number of establishments in that category. When you do the math for each of the possible answers, you see that the category with the greatest average revenue per establishment is general merchandise warehousing, choice b.

Local trucking:  $623,959 \div 4,687 = 133.13$   
 General merchandise:  $610,566 \div 2,170 = 281.37$   
 Refrigerated goods:  $351,696 \div 1,534 = 229.27$

31. The correct answer is b. To find the number of special warehousing units, first add up the number of warehouses in the other categories. (The number of general merchandise warehouses is not shown on the first table, but you can find this number on the second table.)

Local trucking	4,687
General merchandise:	2,170
Refrigerated goods:	1,534
Farm products:	744
Household goods:	<u>423</u>
	9,558

Now subtract this number from the total number of warehouses:

10,026
- <u>9,558</u>
468

This is the number of special warehousing units.

32. The correct answer is d. To answer this question, just divide the revenue for each type of warehouse by the number of warehouses.

Local trucking & storage:	$823,959 \div 4,687 = 176$
General merchandise:	$610,566 \div 2,170 = 281$
Farm products:	$155,085 \div 744 = 208$
Household goods:	$46,698 \div 423 = 110$

So household goods warehouses generated the least revenue per establishment.

33. The correct answer is choice b. The question asks, “By what percent did the training program’s spending increase from 2013 to 2014?” Whenever a question asks about percent increase or percent decrease, you first have to find the actual amount of the increase or decrease. You can see on the table that spending increased from 70,200 to 95,570. This is an increase of 25,370.

Now to figure the percent increase, divide the amount of the increase by the original amount. Divide 25,370 by 70,200. You get a decimal, 0.36. To convert a decimal to a percent, you move the decimal point two places to the right.

$$.36 = 36\%$$

34. The answer is choice a. The question asks, by approximately what percent did income increase from 2013 to 2014? When we look at the table we see that the total income for 2014 is missing, so we have to calculate this number. Remember how this table is set up. The totals for each source of income are ABOVE the subtotals. For example, the total for federal funds in 2014 is 64,070. This is the total of the three numbers below it.

So to figure out the total for grants, add the numbers for the subtotals, 8,000 and 5,000. The total for grants is 13,000.

Now we can add the totals for federal funds, county funds, and grants. The answer is 94,570.

Now to find out how much income increased from 2013 to 2014, subtract 70,200 from 94,570. Income increased by 24,370.

To figure the percent increase, divide the amount of the increase by the original amount. Divide 24,370 by 70,200. You get .347. To convert this decimal to a percent, move the decimal point two places to the right. You get 34.7%. And you can round this to 35%.

35. The answer is choice d. The questions asks, which category of expenses had the greatest percent increase from 2013 to 2014? Begin by calculating the increase for each category.

Personnel	Office	Training Materials	Transportation
2014: 71,300	2014: 13,540	2014: 8,500	2014: 2,230
2013: <u>-51,750</u>	2013: <u>-10,120</u>	2013: <u>-6,800</u>	2013: <u>-1,530</u>
19,550	3,420	1,700	700

Now to calculate the percent increase, divide the amount of the increase by the original amount (the amount in 2013):

Personnel:  $19,550 \div 51,750 = .378 = 37.8\%$

Office:  $3,420 \div 10,120 = .338 = 33.8\%$

Training Materials:  $1,700 \div 6,800 = .25 = 25\%$

Transportation:  $700 \div 1,530 = .458 = 45.8\%$

36. The answer is choice a. From 2013 to 2014, total personnel expenses increased from 51,750 to 71,300, an increase of 19,550. To calculate the percent increase, divide the amount of the increase by the original amount (the amount in 2013):

$$19,550 \div 51,750 = .378 = 37.8\%$$

You are told that salaries increased by the same percent. To find the amount of the increase for salaries, multiply the percent increase (expressed as a decimal) times the amount in 2013:

$$.378 \times 45,000 = 17,010$$

Add this increase to the amount of salaries in 2013 to find the amount of salaries in 2014:

$$45,000 + 17,010 = 62,010$$

37. The answer is choice b. This is a ratio question. In ratio language, the question is:

training materials is to personnel as 1 is to  $x$ , *or*

9,540 is to 90,850 as 1 is to  $x$

You would set up this problem like this:

$$\frac{9,540}{90,850} = \frac{1}{x}$$

To solve this problem, you “cross multiply.” That is, multiply 9,540 times  $x$  and multiply 1 times 90,850. You get

$$9,540x = 90,850$$

To solve for  $x$ , divide both sides of the equation by 9,540. You find that  $x = 9.52$ .

38. The answer is choice a. When you study the table, you see that A represents the city manager’s recommendation for traffic safety. This is the only number missing from this column in the table. To find this number, subtract the amounts given for all the other sub-programs from the total amount.
39. The answer is choice b. The first step in solving this problem is to find the total amount expended in 2014. To find this number, just add up the amounts spent for all the sub-programs. You find that the total amount expended was \$14,204,020. Now you need to find the change between the amount expended in 2004 and the total amount adopted in 2015.

15,280,323	Adopted 2015
– 14,204,020	Expended 2014
1,076,303	Change

Now to find the percentage change, divide the amount of the change by the original amount.

$$1,076,303 \div 14,204,020 = .076$$

To convert this decimal to a percentage, move the decimal point two places to the right.

$$.076 = 7.6\%$$

40. The answer is choice d. The first step in solving this problem is to find the amount requested for administration. This is the only number missing from the Departmental Request column. To find this number, subtract the amounts given for all the other sub-programs from the total in this column. You find that the amount requested was 317,628. Now subtract the amount recommended from the amount requested.

317,628	Request
– <u>317,118</u>	Recommendation
510	Difference

41. The answer is choice b. The first step in solving this problem is to find the percent of funds from federal sources. Funds come from three sources: federal, state, and local. You are given the percents for state and local but not federal. To find the percent from federal sources, add the percent from state and local sources and subtract this sum from 100%:

- In 2010, 7% came from local sources and 20% came from state sources, so 73% came from federal sources.
- In 2011, 8% came from local sources and 14% came from state sources, so 78% came from federal sources.
- In 2012, 6% came from local sources and 19% came from state sources, so 75% came from federal sources.
- In 2013, 4% came from local sources and 22% came from state sources, so 74% came from federal sources.
- In 2014, 7% came from local sources and 25% came from state sources, so 68% came from federal sources.

Now multiply each of these percents (expressed as decimals) times total expenditures for each year.

- 2010:  $.73 \times 15.55 = 11.35$
- 2011:  $.78 \times 23.05 = 17.98$
- 2012:  $.75 \times 24.00 = 18.00$
- 2013:  $.74 \times 24.50 = 18.13$
- 2014:  $.68 \times 25.65 = 17.44$

You see that the three years in which federal funds were approximately the same were 2011, 2012, and 2013.

42. The answer is choice a. To find the percent in the 35–65 bracket, subtract the percent under 35 and the percent over 65 from 100%.

- In 2010, 12% were under 35 and 10% were over 65, so 78% were in the 35–65 bracket.
- In 2011, 14% were under 35 and 12% were over 65, so 74% were in the 35–65 bracket.

To find the number of individuals in each age bracket, multiply the percent in the 35–65 bracket (expressed as a decimal) by the total number screened.

- 2010:  $.78 \times 3,040,000 = 2,371,000$
- 2011:  $.74 \times 3,810,000 = 2,819,000$

The number in the 35–65 bracket increased by 448,000.

43. The answer is choice d. To find the percent of the total that came from the federal government, subtract the percent from local sources (4%) and the percent from state sources (22%) from 100%. In 2013, 74% of funds came from the federal government. The question asks, for every dollar provided by the federal government, how many dollars were provided by states. In ratio language, the question is:

federal is to state as 1 is to  $x$ , or

74 is to 22 as 1 is to  $x$

Notice that you do not need to find the actual amounts from federal and state sources. The percents from these two sources will allow you to determine the ratio.

You would set up this problem like this:

$$\frac{74}{22} = \frac{1}{x}$$

To solve this problem, you “cross multiply.” That is, multiply 74 times  $x$  and multiply 1 times 22. You get

$$74x = 22$$

To solve for  $x$ , divide both sides of the equation by 74. You find that  $x = 0.30$ .

44. The answer is choice d. To answer this question, you need to decide which of the four choices is best supported by the data on the table. Choice a says “there are more people under 35 who have hypertension than there are people over 35 who have hypertension.” But the table shows the number of people screened, not the number who actually have hypertension. Choice b says “the number of people under 35 screened for hypertension increased from 2011 to 2012.” To find the number screened in this age bracket, multiply the percent in this age bracket (expressed as a decimal) times the total number screened:

$$2011: .14 \times 3,810 = 533$$

$$2012: .15 \times 2,950 = 443$$

So the number screened in this age bracket did *not* increase.

Choice c says “the amount of local funds used for hypertension screening remained approximately the same from 2012 to 2013.” To find the amount of local funds, multiply the percent of funds from local sources times the total expenditures:

$$2012: .06 \times 24,000,000 = 1,440,000$$

$$2013: .04 \times 24,500,000 = 980,000$$

So the amount from local sources did *not* remain approximately the same.

Choice d says, “the amount of local funds used for hypertension screening increased from 2010 to 2012.” To find the amount from local sources, multiply the percent from local sources times the total expenditures:

$$2010: .07 \times 15,500,000 = 1,085,000$$

$$2012: .06 \times 24,000,000 = 1,440,000$$

So the amount of local funds did increase from 2010 to 2012.

45. The answer is c. You may think you're being tested more on your ability to persevere and to keep from sinking into despair than on your mathematical ability. (Actually, you are probably being tested on your ability to maintain accuracy even when burned out.) There is no way you can do these questions in your head. You have to carefully go through the paragraphs, pick out the figures, enter them into your table, and tally them up. Then, check, and perhaps recheck, your figures. There are a lot of tricks in these paragraphs that are designed to throw you off. Numbers are spelled out rather than written in figures; age groups and activities are given in different orders; facts are buried among the words. Because of these tricks, you have to be accurate when you read the paragraphs, accurate when you write the figures down, and patient when you check your work. It takes a lot of time and energy, but it's the only way to be sure of your answers.

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

46. The answer is b. See the answer to Question 45 for a full explanation and the table on the following page for the data.
47. The answer is b. See the answer to Question 45 for a full explanation and the table on the following page for the data.
48. The answer is a. See the answer to Question 45 for a full explanation and the table on the following page for the data.
49. The answer is d. See the answer to Question 45 for a full explanation and the table on the following page for the data.

	0-12	13-19	20-60	60+	TOTAL
Swim	7,500	5,400	13,500	2,300	190,000 (A)
	9,000	7,800	15,400	3,500	
	4,500	3,700	7,300	2,300	
	1,000	600	2,500	900	
	10,500	9,400	18,850	4,200	
	9,150	6,450	16,000	2,700	
	1,200	750	2,900	1,100	
	<u>5,200</u>	<u>4,100</u>	<u>7,800</u>	<u>2,500</u>	
	48,050	38,200	84,250	19,500	
Row	50	120	40	50	6,670 (B)
	40	400	500	300	
	100	400	750	250	
	50	480	600	400	
	60	140	50	50	
	<u>150</u>	<u>40</u>	<u>850</u>	<u>300</u>	
		<u>500</u>			
	450	2,080	2,790	1,350	
	Canoe		170	350	
		75	650	350	
		220	1,000	600	
		350	900	450	
		80	950	400	
		250	750	400	
		200	1,200	720	
		<u>400</u>	870	200	
			1,000	450	
0		1,745	<u>1,100</u>	<u>550</u>	
Sail		60	350	150	4,170 (D)
		<u>60</u>	400	200	
			400	350	
			450	250	
			500	370	
			<u>450</u>	<u>180</u>	
	0	120	2,550	1,500	
Fish	1,100	10	1,100	400	8,650 (E)
	<u>1,300</u>	25	600	600	
		<u>45</u>	750	650	
			<u>750</u>	<u>350</u>	
	2,400	110	3,840	2,300	
TOTAL	50,900 (F)	42,255 (G)	102,200 (H)	28,990 (I)	224,345 (J)



50. The answer is d. This was a terrible thing to do to you, forcing you to go back through those pages again to find the figures you needed. But we did it to increase your stamina, and your ability to handle emotional setbacks. Can you imagine how you would have felt if this actually happened to you on an exam? We've compounded the problem by not giving you a ready-made table that is large enough to fill in with figures. In order to get the correct subtotals, you probably need to make a table of your own on a separate piece of paper. You could, of course, use the table you already filled in and just cross out figures you don't need, but that might make it more difficult if you wished to go back over those figures again to review Questions 45-49. Or you could use a calculator and just write down your totals. This is less time-consuming, if you can do it, but it also makes it very difficult to recheck your work. If you want the security of knowing what you did and why, and of being able to check up on yourself, you are better off taking the time to draw a table and fill it in.

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

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

	0-12	13-19	20-60	60+
Lake Arthur Swim July August				
Lake Gleason Fish July August				
Lake Randolph Swim July August Fish July August				
Moon Lake Swim July August Fish Fish July August				
Meadow Lake Swim July August				

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

	0-12	13-19	20-60	60+
Lake Arthur Swim				
July	7,500	5,400	13,500	2,300
August	<u>9,150</u>	<u>6,450</u>	<u>16,000</u>	<u>2,700</u>
	16,650	11,850	29,500	5,000
Lake Gleason Fish				
July		10	1,100	400
Lake Randolph Swim				
July	9,000	7,800	15,400	3,500
August	<u>10,500</u>	<u>9,400</u>	<u>18,850</u>	<u>4,200</u>
	19,500	17,200	34,250	7,700
Fish				
July	1,100	30	600	600
August	<u>1,300</u>	<u>45</u>	<u>750</u>	<u>650</u>
	2,400	75	1,350	1,250
Moon Lake Swim				
July	1,000	600	2,500	900
August	<u>1,200</u>	<u>750</u>	<u>2,900</u>	<u>1,100</u>
	2,200	1,350	5,400	2,000
Fish				
July		25	640	300
August			<u>750</u>	<u>300</u>
			1,390	600
Meadow Lake Swim				
July	4,500	3,700	7,300	2,300
August	<u>5,200</u>	<u>4,100</u>	<u>7,800</u>	<u>2,500</u>
	9,700	7,800	15,100	4,800

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

	0-12	13-19		20-60		60+	
	swim	swim	fish	swim	fish	swim	fish
Arthur	20,812.50	29,625		147,500		12,500	
Gleason			25		8,250		1,000
Randolph	48,750.00	86,000	375	171,250	6,750	19,250	
Moon		3,375		27,000	6,950		
Meadow	24,250.00	39,000		151,000		24,000	
TOTAL	93,812.50	158,000	400	496,750	21,950	55,750	1,000

Now all that remains is to put these totals into a chart, and you will easily be able to answer Questions 50 through 54.

	0-12	13-19	20-60	60	TOTAL
Swimming	\$93,812.50	\$158,000	\$496,750	\$55,750	\$804,312.50(A)
Fishing	---	400	21,950	1,000	23,350. (B)
Boat Rental					
Sailboat	NA	1,000	63,750	44,000	108,750. (C)
Canoe	NA	10,475	100,000	39,000	149,475. (D)
Rowboat	1,750.00	10,250	18,750	4,500	35,250. (B)
TOTAL	\$95,562.50 (F)	\$180,125 (G)	\$701,200 (H)	\$144,250 (I)	\$1,121,137.50 (J)

51. The answer is d. See the answer to Question 50 for a full explanation.
52. The answer is c. See the answer to Question 50 for a full explanation.
53. The answer is d. See the answer to Question 50 for a full explanation.
54. The answer is b. See the answer to Question 50 for a full explanation.

## Appendix: Working with Percent and Ratios

### Percents

In order to solve problems that involve percents, you need to understand the relationship between percents and decimals.

Let's begin by thinking about 100%. If you have 100% of something, you have all of it. Another way of saying this is:

$$100\% = 1$$

*or*

$$100\% = 1.0 \text{ (1.0 is the same as 1)}$$

If you have less than 100%, you have less than 1. Think about sales tax. Suppose you have to pay a sales tax of 8%. How would you express this as a decimal? You know that a tax of 8% is the same as 8¢ on the dollar.

$$8\% = 8\text{¢ on the dollar}$$

*or*

$$8\% = .08$$

Here is another example. You see a sweater on sale for 20% off. You know this means that you will save 20¢ off every dollar of the original price. In other words, you will be saving \$.20 off every dollar of the original price. So

$$20\% = .20$$

If you look at these two examples, you will see that you convert a percent to a decimal by moving the decimal point two places to the *left*.

$$20\% = .20$$

You convert a decimal to a percent by doing just the opposite: You move the decimal point two places to the *right*.

$$.20 = 20\%$$

Let's see how we can approach some sample questions by using the relationship between percents and decimals.

**Question.** A coat that was originally priced at \$100 is on sale for 25% off. How much do you save?

**Answer.** To answer this question, you need to convert the percent to a decimal. You convert a percent to a decimal by moving the decimal point two places to the *left*.

$$25\% = .25$$

Now multiply the original price by the decimal

$$\$100 \times .25 = \$25$$

You save \$25 on the coat. This question asked you to use a percent to calculate an amount. The next question asks you to do just the opposite. It asks you to use an amount to calculate a percent.

**Question.** Between 1995 and 2000, the average price of a house in Middlebury went up from \$100,000 to \$120,000. What was the percent increase in the average price of a house?

**Answer.** To answer this question, you need to know the actual amount of the increase.

$$\begin{array}{r} \$120,000 \quad \text{average price in 2000} \\ - \underline{\$100,000} \quad \text{average price in 1995} \\ \$20,000 \quad \text{increase} \end{array}$$

Now divide the increase by the original price:

$$20,000 \div 100,000 = .20$$

This is one of the basic types of percent questions. When a question asks,

What was the percent increase or decrease?

you divide the amount of the increase or decrease by the original number.

Now you have to convert .20 to a percent. To do this, you move the decimal point two places to the *right*.

$$.20 = 20\%$$

So the answer to this question is 20%.

**Question.** In Middlebury High School, there are 330 freshmen, 300 sophomores, 290 juniors and 280 seniors. What percent of the total student body are sophomores?

**Answer.** To answer this question, you need to know two numbers: the number of sophomores and the total number of students. You are told in the question that there are 300 sophomores. To find out the total number of students, add the numbers in each class. The total number of students is 1,200.

To find the percent of the student body that are sophomores, divide the number of sophomores by the total number of students.

$$300 \div 1,200 = .25$$

This is another one of the basic types of percent questions. When a question asks,

What percent of the total is represented by a certain part?

you divide *the part* by the total.

Now you have to convert .25 to a percent. To convert .25 to a percent, move the decimal point two places to the *right*.

$$.25 = 25\%$$

## Ratios

Ratios are used to express relationships. Let's say you spend \$400 a month on food and \$800 a month on rent. For every dollar you spend on food, how many dollars do you spend on rent? In ratio language, this question is:

400 is to 800 as 1 is to ?

There are two ways to set up this problem. One looks like this:

$$\frac{1}{x} = \frac{400}{800}$$

The letter x is used to represent the "unknown" (the number you are trying to find).

To solve this problem, you "cross multiply." That is, multiply 400 times x and multiply 800 times 1.

$$\frac{1}{x} \begin{array}{l} \swarrow \searrow \\ \nearrow \nwarrow \end{array} \frac{400}{800}$$

$$400x = 800$$

To solve for x, divide both sides of the equation by 400.

$$\frac{400x}{400} = \frac{800}{400}$$
$$x = 2$$

So for every dollar you spend on food, you spend two dollars on rent.

Another way to solve this problem is to write the ratio in sentence form:

food is to rent as 1 is to x

*or*

400 is to 800 as 1 is to x

Now multiply the two inside numbers (800 and 1) and the two outside numbers (400 and x).

400 is to 800 as 1 is to x

$$400x = 800$$

$$x = 2$$

This is really the same as "cross multiplying," but this way of setting up the problem might be easier for you to remember.









