Integrated Reasoning: Table Analysis

TABLE ANALYSIS

Table Analysis questions present data in a table. If you've ever seen a spreadsheet—and really, who hasn't?—you'll feel right at home. Most tables will have 5 to 10 columns and anywhere from 6 to 25 rows. You'll be able to sort the data in the table by each column heading. The sort function is fairly basic, however. If you're used to how you can sort first by a column such as state and then a column such as city to produce an alphabetical list of cities by state, you can't do that sort of sorting for these questions. You can only sort by one column at a time.

Here's what a table analysis question looks like:

Sort By Select... ▼ (1)

National Park		Visitors			Area	
Name	State	Number	% change	Rank	Acres	Rank
Grand Canyon	AZ	4,388,386	0.9	2	1,217,403	11
Yosemite	CA	3,901,408	4.4	3	791,266	16
Yellowstone	WY	3,640,185	10.5	4	2,219,791	8
Rocky Mtn.	CO	2,955,821	4.7	5	265,828	26
Zion	UT	2,665,972	-2.5	8	145,598	35
Acadia	ME	2,504,208	12.4	9	47,390	47
Bryce	UT	1,285,492	5.7	15	35,835	50
Arches	UT	1,014,405	1.8	19	76,519	42
Badlands	SD	977,778	4.7	22	242,756	28
Mesa Verde	CO	559,712	1.7	30	52,122	46
Canyonlands	UT	435,908	-0.1	36	337,598	23

The table above gives information for 2010 on total visitors and total acreage for 11 US National Parks. In addition to the numbers of total visitors and total acreage for each National Park, the table also provides the percent increase or decrease over the total visitors for 2009 and the rank of the National Park for total visitors and total acreage in 2010. (4)

Each column of the table can be (2) sorted in ascending order by clicking on the word "Select" above the table and choosing, from the drop-down menu, the heading of the column on which you want the table to be sortec

Consider each of the following (3) statements about these National Parks. For each statement indicate whether the statement is true or false, based on the information provided in the table.

True	False	(5)
○	○	The park that experienced the greatest percent increase in visitors from 2009 to 2010 also had the least total acreage.
○	○	The park with the median rank by the number of visitors is larger than only one other park by acreage.
○	○	Exactly 20% of the parks with ranks less than 40 by acreage and showing positive growth in visitors were in Utah (UT).
○	○	The total number of visitor at Arches in 2009 was less than 1,000,000.

One thing you won't see on your screen when you take the Integrated Reasoning section are the circled numbers. We've added those so we can talk about different parts of a Table Analysis question. Here's what each circled number represents:

1. This is the Sort By drop-down box. When opened, you'll see all the different ways that you can sort the data in the table. For this table, for example, the possibilities are National Park Name, National Park State, Visitors Number, Visitors % change, Visitors Rank, Area Acreage, and Area Rank. You can always sort by every column.

2. These are the standard directions for a Table Analysis question. These directions are the same for every Table Analysis question. So, once you've read these directions once, you don't really need to bother reading them again.

3. These lines are additional directions. These directions are slightly tailored to the question. However, they'll always tell you to base your answers on the information in the table. These directions will also always tell you which type of choice you are making for each statement: true/false, yes/no, agree/disagree, etc. Again, you can probably get by without reading these most of the time.

4. These lines explain the table. Mostly, this information will recap the column headings from the table. Occasionally, you can learn some additional information by reading this explanatory text. For example, the explanatory text for this table states that the Visitors Number column is for 2010 and that % change column shows the change from 2009 to 2010.

5. These statements are the questions. Typically, there are four statements and you need to evaluate and select an answer for each. If you try to move to the next question without selecting a response for one or more statements, a pop-up window will open informing you that you have not selected an answer for all statements. You cannot leave any part of the question blank.

If you read through the statements, you may have noticed that the questions asked you to do things such as calculate a percentage or find a median. That's typical for Table Analysis questions. You've probably also realized just how helpful the sorting function can be in answering some questions.

TABLE ANALYSIS DRILLS

Item 1:

Student Scores at XYZ College

Kind of Business	Estimate		Actual								
	Jan-June 2010 Est	Rank	Jan	Feb	March	April	May	June	6 Month Total	% Change 2009	% of Estimated Sales
Motor vehicle & parts dealers	402,357	1	61,592	58,779	54,655	60,005	61,547	69,397	365,412	-1.5	90.82%
Food services & drinking places	370,880	2	42,311	49,887	45,332	48,776	58,672	53,221	298,199	1	80.40%
Food & beverage stores	342,564	3	51,650	52,346	52,122	55,432	54,332	52,266	318,148	0.2	92.87%
General merchandise stores	310,755	4	51,148	48,366	51,777	49,588	46,166	53,108	300,153	0.1	96.59%
Gasoline stations	254,678	5	34,970	38,999	35,798	32,667	37,596	39,880	219,910	-2.5	86.35%
Health & personal care stores	226,629	6	25,699	34,577	32,987	38,791	30,912	19,776	182,742	-6.3	80.63%
Non-store retailers	180,765	7	35,604	33,980	39,887	34,576	33,761	35,972	213,780	3.7	118.26%
Building materials & supplies	175,664	8	22,986	19,887	18,330	19,877	17,776	15,998	114,854	-4.3	65.38%
Clothing & clothing accessories	175,638	9	21,345	17,498	14,665	23,457	21,789	28,229	126,983	0.2	72.30%
Electronics & appliance stores	77,892	10	7,658	7,652	8,235	7,399	7,685	8,692	47,321	-0.3	60.75%
Furniture & home furn. stores	72,434	11	9,987	9,076	9,087	10,998	10,332	11,002	60,482	0.3	83.50%
Miscellaneous store retailers	60,998	12	6,592	8,196	9,934	9,922	9,065	9,732	53,441	1.1	87.61%
Hobby, book, & music	49,877	13	7,793	8,072	8,973	9,982	9,057	10,227	54,104	4.9	108.47%

The table above shows estimated and realized monthly and total sales in millions of dollars for the first six months of 2010. These 13 categories were chosen because they comprise the largest publicly-held non-financial companies worldwide. Percent change from the same period in 2009 is given. Actual sales as a percent of estimated sales are also calculated.

Each column of the table can be sorted in ascending order by clicking on the word "Select" above the table and choosing, from the drop-down menu, the heading of the column on which you want the table to be sorted.

Consider each of the following statements about the information on the previous page. For each statement indicate whether the statement is true or false, based on the information provided in the table.

	True	False	
Question 1-1	○	○	The category experiencing the smallest percent change in sales from 2009 has the sales estimate closest to 100% of actual sales for 2010.
Question 1-2	○	○	The category with the median rank based on estimated sales for 2010 is the same as the category with the median 6-month sales total based on actual sales for 2010.
Question 1-3	○	○	The total number of actual sales for Building materials & supplies during the same period in 2009 was approximately $120,000.
Question 1-4	○	○	For all categories in which there was a decrease in sales from 2009 to 2010, there was greater than a 10% difference between actual and estimated sales.

Item 2:

Patient	Dose of Medication A (mg)	Dose of Medication B (mg)	Dose of Medication C (mg)	Age	Sex
AD	3.5	4.1	2.4	13	F
CA	3.2	2.1	0.2	34	M
DE	2.8	3.4	0	65	F
DS	1.2	0	1.3	11	M
ED	1.8	2.3	0	24	F
EG	1.9	2.4	2.5	43	M
FA	2.3	1.2	2.3	58	F
GE	2.3	4.1	2.3	35	M
SE	2.8	3.7	3.2	63	M

The table above provides information on a sample of participants in a medical trial. Each patient is identified by a two-letter code. For each patient, the table lists the patient's dose of three medications – A, B, and C – in milligrams (mg), the patient's age, and the patient's sex – Male (M) or Female (F). The "total dose" is defined as the sum of the patient's doses for medications A, B, and C.

Each column of the table can be sorted in ascending order by clicking on the word "Select" above the table and choosing, from the drop-down menu, the heading of the column on which you want the table to be sorted.

Alternate Sort 1: *Age*

Patient	Dose of Medication A (mg)	Dose of Medication B (mg)	Dose of Medication C (mg)	Age	Sex
DS	1.2	0	1.3	11	M
AD	3.5	4.1	2.4	13	F
ED	1.8	2.3	0	24	F
CA	3.2	2.1	0.2	34	M
GE	2.3	4.1	2.3	35	M
EG	1.9	2.4	2.5	43	M
FA	2.3	1.2	2.3	58	F
SE	2.8	3.7	3.2	63	M
DE	2.8	3.4	0	65	F

Alternate Sort 2: *Dose of Medication B*

Patient	Dose of Medication A (mg)	Dose of Medication B (mg)	Dose of Medication C (mg)	Age	Sex
DS	1.2	0	1.3	11	M
ED	1.8	2.3	0	24	F
EG	1.9	2.4	2.5	43	M
FA	2.3	1.2	2.3	58	F
GE	2.3	4.1	2.3	35	M
DE	2.8	3.4	0	65	F
SE	2.8	3.7	3.2	63	M
CA	3.2	2.1	0.2	34	F
AD	3.5	4.1	2.4	13	M

Consider each of the following questions about the medical trial. For each statement indicate whether the question has an answer with a value between 40% and 60%, exclusively?

	Yes	No	
Question 2-1	○	○	What percent of males in the sample are older than the average (arithmetic mean) age for males in the sample?
Question 2-2	○	○	The total dose of the female with the greatest dose of Medication A is what percent of the total dose of the male with the greatest dose of Medication A?
Question 2-3	○	○	Medication B comprises what percent of the median-aged patient's total dose?
Question 2-4	○	○	The median female age is what percent greater than the median male age?

Item 3:

EMR		Installations			Adverse Events			
Vendor	Location	Number	% Change	Rank	Total	% Change	Preventable	Fatal
Meditech	MA	1,212	10.4	1	10,452	12.4	8,412	28
Cerner	MO	606	8.6	2	10,312	16.2	8,624	18
McKesson	GA	573	15.4	3	10,002	5.4	9,142	21
Epic	WI	413	7.3	4	9,896	16.3	8,546	42
Siemens	PA	397	-1.2	5	11,453	17.5	10,412	83
CPSI	AL	392	0.4	6	8,432	1.2	8,132	25
HMS	TN	347	3.2	7	7,421	4.4	7,003	31
Self-Developed	--	273	18.4	8	8,321	0.02	6,895	17
Healthland	MN	223	-2.4	9	5,612	-2.1	4,590	45
Allscripts	GA	185	-6.1	10	5,212	-5.3	4,784	27

The table above gives information for 2011 on vendors, installations, and associated usability ratings for 10 types of Enterprise Electronic Medical Record (EMR) systems. In addition to total installations and the number of adverse events, the table also gives the percent change in the total installations and adverse events from 2010 to 2011 and the rank of the EMR for total installations. The table also includes the number of the adverse events that were preventable and the number that were fatal.

Each column of the table can be sorted in ascending order by clicking on the word "Select" above the table and choosing, from the drop-down menu, the heading of the column on which you want the table to be sorted.

Alternate Sort 1: *Installations - % Change*

EMR		Installations			Adverse Events			
Vendor	Location	Number	% Change	Rank	Total	% Change	Preventable	Fatal
Allscripts	GA	185	-6.1	10	5,212	-5.3	4,784	27
Healthland	MN	223	-2.4	9	5,612	-2.1	4,590	45
Siemens	PA	397	-1.2	5	11,453	17.5	10,412	83
CPSI	AL	392	0.4	6	8,432	1.2	8,132	25
HMS	TN	347	3.2	7	7,421	4.4	7,003	31
Epic	WI	413	7.3	4	9,896	16.3	8,546	42
Cerner	MO	606	8.6	2	10,312	16.2	8,624	18
Meditech	MA	1,212	10.4	1	10,452	12.4	8,412	28
McKesson	GA	573	15.4	3	10,002	5.4	9,142	21
Self-Developed	--	273	18.4	8	8,321	0.02	6,895	17

Alternate Sort 2: *Adverse Events - Total*

EMR		Installations			Adverse Events			
Vendor	Location	Number	% Change	Rank	Total	% Change	Preventable	Fatal
Allscripts	GA	185	-6.1	10	5,212	-5.3	4,784	27
Healthland	MN	223	-2.4	9	5,612	-2.1	4,590	45
HMS	TN	347	3.2	7	7,421	4.4	7,003	31
Self-Developed	--	273	18.4	8	8,321	0.02	6,895	17
CPSI	AL	392	0.4	6	8,432	1.2	8,132	25
Epic	WI	413	7.3	4	9,896	16.3	8,546	42
McKesson	GA	573	15.4	3	10,002	5.4	9,142	21
Cerner	MO	606	8.6	2	10,312	16.2	8,624	18
Meditech	MA	1,212	10.4	1	10,452	12.4	8,412	28
Siemens	PA	397	-1.2	5	11,453	17.5	10,412	83

Consider each of the following statements about EMRs. For each statement indicate whether the statement is supported based on the information provided in the table.

	Yes	No	
Question 3-1	○	○	In 2011, The EMR Vendor having the second greatest number of installations had both the third greatest number of adverse events and the lowest number of fatal adverse events.
Question 3-2	○	○	In 2010, there were approximately 197 installations of the Allscripts EMR.
Question 3-3	○	○	The ratio of preventable adverse events to fatal adverse events, for the EMR that experienced the second greatest percent decrease in total installations from 2010 to 2011, is 102:1.
Question 3-4	○	○	The EMR that ranks ninth in total installations, has reduced the total number of adverse events since 2010, but still ranks second in terms of the number of fatal adverse events.

Item 4:

Country	# of Pan-Global Games (Judge)	Average Score (Judge)	Highest Score Given	Lowest Score Given	# of Pan-Global Games (Competitor)	Average Score (Competitor)
Albania	1	6.7	9.2	5.4	1	8.6
Estonia	2	8.4	9	6.9	3	7.7
Finland	3	6.2	8.9	4.2	2	8.5
Germany	3	8.2	9.4	7.6	2	8.3
Japan	1	7.3	9.7	6.4	3	8.8
Norway	2	7.9	8.4	5.2	4	6.5
Russia	5	6.8	9.6	5.4	3	7
South Korea	3	7.9	9.3	6.3	2	8.3
United States	4	8.1	9.2	7.1	2	7.1

The table above provides information on a group of judges at the 2012 Pan-Global Games. The table lists the country each judge represents, the number of Pan-Global Games each had participated in as a judge, the average (arithmetic mean) score given as a judge, highest score given as a judge, lowest score given as a judge, the number of Pan-Global Games each had participated in as a competitor, and the average (arithmetic mean) score received as a competitor. The scores are given on a scale from 1 – 10 in increments of one-tenth of a point.

Each column of the table can be sorted in ascending order by clicking on the word "Select" above the table and choosing, from the drop-down menu, the heading of the column on which you want the table to be sorted.

Alternate Sort 1: *Number of Pan-Global Games (Judge)*

Country	# of Pan-Global Games (Judge)	Average Score (Judge)	Highest Score Given	Lowest Score Given	# of Pan-Global Games (Competitor)	Average Score (Competitor)
Albania	1	6.7	9.2	5.4	1	8.6
Japan	1	7.3	9.7	6.4	3	8.8
Estonia	2	8.4	9	6.9	3	7.7
Norway	2	7.9	8.4	5.2	4	6.5
Finland	3	6.2	8.9	4.2	2	8.5
Germany	3	8.2	9.4	7.6	2	8.3
South Korea	3	7.9	9.3	6.3	2	8.3
United States	4	8.1	9.2	7.1	2	7.1
Russia	5	6.8	9.6	5.4	3	7

Alternate Sorts 2: *Number of Pan-Global Games (Competitor)*

Country	# of Pan-Global Games (Judge)	Average Score (Judge)	Highest Score Given	Lowest Score Given	# of Pan-Global Games (Competitor)	Average Score (Competitor)
Albania	1	6.7	9.2	5.4	1	8.6
Finland	3	6.2	8.9	4.2	2	8.5
Germany	3	8.2	9.4	7.6	2	8.3
South Korea	3	7.9	9.3	6.3	2	8.3
United States	4	8.1	9.2	7.1	2	7.1
Japan	1	7.3	9.7	6.4	3	8.8
Estonia	2	8.4	9	6.9	3	7.7
Russia	5	6.8	9.6	5.4	3	7
Norway	2	7.9	8.4	5.2	4	6.5

Consider each of the following statements about the Pan-Global Games judge's scores. For each statement indicate whether the statement is supported based on the information provided in the table.

	Yes	No	
Question 4-1	○	○	On average, the lowest score given for judges who had judged in 3 Pan-Global Games was higher than that for judges who had competed in 3 Pan-Global Games.
Question 4-2	○	○	The judge with the greatest absolute difference between the highest score given and lowest score given also had the greatest percent difference between the lowest score given and highest score given.
Question 4-3	○	○	The average (arithmetic mean) number of Pan-Global Games that judges participated in as judges was higher than the average number of Pan-Global Games that judges participated in as competitors.
Question 4-4	○	○	The probability that a given judge competed in more Pan-Global Games than she judged is the same as the probability that a judge gave a higher average score as a judge than she received as a competitor.

Check your answers on page 95.

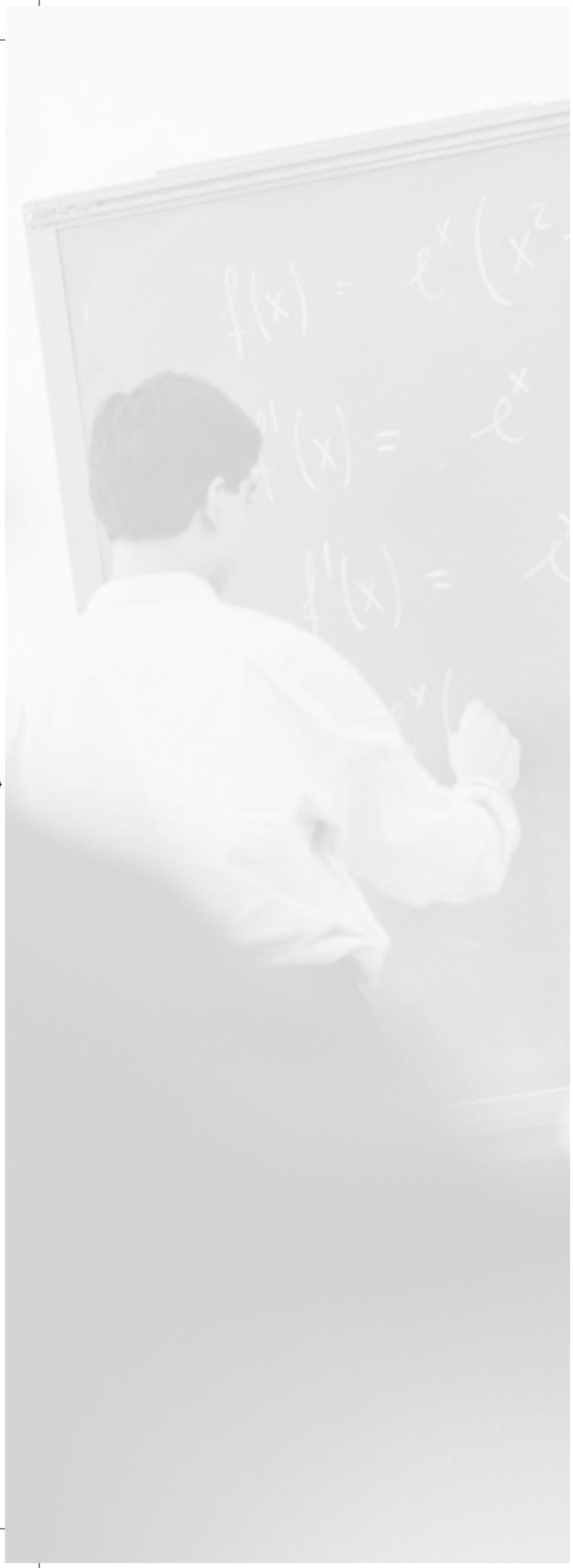


Table Analysis Answers and Explanations

ANSWER KEY

Table Analysis

Item 1
Question 1-1: True
Question 1-2: False
Question 1-3: True
Question 1-4: False

Item 2
Question 2-1: No
Question 2-2: No
Question 2-3: Yes
Question 2-4: No

Item 3
Question 3-1: No
Question 3-2: Yes
Question 3-3: Yes
Question 3-4: Yes

Item 4
Question 4-1: No
Question 4-2: Yes
Question 4-3: Yes
Question 4-4: Yes

EXPLANATIONS:

Item 1:

1-1. True

The category experiencing the smallest percent change from 2009 to 2010 was General Merchandise Stores, with a 0.1 percent change. Realize that the smallest percent change is the number closest to 0. A negative percent change wouldn't necessarily be a smaller change. The estimate for this category was also closest to actual sales. The estimate was 96.59% of actual sales, which is closer to 100% than any other estimate.

1-2. False

The category with the median rank based on estimated sales for 2010 is the one ranked 7th out of 13, which is Non-store Retailers. However, when you sort the column with the actual 6-month total sales, this category comes in 6th, so these ranks are not the same.

1-3. True

Use your calculator to figure out the sales figure for 2009 for Building Materials & Supplies. The percent change is -4.3, so that means that the 2010 sales figure is 95.7% (100 - 4.3) of the 2009 sales figure. You ask yourself: 114,854 is 95.7% of what number? Translated into algebra: 114,854 = 0.957*x*. Divide both sides by 0.957:

$$\frac{114{,}854}{0.957} = x \qquad x = 120{,}014.63$$

So the 2009 figure was about $120,000, which makes this statement true.

1-4. False

If you do a sort on the % Change 2009 column, you see that the sales categories for which there was a decline from 2009 to 2010 were: Health & personal care stores, Building materials and supplies, Gasoline stations, Motor vehicle & parts dealers, and Electronics and appliance stores. Most of them are more than 10% off the actual sales figure, but the actual sales figures for Motor vehicles and parts dealers were 90.82% of the estimated sales. That is less than 10% difference between the actual and estimated sales, so this statement is false.

Item 2:

2-1. No

Divide the sum of the patients' ages by the number of patients:

$$\frac{34+11+43+35+63}{5} = 37.2$$

Of the five male patients, two, EG and SE, are older than the average. Since $\frac{2}{5}$ is 40%, the answer is not between 40% and 60%, exclusively, and the answer is No.

2-2. No

Start by sorting the table by Dose of Medication A (mg). CA and AD are the Male and Female with greatest doses, respectively. CA's total does is 3.2 + 2.1 + 0.2 = 5.5. AD's total dose is 3.5 + 4.1 + 2.4 = 10. To find what percent of 5.5 is 10, divide 10 by 5.5 and multiply by 100 to get approximately 181%; the answer is No.

2-3. Yes

Start by finding the patient with the median age. To do this, sort the table by Age. Since there are 9 patients, the median will be the fifth patient, GE, whose total dose is 2.3 + 4.1 + 2.3 = 8.7. Since 4.1 / 8.7 is about 0.47, Medication B makes up about 47% of the total dose; the answer is Yes.

2-4. No

Start by sorting the table by Sex. The median female Age is the average of 24 and 58, which is $\frac{24+58}{2}=41$. The median male age is 35. To find the percent increase from 35 to 41, use the formula:

$\text{Percent Increase}=\frac{\text{difference}}{\text{original}}\times 100$ which is $\frac{41-35}{35}\times 100\approx 17\%$. The answers is No.

Item 3:

3-1. No

First, find the EMR Vendor having the second greatest number of installations; Cerner is the Vendor having the second greatest number of installations in 2011. Next, identify the EMR Vendor having the third greatest total number of adverse events. Siemens experienced the greatest number of adverse events (11,453), Meditech experienced the second greatest number of adverse events (10,452), and Cerner experienced the third greatest number of adverse events (10,312). Finally, locate the EMR Vendor that experienced the lowest number of fatal adverse events. Self-developed EMRs experienced the lowest number, 17, of fatal adverse events. Therefore, since the EMR Vendor having the second greatest number of installations does not have both the third greatest number of adverse events and the lowest number of fatal adverse events, this statement in incorrect.

3-2. Yes

First, you need to find the number of installations of the Allscripts EMR and the percent change from 2010 to 2011. In 2011, there were 185 installations of the Allscripts EMR which represents a -6.1% change from 2010. Therefore, 185 represents 93.9% as many installations as in 2010. This gives the equation 185 = 0.939*x*. Divide both sides by 0.939, and *x* = 197. Thus, in 2010, there were approximately 197 installations of the Allscripts EMR.

3-3. Yes

First, identify the EMR that experienced the second greatest percent decrease in total installations from 2010 to 2011. According to the percent change column for installations, Healthland experienced the second greatest percent decrease. Next, identify the number of preventable and fatal adverse events for the Healthland EMR. Healthland experienced 4,590 preventable adverse events and 45 fatal adverse events. Therefore, the ratio of preventable adverse events to fatal adverse events is $\frac{4,590}{45}=\frac{102}{1}$.

3-4. Yes

First, identify the EMR that ranks ninth in terms of total installations; according to the chart, Healthland ranks ninth in this category. Next, determine whether the Healthland EMR has reduced the total number of adverse events since 2010. When you consult the percent change column adjacent to the total adverse events for the Healthland EMR, you will find that the Healthland EMR has reduced the number of adverse events by 2.1%. Finally, determine the EMR that ranks second in terms of the number of fatal adverse events. Siemens experienced the greatest number of fatal adverse events and Healthland experienced the second greatest number of fatal adverse events. Accordingly, this statement is correct.

Item 4:

4-1. No

This question asks about the judges who had Judged in 3 Pan-Global Games, so sort the table by # of Pan-Global Games (Judging) and note the Lowest Score Given for Finland, Germany, and South Korea. To find the average divide the total by the number of judges: $\frac{4.2+7.6+6.3}{3}=\frac{18.1}{3}\approx 6.03.$ Now sort the table by # of Pan-Global Games (Competitor) and note the Lowest Score Given for Japan, Estonia, and Russia. The average is $\frac{6.4+6.9+5.4}{3}=\frac{18.7}{3}\approx 6.23,$ which is greater than 6.03; therefore the statement is incorrect and the answer is no.

4-2. Yes

Start by finding the differences between Highest Score Given and Lowest Score Given. It is useful to Ballpark here. Albania: 4, Estonia: 2, Finland: 5, Germany: 2, Japan: 3, Norway: 3, Russia: 4, South Korea: 3, and the United States: 2. Thus the country with the greatest difference is Finland (the exact difference is 8.9 – 4.2 = 4.7). Now to find the percent difference from Lowest Score Given to Highest Score Given, use the formula:

$$Percent\ Change=\frac{Highest-Lowest}{Lowest}\times 100.$$

Again, Ballparking is useful here.

Albania: $\frac{4}{5}$, Estonia: $\frac{2}{7}$, Finland: $\frac{5}{4}$, Germany: $\frac{2}{8}$, Japan: $\frac{2}{6}$, Norway: $\frac{3}{5}$, Russia: $\frac{3}{6}$, South Korea: $\frac{3}{6}$, and the United States: $\frac{2}{7}$.

Finland also has the greatest percent change (the exact percent change is $\frac{8.9-4.2}{4.2}\times 100=\frac{4.7}{4.2}\times 100=111.9\%$). Therefore the answer to statement 2 is yes.

4-3. Yes

To find the average number of Pan-Global Games as a judge, add up the values in # of Pan-Global Games (Judge) and divide by the number of judges: $\frac{1+2+3+3+1+2+5+3+4}{9}=\frac{24}{9}.$

Now do the same for # of Pan-Global Games (Competitor): $\frac{1+3+2+2+3+4+3+2+2}{9}=\frac{22}{9}$ which is less than $\frac{24}{9}$. Therefore the answer to statement 3 is a yes.

4-4. Yes

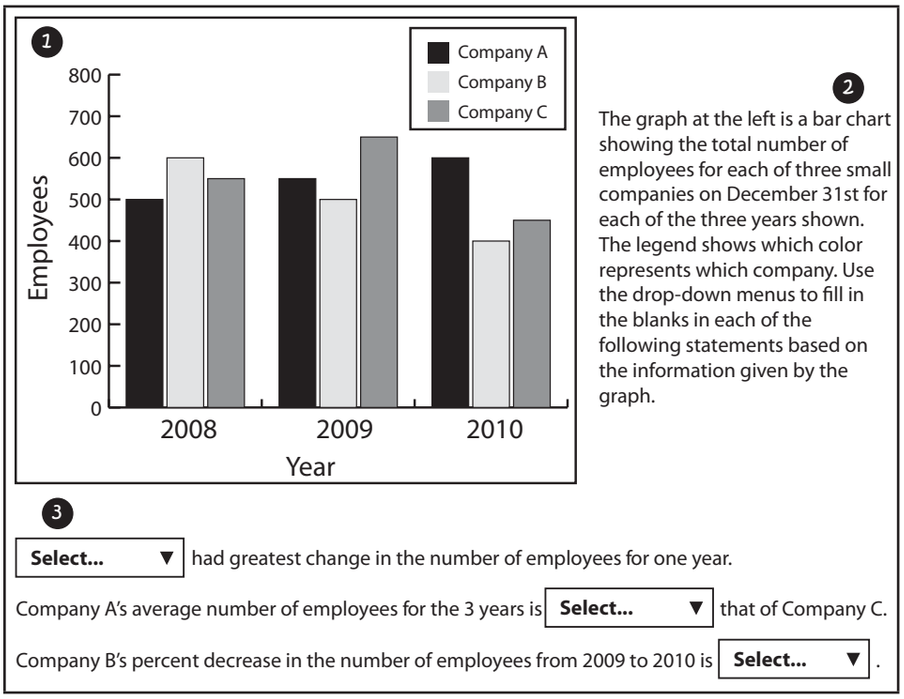
The probability that a judge participated in more Pan-Global Games as a competitor than as a judge is $\frac{\#\text{ of judges who competed more than judged}}{\text{total \# of judges}}$. Those judges are *Estonia*, *Japan*, and *Norway*. Thus the probability is $\frac{3}{9} = \frac{1}{3}$. The probability that a judge gave a higher average score as a judge than received as a competitor is $\frac{\#\text{ of judges whose score as judge} > \text{score as competitor}}{\text{total \# of judges}}$. Those judges are *Estonia*, *Norway*, and *United States*. Thus the probability is also $\frac{3}{9} = \frac{1}{3}$. Therefore the answer to statement 4 is yes.

Integrated Reasoning: Graphics Interpretation

GRAPHICS INTERPRETATION

Now, let's take a look at the Graphics Interpretation question. For this question type, you are given one chart, graph, or image and asked to answer three questions based on that information. The questions are statements that include one drop-down box. You select your answer from the drop-down box to complete the statement.

Here's an example of a Graphics Interpretation question:



As with the Table Analysis questions, we've added the circled numbers so we can point out the different things that you'll see on your screen for a Graphics Interpretation question. Here's what each circled number represents:

1. The chart, graph, or image is always in the upper left of the screen. As shown here, the chart will take up a good deal of the screen. It will certainly be large enough that you can clearly extract information from it. You can expect to see a variety of different types of charts or graphs including scatter plots, bar charts, line graphs, and circle (or pie) charts. For the most part, you'll see fairly standard types of graphs, however. Be sure to check out any labels on the axes as well as any sort of included legend.

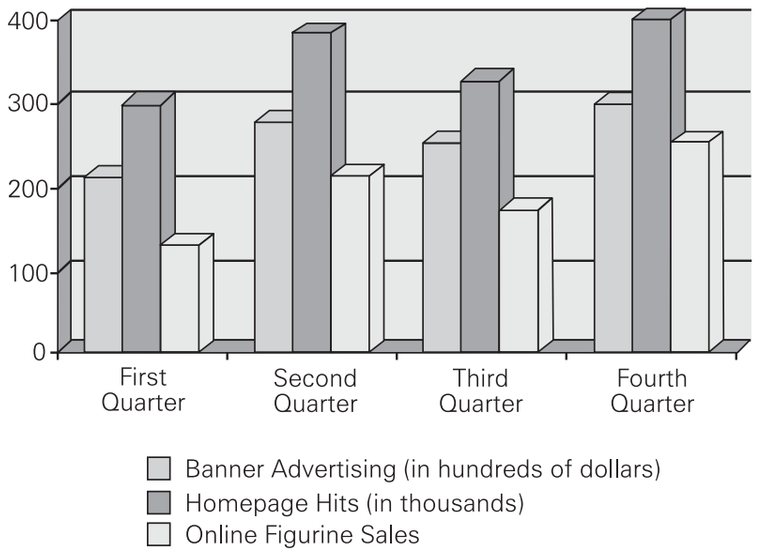
2. These lines are an explanation of the graph or chart. Mostly, you'll be told what the chart represents as well as what individual lines, bars, or sectors may represent. Sometimes, you'll be given some additional information such as when measurements were made. For example, here you are told that the bars show the numbers of employees for each firm on December 31st of the year in question. This information is typically extraneous to answering the questions. The explanatory information always ends with the same line about selecting your answers from the drop-down menu.

3. These are the questions. Graphics Interpretation questions typically include three statements. Each statement is typically a single sentence with one drop-down menu. Each drop-down menu typically includes three to five answer choices. Choose that answer choice that makes the statement true.

Graphics Analysis questions mostly ask you to find relationships and trends for the data. You can also be asked to calculate percentage increases or decreases, averages, and medians.

GRAPHICS INTERPRETATION DRILLS

Item 1:



The graph above is a bar chart representing various data for TinyToys Company over the last fiscal year: Banner Advertising, Homepage Hits, and Online Figurine Sales. Use the drop-down menus to fill in the blanks in each of the following statements based on the information given by the graph.

Question 1-1:

There were _____ more homepage hits in the 4th quarter than in the 1st quarter.

(A) 100
(B) 400
(C) 100,000
(D) 700,000

Question 1-2:

The quarter that had the lowest ratio of Online Figurine Sales to Banner Advertising was the _____.

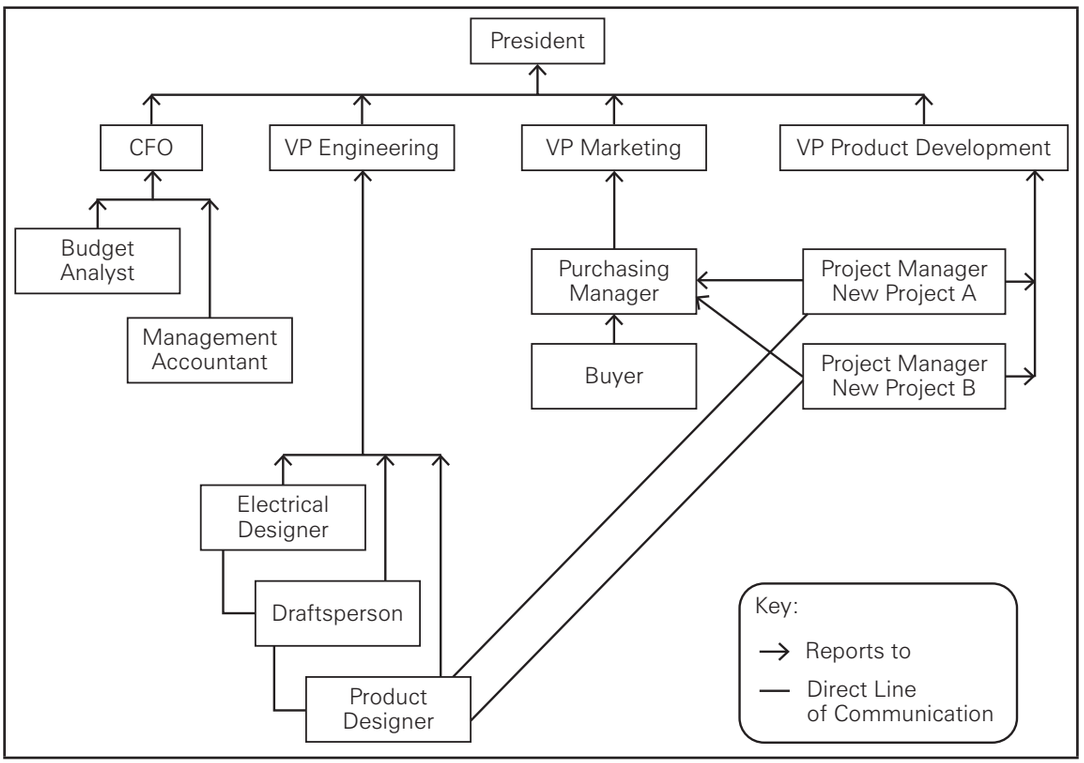
(A) First Quarter
(B) Second Quarter
(C) Third Quarter
(D) Fourth Quarter

Question 1-3:

If graphed, the slope of the line representing the overall trend in Homepage Hits would be

(A) positive
(B) negative
(C) zero
(D) undefined

Item 2:



The organizational flow chart shown above shows the reporting structure of an electronics company. Any employee who reports directly to the president is at salary Level A. Employees who report to Level A employees are at salary Level B. Employees who report to Level B employees are at salary Level C. Use the drop-down menus to fill in the blanks in each of the following statements based on the information given by the graph.

Question 2-1:

A buyer is at salary Level _____.

(A) A
(B) B
(C) C

Question 2-2:

A draftsperson reports directly to _____.

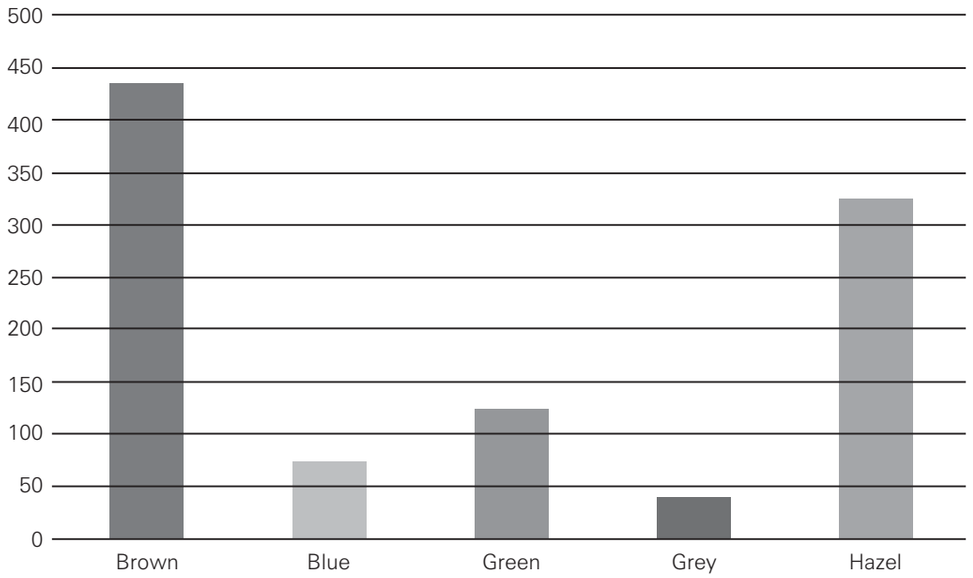
(A) the electrical designer
(B) the product designer
(C) a project manager
(D) the VP of engineering
(E) the president

Question 2-3:

The management accountant's salary ranking is on the same level as the _____.

(A) product manager for new product A
(B) VP of product development
(C) buyer

Item 3:



The graph above is a bar chart with six measurements, each representing a certain eye color, based on 1,000 observations made in February of 2012. Use the drop-down menus to fill in the blanks in each of the following statements based on the information given by the graph.

Question 3-1:

Individuals with grey eyes comprise approximately_____of the individuals.

(A) 1%
(B) 4%
(C) 5%
(D) 40%
(E) 95%

Question 3-2:

If a study of 1,000 individuals conducted in February of 1912 found that 90 individuals had blue eyes, the number of individuals having blue eyes has _____ since February of 1912.

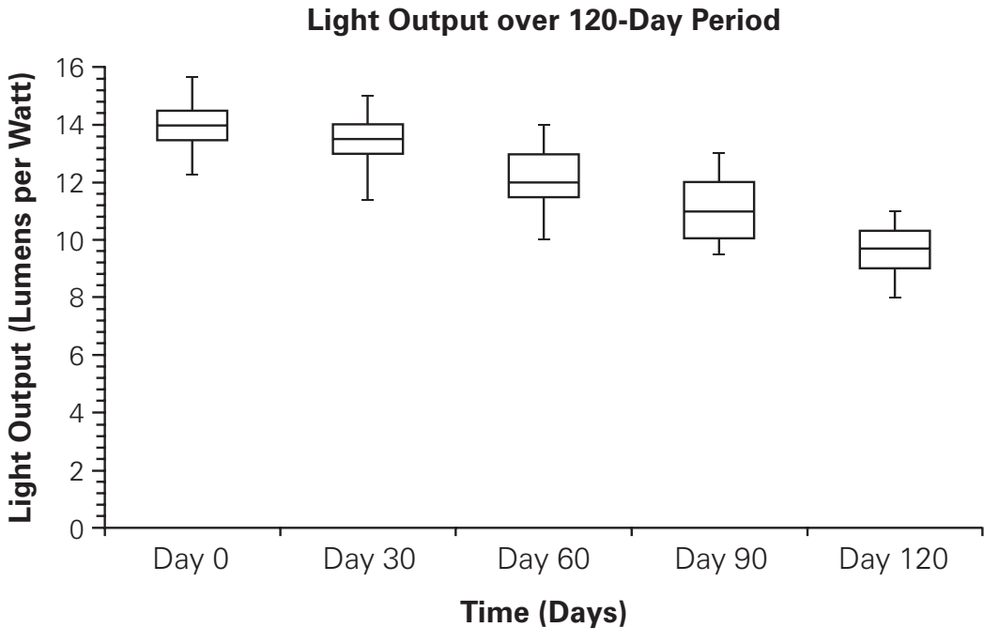
(A) increased by 15%
(B) decreased by 15%
(C) decreased by 16.67%
(D) increased by 20%
(E) decreased by 20%

Question 3-3:

The difference between the most and least common eye color is approximately _____.

(A) 150
(B) 275
(C) 350
(D) 400

Item 4:



The graph above is a box plot with five measurements, each representing the average light output (in lumens per watt) of 25 60-Watt incandescent light bulbs, measured over a 120-day period. Each box represents the middle 50%, also known as the interquartile range, and the lines extending vertically upwards or downwards represent the top 25% and bottom 25%, respectively. The solid line inside the box represents the median light output for each measurement. Use the drop-down menus to fill in the blanks in each of the following statements based on the information given by the graph.

Question 4-1:

Light output ranges from _____ lumens per watt between Day 30 and Day 120.

(A) 15 to 8
(B) 14 to 9.5
(C) 13.5 to 9.75

Question 4-2:

The greatest interquartile range occurs on _____.

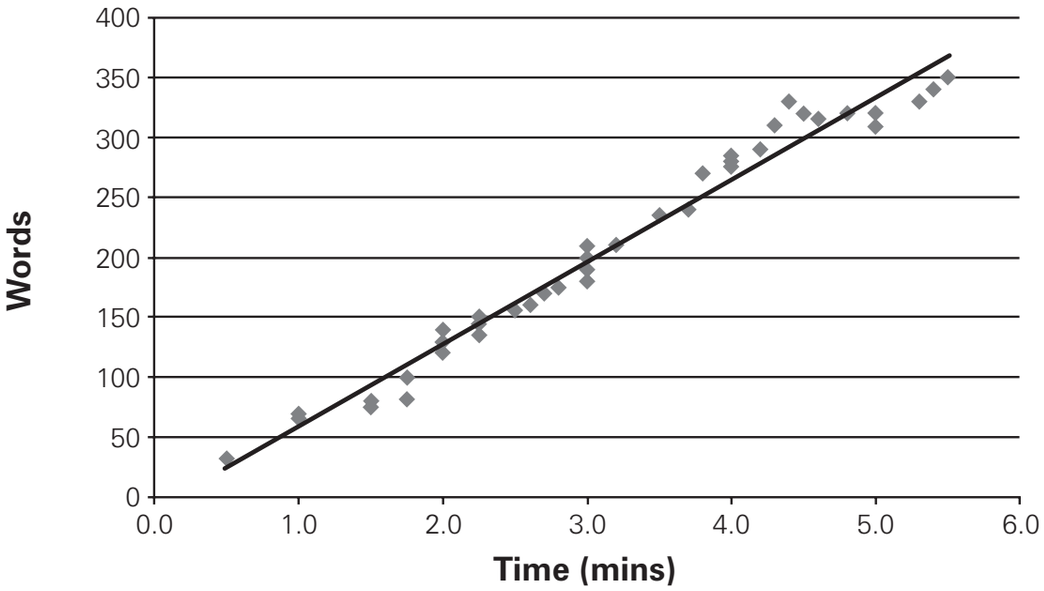
(A) Day 0
(B) Day 30
(C) Day 60
(D) Day 90
(E) Day 120

Question 4-3:

Light output and time have _____relationship.

(A) a direct
(B) an indirect
(C) no

Item 5:



The graph above is a scatter plot with 40 points, each representing the number of words typed in a given time period. The amount of time each individual spent typing is given in minutes. The solid line is the regression line. Use the drop-down menus to fill in the blanks in each of the following statements based on the information given by the graph.

Question 5-1:

The slope of the regression line is _____ the slope of a line that would pass through points (0,0) and (4, 200).

(A) greater than
(B) less than
(C) equal to

Question 5-2:

Based on the line of regression, an individual who types for 5.5 minutes should expect to type approximately _____ words than an individual who types for 3 minutes.

(A) 50% fewer
(B) 50% more
(C) 100% fewer
(D) 100% more
(E) 120% more

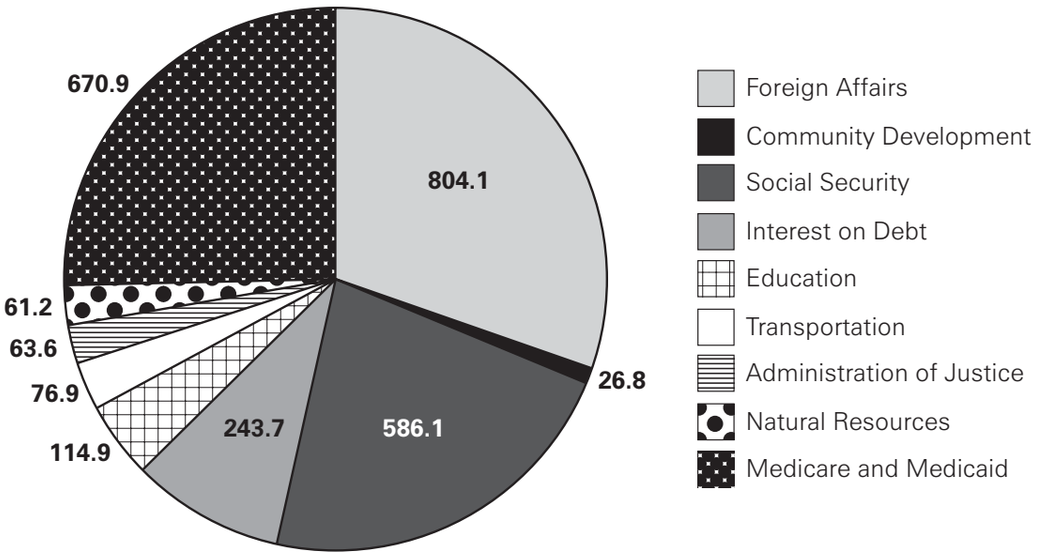
Question 5-3:

Time and the number of words typed have _____ relationship.

(A) a direct
(B) an inverse
(C) no

Item 6:

2006 U.S. Government Spending (in Millions of Dollars)



The graph above is a circle graph with 9 sectors, each representing an area in which the U.S. government spent money (in millions of dollars) during the 2006 fiscal year. Use the drop-down menus to fill in the blanks in each of the following statements based on the information given by the graph.

Question 6-1:

If Medicare and Medicaid spending in 2005 were $824,400,000, spending in this sector approximately _____ from 2005 to 2006.

(A) increased by 22.88%
(B) decreased by 22.88%
(C) increased by 18.62%
(D) decreased by 18.62%
(E) experienced no change

Question 6-2:

The sectors of _____ comprise approximately 25% of the total amount spent by the U.S. Government in 2006.

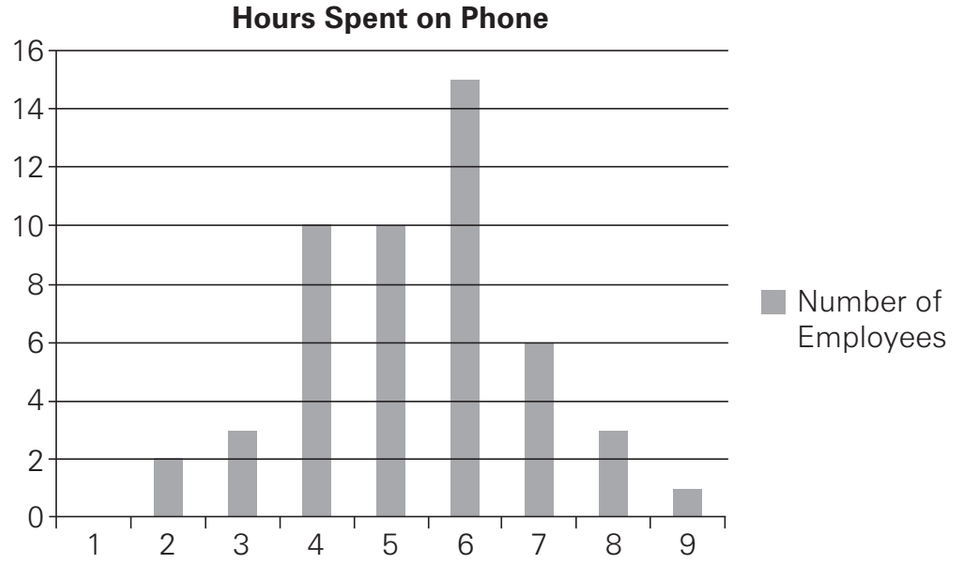
(A) Social Security and Interest on Debt
(B) Medicare & Medicaid and Community Development
(C) Interest on Debt, Education, Administration of Justice, and Transportation
(D) Social Security and Education
(E) Social Security and Transportation

Question 6-3:

The total amount of money that the U.S. government spent on the four lowest ranking sectors is _____ than the average amount of money that the U.S. government spent on the two highest-ranking sectors.

(A) 509 million dollars less
(B) 509 million dollars more
(C) 680.4 million dollars less
(D) 1,246.5 million dollars less
(E) 1,246.5 million dollars more

Item 7:



The table above shows the number of hours spent on the phone by the 50 employees on a certain day at the call center for RPT Corporation. Use the drop-down menus to fill in the blanks in each of the following statements based on the information given by the graph.

Question 7-1:

The median number of hours spent on the phone by the employees at RPT Corporation _____.

(A) 4
(B) 4.5
(C) 5
(D) 5.5
(E) 6

Question 7-2:

The ratio of the number of employees who spent greater than 5 hours on the phone to those who spent less than 4 hours on the phone is _____.

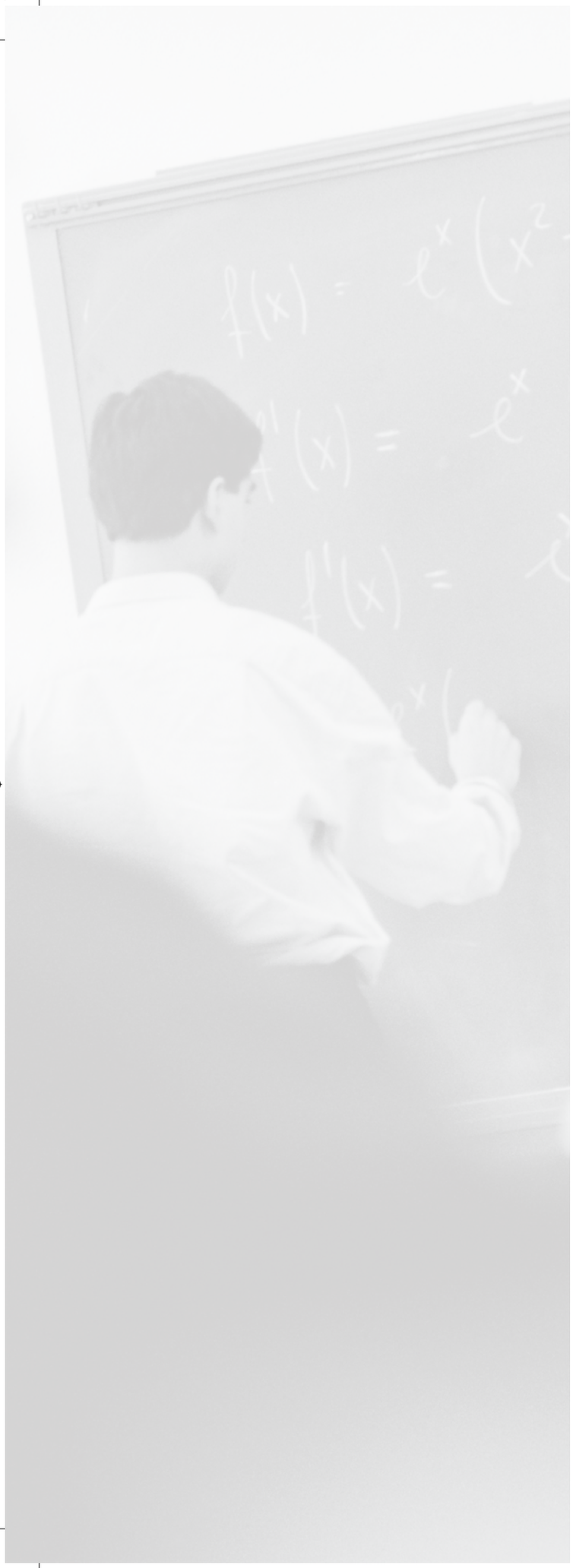
(A) 1 : 1
(B) 3 : 1
(C) 5 : 1
(D) 7 : 1
(E) 7 : 3

Question 7-3:

If the employees who spent 2 hours on the phone increased their total hours spent on the phone by 50%, then the total hours spent on the phone by these employees would be _____.

(A) 2
(B) 4
(C) 6
(D) 8

Check your answers on page 119.



Graphics Interpretation Answers and Explanations

ANSWER KEY

Graphics Interpretation

Item 1
Question 1-1: C, 100,000
Question 1-2: A, First Quarter
Question 1-3: A, Positive

Item 2
Question 2-1: C, Level C
Question 2-2: D, The VP of Engineering
Question 2-3: A, Product manager for new Product A

Item 3
Question 3-1: B, 4%
Question 3-2: C, Decreased by 16.67%
Question 3-3: D, 400

Item 4
Question 4-1: A, 15 to 8
Question 4-2: D, Day 90
Question 4-3: B, Indirect

Item 5
Question 5-1: A, Greater than
Question 5-2: D, 100% more words
Question 5-3: A, a direct

Item 6
Question 6-1: D, Medicare and Medicaid spending decreased by 18.62%
Question 6-2: E, Social Security and Transportation
Question 6-3: A, 509 million dollars less

Item 7
Question 7-1: D, 5.5
Question 7-2: C, 5 : 1
Question 7-3: C, 6

EXPLANATIONS

Item 1:

1-1. C, 100,000

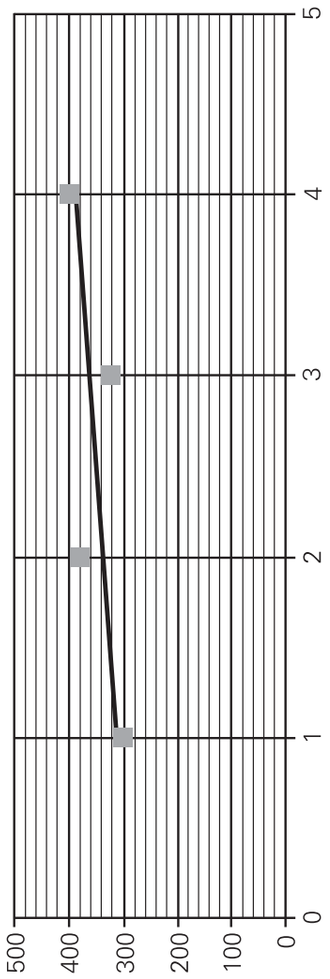
The question asks you how many more Homepage Hits there were in the 4th quarter compared to the 1st quarter. According to the legend, Homepage Hits are represented in thousands. For the 4th quarter, the bar reflecting Homepage Hits reaches the 400 mark; while for the 1st quarter the bar reflecting Homepage Hits reaches the 300 mark. Since Homepage Hits are represented in thousands, the difference is actually 100 thousand, or 100,000.

1-2. A, First Quarter

The question asks which quarter reflects the lowest ratio of Online Figurine Sales to Banner Advertising, which can be expressed as the relationship $\frac{\text{Online Figurine Sales}}{\text{Banner Advertising}}$. So, for the First Quarter, the ratio would be approximately $\frac{130}{210}$ or 0.62. For the Second Quarter, the ratio would be approximately $\frac{210}{275}$ or 0.76. For the Third Quarter, the ratio would be approximately $\frac{170}{250}$ or 0.68. For the Fourth Quarter, the ratio would be approximately $\frac{250}{295}$ or 0.84. Thus, the correct answer is the First Quarter.

1-3. A, Positive

The question asks about the slope of the line, if graphed, that would represent the overall trend in Homepage Hits. Consulting the graph, you can see that the overall trend in Homepage hits is upward, even though there is a dip in the third quarter. It is not necessary to draw the line, but it would look like this:



Because the general trend for Homepage Hits, from First Quarter to Fourth Quarter, is upwards, the slope of the line, if graphed, would be Positive.

Item 2:

2-1. C, Level C
The chart indicates that the buyer reports to the purchasing manager, who in turn reports to the VP of marketing, who in turn reports to the president. So a map of this would look like this:

buyer ➔ purchasing manager ➔ VP marketing ➔ president

The VP of marketing is a Level A employee because he/she reports directly to the president. The purchasing manager is a Level B employee because he/she reports to a Level B employee (marketing VP). The buyer must be a Level C employee because he/she reports to a Level B employee (purchasing manager).

2-2. D, The VP of Engineering
Use the key to see how you can tell who reports directly to whom. Since the arrow goes from the draftsperson's box to the line under the VP of engineering's box, the draftsperson reports directly to the VP of engineering. The lines connecting from the draftsperson's box to the electrical designer and the product designer indicate a direct line of communication, not a reporting relationship.

2-3. A, Product manager for new Product A
The management accountant is two levels under the president, so he/she is a Level B employee. The product manager for new product A is also two levels under the president, so the management accountant and the product manager have the same salary ranking. The VP of product development is a Level A employee, so this is not the same as the management accountant's salary ranking (B). The buyer is three levels under the president, so he/she is a Level C employee, which is not the same as the management's accounting ranking.

Item 3:

3-1. B, 4%
First, you need to identify the number of individuals with grey eyes; there are 40 individuals having grey. Since you were previously told that the study was based on 1,000 observations, you need to find what percent of 1,000 is 40. Translate from English to math: *What percent of 1,000 is 50* is the same as $\frac{x}{100}\times 1{,}000 = 40$, $10x = 40$, and $x = 4$. Thus, individuals with grey eyes comprise 4% of the individuals.

3-2. C, Decreased by 16.67%
First, write down the formula for percent change: $percent\ change = \frac{difference}{original}\times 100$. Next, find the number of individuals with blue eyes in February 2012 and February 1912. The chart indicates that 75 individuals had blue eyes in February 2012 and the question states that 90 individuals had blue eyes in February 1912. Accordingly, the difference between February 1912 and February 2012 is 90 – 75 = 15. Now, when you plug in the information to the percent change formula, you will find that $percent\ change = \frac{15}{90}\times 100 = 16.67\%$. Thus, if an identical study conducted in February of 1912 found that 90 individuals had blue eyes, the number of individuals having blue eyes has decreased by 16.67% since February 1912.

3-3. D, 400

The most common eye color is Brown, at approximately 430. The least common is Grey, at approximately 40. The difference between the two is 430 – 40 = 390, which is closest to 400.

Item 4:

4-1. A, 15 to 8

In order to find the range of light output between Day 30 and Day 120, you need to identify the greatest light output on Day 30 and the lowest light output on Day 120. On Day 30, the maximum light output was 15 lumens per watt. On Day 120, the minimum light output was 8 lumens per watt. Accordingly, light output ranges from 15 to 8 lumens per watt between Day 30 and Day 120.

4-2. D, Day 90

First, you want to find interquartile range, as defined in the chart explanation, for each observation. On Day 0, the middle 50% range is 14.5 -13.5 = 1. On Day 30, the middle 50% range is 14 -13 = 1. On Day 60, the middle 50% range is 13 -11.5 = 1.5. On Day 90, the middle 50% range is 12 - 10 = 2. On Day 120, the middle 50% range is 10.5 - 9 = 1.5. Therefore, the greatest range in the middle 50% occurs at Day 90.

4-3. B, Indirect

In order to answer this question, you need to identify the trend for Light Output and Time. In this graph, as time increases, the light output decreases. Therefore, light output and time have an indirect relationship.

Item 5:

5-1. A, Greater than

First, you want to find the slope of the regression line. Utilizing points of the graph, you can estimate the slope is $\frac{y_2 - y_1}{x_2 - x_1} = \frac{350 - 70}{5.5 - 1} = \frac{280}{4.5} \approx 62.2$. Next, you want to find the slope of the line crossing through points (0,0) and (4,200). Utilizing, the same formula, you can estimate the slope of the line crossing through points (0,0) and (4,200) to be $\frac{y_2 - y_1}{x_2 - x_1} = \frac{200 - 0}{4 - 0} = \frac{200}{4} = 50.$ Accordingly, since 62.2 > 50, the slope of the regression line is greater than the slope of the line crossing through points (0,0) and (4,200).

5-2. D, 100% more words

First, write down the percent change formula: $\frac{difference}{original} \times 100.$ Next, using the regression,find the words typed by an individual who types for 3 minutes; an individual who types for 3 minutes will type approximately 190 words. Next, according to the line of regression, an individual who types for 5.5 minutes will type approximately 375 words. Finally, plug the appropriate information into the percent change formula. When you do, you will find that the percent change equals $\frac{185}{190} \times 100 \approx 97\%$. Therefore, based on the regression line, an individual who types for 5.5 minutes should expect to type 100% more words than an individual who types for 3 minutes.

5-3. A, A direct

First, identify what is happening with both typing time and the number of words typed. According to the regression line, as the amount of time spent typing increases, the number of words typed increases. Therefore, time and the number of words typed have a direct relationship.

Item 6:

6-1. D, decreased by 18.62%

Since this question asks about percent change, you want to write down the necessary formula: $percent\ change = \frac{difference}{original} \times 100$. Next, since the question asks about the percent change from 2005 to 2006, you need to find the amount the U.S. Government spent on Medicare and Medicaid in 2006. According to the circle graph, the U.S. Government spent 670.9 million dollars on Medicare and Medicaid in 2006. Thus, the difference in spending from 2005 to 2006 is 824.4 – 670.9 = 153.5. Next, fill in the information in the percent change formula to find that $percent\ change = \frac{153.5}{824.4} \times 100 = 18.62$. Since more was spent in 2005 than in 2006, you can conclude that Medicare and Medicaid spending decreased by 18.62%.

6-2. E, Social Security and Transportation

First, you need to calculate the total amount of money spent by the U.S. Government in 2006. When you total the money spent in each sector, you will find that 26.8 + 61.2 + 63.6 + 76.9 + 114.9 + 243.7 + 586.1 + 670.9 + 804.1 = 2,648.2. Next, check each answer choice and see how much the stated sectors comprise of the total amount spent. A total of 829.8 was spent on Social Security and Interest on Debt; $\frac{829.8}{2648.2} \times 100 = 31.33\%$ of the total amount spent in 2006. A total of 697.7 was spent on Medicare and Medicaid and Community and Regional Development; $\frac{697.7}{2648.2} \times 100 = 26.35\%$ of the total amount spent in 2006. A total of 499.1 was spent on Interest on Debt, Education and Technology, Administration of Justice and General Government, and Transportation; $\frac{499.1}{2648.2} \times 100 = 18.85\%$ of the total amount spent in 2006. A total of 701.0 was spent on Social Security and Education and Technology; $\frac{701}{2648.2} \times 100 = 26.47\%$ of the total amount spent in 2006. A total of 663.0 was spent on Social Security and Transportation; $\frac{663}{2648.2} \times 100 = 25.04\%$ of the total amount spent in 2006. Accordingly, the sectors that comprise approximately 25% of the total amount spent by the U.S. Government in 2006 are Social Security and Transportation.

6-3. A, 509 million dollars less

First, identify the four lowest ranking sectors: Community and Regional Development, Natural Resources and the Environment, Administration of Justice and General Government, and Transportation. Next, calculate the total amount spent on these four sectors: 26.8 + 61.2 + 63.6 + 76.9 = 228.5. Next, in order to find the average amount of money that the U.S. government spent on the two highest-ranking sectors, set up an average pie and find the two highest-ranking sectors. You will find that 1,475.0 was spent on Defense and Foreign Affairs and Medicare and Medicaid. Accordingly, the average amount spent on these two sectors was $\frac{1,475}{2} = 737.5$. Finally, find the difference between the total amount of money that the US government spent on the four lowest ranking sectors (228.5) and the average amount of money that the U.S. government spent on the two highest-ranking sectors (737.5) is 737.5 – 228.5 = 509.0. Thus, the U.S. government spent 509.0 less on the four lowest ranking sectors than the average of the two highest-ranking sectors.

Item 7:

7-1. D, 5.5

To find the median you can either write out all of the data points for the number of hours spent and start eliminating numbers from each side, or, since you know that there are 50 employees at the call center, you can just find the 25th and 26th data points and average them. The 25th person spent 5 hours on the phone and the 26th person spent 6 hours on the phone. The median is therefore 5.5.

7-2. C, 5 : 1

From the chart, the number of people who spent more than 5 hours on the phone is 25, and the number of people who spent less than 4 hours on the phone is 5. The ratio is therefore 25:5, or 5:1.

7-3. C, 6

From the chart, you can see that there are 2 employees who spent 2 hours on the phone. So, the total hours spent by these employees is 4 hours. If you increase that by 50 percent, then you will get 6 total hours.