GMAT™ Focus – Data Insights Questions

Data Sufficiency

1.

A sum of $200,000 from a certain estate was divided among a spouse and three children. How much of the estate did the youngest child receive?

(1) The spouse received $\frac{1}{2}$ of the sum from the estate, and the oldest child received $\frac{1}{4}$ of the remainder.

(2) Each of the two younger children received $12,500 more than the oldest child and $62,500 less than the spouse.

- ○ Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
- ✓ Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
- ○ BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
- ○ EACH statement ALONE is sufficient
- ○ Statements (1) and (2) TOGETHER are NOT sufficient

Explanation:

Algebra | First- and second-degree equations

(1) The combined amount that the two youngest children together received can be determined, but not the specific amount that either one of them received; NOT sufficient.

(2) An equation can be set up expressing the relationships given in terms of x, with x being the amount that each of the two younger children received: $200,000 = x + x + (x - 12,500) + (x + 62,500)$. The amount that the youngest child received (x) can thus be determined; SUFFICIENT.

The correct answer is B; statement 2 alone is sufficient.

2.

A certain group of car dealerships agreed to donate x dollars to a Red Cross chapter for each car sold during a 30-day period. What was the total amount that was expected to be donated?

(1) A total of 500 cars were expected to be sold.

(2) 60 more cars were sold than expected, so that the total amount actually donated was $28,000.

- ○ Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
- ○ Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
- ✓ BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
- ○ EACH statement ALONE is sufficient
- ○ Statements (1) and (2) TOGETHER are NOT sufficient

Explanation:

Algebra | Applied problem

(1) It is known that 500 cars were expected to be sold, so $500x$ represents the total amount of the expected donation. However, x is unknown so $500x$ cannot be determined; NOT sufficient.

(2) Since $60x$ represents the extra amount donated beyond the expectation, the total amount that it was expected would be donated would be $28,000 minus $60x$. Again, x is unknown, so the total amount expected to be donated cannot be found; NOT sufficient.

If the information in **(1)** and **(2)** is used together, then $500x = $28,000 - 60x$, from which the value of x can be determined. Thus, the total amount expected to be donated can also be determined ($500x$).

The correct answer is C; both statements together are sufficient.

3.

A certain company currently has how many employees?

(1) If 3 additional employees are hired by the company and all of the present employees remain, there will be at least 20 employees in the company.

(2) If no additional employees are hired by the company and 3 of the present employees resign, there will be fewer than 15 employees in the company.

- ○ Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
- ○ Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
- ✓ BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
- ○ EACH statement ALONE is sufficient
- ○ Statements (1) and (2) TOGETHER are NOT sufficient

Explanation:

Algebra | Inequalities

Let n be the current number of employees in the company.

(1) This can be expressed as $n + 3 \geq 20$, and thus $n \geq 17$, which gives a range of possible values of n; NOT sufficient.

(2) This can be expressed as $n - 3 < 15$, and thus $n < 18$, which also gives a range of possible values of n; NOT sufficient.

From **(1)** and **(2)** together, the ranges are limited to $n \geq 17$ and $n < 18$, and the value of n can be determined to be 17.

The correct answer is C; both statements together are sufficient.

4.

A bookstore that sells used books sells each of its paperback books for a certain price and each of its hardcover books for a certain price. If Joe, Maria, and Paul bought books in this store, how much did Maria pay for 1 paperback book and 1 hardcover book?

(1) Joe bought 2 paperback books and 3 hardcover books for $12.50.

(2) Paul bought 4 paperback books and 6 hardcover books for $25.00.

- ○ Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
- ○ Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
- ○ BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
- ○ EACH statement ALONE is sufficient
- ✓ Statements (1) and (2) TOGETHER are NOT sufficient

Explanation:

Algebra | Applied problems

Let p be the price for each paperback book, and let h be the price for each hardcover book.

(1) From this, Joe's purchase can be expressed as $2p + 3h = \$12.50$. Without more information, this equation alone cannot determine the cost of 1 paperback and 1 hardcover book; NOT sufficient.

(2) This statement is equivalent to $4p + 6h = \$25.00$. If both sides of this equation are divided by 2, it gives exactly the same equation as in **(1)**; NOT sufficient.

Since **(1)** and **(2)** are the same equation that cannot be solved, taken together they cannot determine the cost of 1 of each type of book.

The correct answer is E; both statements together are still not sufficient.

5.

Will the first 10 volumes of a 20-volume encyclopedia fit upright in the bookrack shown above?

(1) $x = 50$ centimeters

(2) Twelve of the volumes have an average (arithmetic mean) thickness of 5 centimeters.

- Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
- Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
- BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
- EACH statement ALONE is sufficient
- ✓ Statements (1) and (2) TOGETHER are NOT sufficient

Explanation:

Arithmetic | Measurement

(1) This establishes the length of the bookrack but does not give any information about the thickness of the volumes; NOT sufficient.

(2) This establishes the average thickness of 12 of the volumes, but does not give any information about the average thickness of the first 10 volumes; NOT sufficient.

By the same reasoning used in **(2)**, **(1)** and **(2)** taken together are not sufficient to answer the question.

The correct answer is E; both statements together are still not sufficient.

6.

A certain 4-liter solution of vinegar and water consists of x liters of vinegar and y liters of water. How many liters of vinegar does the solution contain?

(1) $\frac{x}{4} = \frac{3}{8}$

(2) $\frac{y}{4} = \frac{5}{8}$

- Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
- Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
- BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
- ✓ EACH statement ALONE is sufficient
- Statements (1) and (2) TOGETHER are NOT sufficient

Explanation:

Arithmetic | Percents

(1) This proportion can be solved for x to determine the liters of vinegar in the solution; SUFFICIENT.

(2) This proportion can be solved for y to determine the liters of water in the solution. Then, substituting this value of y in the equation $x + y = 4$, which can be formulated from the given information, will give the value of x; SUFFICIENT.

The correct answer is D; each statement alone is sufficient.

Two-Part Analysis

7.

A literature department at a small university in an English-speaking country is organizing a two-day festival in which it will highlight the works of ten writers who have been the subjects of recent scholarly work by the faculty. Five writers will be featured each day. To reflect the department's strengths, the majority of writers scheduled on one of the days will be writers whose primary writing language is not English. On the other day of the festival, at least four of the writers will be women. Neither day should have more than two writers from the same country. Departmental members have already agreed on a schedule for eight of the writers. That schedule showing names, along with each writer's primary writing language and country of origin, is shown.

- Day 1:

Achebe (male, English, Nigeria)
Weil (female, French, France)
Gavalda (female, French, France)
Barrett Browning (female, English, UK)

- Day 2:

Rowling (female, English, UK)
Austen (female, English, UK)
Ocantos (male, Spanish, Argentina)
Lu Xun (male, Chinese, China)

Select a writer who could be added to the schedule for either day. Then select a writer who could be added to the schedule for neither day. Make only two selections, one in each column.

Either day	Neither day	
☐	☐	LeGuin (female, English, USA)
☐	☑	Longfellow (male, English, USA)
☑	☐	Murasaki (female, Japanese, Japan)
☐	☐	Colette (female, French, France)
☐	☐	Vargas Llosa (male, Spanish, Peru)
☐	☐	Zola (male, French, France)

Explanation:

Apply

Since Day 2 already has two male writers on the schedule, it cannot be the day in which four of the writers are women. Thus, Day 1 is the day in which at least four of the writers are women. A male writer, Achebe, is already scheduled for Day 1 so the fifth writer must be a woman. The writers who match this criterion are LeGuin, Murasaki, and Colette. Of the writers already scheduled for Day 1, two are from France, so the fifth writer cannot also be from France. This disqualifies Colette from consideration.

Thus, the writers who can be added to the schedule for Day 1 are LeGuin and Murasaki.

Day 2 is the day in which the majority of the writers must have primary writing languages that are not English. Two of the writers on Day 2 write primarily in English, so the fifth writer must not write primarily in English. The writers who match this criterion are Murasaki, Colette, Vargas Llosa, and Zola. Two writers scheduled for Day 2 are from the UK, so no additional writers can be from the UK. However, Murasaki, Colette, Vargas Llosa, and Zola are all from countries other than the UK.

Thus, the writers who can be added to the schedule for Day 2 are Murasaki, Colette, Vargas Llosa, and Zola.

RO1, *Either day*: Apply

The only writer who is eligible to be added to the schedule for Day 1 and is also eligible to be chosen for Day 2 is Murasaki.

The correct answer is *Murasaki.*

RO2, Neither day: Apply

The only writer who is not eligible to be added to the schedule for Day 1 and is also not eligible to be added to the schedule for Day 2 is Longfellow.

The correct answer is *Longfellow.*

8.

The Quasi JX is a new car model. Under ideal driving conditions, the Quasi JX's fuel economy is E kilometers per liter $\left(E\,\frac{\text{km}}{\text{L}}\right)$ when its driving speed is constant at S kilometers per hour $\left(S\,\frac{\text{km}}{\text{hr}}\right)$.

In terms of the variables S and E, select the expression that represents the number of liters of fuel used in 1 hour of driving under ideal driving conditions at a constant speed S, and select the expression that represents the number of liters of fuel used in a 60 km drive under ideal driving conditions at a constant speed S. Make only two selections, one in each column.

	Liters of fuel in 1 hr	Liters of fuel in 60 km	
A	☑	○	$\frac{S}{E}$
B	○	○	$\frac{E}{S}$
C	○	☑	$\frac{60}{E}$
D	○	○	$\frac{60}{S}$
E	○	○	$\frac{S}{60}$
F	○	○	$\frac{E}{60}$

Explanation:

Strategize

Choose from the available options the expression that yields the intended value.

RO 1, *Liters of fuel in 1 hr*: Strategize

The Quasi JX travels E kilometers per liter of fuel $\left(E\,\frac{km}{L}\right)$ at S kilometers per hour $\left(S\,\frac{km}{hr}\right)$. Therefore the Quasi JX requires $\frac{1}{E}$ liters of fuel to travel 1 km.

Since the Quasi JX travels S kilometers per hour, it requires $\frac{1}{E}\frac{L}{\cancel{km}} \times S\frac{\cancel{km}}{hr}$, or $\frac{S}{E}\frac{L}{hr}$.

The correct answer is A, $\frac{S}{E}$.

RO 2, *Liters of fuel in 60 km*: Strategize

The Quasi JX travels E kilometers per liter of fuel $\left(E\,\frac{km}{L}\right)$. Therefore the Quasi JX requires $\frac{1}{E}$ liters of fuel to travel 1 km. Given this, the Quasi JX uses $\frac{1}{E}\frac{L}{\cancel{km}} \times 60\,\cancel{km}$, or $\frac{60}{E}L$ of fuel to travel 60 km.

The correct answer is C, $\frac{60}{E}$.

9.

The following excerpt from a fictitious science news report discusses a fictitious type of location called a *morefa*.

For zoologists studying the behavior of certain species of birds, the critical importance of observing the birds in those species' morefa during the annual breeding season is obvious. Such observation allows researchers to study not only the courtship displays of many different individuals within a species, but also the species' social hierarchy. Moreover, since some species repeatedly return to the same morefa, researchers can study changes in group dynamics from year to year. The value of observing a morefa when the birds are not present, however—such as prior to their arrival or after they have abandoned the area to establish their nests—is only now becoming apparent.

Based on the definition of the imaginary word *morefa* that can be inferred from the paragraph above, which of the following activities of a bird species must happen in a location for that location to be the species' morefa, and which must NOT happen in a location for that location to be the species' morefa? Make only two selections, one in each column.

	Must happen in the location	Must not happen in the location	Activities of the members of the species
A	○	○	Sleeping
B	○	○	Occupying the location multiple times
C	○	✓	Establishing nests
D	✓	○	Gathering together with members of their own species
E	○	○	Territorial competition with members of different species

Explanation:

Infer

Infer the meaning of a term from the way that term is used in the information provided.

RO1 Infer, *Must happen in the location*:

The excerpt indicates that, by studying a species in its morefa, "researchers can study changes in group dynamics," including "the courtship displays of many different individuals within a species" and "the species' social hierarchy." For researchers to observe such group behaviors of a species in a morefa requires that members of that species gather with other members of their species in such locations.

The correct answer is D, *Gathering together with members of their own species.*

RO2 Infer, *Must not happen in the location*:

The excerpt indicates that birds will abandon their morefa "to establish their nests." Thus, on the basis of the information provided, it is inconsistent for a bird to establish a nest in its morefa, which corresponds to the third of the available choices.

The correct answer is C, *Establishing nests.*

10.

Over a period of 5 academic years from Fall 1999 through Spring 2004, the number of faculty at a certain college increased despite a decrease in student enrollment from 5,500 students in Fall 1999.

In the given expressions, F and S represent the percent change in the number of faculty and students, respectively, over the 5 academic years, and R represents the number of students per faculty member in Fall 1999. The percent change in a quantity X is calculated using the formula $\left(\frac{X_{new} - X_{old}}{X_{old}}\right)(100)$.

Select the expression that represents the number of faculty in Fall 1999, and select the expression that represents the number of students per faculty member in Spring 2004. Make only two selections, one in each column.

	Number of faculty in Fall 1999	Students per faculty member in Spring 2004	
A	○	○	$5{,}500R$
B	☑	○	$\frac{5{,}500}{R}$
C	○	○	$\frac{1}{R}$
D	○	☑	$\left(\frac{100+S}{100+F}\right)R$
E	○	○	$\left(\frac{100-S}{100+F}\right)R$
F	○	○	$\left(\frac{100+S}{100-F}\right)R$

Explanation:

Strategize

RO1, *Number of faculty in Fall 1999*: Strategize

The variable R represents the ratio of the number of students to the number of faculty in 1999. It is given that there were 5,500 students in 1999, so

$$R = \frac{\#\text{ of students in Fall 1999}}{\#\text{ of faculty in Fall 1999}}$$

$$= \frac{5{,}500}{\#\text{ of faculty in Fall 1999}}$$

Thus the number of faculty in Fall 1999 was $\frac{5{,}500}{R}$.

Another method is to invert the ratio R:

$$\frac{1}{R} = \frac{\#\text{ of faculty in Fall 1999}}{\#\text{ of students in Fall 1999}}$$

Multiplying both sides of the equation by the number of students in Fall 1999 would then give

$$5{,}500\frac{1}{R} = \left(\cancel{\#\text{ of students in Fall 1999}}\right)\frac{\#\text{ of faculty in Fall 1999}}{\cancel{\#\text{ of students in Fall 1999}}}$$

$$= \#\text{ of faculty in Fall 1999}$$

Neglecting to multiply by the number of students in Fall 1999 would lead to the selection of expression C, $\frac{1}{R}$.

The correct answer is B, $\frac{5{,}500}{R}$.

RO2, *Students per faculty member in Spring 2004*: Strategize

The variable S represents the percent change in the student population from 1999 to 2004. If X_{2004} represents the student population in Spring 2004 and X_{1999} represents the student population in Fall 1999, then

$$S = \left(\frac{X_{2004} - X_{1999}}{X_{1999}}\right)100$$

Solve for X_{2004}:

$$\frac{S}{100} = \frac{X_{2004} - X_{1999}}{X_{1999}}$$

$$\frac{S}{100}X_{1999} = X_{2004} - X_{1999} \qquad \text{multiply both sides by } X_{1999}$$

$$X_{1999} + \frac{S}{100}X_{1999} = X_{2004}$$

$$X_{1999}\left(\frac{100+S}{100}\right) = X_{2004} \qquad \text{factor out } X_{1999}$$

Substituting X_{1999} = 5,500, the number of students in 2004 is given by

$$X_{2004} = 5{,}500\left(\frac{100+S}{100}\right)$$

Similarly, since there were $\frac{5{,}500}{R}$ faculty members in 1999, the number of faculty in 2004 is given by

$$\frac{5{,}500}{R}\left(\frac{100+F}{100}\right)$$

The ratio of the number of students in Spring 2004 to the number of faculty in Spring 2004 can be simplified:

$$\frac{5{,}500\left(\frac{100+S}{100}\right)}{\frac{5{,}500}{R}\left(\frac{100+F}{100}\right)} = \left(\cancel{5{,}500}\left(\frac{100+S}{\cancel{100}}\right)\right)\left(\frac{R}{\cancel{5{,}500}}\left(\frac{\cancel{100}}{100+F}\right)\right)$$

$$= \left(\frac{100+S}{100+F}\right)R$$

Note that no assumption was made in the algebraic manipulation about whether the populations were increasing or decreasing, so this expression must be valid in all possible cases. Expression E, $\left(\frac{100-S}{100+F}\right)R$, might appear to be the right answer because it has a minus sign preceding the S in the numerator, and student enrollment has declined. However, the decline in enrollments simply means that S is a negative number.

The correct answer is D, $\left(\frac{100+S}{100+F}\right)R$.

Multi-Source Reasoning

Techniques | Artifacts | Budget

Island Museum analyzes historical artifacts using one or more techniques described below—all but one of which is performed by an outside laboratory—to obtain specific information about an object's creation. For each type of material listed, the museum uses only the technique described:

Animal teeth or bones: The museum performs *isotope ration mass spectrometry* (IRMS) in-house to determine the rations of chemical elements present, yielding clues as to the animal's diet and the minerals in its water supply.

Metallic ores or alloys: *Inductively coupled plasma mass spectrometry* (ICP-MS) is used to determine the ratios of traces of metallic isotopes present, which differ according to where the sample was obtained.

Plant matter: While they are living, plants absorb carbon-14, which decays at a predictable rate after death; thus *radiocarbon dating* is used to estimate a plant's date of death.

Fired-clay objects: *Thermoluminescence* (TL) *dating* is used to provide an estimate of the time since clay was fired to create the object.

Techniques | Artifacts | Budget

Island Museum has acquired a collection of metal, fired clay, stone, bone, and wooden artifacts found on the Kaxna Islands, and presumed to be from the Kaxna Kingdom of 1250–850 BC. Researchers have mapped all the mines, quarries, and sources of clay on Kaxna and know that wooden artifacts of that time were generally created within 2 years after tree harvest. There is, however, considerable uncertainty as to whether these artifacts were actually created on Kaxna.

In analyzing these artifacts, the museum assumes that radiocarbon dating is accurate to approximately ±200 years and TL dating is accurate to approximately ±100 years.

Techniques | Artifacts | Budget

For outside laboratory tests, the museum's first-year budget for the Kaxna collection allows unlimited IRMS testing, and a total of $7,000—equal to the cost of 4 TL tests plus 15 radiocarbon tests, or the cost of 40 ICP-MS tests—for all other tests. For each technique applied by an outside lab, the museum is charged a fixed price per artifact.

11.

For each of the following artifacts in the museum's Kaxna collection, select *Yes* if, based on the museum's assumptions, a range of dates for the object's creation can be obtained using one of the techniques in the manner described. Otherwise, select *No*.

○ Yes	● No	Bronze statue of a deer
● Yes	○ No	Fired-clay pot
● Yes	○ No	Wooden statue of a warrior

Explanation:

Apply

RO1: Apply

Based on the information in *Techniques*, the only technique the museum would use on a bronze statue is ICP-MS, which yields information on the ratios of traces of metallic isotopes present but would not provide information about the statue's age.

The correct answer is *No*.

RO2: Apply

According to *Techniques*, TL dating can be used to estimate the time at which the clay was fired to produce the pot. According to the assumptions in *Artifacts*, the date so obtained is considered accurate to within ±100 years, so TL dating produces a 200 year range of dates for the creation of the pot.

The correct answer is *Yes*.

RO3: Apply

Since wood is a form of plant matter, radiocarbon dating (*Techniques*) can be used to estimate the date of death of the tree from which the wooden statue was made. The assumption that radiocarbon dating is accurate to within ±200 years (*Artifacts*) produces a 400-year range of dates for the death of the tree. The assumption that the statue was almost certainly created within 2 years of the tree's death (*Artifacts*) yields a 400-year range of dates for the creation of the wooden statue.

The correct answer is *Yes*.

12.

For each of the following combinations of Kaxna artifacts, select *Yes* if, based on the information provided, the cost of all pertinent techniques described can be shown to be within the museum's first-year Kaxna budget. Otherwise, select *No*.

● Yes	○ No	2 fired-clay statues and 10 bronze statues
● Yes	○ No	3 fired-clay statues and 5 tin implements
○ Yes	● No	4 fired-clay pots and 20 wooden statues