Quantitative Comparison

Introduction

QC (Quantitative Comparison) questions are unique to the GRE test. More than thirty percent of the Quantitative Reasoning section of the GRE test will comprise QC questions. So ask yourself, is it important? Yes! Let us have a look at a sample question first:

Quantity A	Quantity B
X	2X

a) Quantity A is greater than Quantity B

b) Quantity B is greater than Quantity A

c) The two quantities are equal

d) The relationship cannot be determined from the given information

The biggest mistake is to not to understand QC questions while preparing for GRE. Reading one of the students mind, "Ehh! I just have to compare two values right, no big deal!". Well it is a big deal when staggering thirty to forty percent of the GRE Quantitative Reasoning questions are related to comparison questions. Just knowing the concepts (such as percentages and algebra) is not enough to tackle QC questions, you have to know the techniques to efficiently solve them.

Let us try and understand the strategies which are required to ace the QC questions.

- **QC Structure**

The most important aspect of a QC question is to understand the structure of the question type. Every question has two quantities and we have to compare both of them. There are four options which are same for every QC question. So it is very important for us to understand the meaning of these options. Let us take a look on the QC options with a little modification.

a) Quantity A is greater than Quantity B **for all values**

b) Quantity B is greater than Quantity A **for all values**

c) The two quantities are equal **for all values**

d) The relationship can be determined however any two of the following can happen:

- Quantity A is greater
- Quantity B is greater
- Both are equal

The last one is tricky. Why? Ask yourself a question now. What is easier to do, prove or disprove?

DISPROVE! To prove anything you will have to look at every parameter so that there is no scope of error however to disprove you have to find just one error and say DISPROVE! Now you must be wondering how to apply this to QC questions.

- **DISPROVE:** Look for D

In QC questions it is very critical that the student disproves rather than trying to prove since disproving is much easier than proving. So how do we look for D? Are there any special types of glasses which will make us spot D? No! Let us see how to look for D.

Look for D: Art not Science

If a student wants to disprove the options then he or she should try and prove D. It is relatively much easier to get to the answer option 'D' when compared to other answer options. Well how do we do that? To prove option 'D' all a student needs is to prove any two of the three options: A>B, B>A, A=B. Let us take an example:

Quantity A	Quantity B
X	2X

In the question above, if X is positive then B > A and if X is negative, then A > B. We have proved that A >B and B>A which means that the answer is option 'D'.

The above question is not really a tricky one. The trickier the question the more dangerous the trap is. When the questions get trickier, students panic. We know it because that is what the test is all about. However we have a great tool which will not only to help you organize yourself in QC questions but also to tackle tough questions with ease. The tool is called QC box.

QC Box:

QC box is a tool that will keep you get organized and will never let you forget the next step. Let us apply the QC tool on a question.

Quantity A	Quantity B
X	X^2

A	a b c d	B
	x =	

Step 1: Write the above structure down in the scratch paper

Step 2: Use a value for the variable. Let us say x = 2 then quantity A is 2 and Quantity B is 4. Hence A is greater than B. Don't see it this way; eliminate the options that you have disproven. If you have proven for one instance that A is greater than B then you have disproven that B is greater than A and both are equal. So strike that off in your scratch paper as it is shown below.

A	a ~~b~~ ~~c~~ d	B
2	x = 2	4

Step 3: Now look for option D. Once you have proven than A is greater than B, try and disprove it with a value. Let us say x = 0.2. If x is equal to 0.2 then quantity A is 0.2 and quantity B is 0.04. Hence now quantity B is greater, which disproves A and the answer is option 'D'. Your scratch paper should look like:

A	~~a~~ ~~b~~ ~~c~~ (d)	B
2	x = 2	4
0.2	x = 0.2	0.04

Easy isn't it! Now whenever you solve a QC question don't forget the QC box. It will keep you organized and make sure that whenever you are looking for the option D by using values or numbers you don't get confused.

- **USE NUMBERS:**

It has already been emphasized that you should be using numbers. However using numbers unnecessarily won't help you. It is very important that you know what you are doing in QC questions. Numbers should be used only to simplify your approach not as the only approach. Well algebra helps but there are some features of the QC questions which would help you to understand different types of traps which QC questions put.

When you throw a number in the QC box you must to know what you are doing otherwise you will end up not solving the questions, cursing this book and your instructor. There are certain weapons that you have which you can throw and QC questions will fall like dominos.

Your Weapons:

Let us see what weapons you have and what type of explosions they do:

- Zero: The first brahmastra (a dangerous weapon) which you can throw is a zero. This can kill a question like a Penguin in Sahara Desert. Let us see how.

Quantity A	Quantity B
3X	4|X|

The very first blow to this question can be x = 0 when both are equal. This will eliminate the possibility of A>B and B>A.

A	a b c d	B
0	x = 0	0

So whenever you see a question just try to put zero in the mix. Now some questions will clearly say not to put zero (They are scared) then don't put zero there as putting zero in such questions will destroy your score.

- **One:**

The second weapon is 'One'. One has its own properties. You can easily multiply any number with one and it comes very handy when dealing with exponents. Let us see a question.

X is not equal to zero

Quantity A	Quantity B
$\|X - 1\|$	$\|X\| - 1$

A	~~a b c~~ d	B
0	x = 1	0
2	X = -1	0

- **Values between 0 and 1:**

These values behave a little different than positive values. They act like they are on drugs. The square is smaller than the number. The cube is the least among square and the number.

Let us say: $x = 0.2$, $x^2 = 0.04$, $x^3 = 0.008$

X >0 and X not equal to 1

Quantity A	Quantity B
$\|X\|$	$X\|X\|$

A	a b c d	B
0	x = 1	0
2	X = -1	0

- **Values between -1 and 0**:

  These guys are on some serious drugs. The square is the greatest and the number being the least among square, number and the cube.

  Let us say x = -0.2, x2 = 0.04, x^3 = - 0.008

- **Numbers less than -1 and greater than +1**

  Numbers less than -1 and greater than +1 are like mirror images of each other. In positive the bigger the power the bigger the number, however for numbers less than -1 the square is the greatest and the number is greater than its cube.

  Let us say: x = -3, $X^2 > X > X^3$

  Well these are your weapons and each weapons gives different values and you can look for option 'D' with much ease once you are loaded with all these weapons. It is very important to respect the restrictions given in the questions.

ALGEBRA and QC:

Sometimes numbers don't help or we just don't get the pattern in the question. So there are some algebraic operations that you can perform in a QC question. There are some manipulations that you can do in a QC question to both the quantities so that it looks friendly. Let us see the operations that you can do:

- You may add or subtract the same value from both the quantities
- You may multiply or divide both the quantities by the same number provided that the number is positive

- You may square or square root both the quantities provided that both the quantities are positive.

Let us see a question:

Quantity A	Quantity B
$\sqrt{5}+\sqrt{7}$	$\sqrt{12}$

Since both the quantities are positive numbers, you can square both of them:

Quantity A	Quantity B
$(\sqrt{5}+\sqrt{7})^2$	$(\sqrt{12})^2$
$12+\sqrt{35}$	12

Clearly we can observe that Quantity A is greater.

Example:

Quantity A	Quantity B
2^{50}	3^{30}

Raising both the quantities to the power 1/10 (Since both are positive)

Quantity A	Quantity B
2^5	3^3
32	27

We can observe that Quantity A is greater

THE 'OTHER' IS BENCHMARK:

An algebraic QC question has two quantities, one of them contains a variable and the other is a fixed value. The fixed value can serve as the benchmark to solve the questions. Let us learn that with a simple example:

Triangle A has a perimeter 18 cm.

Quantity A	**Quantity B**
Length of the longest side	9

Now there is no picture given here. You have a triangle with perimeter 18 cm and nothing from there. The 'Fixed' quantity will get you started. Let us say that the longest side is 9 cm then the sum of other two sides will be 9 cm which is not possible as sum of two sides of a triangle is greater than the third side. Increasing the length more than 9 is not possible as sum of two sides has to remain greater than the third side.

Hence B is the answer.

There will be many questions in which you have to find the maximum or minimum of a certain equation, given the restrictions then the other quantity can help you to get started which acts like a benchmark.

LOOK FOR PATTERNS:

As emphasized again and again don't put numbers just for the sake of it, make sure that you know what you are doing. How would you know that? Well GRE makes it very easy for you. Most questions will have a pattern. Here are some of the major patterns:

- **Sign not Magnitude:**

  QC question traps focus more on sign of the value rather than the magnitude. The essence of the trap would lie in numbers being positive or negative most of the time and very rarely it will test for magnitude of the values. So if you are planning to use numbers just understand that if you have tried a positive number then go for a negative number rather than another positive number. Let us see that explains this:

Example:

RS>0>-R

Quantity A	Quantity B
S	|X|

You can observe that –R > 0 which means that R<0. If R is negative and the product of R and S is positive then S will also be negative. Since |X| can never be negative hence Quantity B is always greater. So when it comes to proving using numbers will only help to eliminate the wrong ones however it won't lead you to an answer. It is always advisable to keep both the weapons with you i.e. Using Numbers and Algebra.

- **It's never one value**

GRE never asks questions such as "What is in my pocket?". Mostly there will be a range of values giving two different results helping you to come to option 'D'. Different ranges have already been discussed in the weapons section.

Example:

A > B > 0

Quantity A	Quantity B
5A	6B

For the question above, till A = 6 Quantity A is greater and then after that Quantity B is greater.

- **Zero**

Zero is the number which can make the QC journey very easy for any student. If you can, always try to put zero in the mix as it has the capability of messing things. As discussed in the weapons section, zero is the most dangerous weapon that you have. Let us see a question:

A > B, A and B are positive integers

Quantity A	Quantity B
(A – 3) (A)	B

In the question above if we put A = 3 then Quantity A is smaller and If we put A = 4 then Quantity A is greater. The reason we started with A = 3 is that we wanted a zero which would always go against the tradition. Zero is quite naughty isn't it!

SUMMARY-

Well to keep all information in one place let us summarize all the major points that we have discussed. The following will be the major points that you need to implement to ace the QC questions.

Note: Concept knowledge, Organization tool (QC Box) and Strategies are three pillars on which you success depends. Skipping any of them can lead to low confidence, low scores and lot of sugar consumption.

- **Look For D:**

  Again and again, it has been, is and will be emphasized that when you plan to disprove look for D. To prove you need a plan of action and knowledge of a concept. If you know that, perfect! Otherwise you disprove.

- **Manipulate the Quantities:**

  To simplify things you may manipulate both the quantities by adding, multiplying or dividing both the quantities by the same number. Multiplication and division is only applicable when both quantities are positive. You may also play with the powers.

- **The 'OTHER' is benchmark:**

  The other quantity, which is fixed, acts as an inflexion point for the quantity with variables. Use the number, in fixed quantity, in the quantity with variables.

- **Patterns:**

  There are such patterns in GRE QC questions that mostly check signs rather than magnitude of the numbers which will help you put numbers more smartly. One of the major patterns is zero being the only exception.

Concept Exercise

1. 'y' is a positive integer

Quantity A	**Quantity B**
Y	The sum of two integers whose product is y.

2. X not equal to zero

Quantity A	**Quantity B**
x	X^4

3. y > 0

Quantity A	**Quantity B**
1/3y	3y

4. XY>0

Quantity A	**Quantity B**
|X| + |Y|	|X + Y|

5. X and Y are positive integers

Quantity A	**Quantity B**
$\sqrt{Y} + \sqrt{X}$	$\sqrt{Y + X}$

6. AB = BC

Quantity A	**Quantity B**
A	C

7. (XY/Z) > 1

Quantity A	**Quantity B**
XY	Z

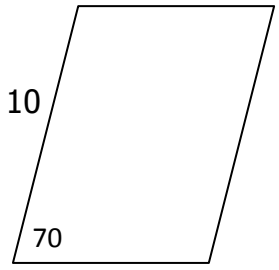
8. Set S consists of 'n' consecutive integers

Quantity A	**Quantity B**
Mean of Set S	Median of Set S

9. A > B > 0 > C

Quantity A	**Quantity B**
A - B	|C|B

10.



The figure above is a parallelogram.

Quantity A	**Quantity B**
80	Area of parallelogram

Solutions

1. 'y' is a positive integer

Quantity A	Quantity B
Y	The sum of two integers whose product is y.

Solution:

A	~~a~~ ~~b~~ ~~c~~ d	B
6	y = 6	5 (3 + 2)
1	y = 1	2 (1 + 1)

Hence answer is D

2. X not equal to zero

Quantity A	Quantity B
x	X^4

Solution:

A	~~a~~ ~~b~~ ~~c~~ d	B
1	x = 1	1
2	X = 2	16

Hence the answer is D.

3. $y > 0$

Quantity A	Quantity B
1/3y	3y

Solution:

A	a b c d	B
1	y = 1/3	1
1/3	y = 1	3

Hence the answer is D.

4. $XY>0$

Quantity A	Quantity B
$\|X\| + \|Y\|$	$\|X + Y\|$

Solution:

You may try using numbers here however X and Y both have same signs as XY > 0. Since they have same signs both of the quantities will yield same value.

Hence answer is C.

5. X and Y are positive integers

Quantity A	Quantity B
$\sqrt{Y} + \sqrt{X}$	$\sqrt{Y + X}$

Solution:

Square both sides as both the quantities as positive.

Quantity A	Quantity B
$X + Y + 2\sqrt{YX}$	$Y + X$

We can clearly observe that Quantity A is greater. Remember in questions where you always get one of the quantities greater then is the time to think algebraically.

6. AB = BC

Quantity A	Quantity B
A	C

Solution:

A	~~a b c~~ d	B
2	B = 0, A = 2, C = 2	2
1	B = 0, A = 1, C = 3	3

Hence the answer is D.

7. (XY/Z) > 1

Quantity A	Quantity B
XY	Z

Solution:

A	a b c d	B
3	XY = 3, Z = 2	2
-3	XY = -3, Z = -2	2

8. Set S consists of 'n' consecutive integers

Quantity A	Quantity B
Mean of Set S	Median of Set S

Solution:

This question is put here for a reason. A very important point that average of numbers in arithmetic progression is the middle number which in turn the median of the set of numbers.

Hence the answer is C.

9. $A > B > 0 > C$

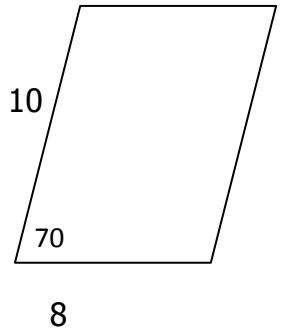
Quantity A	Quantity B
A - B	|C|B

Solution:

A	a b c d	B
1	A = 3, B = 2, C = -2	4
1	A = 3, B = 2, C = -0.01	0.02

Hence the answer is D.

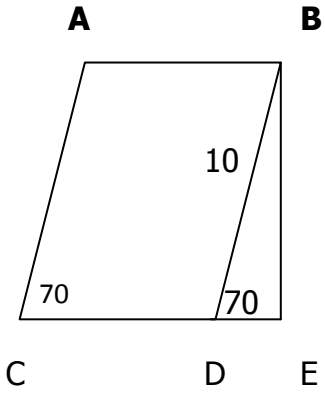
10.



The figure above is a parallelogram.

Quantity A	Quantity B
80	Area of parallelogram

Solution:



If the angle BDE is 90 degrees then the BE will be 10 and the area will be 80

If the angle BDE is 60 degrees then the length BE will be $5\sqrt{3}$ (it becomes a 30 60 90 triangle) and the area of the parallelogram is 8 x 5 x 1.7 = 68

If the angle BDE is 30 degrees then the length BE will be 5 and the area of the parallelogram will be 8 x 5 = 40

Hence as the angle decreases the area also decreases. Since at angle 90 degrees the area is 80 (Remember the 'OTHER' is benchmark), the area of the figure is less than 80.

Quantity A is greater.