

GMAT Study Guide

Quant:

Algebra

- You don't always need the same number of equations as variables when you're solving for the sum of those variables. Try lining up and canceling out things
- In DS, it is often helpful to manipulate the statements into a form similar to the question stem
- When converting word problems into algebraic equations, be wary of questions that include an object where $1X=2$ or 3 (Ex: Twins $\rightarrow 1X=2$, Triplets $\rightarrow 1X=3$)
- If time allows, pick numbers for complicated algebra questions to double check
- $f(x)$ = "some functions of X " problems are like symbolism problems, you need to plug the value of X into the function. Ex: $f(x)=X+2$, $f(2)=2+2=4$. When the exam gives you a function question and you are stuck, plug answers into the answer choices to eliminate options
- When someone losses more than $\frac{1}{2}$ of X per turn, what remains is at most $x-(1/2x+1)$

Number Properties

- The longer the word problem, the more important it is to start with the question posed; organize the given information; and set up your final equation
- If the question stem says nothing about distinct factors, DO NOT ASSUME DISTINCT FACTORS
- Sets of prime numbers $\rightarrow$ write out some of the prime numbers and plug them into the equations to help out with the calculation
- It is okay to divide both sides of an inequality by a variable (usually to cancel out the variable) if the question stem says that the variable is positive (or negative, but in this case remember to flip the sign). Just be wary of inequalities with variables where you don't know if the variable is positive or negative
- Read question stems carefully and take note of when an inequality is $>$ vs. $\geq$. When the distinction is made, there is usually a trap answer involving the inequality sign that is incorrect
- The lowest common multiple (LCM) of two numbers equals the product of two numbers only when there are no other common factors (other than 1)
- Questions such as "How many 3-digit integers between 100 and 200 have a digit that is the average (arithmetic mean) of the other 2 digits" are best solved by placing a 1 in the hundreds place and then going through the numbers 0-9 methodically. A pattern will emerge than you can almost always extrapolate to save time
- Be wary of trap answers that flip a set ("ascending vs. descending")
- All x distinct prime numbers will have the same number of prime factors
- To determine how many unique combinations of numbers are available out of a 4 digit number, take the number of possibilities in the 1000s digit $\times$ possibilities in 100s digit $\times$ possibilities in 10s digit $\times$ possibilities in units digit. Assuming the stem puts not restrictions and options are 0 to 9, this equals $10 \times 9 \times 8 \times 7 = 5,040$. This process can be repeated with any length number and with numbers with restrictions

- When receiving information such as “the number of women was less than 30” check to see if there is only one value that will make the statement true
- When you get a number with very many decimal places, break up the number
 - Ex: $(1.00001-.99999) = (1+10^{-5}) - (1-10^{-5})$
 - Ex: $(1.00002-.99998) = (1+2*(10^{-5})) - (1-2*(10^{-5}))$
- r/s is an integer if every factor of s is a factor of r but not if every prime factor of s is a prime factor of r
- For any factorial, $X!$, n is a factor of $X!+n$ where n is a positive integer $\leq X$
- If 9 is the units digit of x^2 , then either 3 or 7 must be the units digit of x ($7*7=49$, $3*3=9$, $127*127=16129$, etc....)
- Don't get confused by the wording of function, symbolism, or set questions. Just keep plugging in your answers into the equation that is given
- For complicated number properties problems that ask for the remainder when two variables are divided by an integer, pick numbers. For the data sufficiency problems, when combining the two statements, set up equations in the following manner
 - 1) $(x+y)/5$ has a remainder of 1 $\rightarrow (x+y)/5 = 5q+1$
 - 2) $(x-y)/5$ has a remainder of 2 $\rightarrow (x-y)/5 = 5p+2$
 - After setting up the above equations, square both sides and combine the equations
- Be wary of the wording X vs. $X\%$. The answer choices will usually be a guide, but if they do not help, use logic to determine if the answer would be way too large given what they are asking for. Picking numbers will help with this

Geometry

- When a right triangle's altitude (height) is drawn from the vertex of the 90 degree angle to the hypotenuse, the resulting triangles are both similar to the original triangle
- Whenever you add a walkway around something or a frame around a picture, remember that the length of the walkway or frame must be added to both sides
- When a circle's central and inscribed angles originate from the same points, the central angle will be twice the inscribed angle
- In problems involving multiple figures, the challenge is to take one figure's information and apply it to the other figure
- Solving for the greatest possible distance between two vertices of a rectangular solid requires two applications of the Pythagorean Theorem
- On the coordinate plane, two points with the same x -coordinate create a vertical line, while two points with the same y -coordinate create a horizontal line
- You can employ geometry formulas in order to avoid unnecessary figure sketching
- 3-4-5; 5-12-13; 7-24-25 are Pythagorean triples
- To bisect = to divide into two equal parts
- SA of a cylinder = $2*\pi*r^2+2*\pi*r*h$
- Area of a Trapezoid = $((b1+b2)/2)*h$

- For calculating the area of parts of a trapezoid, it is sometimes faster to utilize the rectangle and triangle formulas instead of utilizing the trapezoid formula
- When solving for a side of an object, if you have a base unit with dimensions (such as $3 \times 2 \times 1$ blocks in a monument), look at divisibility to determine sufficiency
 - Ex: How many $3 \times 2 \times 1$ blocks high is a 25 ft tall monument? Answer: since 25 is not divisible by 3 or 2, the answer must be $25/1=25$
- Do not be fooled by what a figure looks like. All that can be assumed is that if the drawing has four sides, the figure is a quadrilateral, etc..
- For coordinate geometry, perpendicular lines have slopes that are negative reciprocals and slope is Rise/Run
- Total degrees of a polygon/# of sides to the polygon = degrees per side
 - Total degrees of a polygon = $180(n-2)$. A good way to remember this is a triangle has 3 sides and 180 degrees, a Square has 4 sides and 360 degrees, etc..

Properties of Sets

- Venn diagrams can help solve overlapping sets problems
- Only one equation is needed when all given information is in terms of a single variable
- Standard deviation measures the dispersal of a set of numbers about the mean of those numbers. Shifting the numbers up on the number line will not change the standard deviation
 - Ex: Standard deviation of X,Y,Z is the same as the standard deviation of $X+a$, $Y+a$, $Z+a$ where a is a constant
- Calculating a standard deviation requires consideration of every term on a list. Information about only part of a list tells you little about the standard deviation of the whole
- When looking at “is average of x,y,z... greater than #” questions, add the two equations/inequalities together when evaluating statement 1+2
- When summing a list that goes from negative to positive, remember that zero is included in the range so you have to have n-1 numbers
- Just because the question stem says “13 of the incomes were between 20 and 35” does not mean that a 20 and a 35 are in the set. The question stem will usually specify if it wants to mean that a 20 and a 35 were in the set

Ratios

- A ratio can be converted to algebra by using the parts of the ratio as the coefficients of a variable
 - Ex: $1:3:5 \rightarrow 1x:3x:5x$
- When solving “the minimum number of X that must be filled in order to ensure Y is filled” problems, figured out the maximum that can be filled without filling up any of Y and then add 1Y to that number
 - Ex: 4 rows, with 15,20,25,30 seats, seats filled at random. What is the minimum number of seats that must be filled to ensure two rows are filled? A: $14+19+24+29=86+2=88$
- For ratio questions that have you add or subtract to a ratio and give you the new ratio, set up in the following manner:

- Ex: The number of stamps that Kyle and Albert had were in the ratio of 5:3 respectively. After Kyle gave Albert 10 of her stamps, the ratio of the number of Kyle had to the number of Albert had was 7:5. $\rightarrow 5x/3x$ and $(5x-10)/(3x+10) = 7/5$, then use algebra to discover that $X=30$ and plug that back in to solve for the question

Probability

- The probability at least one occurs: $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
- In counting problems, every choice you make increases the number of arrangements. Make sure your math accounts for every possibility
- When dealing with complex probability, use combinations to solve for the total outcomes, then to solve for the desired outcomes
- For probability questions dealing with coin flips, heads and tails can be substituted for one another in the question stem because the probability of getting each is the same. This can apply to all things that have the same probability for each event
- When calculating factorials, the largest possible result comes from $n!/(k!(n-k)!)$ where $k=n/2$
- The wording of the question stem can determine whether all probabilities, p , are supposed to be the same or if each can be different

Rates

- Combined rate problems can usually be solved with your $\text{speed} = \text{distance}/\text{time}$ equations and without engaging in much math
- Set up a “speed chart” for multistep journey problems

Verbal:

Sentence Correction

Modifiers

- Make sure that the “thing before the comma” modifies the “thing” after the comma
- “Which” is only correct if it appears immediately after a comma and refers to the thing directly before the comma
- When looking at modifiers and evaluating answer choices, don’t focus on whole clause that precedes the comma, focus more on what is immediately before and after the comma

Parallelism

- Keep “to X” and “to Y” parallel with the “to” in front
- When two choices are left with no errors, pick the least wordy
- “Not only... but also” is idiomatically correct and parallel

Verbs

- Make sure that the two things being compared are actually comparable

- “Would have been” when speaking in historical context implies that there was a time before the event occurred
- “audience” is singular

Idioms

- “To move... rather than to carry”
- “If X is attributed to Y”
- “Require X to Y”
- “Require that XY”
- Proper idiom is “better served by X than by Y”
- “Such X’s” is correct because it is more efficient than “X’s of this kind”
- “Like” vs. “Such as”
 - Use “like” for a comparison and “such as” for an example
- “For instance” is the correct idiomatic form
- “So X” is the correct idiom to express an excessive amount of an adjective when introducing the result
 - Ex: “So outspoken as to...”
- “Required that XY” is correct, not “Required X to Y”
- “So substantial has X been that Y” or “X has been so substantial that Y” or “So substantial has been X that Y” are all correct structures
- Use “that” if the object in question is further identified/restricted, use “which” if the object in question is not further modified/restricted
- “The rivalry between X and Y”
- “Just as... so” is proper
- You are fed “a diet of fish”
- You are fed “a diet that has fewer calories” not “a diet of fewer calories”

Pronouns

- Even if the answer doesn’t sound right, it is important to pick the least wrong response sometimes
- “Board of directors” is singular
- When a pronoun is underlined, always look for what that pronoun is supposed to be referring to
- “This” must refer to something specific, it cannot refer to a general idea

Usage

- “So as to” implies that the object itself is going to do the action
- “Have swam” is incorrect. “Have swum” is correct
- “Amount” is used if something does not have countable units (e.g. amount of fun) and “number” is used if something does have countable units (e.g. number of oz.)
- “little” can only apply to uncountable nouns, such as “I’ve had little sleep”
- countable nouns require the use of the word “few”

- Put the effect before the cause stylistically
- “Besides” means in addition to. “Beside” means next to
- Sentences starting with “There is” are not favored on the GMAT
- In certain sentences, certain things need to show purpose
- “Them” is used as an object. Ex: “The pears were ripe when I ate them”
- “These” can be used with a subject and identifies which people or items are being referenced. Ex: “These pears are delicious”
- ALWAYS BE WARY of what is right before and after the coma

Critical Reasoning

- Watch out for strong wording, such as “inherent contradiction between X and Y”
- Sometimes, it helps to write out a stimulus that refers ratios or percent changes in numerical/quant form
- Look at what an argument revolves around, there are usually trap answers that sound tempting but don’t focus on the central point in the argument
- Look at the wording of arguments very closely, usually one key word or phrase separates the correct answer from trap answers
- Don’t make a mental leap when evaluating certain answer choices. Only look at what is on the screen!! → Pay attention to the precise terms
- “Will result in higher expenses” and “will result in higher expenses for the company” mean different things, must differentiate between them on the GMAT
- Look for key words such as “must”

Reading Comprehension

- Even if you see an answer choice that you like, make sure to read all of the answer choices in order to be through