CORE CONCEPTS
& CRITICAL THINKING SKILLS

read Q → locating info to use → answering Q → bubble it

★ organized

COMMON ERRORS

annotate underline circle

- Misreading the question
- Using the wrong information
- Lacking knowledge
- Bubbling in the wrong answer

NOT

EXCEPT

WHEN TO SKIP

- If you don't know how to answer the question
- If the question is long, and you're running out of time
- Remember to still bubble in a "guess"

AVOID FATIGUE

- You get the same point for an easy question as a hard question, so collect the easy points first (you don't have to read the passages or answer the questions in a certain order)
- Don't burn out on a question that you don't know how to solve

free response
math
Blindly Guessing

→ question #
→ # in the Q
→ 0

GUESSING

- Eliminate one or two answer choices before guessing
- Look for patterns when guessing
- Answer every question (every bubble should be filled in)

TRACKING YOUR PROGRESS

	verbal	math	total score	*retake to reinforce new concepts* verbal	math	total score
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

NOTES:

BINDER
dividers
sticky notes

FREE PRACTICE MATERIALS

www.collegeboard.com

READING STRATEGY

INTRODUCTION

Always first read the passage introduction to find out who, what, where, when, and why

MAP THE PASSAGE

You don't have to remember key details or themes, just where to find them

MAIN IDEA

Focus on identifying the main idea and refer back to the main idea when answering questions

STRATEGIZE

Find what works best for you (reading the questions first and then the passage or vice versa). If you choose to skim the passage, don't skim the questions

ZOOM OUT

Zooming out will help you figure out the tone and main idea

TONE

The author's attitude (positive, negative, or neutral)

ELIMINATE

Avoid answers that are too specific, too broad, extreme, offensive, reverse relationship, opposite to or unrelated to the main idea

READ

To improve your reading speed and comprehension, read a variety of challenging material

www.carlabarry.com/read

"BUT"

Key information about the main idea usually comes after "but," "however," "although," etc.

DUAL PASSAGES

Answer dual passages one passage at a time

OWN WORDS

Cover the answer choices and first answer the question using your own words then pick the answer choice that best matches your idea

LINE REFERENCES

- Read before and after line references
- Plug in the line reference into the previous question to see which line fits best (for evidence questions

WRITING & LANGUAGE STRATEGY

Grammar/Punctuation & meaning

BEWARE

-ing, being, it, was, and long answer choices

SEMICOLON

Semicolon separates two complete sentences (SV ; SV)

REDUNDANCY

Be concise and avoid redundancy
- Avoid overly wordy phrases
- Combine simple sentences

COMMAS

- SV, and SV
- dependent clause, independent clause
- ,non essential words/phrases,
- used to separate items in a list
- after introductory words or phrases
- to separate adjectives whose order could be reversed

CONSISTENCY

Keep pronouns consistent (you....you or one....one)

MODIFIERS

Check what comes after the comma
Ex: Born in Mexico, Frida Kahlo

PRONOUNS

- Pronouns must be clear in reference and number
- Plural: they, them, their, themselves
- Singular: it, she, him, + collective nouns

VERBS

- Subject and verb agreement (eliminate prepositional phrases)
- See time (1800s, summer, etc.), think tense

PARALLELISM

Parallel sentence structure (-ing, -ing, -ing, ... to, to, to... noun, noun, noun

MEANING

context save for last (@ end of passage)
- transitions
- adding/deleting sentence
- placing sentences

WORD PAIRS

neither....nor
either....or
not only....but also
as.....as

PICK ONE

who vs. whom
who's vs. whose
than vs. then
they're, their, there
like vs. as

Clear + Concise + Consistent

MATH STRATEGY

Why do we want to avoid doing a lot of work?
- → takes a lot of time
- → fatigued
- → * more opportunities for mistakes

✳ ZOOM IN *identify concept*

Zoom in to find what the question is asking
Be wary of two-part questions

STRATEGY

- Look for patterns and the most reasonable answer choice
- Pick which questions to answer first
- Keep track of time (same point for hard question as easy question)

PICK NUMBERS *when all of the answer choices are variables*

- Pick numbers for variables (don't pick "1" or numbers that are multiples of each other
- Solve problem using your numbers
- Plug numbers into answer choices & pick the answer that matches yours

MEAN, MEDIAN, MODE
& THE RANGE [graphing calculator]
- Mean = average
- Median is the # in the middle after rearranging from low to high
- Mode the # that appears the most
- Range is the difference between the lowest and highest values

CONJUGATE $\frac{2-3i}{2+3i}\left(\frac{2-3i}{2-3i}\right)$ $\frac{2-\sqrt{3}}{2+\sqrt{3}}\left(\frac{2+\sqrt{3}}{2+\sqrt{3}}\right)$

Used to rationalize complex numbers and radicals in the denominator → [graphing calculator]

DOMAIN & RANGE $\sqrt{x} = \oplus$

Domain (look at x-axis)
Range (look at y-axis)
$\frac{1}{x-2}$ $x \neq 2$

TRIANGLES

- Always draw right triangles
- Similar triangles have the same respective proportions & trigonometric ratios
- Radii of a circle form isoceles triangles

✳ EQUATIONS FOR A LINE

slope intercept $y = mx + b$ *m slope / b y-int* PLVSMLT
standard $Ax + By = C$
point slope $y - y_1 = m(x - x_1)$ *two coordinates or slope one coordinate*

slope $= \frac{-A}{B} = -A \div B$ *slope: increase decrease change*
y-int $= C/B$

✳ THINK *→ like a test taker*

Before jumping in and doing the problem, think about what math concept the problem is addressing

✳ SHOW YOUR WORK

Don't do problems in your head or only on the calculator. This will enable you to check your work if time allows

✳ PARABOLAS /Quadratics

vertex form *max min* $y = a(x-h)^2 + k$ *(h,k) vertex*
y-intercept form $y = ax^2 + bx + c$ *c y-int*
x-intercept form $y = a(x-p)(x-q)$ *p and q x-int*
zero or root solutions

MORE PARABOLAS *no calc*

equation for x value of vertex $x = \frac{-b}{2a}$

(+) leading coefficient ⤴ [graphing calculator]

(-) leading coefficient ⤵
$(x+3)^2 + (y-2)^2 = 9$ $(-3, 2)$ $r = 3$

EQUATION OF A CIRCLE

$(x-h)^2 + (y-k)^2 = r^2$
(h,k) : center , r : radius

PEMDAS *use parentheses in your calculator*

Parentheses, exponents, multiplication, division, addition, and subtraction

PERCENTAGE

If original amount is not given, pick "100"
- part/whole *1: included*
- → difference/original *→ growth and sales tax*
- * increased by x percent → 1 + decimal
- * decreased by x percent → 1 - decimal *→ decay*

FACTORING [graphing calculator]

$x^2 + 2xy + y^2 = (x+y)^2$
$x^2 - 2xy + y^2 = (x-y)^2$
$f(0) =$ $x^2 - y^2 = (x+y)(x-y)$

✳ MEMORIZE

Key equations, formulas, and the directions at the beginning of each math section
DO NOT PROCASTINATE

GRAPHS

- Identify the slope, x-intercept(s), and y-intercept(s)
- Read the labels
- Pay attention to the scale!
- "xy-plane" --> graph

CALCULATOR

- MATH --> FRAC, nth roots, numeric solver, and absolute value
- APPS --> POLYSMLT, INEQUALZ, and CONICS
- Y =   STAT
- i   Y=

PRIME NUMBERS

Prime numbers are positive integers that are only divisible by themselves and "1" (1 is not prime | no negative prime numbers)

INTEGERS

Whole numbers, including zero and negative whole numbers

PROBABILITY

(desired possibilities)/(total possibilities)
BOTH = **and** → multiply probabilities Ex: (½)(½) = ¼
or → add probabilities Ex: ½ + ½ = 1

WORD PROBLEMS *y = x+b (p, r) plug the coordinates into the equation*
constant rate | *linear* lies on the line
of | multiplication
sum | addition $f(x) = y$
difference | subtraction
product | multiplication *what is y=?*
quotient | division *when x = ___*
what # | x → variable *un efined | denominator = 0*
same line | same slope and same y-int

Y-INT, X-INT, & SLOPE (a,0)

x-intercept (# or variable , 0) (0,c)
y-intercept (0 , # or variable)
slope $\frac{rise}{run} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$
perpendicular slope is the negative reciprocal → ½ ⊥ -²/₁ or -⁵/₃ ⊥ ³/₅

x	y
0	4	y-int (0,4)
3	0	x-int (3,0)

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www.carlabarry.com

MATH STRATEGY CONTINUED

$\star \dfrac{\text{sector } A}{\text{sector } B} = \dfrac{\text{central angle } A}{\text{central angle } B}$ $\star \dfrac{\text{arc } A}{\text{arc } B} = \dfrac{\text{central angle } A}{\text{central angle } B}$
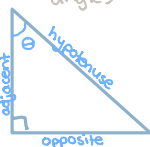
AREA OF A SECTOR

$\dfrac{\text{area of a sector}}{\text{area of a circle}} = \dfrac{\text{central angle}}{360° \text{ or } 2\pi}$

ARC LENGTH

$\dfrac{\text{arc length}}{\text{circumference}} = \dfrac{\text{central angle}}{360° \text{ or } 2\pi}$

VARIABLE EXPONENTS

- Make the same base
- Set exponents equal to each other
- Solve

SOHCAHTOA

$(90-x) \Rightarrow$ code for complementary angles

SIN θ $\dfrac{\text{opposite}}{\text{hypotenuse}}$

COS θ $\dfrac{\text{adjacent}}{\text{hypotenuse}}$

TAN θ $\dfrac{\text{opposite}}{\text{adjacent}}$

$\sin x = \cos(90-x)$
$\cos x = \sin(90-x)$

sin and cos of complementary angles are = add up to 90°

PARALLEL LINES

- alternate interior angles
- alternate exterior angles
- corresponding angles
- vertical angles

DISTANCE

distance = (rate)(time)

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$\hookrightarrow$ circles $\Rightarrow$ center + end point

TRIG TABLE [graphing calculator]

	0	30	45	60	90
SINθ	$\dfrac{\sqrt{0}}{2}$	$\dfrac{\sqrt{1}}{2}$	$\dfrac{\sqrt{2}}{2}$	$\dfrac{\sqrt{3}}{2}$	$\dfrac{\sqrt{4}}{2}$
COSθ	$\dfrac{\sqrt{4}}{2}$	$\dfrac{\sqrt{3}}{2}$	$\dfrac{\sqrt{2}}{2}$	$\dfrac{\sqrt{1}}{2}$	$\dfrac{\sqrt{0}}{2}$

i [graphing calculator]

- Square root of -1 $\sqrt{-1}$
- Using your calculator

$i^2 = -1$

MIDPOINT

$\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

QUADRATIC FORMULA
& THE DISCRIMINANT [graphing calculator]

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

PLVSMLT or complete the square

discriminant $b^2 - 4ac \Rightarrow ax^2 + bx + c$

(+) 2 real solutions $\sqrt{4} = \pm 2$

(-) no real solutions $\sqrt{-2}$

zero 1 real solution $\sqrt{0} = 0$

ABSOLUTE VALUE [graphing calculator]

- Isolate the absolute value expression
- Set the quantity inside the absolute value notation equal to + and - the quantity on the other side of the equation
- Solve each equation for the unknown
- Check answers by plugging them back into the absolute value expression

Example:
$2|x+3| = 6$
$|x+3| = 3$

$x + 3 = 3$
$x = 0$

$x + 3 = -3$
$x = -6$

NO SOLUTION VS. INFINITE SOLUTIONS

no solution   // lines $\Rightarrow$ same slope

infinite solutions   same line $\Rightarrow$ same slope, same y-int.

EXPONENT RULES

$a^0 = 1, \quad a \neq 0$

$(ab)^x = a^x b^x$

$a^x a^y = a^{x+y}$

$\sqrt{a} = a^{1/2}$

$\dfrac{a^x}{a^y} = a^{x-y}$ $a^x \cdot a^{-y} = a^{x-y}$

$\sqrt[n]{a} = a^{1/n}$

$\left(\dfrac{a}{b}\right)^x = \dfrac{a^x}{b^x}$

$\sqrt[n]{a^m} = a^{m/n}$ [graphing calculator]

$a^{-x} = \dfrac{1}{a^x}$ $\dfrac{1}{a^{-2}} \Rightarrow a^2 = a^2$

$\sqrt[n]{ab} = \sqrt[n]{a}\,\sqrt[n]{b}$

$(a^x)^y = a^{xy}$

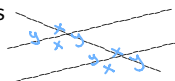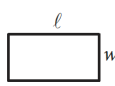$\sqrt[n]{\dfrac{a}{b}} = \dfrac{\sqrt[n]{a}}{\sqrt[n]{b}}$

REFERENCE INFORMATION
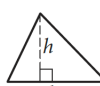### PROVIDED AT THE BEGINNING OF EACH MATH SECTION

REFERENCE

no calculator

$A = \pi r^2$
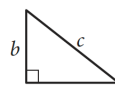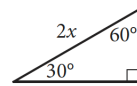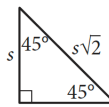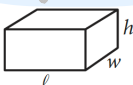$C = 2\pi r$

$A = \ell w$

$A = \dfrac{1}{2} bh$

$c^2 = a^2 + b^2$

Special Right Triangles

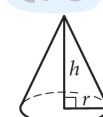rectangular prism $V = \ell w h$

cylinder $V = \pi r^2 h$

sphere $V = \dfrac{4}{3} \pi r^3$

cone $V = \dfrac{1}{3} \pi r^2 h$

rectangular pyramid $V = \dfrac{1}{3} \ell w h$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π. $360° = 2\pi$
The sum of the measures in degrees of the angles of a triangle is 180.

	0°	30°	45°	60°	90°
Sin θ	$\frac{\sqrt{0}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2}$
cos θ	$\frac{\sqrt{4}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{0}}{2}$