CORE CONCEPTS
& CRITICAL THINKING SKILLS

COMMON ERRORS

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

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

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						
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10						

NOTES:

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FREE PRACTICE MATERIALS

www.collegeboard.com

READING STRATEGY

INTRODUCTION

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

PRIMARY DEFNITIONS

Avoid primary definitions

MAIN IDEA

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

PERSONALIZED

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 literature, newspaper articles, science journals, magazines, and historical texts

"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

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

- 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

MATH STRATEGY

ZOOM IN

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)

LAST RESORT

PICK NUMBERS

answer choices all have 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
- 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 $\frac{2+i}{3-i}\left(\frac{3+i}{3+i}\right)$

Used to rationalize complex numbers and radicals in the denominator $\frac{1}{2+\sqrt{3}}\left(\frac{2-\sqrt{3}}{2-\sqrt{3}}\right)$

DOMAIN & RANGE

Domain (look at x-axis)
Range (look at y-axis)

TRIANGLES

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

THINK

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

→ *working memory*

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

$y = 3(x-2)^2 + 1$

PARABOLAS

$f(h,k)$ vertex

vertex form $y = f(x) = a(x-h)^2 + k$

y-intercept form $y = Ax^2 + Bx + C$

x-intercept form $y = a(x-p)(x-q)$ *factored*

↳ *aka zero & root*

MORE PARABOLAS

equation for x value of vertex $x = \dfrac{-B}{2A}$

(+) leading coefficient ⤴ ☺

(-) leading coefficient ⤵ ☹

EQUATION OF A CIRCLE

$(x-h)^2 + (y-k)^2 = r^2$

(h,k): center , r: radius

PEMDAS ✱ calculator $\frac{5}{3\pi} → \frac{5}{(3\pi)}$

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

PERCENTAGE

If original amount is not given, pick "100" $\frac{100}{160}$ $1 + .6 = 1.6$
- part/whole
- difference/original → *growth and sales tax*
- increased by x percent → 1 + decimal $1 + .2 = 1.2$
- decreased by x percent → 1 - decimal $1 - .1 = .9$
  ↳ *decay*

MEMORIZE

Key equations, formulas, and the directions at the beginning of each math section

GRAPHS → solve for it
- 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 =
- i

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 $(\frac{1}{2})(\frac{1}{2}) = \frac{1}{4} = 25\%$
bigger ½. **or** → add probabilities $\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1 = 100\%$

WORD PROBLEMS
what # → x ← variable
of | multiplication
sum | addition
difference | subtraction
product | multiplication
quotient | division

✱ $f(5) = ?$
what is $y = ?$ when $x = 5$
$f(5) = f(x)$

★ $f(x) = y$

EQUATIONS FOR A LINE

slope intercept $y = mx + b$
numeric solver
standard $Ax + By = C$
★ *PLYSMLT*
point slope $y - y_1 = m(x - x_1)$

given two coordinates or one coordinate and the slope

Slope $= \dfrac{-A}{B} = -A \div B$

y-int $= \dfrac{C}{B}$

$5x + 2y = 3$
$-2x + 5y = 3$ } Ex.

FACTORING

$x^2 + 2xy + y^2 = (x+y)^2$

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

$x^2 - y^2 = (x+y)(x-y)$

Y-INT, X-INT, & SLOPE

$(b,0)$ → x-int.
x-intercept (# or variable, 0)
y-intercept (0, # or variable)
★ $f(0)$
slope $\dfrac{\text{rise}}{\text{run}} = \dfrac{\Delta y}{\Delta x}$ or $\dfrac{y_2 - y_1}{x_2 - x_1}$

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

MATH STRATEGY CONTINUED

$8^a = 4$
$2^{3a} = 2^2$
$3a = 2$
$a = 2/3$

AREA OF A SECTOR

sector

central angle

$$\frac{\text{Sector A}}{\text{Sector B}} \quad \frac{\text{area of a sector}}{\text{area of a circle}} = \frac{\text{central angle}}{360° \text{ or } 2\pi}$$

ARC LENGTH

arc

central angle

$$\frac{\text{arc length}}{\text{circumf. of a circle}} = \frac{\text{central angle}}{360° \text{ or } 2\pi}$$
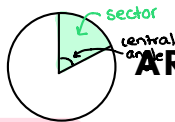
VARIABLE EXPONENTS

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

SOHCAHTOA

SIN $\underline{\text{opp}/\text{hyp}} = 4/5$ 3

COS $\underline{\text{adj}/\text{hyp}} = 3/5$

TAN $\underline{\text{opp}/\text{adj}} = 3/4$ $\tan\theta = \frac{\sin\theta}{\cos\theta}$

★ $\sin\theta$ & $\cos\theta$ of complementary angles are equal

TRIG TABLE

$(90°-x)$ ← complementary angles add up to 90°

	0°	$\pi/6$ 30	$\pi/4$ 45	$\pi/3$ 60	$\pi/2$ 90
SINθ	$\sqrt{0}/2$	$\pi/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	$\pi/2$
COSθ	$\sqrt{4}/2$	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	$\sqrt{0}/2 = 0$

PARALLEL LINES

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

$x+y=180°$

i = imaginary

- Square root of -1
- Using your calculator

$\sqrt{-1}$

$i^2 = -1$

↳ treat i as a variable
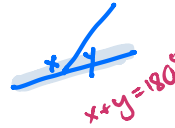
DISTANCE

distance = (rate)(time)

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

↳ radius of a circle given the center and an endpoint

MIDPOINT

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

QUADRATIC FORMULA
& THE DISCRIMINANT

→ PLYSMLT
or complete the square

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

discriminant $b^2 - 4ac$

(+) { 2 real solutions

(-) { no real solutions (2 imaginary solutions)

zero { 1 real solution

ABSOLUTE VALUE

how many solutions?
2 solutions

- 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

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

$|x+3|=3$ $x+3=-3$

NO SOLUTION VS. INFINITE SOLUTIONS

no solution — // lines — same slope

infinite solutions — same line

↳ same y-int. same slope

⊥ slope is the negative reciprocal

$1/2 \perp -2$ or $-5/3 \perp 3/5$

EXPONENT RULES

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

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

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

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

$\frac{a^x}{a^y} = a^{x-y}$

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

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

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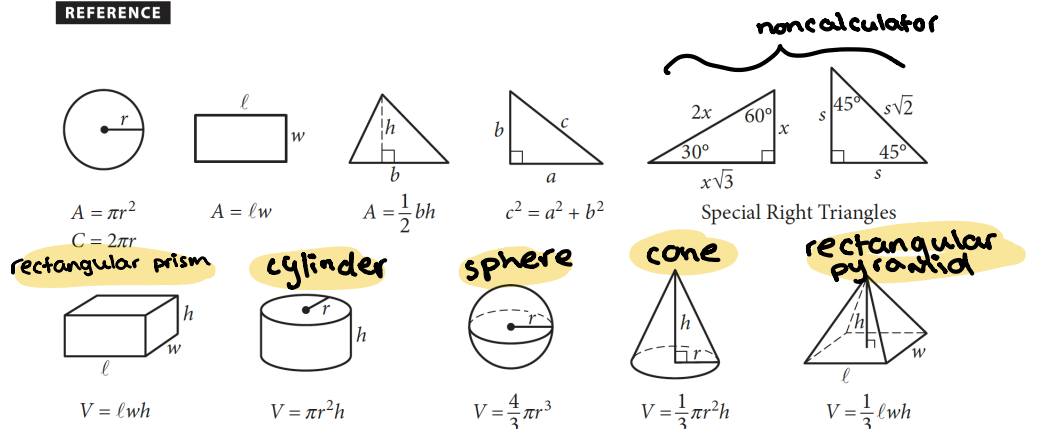
$a^{-x} = 1/a^x$

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

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

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

REFERENCE INFORMATION
PROVIDED AT THE BEGINNING OF EACH MATH SECTION

REFERENCE

noncalculator

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

$A = \ell w$

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

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

Special Right Triangles

rectangular prism   cylinder   sphere   cone   rectangular pyramid

$V = \ell wh$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

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

$V = \frac{1}{3}\ell wh$

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

$360° = 2\pi$