

GRE NOTEBOOK

FORMULAS + KEY INFO

MATH

geometry

area = s^2
perimeter = $4s$

area = lw
perimeter = $2l + 2w$

area = $\frac{b_1 + b_2}{2}h$

area = πr^2
circumference = $2\pi r$
central angle $\rightarrow \angle x = 2\angle z$
arc length = $\frac{x}{360} 2\pi r$
sector area = $\frac{x}{360} \pi r^2$

area = $\frac{ab}{2}$
special right triangles:
 30-60-90: $1 : \sqrt{3} : 2$
 45-45-90: $1 : 1 : \sqrt{2}$
triangle exterior angle: $x + y = z$
isosceles triangle: $x = z$
equilateral triangle: $x = z = 60^\circ$

supplementary \rightarrow angles sum to 180°
complementary \rightarrow angles sum to 90°
parallel lines w/ intersection:
 congruent angles
 same color
 perpendicular lines \rightarrow neg. reciprocal slopes
 parallel lines \rightarrow same slope
 distance $b/w = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
 midpoint = $(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2})$

quadrants:
 (-, +) 2
 (+, +) 1
 (+, -) 4
 (-, -) 3

probability

combinations: $nCr = \frac{n!}{r!(n-r)!}$
order not matter

permutations: $nPr = \frac{n!}{(f_1!)(f_2!)(f_3!)...}$
order matter

when items chosen indistinguishable
 $n \rightarrow$ total, $r \rightarrow$ chosen, $f \rightarrow$ frequency of each event

counting principle: total possible outcomes is product of all ways of each event occurring

examples:

a) how many ways arrange letters **ABBCCC**
 $n=6$
 $A \rightarrow f_1=1$
 $B \rightarrow f_2=2$
 $C \rightarrow f_3=3$
 $nPr = \frac{6!}{(1!)(2!)(3!)} = 120$ **indistinguishable**

c) ways chose 3 people from group of 5
 $nCr = \frac{5!}{3!2!} = \frac{5 \times 4 \times 3 \times 2 \times 1}{3 \times 2 \times 1 \times 2 \times 1} = 10$
3 x 2 x 1 cancel out

b) how many ways arrange 5 english & 3 science books on shelf so that subjects are together

2 placement options $nPr = \frac{2!}{0!} = 2!$
 $\left\{ \begin{array}{l} S \rightarrow nPr = \frac{3!}{0!} = 3! \\ E \rightarrow nPr = \frac{5!}{0!} = 5! \end{array} \right\} (2!)(3!)(5!) = 120$ **counting principle**

complementary events: $P(A) + P(\text{not } A) = 1$

independent: $P(A+B) = P(A)P(B)$

dependent: $P(A+B) = P(A)P(A|B)$

$\hookrightarrow P(A|B) \rightarrow$ probability of A given event B

Mutually exclusive: $P(A \text{ or } B) = P(A) + P(B)$

Mutually inclusive: $P(A \text{ or } B) = P(A) + P(B) - P(A+B)$



total = group 1 + group 2 - both + neither

only group 1 = group 1 - both

examples:

a) draw queen or heart

$$P(Q \text{ or } H) = P(Q) + P(H) - P(Q \text{ and } H)$$

b) draw queen or king

$$P(Q \text{ or } K) = P(Q) + P(K)$$

c) rain on Mon & Tues w/ daily $P(\text{rain}) = 0.3$

$$P(M \text{ and } T) = (0.3)(0.3)$$

d) 5 blue & red, draw blue then red no replace

$$P(B \text{ and } R) = P(B)P(B|R) = \left(\frac{5}{10}\right)\left(\frac{4}{9}\right)$$

percents

$$\% \Delta = \frac{\text{difference}}{\text{original}} \times 100$$

$$\% \text{ less than} \rightarrow \text{Final} = 1 - \frac{\% \text{ less than}}{100} \times \text{initial}$$

$$\% \text{ greater than} \rightarrow \text{Final} = 1 + \frac{\% \text{ greater than}}{100} \times \text{initial}$$

$$\% \text{ discount} = \text{price} (1 - \text{percentage})$$

$$\% \text{ mark-up} = \text{price} (1 + \text{percentage})$$

examples:

$$a) 12 \text{ is } 5\% \text{ of what} \rightarrow 0.05x = 12$$

$$b) 7\% \text{ of } 9 \text{ is what percent of } 7 \rightarrow 0.07(9) = \frac{x}{100}(7)$$

$$c) 200\% \text{ of } 4\% \text{ of } 50 \text{ is what} \rightarrow \frac{200}{100} \times \frac{4}{100} \times 50$$

$$d) \text{what percent of } y\% \text{ of } 50 \text{ is } 40\% \text{ of } y \rightarrow \frac{x}{100} \times \frac{y}{100} \times 50 = \frac{40}{100}y$$

y cancel out

interest

simple interest = (principal)(rate)(time)
compound interest: $a = p(1 + \frac{r}{n})^{nt}$

a \rightarrow future value, p \rightarrow principal, r \rightarrow rate, t \rightarrow time
n \rightarrow # times per year interest compounded

million $\rightarrow 10^6$
billion $\rightarrow 10^9$
trillion $\rightarrow 10^{12}$

sequences

arithmetic sequence: $a_n = a_1 + (n-1)d$

↳ n^{th} term

↳ first term

↳ term #

↳ common difference

↳ # of terms added

$$\Sigma \rightarrow S_n = \frac{n}{2}(a_1 + a_n) \leftarrow \text{sum of first } n \text{ terms}$$

geometric sequence: $a_n = a_1 r^{(n-1)}$

↳ n^{th} term

↳ first term

↳ term #

↳ common ratio

work + rates algebra

distance/work = (rate)(time)

work = (individual rate)(# individuals)(time)

average speed = total distance ÷ total time

for chase problems → subtract rates

proportion → equivalent relationships b/w ratio
keep track units

exponents:

$$x^0 = 1$$

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

$$x^{-a} = \frac{1}{x^a}$$

$$\frac{x^a}{x^b} = x^{a-b} = \frac{1}{x^{b-a}}$$

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

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

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

$$\text{PEMDAS}$$

roots:

$$\sqrt[n]{x^m} = \pm x^{m/n}$$

$$\sqrt[n]{x} \sqrt[n]{y} = \sqrt[n]{xy}$$

$$\sqrt[n]{x} = \sqrt[n]{\frac{x}{y}} = \frac{\sqrt[n]{x}}{\sqrt[n]{y}}$$

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

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

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

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

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

examples:

a) $(\sqrt[3]{x})^2 \rightarrow (x^{1/3})^2 = x^{2/3}$

b) $x^8 - y^8 \rightarrow (x^4)^2 - (y^4)^2 = (x^4 + y^4)(x^4 - y^4) = (x^4 + y^4)(x^2 + y^2)(x^2 - y^2)$

difference of squares:

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

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

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

absolute value:

$$|x+y| \leq |x| + |y|$$

$$|x-y| \geq |x| - |y|$$

solving abs. equations

$$|x+y| = z \rightarrow \pm(x+y) = z$$

difference of squares:

divisibility:

a) # divide by 3 → Σ digits ÷ 3

b) # divide by 4 → last 2 digits ÷ 4

c) # divide by 6 → also ÷ by 2 & 3

d) # divide by 8 → last 3 digits ÷ 8

e) # divide by 9 → Σ digits ÷ 9

$$\frac{x}{y} = \text{quotient} + \frac{\text{remainder}}{y}$$

ratio

ratios → part to whole relationship

	parts	total
ratio		ratio total
multiplier		
actual		actual total

whole → ratio total = Σ all parts

$$\text{multiplier} = \frac{\text{actual total}}{\text{ratio total}}$$

$$\text{partial actual} = (\text{part})(\text{multiplier})$$

each part has column

examples:

a) flour, egg, yeast, salt mixed in ratio of 11:9:3:2, how many lbs of yeast in 20 pound mix

	flour	egg	yeast	salt	total
ratio	11	9	3	2	25
multiplier	4/5	4/5	4/5	4/5	4/5
actual			12/5		20

$$\text{multiplier} \rightarrow 25 \times \frac{4}{5} = 20$$

$$\text{yeast} \rightarrow 3 \times \frac{4}{5} = \frac{12}{5}$$

composite #s → non-prime

2,3,5,7,11,13...

prime factorization: breaking down # into product of prime #s → integers w/ factors 1 & itself

prime factorize each, use exponents

LCM for repeated prime factors take ones w/ largest exponent, w/ same power just take once

multiply previous w/ all non-repeated prime factors

prime factorize each, use exponents

GCF for repeated prime factors take ones w/ smallest exponent, w/ same power take once

multiply previous

factors prime factorize, use exponents

+1 to each exponent & multiply each

no repeated means GCF = 1

examples:

a) LCM 24 & 60

$$\text{LCM} \rightarrow 2^3 \times 3^1 \times 5^1 = 120$$

b) GCF 24 & 60

$$2^2 \times 3^1 = 12$$

c) # factors of 240

$$(4+1)(1+1)(1+1) = 20$$

$$2^4 \times 3^1 \times 5^1$$

$$\begin{array}{c} 4 \quad 6 \quad 10 \\ \swarrow \downarrow \searrow \\ 2 \times 2 \times 3 \quad 2 \times 3 \times 5 \quad 2 \times 5 \\ \hline 2^3 \times 3^1 \quad 2^2 \times 3^1 \times 5^1 \end{array}$$

prime factorization tree

tree

statistics

$$\text{average} = \frac{\text{total } \Sigma}{\text{\# of things}}$$

weighted average:

$$\frac{(x_1)(f_1) + (x_2)(f_2) + \dots}{\Sigma f}$$

standard deviation:

a) when add/subtract all terms by constant → s.d. no Δ

b) when multiply/divide all terms by constant → s.d. Δ by same amount

evenly spaced set → mean = median

median: middle value, numerical order

measure of spread

VOCABULARY

READING

a-words

adjectives

adverbs

verbs

nouns

Abate: to lessen in intensity

Aberrant: abnormal

Abreast: informed

Abridge: to shorten

Abscond: to depart secretly

Accolade: award, honor

Acerbic: bitter

Acrimonious: angry

Acumen: accurate insight

Adept: skilled

Admonish: to advise

Adulation: excessive praise

Adulterate: to spoil

Advocate: to support

Aesthetic: pertaining to beauty

Agglomerate: to lump

Aggrandize: to increase influence

Aghast: shocked

Agog: eagerness

Alacrity: eagerness

Amalgamate: to combine

Ambivalence: hesitant

Ameliorate: to make better

Amenable: agreeable

Anachronism: something not belonging to time period

Anomaly: abnormality

Antedate: to predate

Anodyne: inoffensive

Antipathy: hatred

Apace: quickly

Apathy: lack of feeling

Approbation: expression of approval

Archaic: ancient

Arduous: strenuous

Artless: genuine

Ascertain: to investigate

Ascetic: self discipline

Asperity: harshness

Assuage: to pacify

Astringent: sharp, severe

Astringent: substance making skin tight

Audacious: daring

Auspicious: lucky

Austere: simple

Avarice: greed

Aver: to declare

Axiomatic: universally accepted

b-words

Banal: boring
Belligerent: eager to fight
Bolster: to support
Bombastic: arrogant
Bucolic: rural
Burgeon: to flourish

adjectives
adverbs
verbs
nouns

c-words

Cacophony: harsh sound
Canon: established set of principles
Canonical: agrees with principles
Capricious: changing mind quickly and often
Castigation: severe punishment
Catalyst: thing that speeds up result
Caustic: corrosive
Censure: to criticize
Chary: cautious, wary
Chicanery: deceitfulness
Coalesce: to combine
Cogent: convincing
Complaisance: willing to comply
Connoisseur: judge, critic
Contentious: causing disagreement
Contiguous: side-by-side
Contrite: regretful
Convention: agreement
Convolute: complicated
Corroborate: to confirm
Credulous: gullible
Culpable: blamable
Cynicism: belief that people are motivated by selfishness

d-words

Dearth: scarcity
Decorum: proper behavior
Demur: to question
Deride: to ridicule
Derision: mockery
Desiccate: to dry
Diatribes: denunciation
Didactic: instructive
Diffident: timid
Dilettante: amateur
Disabuse: to undeceive
Discordant: harsh sound
Discretion: cautious reserve in speech
Disinterested: free of bias
Disparage: to belittle
Disparate: distinct
Dissemble: to mislead
Divulge: to reveal
Dogmatic: stubbornly opinionated

e-words

adjectives
adverbs
verbs
nouns

Ebullience: cheerfulness
Eccentric: unconventional
Eclectic: choosing from wide range
Effrontery: boldness
Elegy: sad poem
Eloquent: well-spoken
Emollient: soothing
Empirical: based on observation or experiment
Endemic: native to location
Enervate: to weaken
Engender: to cause
Enigma: puzzle
Enigmatic: mysterious
Enmity: hostility
Ennui: dissatisfaction from boredom
Ephemeral: short-lived
Equivocal: ambiguous
Equivocate: to use ambiguous language for deception
Erudite: scholarly
Esoteric: restricted to small group
Eulogy: speech honoring dead
Euphony: pleasant sound
Evanescent: vanish like vapor
Exacerbate: to make worse
Excoriate: to criticize
Exculpate: to prove innocent
Exigent: urgent
Exonerate: to prove innocent
Extant: surviving
Extemporaneous: improvised

f-words

Facetious: inappropriate humor
Fallacy: mistaken belief
Fawn: to flatter
Fervent: emotional
Fervid: really passionate
Filibuster: long speech to delay legislature
Flout: to mock
Fortuitous: fortunate
Fulminate: to protest
Furtive: secretive

g-words

Garrulous: talkative
Germane: relevant
Gibe: insulting taunt
Glib: insincere speech, superficial
Gossamer: delicate
Grandiloquence: arrogant speech
Gregarious: sociable
Gyrate: to spiral

h-words

Hackneyed: cliché
Halcyon: calm
Harangue: long ranting speech
Harangue: to deliver a ranting speech
Hedonism: pursuit pleasure
Headlong: with reckless haste
Hector: to harass
Hegemony: domination over others
Heretical: violation
Homogenous: similar
Hubris: prideful

adjectives
adverbs
verbs
nouns

i-words

Iconoclast: rebel
Idolatrous: excessive devotion
Imminent: about to happen
Immutable: unchangeable
Impassive: unemotional
Impecunious: poor
Imperturbable: emotionally steady
Impetuous: impulsive
Implacable: unable to be calmed
Impunity: freedom from punishment
Inchoate: undeveloped
Incipient: begin to exist
Inculcate: to accuse
Indifferent: having no preference
Inert: inactive
Infelicitous: inappropriate
Ingenuous: unsuspecting
Inimical: hostile
Innocuous: harmless
Insipid: lacking interest
Intractable: stubborn
Intransigent: refusing to compromise
Intrepid: brave
Inured: accustomed to accepting something undesirable
Inveigle: to obtain by deception
Irascible: easily angered

l-words

Lachrymose: sad
Laconic: using few words
Largess: generous
Laud: to praise highly
Laudable: deserving praise
Libidinous: lustful
Loquacious: talkative
Lucid: clear
Ludic: playful in an aimless way
Lugubrious: sad
Luminous: bright

m-words

Macabre: disturbing
Magnanimity: forgiving
Malevolent: spiteful
Malleable: capable of being shaped
Martial: warlike
Martinet: strict disciplinarian
Maudlin: very emotional
Maverick: nonconformist, independent
Mendacity: dishonesty
Mercenary: greedy
Mercurial: sudden unpredictable change
Meticulous: detailed and thorough
Minatory: threatening
Misanthrope: hater of mankind
Mitigate: to lessen
Mollify: to soothe
Mordant: hard-hearted
Morose: sad
Mundane: ordinary, worldly
Munificent: very generous

adjectives
adverbs
verbs
nouns

n-words

Nadir: all time low
Nascent: beginning to exist, develop
Nebulous: cloudy, uncertain
Neologism: new word or expression
Neophyte: beginner
Noisome: unpleasant
Nonplussed: perplexed
Novitiate: beginner in religious order
Noxious: harmful

o-words

Obdurate: stubborn
Obfuscate: to make confusing
Objurgate: to scold
Obloquy: strong criticism, verbal abuse
Obsequious: eager to please
Obstinate: stubborn
Obtuse: mentally dull
Obviate: to anticipate and prevent
Occlude: to block
Odious: repulsive
Onerous: burdensome
Opaque: unable see through, hard to understand
Opprobrium: harsh criticism
Optimum: most favorable outcome
Orifice: opening
Oscillation: movement back-and-forth, hesitation
Ostensible: stated to be true, but not necessarily so
Ostentation: excessive showiness
Ostentatious: showy

p-words

adjectives
adverbs
verbs
nouns

Paeon: song of praise

Paucity: scarcity

Pedagogy: art of teaching

Pedant: someone who overly shows off learning

Pellucid: clear

Penurious: stingy

Penury: poverty

Perennial: lasting long time

Perfidy: treachery

Perfunctory: done without care

Pernicious: gradual harmfulness

Perspicacious: wise

Peruse: to examine carefully

Pervade: to spread throughout

Pervasive: spread throughout

Philistine: person lack culture

Phlegmatic: unemotional, sluggish

Pine: to yearn for

Pious: religious

Pirate: to illegally use or reproduce

Pith: essential part

Pithy: precise

Placate: to soothe

Platitude: cliché

Plethora: surplus

Polemic: verbal attack

Polemical: controversial, argumentative

Pragmatic: practical rather than idealistic

Prattle: to babble meaninglessly

Precipitate: acting hastily with impulse

Precipitate: to cause to happen suddenly

Predilection: preference

Preen: to dress up

Prescience: clairvoyant

Presumptuous: disrespectfully bold

Prevaricate: to speak/act in an evasive way, beat-around-the-bush

Pristine: pure, uncorrupted

Probity: honesty

Proclivity: natural predisposition

Prodigal: wastefully lavish

Prodigious: enormous

Profligate: wastefully lavish

Profuse: abundant

Proliferate: to increase quickly

Prolific: productive

Propensity: natural predisposition

Propriety: being proper

Prosaic: dull

Puerile: childish

Putrefy: to rot

q-words

Quaff: to drink deeply
Qualms: causes for hesitancy
Queries: questions
Querulous: complaining
Quiescence: stillness
Quixotic: idealistic but impractical
Quotidian: recurring daily

adjectives
adverbs
verbs
nouns

r-words

Raconteur: skilled storyteller
Rancorous: resentment
Rarefy: to make thinner
Recalcitrant: disobedient
Recant: to retract from previous beliefs
Recondite: difficult to understand
Redoubtable: awe-inspiring
Refulgent: shiny
Relegate: to assign to lower position
Renege: to go back on a promise
Repudiate: to reject
Rescind: to cancel
Restive: restless
Reticent: silent/reserved
Reverent: deeply respectful
Rhetoric: effective writing/speaking

s-words

Salubrious: promoting health
Sanction: official permission
Sanction: to authorize
Satire: literary work ridiculing human misconduct and stupidities
Sedulous: hard working
Shard: broken fragment
Solicitous: concerned, eager
Solvent: able to dissolve other substances, able to pay debts
Soporific: sleep-inducing
Sordid: filthy
Specious: seemingly plausible, but actually wrong
Spendthrift: who wastes money
Sporadic: occasionally
Spurious: not genuine
Squalid: filthy
Squander: to spend wastefully
Stoic: indifferent to pleasure/pain
Stupefy: to stun
Stymie: to hinder
Subpoena: court order appearance
Succinct: concise
Superfluous: extra, unnecessary
Supplant: to replace
Surfeit: extra
Synthesis: combination

+ - words

Tacit: implied, not explicit
Temperate: showing moderation/self-restraint
Tenacity: persistence
Tenuous: flimsy
Terse: concise
Timorous: fear, lack of confidence
Tirade: angry speech
Torpido: sluggish
Torque: rotational force
Tortuous: complicated
Transient: temporary
Trenchant: insightful
Trepidation: apprehension
Trite: cliché
Trout: to praise
Truculent: eager to fight
Truism: true statement, but not interesting or new
Turgid: swollen, tediously pompous
Turbid: obscure, cloudy
Tyro: beginner

adjectives
adverbs
verbs
nouns

u - words

Ubiquitous: widespread
Unfeigned: genuine
Untenable: indefensible
Urbane: courteous, civilized

v - words

Vacillate: to sway indecisively
Variegated: multicolored
Venal: greedy
Venerate: to look up to
Veracity: honesty
Verity: truth
Vexation: annoyance
Vicarious: indirect empathy
Vigilant: watchful
Vilify: to defame
Vindictive: desire revenge
Virulent: bitterly hostile
Viscous: thick, sticky
Vitiate: to weaken
Vitriolic: malice
Vituperate: to condemn
Volatile: unstable
Voracious: huge appetite

Waver: to fluctuate between choices

Zeal: strong feeling of interest
Zealous: enthusiastically devoted

w - words

z - words