

ASVAB

Study Guide

190+ High-Yield Terms & Concepts

for the Armed Services Vocational Aptitude Battery

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- All 9 ASVAB subtests - one section per subtest
 - General Science, Arithmetic Reasoning, Word Knowledge,
 - Paragraph Comprehension, Mathematics Knowledge, Electronics
 - Information, Shop Information, Mechanical Comprehension,
 - Auto & Shop Information
 - Exam overview: CAT-ASVAB vs PICAT vs MET versions
 - AFQT, composites (MAGE) & standard scores explained
 - Key facts, ASVAB tips & examples for every concept
 - Final review + test-day strategy

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How to Use This Guide

The ASVAB is the military's aptitude battery. Your subtest standard scores feed the AFQT (the enlistment gate) and the classification composites that qualify you for specific jobs (MOS/rating). This guide organizes the high-yield terms and concepts tested across all nine ASVAB subtests - one section per subtest - plus the exam overview, a final review, and a test-day strategy.

Work through the nine subtest sections in order on your first pass. Each concept gives you the key facts, a high-yield ASVAB tip, and where useful an example. Mark anything unfamiliar and come back to it 48 hours later. The Math and Verbal subtests carry the AFQT weight, so budget your review time accordingly: Arithmetic Reasoning and Mathematics Knowledge + Word Knowledge and Paragraph Comprehension deserve the most reps.

How to use the concepts

- Each concept = term + key facts + high-yield ASVAB tip (+ example where useful).
- First pass: read every concept in order. Underline anything unfamiliar.
- Second pass: focus only on the concepts you underlined.
- Two weeks before test day: rapid-review every tip line (they are the highest-yield).
- Use the Table of Contents to jump straight to your weakest subtests.
- Pair this guide with the official ASVAB practice tests - format and pacing matter.

Note: this is an independent study aid, not affiliated with or endorsed by the Department of Defense or the ASVAB program. Exam formats and requirements can change - verify current detail with your recruiter or the official ASVAB site.

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Total: 200 high-yield concepts (190+ advertised)

How to use the TOC: work through the nine subtest sections in order on your first pass, then jump back to your weakest subtests for review. Each concept includes key facts, a high-yield ASVAB tip, and where useful an example. The Math and Verbal subtests carry the AFQT weight - schedule extra reps there.

EXAM OVERVIEW: THE ASVAB

CAT-ASVAB vs PiCAT vs MET, standard scores, the AFQT, composites (MAGE) and line scores.

The ASVAB (Armed Services Vocational Aptitude Battery) is used by all branches to determine enlistment eligibility (via the AFQT) and to classify applicants into specific jobs via composite scores such as MAGE. There are three delivery versions: the proctored computer-adaptive CAT-ASVAB given at a Military Entrance Processing Station (MEPS), the PiCAT (a non-proctored internet version that is usually verified by a short confirmation test at MEPS), and the MET (Mobile Examining Team) versions, which are proctored paper-and-pencil or computer versions administered at satellite sites. The content is the same across versions; timing and question counts differ.

Scoring: each subtest is reported as a standard score with a mean of 50 and a standard deviation of 10. A Verbal composite (VE) is formed from Word Knowledge and Paragraph Comprehension. The AFQT - the enlistment qualification score - is computed as $AR + MK + 2(VE)$ and reported as a percentile from 1 to 99 against the 1997 norming sample of 18-23 year olds. Classification composites such as MAGE (Mechanical, Administrative, General, Electronics) are standard scores on a scale with mean 100 and standard deviation 20; your branch uses them to qualify you for specific military occupations.

CAT-ASVAB structure (official, scored questions): General Science (GS) 15 questions / 12 minutes, Arithmetic Reasoning (AR) 15 / 55, Word Knowledge (WK) 15 / 9, Paragraph Comprehension (PC) 10 / 27, Mathematics Knowledge (MK) 15 / 31, Electronics Information (EI) 15 / 10, Auto Information (AI) 10 / 7, Shop Information (SI) 10 / 6, Mechanical Comprehension (MC) 15 / 22, Assembling Objects (AO) 15 / 18. AI and SI are reported together as the Auto & Shop Information (AS) score. The CAT is adaptive: the computer picks questions based on your ability estimate, so answer every item - a wrong guess costs less than running out of time on a well-targeted question.

Score terminology you will meet: standard score (per-subtest, mean 50 / SD 10), AFQT percentile (the enlistment gate, categories I-V), composite scores (job qualification, mean 100 / SD 20), and line scores (the outdated paper-era term for the subtest/aptitude scores used to build composites). Your recruiter and branch guidance can tell you exactly which composite each MOS or rating requires.

SECTION 1: GENERAL SCIENCE (GS)

15 scored questions (CAT). Life, physical and earth/space science. Broad but shallow - know the vocabulary and the one-line 'why' behind each concept.

1 Cell

- Key facts:** The basic unit of life. The cell membrane controls what enters and leaves; the nucleus holds DNA; mitochondria make ATP (energy); ribosomes build proteins; the endoplasmic reticulum and Golgi apparatus process and ship proteins.
- ASVAB tip:** GS asks function-matching: mitochondria = energy, ribosomes = protein, nucleus = DNA. Match organelle to job and you will ace most cell questions.
- Example:** A cell that needs more energy has more mitochondria; a gland making lots of protein has abundant ribosomes.

2 DNA & RNA

- Key facts:** DNA is double-stranded, stores genetic information, and uses bases A-T and G-C. RNA is single-stranded, carries the message, and uses A-U and G-C. DNA → RNA → protein is the central flow of molecular biology.
- ASVAB tip:** GS loves base pairing. If one strand reads ATCG, the complement is TAGC; in RNA, T becomes U, so AUGC.
- Example:** A DNA strand of ATCG pairs with TAGC. RNA transcribed from it is AUGC.

3 Mitosis vs Meiosis

- Key facts:** Mitosis makes two identical diploid body cells (growth and repair). Meiosis makes four genetically different haploid gametes (sperm and egg) with half the chromosome number.
- ASVAB tip:** Somatic (body) cells = mitosis; gametes = meiosis. If chromosomes are halved, it is meiosis.
- Example:** A skin cell healing a cut divides by mitosis. A sperm cell is produced by meiosis.

4 Genes & Alleles

- Key facts:** A gene is a section of DNA coding for a trait; an allele is one version of that gene. Dominant alleles (A) mask recessive ones (a); genotype is the allele pair (AA, Aa, aa), phenotype is the visible result.
- ASVAB tip:** Simple Punnett squares: two heterozygous parents (Aa x Aa) give a 3:1 dominant-to-recessive phenotype ratio.
- Example:** Bb x Bb gives 25% bb - so a child has a 25% chance of the recessive blue-eyed phenotype.

5 Photosynthesis

- Key facts:** Plants convert light energy into chemical energy: $6\text{ CO}_2 + 6\text{ H}_2\text{O} + \text{light} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{ O}_2$. It happens in chloroplasts; chlorophyll captures the light.
- ASVAB tip:** Products of photosynthesis are the reactants of cellular respiration, and vice versa. That pairing is a classic GS question.
- Example:** Plants take in carbon dioxide and release oxygen during the day.

6 Cellular Respiration

- Key facts:** Cells break down glucose with oxygen to release energy: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{ O}_2 \rightarrow 6\text{ CO}_2 + 6\text{ H}_2\text{O} + \text{ATP}$. Aerobic respiration (with O₂) yields far more ATP than anaerobic (fermentation).
- ASVAB tip:** Muscle fatigue and the burn during hard exercise come from anaerobic respiration making lactic acid.
- Example:** Without oxygen, a muscle cell switches to fermentation and produces lactic acid - the ache you feel after sprinting.

7 Atoms & Elements

- Key facts:** An atom has protons (+) and neutrons in the nucleus and electrons (-) around it. The atomic number equals the number of protons and defines the element; atomic mass is protons plus neutrons.
- ASVAB tip:** Ions = charged atoms (lost/gained electrons); isotopes = same protons, different neutrons. GS rarely goes deeper.
- Example:** An atom with 6 protons and 6 neutrons is carbon-12; adding a neutron makes carbon-13, an isotope.

8 Chemical Bonds

Key facts:	Ionic bonds transfer electrons (metal + nonmetal, e.g., NaCl). Covalent bonds share electrons (nonmetals, e.g., water). Hydrogen bonds are weak attractions between molecules that give water its special properties.
ASVAB tip:	<i>Ionic = transfer and a salt; covalent = share and a molecule; hydrogen bond = between molecules (DNA strands, water).</i>
Example:	Table salt (NaCl) is ionic; water (H ₂ O) is covalent; the two DNA strands are held together by hydrogen bonds.

9 Acids & Bases

Key facts:	Acids release H ⁺ (pH below 7); bases release OH ⁻ or accept H ⁺ (pH above 7). The pH scale is logarithmic: each whole step is a tenfold change in H ⁺ concentration.
ASVAB tip:	<i>Lower pH = more acidic = more H⁺. A pH of 3 is 100x more acidic than pH 5.</i>
Example:	Stomach acid has pH ~2; blood sits near pH 7.4; household ammonia is basic (pH ~11).

10 States of Matter

Key facts:	Solid (fixed shape and volume), liquid (fixed volume, takes the container's shape), gas (fills any container), plasma (ionized gas). Phase changes: melting, freezing, boiling/evaporation, condensation, sublimation.
ASVAB tip:	<i>Match the phase change to the process: gas to liquid = condensation; solid to gas = sublimation (dry ice).</i>
Example:	Dry ice (solid CO ₂) goes straight to gas - that is sublimation.

11 Periodic Table Basics

Key facts:	Elements are arranged by atomic number. Columns (groups) share valence-electron counts and therefore similar chemical behavior; rows (periods) show increasing electron shells.
ASVAB tip:	<i>Same group = same chemistry. Group 1 metals react with water; noble gases (group 18) barely react.</i>
Example:	Sodium and potassium are both group 1 alkalis - both form +1 ions and react vigorously with water.

12 Scientific Method

Key facts:	Observation -> question -> hypothesis (testable, falsifiable) -> experiment -> data -> conclusion. Controlled experiments change one independent variable and measure the dependent variable.
ASVAB tip:	<i>Identify the independent variable (what is changed) and the dependent variable (what is measured); the control group gets no treatment.</i>
Example:	Testing fertilizer: the fertilizer dose is independent, plant growth is dependent, plants without fertilizer are the control.

13 Nutrition & Macromolecules

Key facts:	Carbohydrates are quick energy (sugars, starches); lipids are long-term energy and membranes (fats, oils); proteins do structure and enzyme work (amino acids); nucleic acids carry genetic information (DNA, RNA).
ASVAB tip:	<i>Enzymes are proteins; cell membranes are built from lipids (phospholipids); quick energy = carbs.</i>
Example:	Bread and pasta are carbohydrate-rich; olive oil is a lipid; muscle is built from protein.

14 Human Body Systems

Key facts:	Circulatory (heart/blood transport), respiratory (gas exchange), digestive (breakdown/absorption), nervous (signals), endocrine (hormones), immune (defense), skeletal (support), muscular (movement), excretory (waste removal).
ASVAB tip:	<i>GS asks system-to-job matches. Kidneys = excretory/urinary; lungs = respiratory; pancreas = endocrine + digestive.</i>
Example:	The kidneys filter blood and make urine, so they belong to the excretory (urinary) system.

15 Circulatory System Basics

Key facts:	Oxygen-poor blood goes from the heart to the lungs to pick up O ₂ and drop CO ₂ , returns to the heart, and is pumped to the body. Arteries carry blood away from the heart; veins return it; capillaries exchange gases and nutrients.
ASVAB tip:	<i>Arteries = away, veins = back, capillaries = exchange. Oxygenated blood leaves the heart's left side.</i>
Example:	Blood leaves the left ventricle through the aorta (an artery) to reach the body.

16 Respiratory System

- Key facts:** Air enters through the nose/mouth, down the trachea into the bronchi and bronchioles to the alveoli, where oxygen and carbon dioxide are exchanged across thin membranes.
- ASVAB tip:** *Gas exchange happens in the alveoli - the site with the huge surface area. Everything before that is just plumbing.*
- Example:** In the alveoli, oxygen moves into the blood and carbon dioxide moves out.
-

17 Digestive System

- Key facts:** Mechanical and chemical breakdown of food: mouth (chewing, amylase), stomach (acid, protein digestion), small intestine (most absorption, villi), large intestine (water reabsorption).
- ASVAB tip:** *Most nutrient absorption happens in the small intestine, not the stomach. Villi increase surface area.*
- Example:** After a meal, glucose and amino acids are absorbed into the blood across the small intestine's villi.
-

18 Immune System

- Key facts:** White blood cells defend the body. Innate immunity is the fast, general response; adaptive immunity is slower but specific and remembers pathogens (antibodies, B and T cells).
- ASVAB tip:** *Vaccines build adaptive immunity by teaching B cells to make antibodies against a specific pathogen.*
- Example:** A vaccine for measles triggers antibody production so a later measles exposure is defeated quickly.
-

19 Rock Cycle

- Key facts:** Igneous rocks form from cooled magma; sedimentary rocks form from compressed sediment layers; metamorphic rocks form when heat and pressure change existing rock. The cycle connects all three.
- ASVAB tip:** *Cooling magma = igneous; heat + pressure = metamorphic; layers of sediment = sedimentary.*
- Example:** Granite is igneous (cooled magma); limestone is sedimentary; marble is metamorphic limestone.
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20 Water Cycle

- Key facts:** Evaporation (liquid to vapor), condensation (vapor to liquid, forming clouds), precipitation (rain/snow), collection and runoff. The sun drives the cycle.
- ASVAB tip:** *Evaporation and condensation are the two phase changes the water cycle depends on.*
- Example:** Sunlight evaporates ocean water; it condenses into clouds and falls as rain over land.
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21 Atmosphere Layers

- Key facts:** Troposphere (weather, where we live), stratosphere (ozone layer, jets), mesosphere (meteors burn up), thermosphere (auroras, ISS orbits).
- ASVAB tip:** *Weather = troposphere; ozone = stratosphere. Those two are the classic GS pair.*
- Example:** Commercial jets fly in the lower stratosphere, above the weather of the troposphere.
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22 Weather Basics

- Key facts:** Air pressure, temperature, humidity and wind drive weather. Low-pressure systems usually bring clouds and precipitation; high-pressure systems bring clear skies.
- ASVAB tip:** *Low pressure = stormy/cloudy; high pressure = clear. Cold front = fast, heavy storms; warm front = gentle, lasting rain.*
- Example:** A falling barometer usually means a low-pressure system is moving in - expect clouds or rain.
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23 Solar System

- Key facts:** The sun is a star at the center; eight planets orbit it. Inner planets are rocky (Mercury, Venus, Earth, Mars); the asteroid belt sits between Mars and Jupiter; outer planets are gas/ice giants.
- ASVAB tip:** *Order the planets from the sun: My Very Educated Mother Just Served Us Noodles (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune).*
- Example:** Jupiter is the largest planet and sits just beyond the asteroid belt.
-

24

Simple Ecology

- Key facts:Producers (plants) make food; consumers eat it; decomposers break down waste and dead matter. Food chains and webs transfer energy, and about 90% of energy is lost at each step.
- ASVAB tip:Producers -> primary consumers -> secondary consumers. Decomposers finish the job, recycling nutrients.
- Example:Grass (producer) -> rabbit (primary consumer) -> fox (secondary consumer) -> fungi (decomposer).

25

Magnetism Basics

- Key facts:Magnetic fields surround magnets; like poles repel, opposite poles attract. Earth behaves as a giant magnet with a magnetic north pole. Compasses align to the field.
- ASVAB tip:Like poles repel, opposites attract - the same rule as electric charges.
- Example:Bringing the north pole of one magnet near the north pole of another pushes them apart.

26

Properties of Water

- Key facts:Water is polar, is an excellent solvent, has high surface tension, expands when it freezes (ice floats), and has a high specific heat (it resists temperature change).
- ASVAB tip:Water expands on freezing - that is why ice floats and why water pipes burst in winter.
- Example:A lake freezes from the top down because ice is less dense than liquid water.

SECTION 2: ARITHMETIC REASONING (AR)

15 scored questions / 55 minutes (CAT). Straightforward math wrapped in word problems. The 4-step habit - what is asked, what is given, plan, compute - is the whole game.

27 Word Problem Translation

Key facts: Convert words into math: 'is' = =, 'of' = multiply, 'per' = divide, 'more than' = +, 'less than' = -, 'a number' = x. Write the equation BEFORE touching the calculator.

ASVAB tip: ASVAB word problems reward translating carefully once over computing fast. Identify the variable, set up, then solve.

Example: 'A number increased by 5 is 17' $\rightarrow x + 5 = 17 \rightarrow x = 12$.

28 Percent of a Number

Key facts: Percent means per hundred. Find 15% of 80 by multiplying: $80 \times 0.15 = 12$. Move the decimal two places to convert percent to decimal.

ASVAB tip: Convert percent to decimal first, then multiply. $15\% = 0.15$; $150\% = 1.5$; $0.5\% = 0.005$.

Example: A \$40 item at 25% off: discount = $40 \times 0.25 = \$10$; sale price = \$30.

29 Percent Increase / Decrease

Key facts: Percent change = $(\text{new} - \text{original}) / \text{original} \times 100\%$. The change is always relative to the ORIGINAL value.

ASVAB tip: Sequential percent changes do NOT add. A 10% raise then a 10% cut is a net loss. Compute step by step against the new base.

Example: \$100 up 10% = \$110; down 10% = \$99. Net result: -1%, not 0.

30 Ratios

Key facts: A ratio compares two quantities (a:b). It can be simplified like a fraction. Know the order: 'the ratio of men to women is 3:2' means 3 men for every 2 women.

ASVAB tip: Total parts = sum of the ratio numbers. Divide the total quantity by parts, then multiply by each ratio piece.

Example: Split \$100 in a 3:2 ratio: 5 parts total, each \$20, so \$60 and \$40.

31 Proportions

Key facts: Two equal ratios: $a/b = c/d$. Solve by cross-multiplying: $a \times d = b \times c$. Units must line up.

ASVAB tip: Set up so the same units are on the same side. 3 miles in 20 minutes $\rightarrow$ 9 miles in how many? $3/20 = 9/x \rightarrow x = 60 \text{ min}$.

Example: If 5 workers finish a wall in 12 hours, 1 worker needs 60 hours (inverse proportion: $5 \times 12 = 60$).

32 Average (Mean)

Key facts: Average = sum of values / number of values. If you know the average and the count, the sum is average $\times$ count.

ASVAB tip: Use the sum trick: 'average of 4 numbers is 15' means the sum is 60. Add/drop one value and recompute.

Example: Scores 80, 85, 90, 85: sum = 340, count = 4, average = 85.

33 Distance, Rate & Time

Key facts: Distance = rate $\times$ time. Rearrange: time = distance/rate; rate = distance/time. Keep units consistent (miles per hour vs minutes).

ASVAB tip: For round trips, average speed is total distance / total time - NOT the simple average of the two speeds.

Example: 60 miles at 30 mph = 2 hours; 60 miles at 60 mph = 1 hour; total 120 miles / 3 hours = 40 mph average.

34 Work Problems

Key facts: If a person completes a job in N hours, their rate is $1/N$ per hour. Working together, add the rates: $1/N + 1/M = \text{combined rate}$.

ASVAB tip: Combined time = $1 / (1/N + 1/M)$. A 4-hour worker and a 6-hour worker together: $1/4 + 1/6 = 5/12 \rightarrow 12/5 = 2.4 \text{ hours}$.

Example: A pipe fills a tank in 3 hours; another in 6. Together: $1/3 + 1/6 = 1/2 \rightarrow 2 \text{ hours}$.

35 Interest

- Key facts:** Simple interest = principal x rate x time ($I = PRT$). Rates are per year unless stated otherwise. Convert the rate to a decimal.
- ASVAB tip:** Simple interest keeps the same base every year; compound interest builds on the previous total.
- Example:** \$500 at 4% simple interest for 3 years: $500 \times 0.04 \times 3 = \60 interest.

36 Discounts & Markup

- Key facts:** Discount = percent off the list price. Markup = percent added to the cost to set the selling price. Both multiply the base price by (1 +/- the percent).
- ASVAB tip:** A store pays \$60 and marks up 40%: selling price = $60 \times 1.40 = \$84$. After a 20% sale: $84 \times 0.80 = \$67.20$.
- Example:** A \$120 coat at 30% off: $120 \times 0.70 = \$84$.

37 Fractions: Add & Subtract

- Key facts:** Find a common denominator, convert both fractions, add or subtract the numerators, keep the denominator, then simplify.
- ASVAB tip:** The least common denominator is the LCM of the denominators. $1/3 + 1/4$: LCD 12 $\rightarrow 4/12 + 3/12 = 7/12$.
- Example:** $3/4 - 1/6$: LCD 12 $\rightarrow 9/12 - 2/12 = 7/12$.

38 Fractions: Multiply & Divide

- Key facts:** Multiply top times top and bottom times bottom. Divide by multiplying by the reciprocal: keep-change-flip on the SECOND fraction only.
- ASVAB tip:** Keep-change-flip: $2/3 \div 3/4 = 2/3 \times 4/3 = 8/9$. Flip the second fraction, never the first.
- Example:** $2/5 \times 3/4 = 6/20 = 3/10$. $3/4 \div 1/2 = 3/4 \times 2/1 = 6/4 = 1.5$.

39 Decimals & Place Value

- Key facts:** Decimals extend the place-value system: tenths, hundredths, thousandths. Line up decimal points when adding or subtracting; count decimal places when multiplying.
- ASVAB tip:** On the ASVAB calculator, decimals behave like whole numbers - but track the decimal point in the answer.
- Example:** $0.2 + 0.07 = 0.27$ (align tenths and hundredths). $0.3 \times 0.4 = 0.12$ (two decimal places).

40 Fees & Taxes

- Key facts:** Tax = price x tax rate. Total = price + tax. Tips are a percent of the bill added on top.
- ASVAB tip:** Two-step: compute the tax/tip, then add it. Don't mix up 'including tax' (rate already baked in) with 'plus tax'.
- Example:** A \$20 meal with 8% tax: tax = \$1.60, total = \$21.60.

41 Consecutive Integers

- Key facts:** Consecutive integers differ by 1 ($n, n+1, n+2$). Consecutive even/odd integers differ by 2. Let the first be n and translate the sum.
- ASVAB tip:** Three consecutive integers summing to 24: $n + (n+1) + (n+2) = 24 \rightarrow 3n + 3 = 24 \rightarrow n = 7 \rightarrow 7, 8, 9$.
- Example:** Find two consecutive even integers whose sum is 34: $n + (n+2) = 34 \rightarrow n = 16 \rightarrow 16$ and 18.

42 Age Problems

- Key facts:** Translate age statements into equations in one variable, using 'x' for the current age and $x+k$ for ages k years from now.
- ASVAB tip:** Build a table: now vs future. 'In 5 years he will be twice as old as his son' $\rightarrow x + 5 = 2(s + 5)$ with current ages x and s .
- Example:** A father is 40 and his son is 10. In how many years will he be twice as old? $40 + y = 2(10 + y) \rightarrow y = 20$.

43 Coin & Mixture Problems

- Key facts:** Total value = count x value per item. For coins, value is in consistent units (cents). For mixtures, total amount x concentration = amount of the active ingredient.
- ASVAB tip:** Set two equations: one for count/amount, one for value. Solve by substitution.
- Example:** 10 coins, some nickels (5c) and some dimes (10c), worth 80c: $n + d = 10$ and $5n + 10d = 80 \rightarrow 4$ nickels, 6 dimes.

44 Unit Conversion

- Key facts:** Convert units with factor labels: multiply by a fraction equal to 1 (e.g., 1 mile / 5280 feet) so units cancel. Know common equivalences: 1 mile = 5280 ft, 1 hour = 60 min, 1 yd = 3 ft.
- ASVAB tip:** Write the conversion as a chain and cancel units. If the units don't cancel, the setup is wrong.
- Example:** How many feet in 2 miles? $2 \text{ mi} \times (5280 \text{ ft} / 1 \text{ mi}) = 10,560 \text{ ft}$.
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45 Geometry Word Problems

- Key facts:** Perimeter = sum of side lengths; area = length x width (rectangle), $\frac{1}{2} \times \text{base} \times \text{height}$ (triangle), $\pi \times r^2$ (circle); volume = length x width x height (box), $\pi \times r^2 \times h$ (cylinder).
- ASVAB tip:** Read what the question wants: a fence is perimeter, carpet is area, a tank is volume. Pick the right formula first.
- Example:** Carpeting a 12 ft x 15 ft room: area = 180 sq ft. Fencing it: perimeter = 54 ft.
-

46 Probability

- Key facts:** Probability = favorable outcomes / total outcomes. It ranges from 0 to 1 and can be a fraction, decimal, or percent.
- ASVAB tip:** Probability questions on the ASVAB are usually single-event. Count total outcomes carefully.
- Example:** A bag has 3 red and 5 blue marbles: $P(\text{red}) = \frac{3}{8} = 0.375 = 37.5\%$.
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47 Mean, Median, Mode & Range

- Key facts:** Mean = average. Median = middle of sorted values (average of the two middle for even counts). Mode = most frequent. Range = max - min.
- ASVAB tip:** Sort before finding the median. The mode is what appears most often - it can be non-numeric.
- Example:** Values 72, 85, 85, 90, 94: mean 85.2, median 85, mode 85, range 22.
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48 Order of Operations

- Key facts:** Evaluate in this order: Parentheses, Exponents, Multiplication/Division (left to right), Addition/Subtraction (left to right) - PEMDAS.
- ASVAB tip:** Multiplication and division share priority; do them left to right. $10 - 3 + 2 = 9$, NOT 5.
- Example:** $3 + 6 \times (5 + 4) / 3 - 7 = 3 + 6 \times 9 / 3 - 7 = 3 + 18 - 7 = 14$.
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49 Rounding & Estimation

- Key facts:** Round to a convenient place before computing to estimate an answer. When answer choices are far apart, estimation is enough - and it catches calculator entry errors.
- ASVAB tip:** Look at the spread of the answer choices. 47×32 is close to $50 \times 30 = 1500$; pick the choice near 1500.
- Example:** If choices are 150, 500, 1500, 5000, estimate $50 \times 30 = 1500$ and choose C without calculating.
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50 Gallon / Quart / Pint Conversions

- Key facts:** 1 gallon = 4 quarts = 8 pints = 16 cups. 1 quart = 2 pints = 4 cups. These food-service unit conversions show up in practical word problems.
- ASVAB tip:** Memorize the chain: gallon -> quart -> pint -> cup doubles each step down.
- Example:** 2.5 gallons = 10 quarts = 20 pints = 40 cups.
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SECTION 3: WORD KNOWLEDGE (WK)

15 scored questions / 9 minutes. Most questions ask for the best synonym (answer choice closest in meaning); some ask for the meaning of a word in context. Build vocabulary and learn to infer from roots and prefixes.

53 Prudent

Key facts: Wise and careful about practical matters; showing good judgment.

ASVAB tip: *If a choice means 'careful' or 'sensible,' it is likely the match for prudent.*

Example: A prudent driver checks both mirrors before changing lanes.

54 Meticulous

Key facts: Extremely careful and precise about detail.

ASVAB tip: *'Careful' is the closest common synonym; 'sloppy' is the opposite.*

Example: The meticulous accountant caught a one-cent error.

55 Alleviate

Key facts: To make pain or a problem less severe; to relieve.

ASVAB tip: *Think 'relief': alleviate pain = reduce it. Not cure, not ignore.*

Example: Rest and fluids alleviated her headache.

56 Mitigate

Key facts: To make something less harmful, severe, or serious.

ASVAB tip: *Arguments can be mitigated (softened) but rarely eliminated. Look for 'lessen.'*

Example: Quick action mitigated the damage from the leak.

57 Substantiate

Key facts: To provide evidence that supports a claim; to prove or confirm.

ASVAB tip: *Substantiate = back up with evidence. If the question involves proof, this is the word.*

Example: The photos substantiated his account of the accident.

58 Corroborate

Key facts: To support a statement with additional evidence or testimony.

ASVAB tip: *Two independent witnesses corroborate each other. Same family as 'confirm.'*

Example: Her testimony corroborated the driver's story.

59 Pragmatic

Key facts: Dealing with things practically rather than by theory or ideals; realistic.

ASVAB tip: *A pragmatic person does what works, not what is perfect on paper.*

Example: His pragmatic approach fixed the budget without a long debate.

60 Tenacious

Key facts: Holding firmly; persistent and determined.

ASVAB tip: *Tenacious = stubbornly persistent. Think 'grips and won't let go.'*

Example: The tenacious climber reached the summit despite bad weather.

61 Resilient

Key facts: Able to recover quickly from difficulty or change; springy.

ASVAB tip: *Resilient = bounces back. Think of a spring or rubber band.*

Example: The resilient team bounced back after a losing season.

62 Cursory

Key facts: Hasty and therefore not thorough; quick and superficial.

ASVAB tip: *'Cursory' is negative: too quick. A cursory glance is a quick once-over.*

Example: A cursory scan of the manual missed the warning label.

63 Tentative

Key facts: Not final; uncertain or hesitant.

ASVAB tip: *A tentative plan can change; a tentative handshake is unsure.*

Example: They set a tentative date for the meeting.

64 Facilitate

Key facts: To make an action or process easier.

ASVAB tip: *Facilitate = make easier, not do for someone.*

Example: The new software facilitates faster data entry.

65 Impede

Key facts: To delay or block progress.

ASVAB tip: *Impede = hinder. Traffic impedes your commute.*

Example: Roadwork impeded traffic through the tunnel.

66 Concise

Key facts: Giving a lot of information clearly and in few words; brief but complete.

ASVAB tip: *'Concise' is a compliment: short AND clear, not just short.*

Example: Her concise report said more in one page than his in ten.

67 Ambiguous

Key facts: Open to more than one interpretation; unclear.

ASVAB tip: *Ambiguous = can mean two things. A sentence with two readings is ambiguous.*

Example: The ambiguous email left everyone unsure what to do.

68 Coherent

Key facts: Logical and consistent; easy to follow because parts connect well.

ASVAB tip: *A coherent argument holds together from one point to the next.*

Example: The witness gave a coherent account of the events.

69 Profound

Key facts: Very deep, intense, or far-reaching; showing deep insight.

ASVAB tip: *Profound can be deep (a profound change) or insightful (a profound comment).*

Example: The invention had a profound effect on daily life.

70 Superficial

Key facts:	Existing or happening at or near the surface; shallow, not deep.
ASVAB tip:	<i>Superficial = surface-level. A superficial wound is a scratch; a superficial analysis skims.</i>
Example:	The doctor said the cut was superficial and would heal quickly.

71 Aversion

Key facts:	A strong dislike or unwillingness toward something.
ASVAB tip:	<i>Aversion = strong dislike. You have an aversion to what you avoid.</i>
Example:	She has an aversion to crowded places.

72 Arduous

Key facts:	Involving or requiring strenuous effort; difficult and tiring.
ASVAB tip:	<i>Arduous = hard work. A trek, a climb, a long project are arduous.</i>
Example:	The arduous hike took the whole day.

73 Benevolent

Key facts:	Well meaning and kindly; wanting to do good.
ASVAB tip:	<i>Bene- = good; think 'benefit.' A benevolent ruler governs kindly.</i>
Example:	A benevolent donor funded the new library.

74 Candid

Key facts:	Truthful and straightforward; frank.
ASVAB tip:	<i>Candid = honest, even when it costs something.</i>
Example:	He gave a candid assessment of the team's chances.

75 Diligent

Key facts:	Showing steady, careful, and earnest effort.
ASVAB tip:	<i>Diligent = hard-working and thorough, over time - not a one-time burst.</i>
Example:	Diligent study over months raised her score by 40 points.

76 Eminent

Key facts:	Famous and respected within a field; distinguished.
ASVAB tip:	<i>Eminent = famous/renowned. Don't confuse with imminent (about to happen).</i>
Example:	An eminent surgeon performed the procedure.

77 Frugal

Key facts:	Careful with money; thrifty; sparing.
ASVAB tip:	<i>Frugal = thrifty, not cheap or greedy. It implies wise restraint.</i>
Example:	Frugal habits let them save a third of every paycheck.

78 Hostile

Key facts:	Unfriendly, antagonistic, or opposed.
ASVAB tip:	<i>Hostile = openly unfriendly. It can describe people, weather, or terrain.</i>
Example:	The hostile crowd made the speaker shorten his remarks.

SECTION 4: PARAGRAPH COMPREHENSION (PC)

10 scored questions / 27 minutes (CAT). Short passages followed by main-idea, detail, inference, and vocabulary-in-context questions. Read once, actively; answer from the passage.

79 Main Idea

- Key facts:** The main idea is the single most important point the passage makes - the sentence almost everything else supports. Look at the first and last sentences and the topic repeated throughout.
- ASVAB tip:** *If every paragraph points to one idea, that idea is the main idea. A detail repeated once is NOT the main idea.*
- Example:** A passage about recycling aluminum, glass and plastic is mainly about recycling materials - not about aluminum alone.

80 Supporting Details

- Key facts:** Details are the facts, examples, and figures that develop the main idea. Detail questions can usually be answered by locating a key word and reading around it.
- ASVAB tip:** *Scan for the exact key word in the question, then read that sentence and the one after it.*
- Example:** 'The bridge was built in 1937' - the detail to find when the question names the bridge and a date.

81 Author's Purpose

- Key facts:** Why the author wrote the passage: to inform, persuade, entertain, explain, or describe. The tone usually gives it away - an opinionated tone signals persuasion.
- ASVAB tip:** *Inform = neutral facts; persuade = opinion + argument; explain = how something works.*
- Example:** A passage arguing for bike lanes is written to persuade, regardless of the facts it cites.

82 Inference

- Key facts:** An inference is a conclusion the passage supports but does not state directly. It must follow logically from what is written - not from outside knowledge.
- ASVAB tip:** *The correct inference is the one the passage's facts point to. If the passage does not support it, it is wrong - even if it is true.*
- Example:** If the passage says sales doubled after the ad campaign, a supported inference is that the campaign likely helped sales.

83 Tone

- Key facts:** Tone is the author's attitude: neutral, approving, critical, concerned, humorous, sarcastic. Tone words show it (unfortunate, impressive, alarming).
- ASVAB tip:** *One or two tone words in the passage are usually enough. Critical = negative judgment; sympathetic = understanding.*
- Example:** Calling a policy 'short-sighted' signals a critical tone.

84 Fact vs Opinion

- Key facts:** A fact can be verified; an opinion is a belief or judgment. Signal words like 'best,' 'should,' and 'clearly' often introduce opinions.
- ASVAB tip:** *Opinions are often wrapped around facts. 'The law passed in 2020 (fact) and is unfair (opinion).'*
- Example:** 'The city has 500,000 residents' is a fact; 'The city is the friendliest in the state' is an opinion.

85 Cause & Effect

- Key facts:** Cause-and-effect passages explain why something happened (cause) and what resulted (effect). Signal words: because, since, therefore, as a result, consequently.
- ASVAB tip:** *The cause answers 'why'; the effect answers 'what happened next.'*
- Example:** Because the dam failed (cause), the valley flooded (effect).

86 Compare & Contrast

- Key facts:** Comparing shows similarities; contrasting shows differences. Signal words: similarly, likewise, both (compare); however, unlike, whereas, on the other hand (contrast).
- ASVAB tip:** Questions ask 'how are X and Y alike/different.' Use the signal words to find the answer.
- Example:** Unlike diesel engines, gasoline engines use spark plugs - a contrast.
-

87 Sequence & Steps

- Key facts:** Some passages present events or steps in order. Signal words: first, next, then, finally, before, after, while. Answer sequence questions by tracking the order words.
- ASVAB tip:** Number the steps in the margin as you read; a 'what happens before/after step 3' question is then free.
- Example:** First mix the dry ingredients, then add the wet, and finally bake at 350 degrees.
-

88 Vocabulary in Context

- Key facts:** Some questions ask the meaning of a word as it is used in the passage. Use the surrounding sentence to infer the meaning - the context, not the dictionary, is authoritative.
- ASVAB tip:** Replace the word with each answer choice and see which keeps the sentence's meaning.
- Example:** 'The team was jubilant after the win' - jubilant means very happy, as the celebration context shows.
-

89 Transition Words

- Key facts:** Transitions connect ideas: however (contrast), moreover (add), therefore (result), for example (illustrate), in conclusion (summarize). They map the passage's logic.
- ASVAB tip:** A question may ask what a transition does: 'however' signals a shift or contrast to come.
- Example:** 'The plan is costly. However, it will pay off in five years' - however signals a contrast.
-

90 Passage Structure

- Key facts:** Structure questions ask how the passage is organized: chronological, cause-effect, compare-contrast, problem-solution, or general-to-specific.
- ASVAB tip:** Skim the first sentence of each paragraph; the pattern of those sentences reveals the structure.
- Example:** A passage that states a problem, then proposes and defends a solution uses problem-solution structure.
-

91 Drawing Conclusions

- Key facts:** A conclusion combines the passage's facts into a broader statement that is still directly supported. The best conclusion is the most specific supported one.
- ASVAB tip:** Tighten the conclusion to what the passage proves. Broad 'moral of the story' conclusions are usually too strong.
- Example:** If the passage describes rising sea levels worldwide, a supported conclusion is that coastal planning should account for the trend.
-

92 Summarizing

- Key facts:** A summary restates the main idea plus the key supporting points in a few sentences. It excludes examples, statistics, and tangents.
- ASVAB tip:** The correct summary covers the WHOLE passage, not one paragraph. If it leaves out a major section, it is wrong.
- Example:** A good summary of a passage about two voting systems covers both systems and their trade-offs.
-

93 Paraphrase

- Key facts:** Paraphrasing is restating the same idea in different words without changing the meaning. Answer choices that repeat the passage's phrasing are often decoys.
- ASVAB tip:** If two choices look similar, the one that keeps the meaning but changes the words is the paraphrase.
- Example:** Passage: 'The device runs on solar power.' Paraphrase: 'The gadget is powered by the sun.'
-

94 Identifying Assumptions

- Key facts:** An assumption is an unstated belief the author relies on. Assumption questions ask what must be true for the argument to hold.
- ASVAB tip:** *Ask: what is the author taking for granted? The answer is something the argument needs but never says.*
- Example:** Arguing that the new bus route 'will cut commute times' assumes the buses run on schedule and at capacity.
-

95 Bias Detection

- Key facts:** Bias is a one-sided perspective: loaded language, only one side of the evidence, or overgeneralization. A biased passage can still contain true facts.
- ASVAB tip:** *Loaded words (disaster, obviously, clearly) and missing counter-evidence are the classic bias signals.*
- Example:** Calling a policy 'a disaster' with no opposing view is biased - even if some facts are accurate.
-

96 Reading for Detail vs Gist

- Key facts:** Some questions test a precise detail; others test the overall gist. For detail questions, slow down and locate the exact sentence. For gist questions, use the first/last sentences and the topic.
- ASVAB tip:** *Identify the question type before hunting. Detail = locate; gist = synthesize. Mixing them up is the #1 error.*
- Example:** A question asking for the year a law took effect is a detail question - go find the year.
-

SECTION 5: MATHEMATICS KNOWLEDGE (MK)

15 scored questions / 31 minutes (CAT). High-school math: algebra, geometry, number properties, and data. No calculator on MK for the paper forms; on the CAT a calculator is provided.

97 Order of Operations

Key facts: Parentheses → Exponents → Multiplication/Division (left to right) → Addition/Subtraction (left to right).

ASVAB tip: Work left to right within equal-priority operations. $8 / 4 \times 2 = 4$, not 1.

Example: $2 + 3 \times 4^2 = 2 + 3 \times 16 = 2 + 48 = 50$.

98 Exponent Rules

Key facts: $x^a \times x^b = x^{(a+b)}$; $x^a / x^b = x^{(a-b)}$; $(x^a)^b = x^{(a \times b)}$; $x^0 = 1$; $x^{-a} = 1/x^a$.

ASVAB tip: Add exponents when multiplying same bases; subtract when dividing. Zero exponent = 1 (for x not 0).

Example: $x^3 \times x^5 = x^8$. $(x^2)^3 = x^6$. $5^0 = 1$.

99 Square Roots

Key facts: The square root of N is the number that squares to N . $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$; $\sqrt{a/b} = \sqrt{a}/\sqrt{b}$.

ASVAB tip: Perfect squares (1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144) are the ones MK expects cold.

Example: $\sqrt{144} = 12$. $\sqrt{50} = \sqrt{25 \times 2} = 5 \times \sqrt{2}$.

100 Prime Numbers

Key facts: A prime has exactly two factors: 1 and itself. The first primes: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29. 1 is not prime; 2 is the only even prime.

ASVAB tip: When reducing fractions or finding GCF/LCM, factor into primes first.

Example: Prime factorization of $60 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3 \times 5$.

101 Greatest Common Factor (GCF)

Key facts: The GCF is the largest factor shared by two numbers. Find it by prime factorizing and taking the common factors at the lowest exponent.

ASVAB tip: GCF is used to reduce fractions and factor expressions.

Example: GCF of 24 ($2^3 \times 3$) and 36 ($2^2 \times 3^2$) = $2^2 \times 3 = 12$.

102 Least Common Multiple (LCM)

Key facts: The LCM is the smallest number that both divide into evenly. Prime factorize and take each prime at its highest exponent.

ASVAB tip: LCM is used to find common denominators and for repeating events.

Example: LCM of 4 (2^2) and 6 (2×3) = $2^2 \times 3 = 12$.

103 Fractions: Equivalent & Simplify

Key facts: Multiply or divide the top and bottom by the same number to make equivalent fractions. Simplify by dividing by the GCF.

ASVAB tip: On MK, simplify answers unless a decimal is requested.

Example: $6/8 = 3/4$ (divide by 2). $2/3 = 4/6 = 8/12$.

104 Mixed Numbers & Improper Fractions

Key facts: An improper fraction has a numerator larger than the denominator ($7/4$). A mixed number shows whole + fraction ($1 \frac{3}{4}$). Convert: multiply the whole by the denominator and add the numerator.

ASVAB tip: Convert to improper before multiplying or dividing; convert back to mixed for a clean final answer.

Example: $1 \frac{3}{4} = (1 \times 4 + 3)/4 = 7/4$. $9/2 = 4 \frac{1}{2}$.

105 Decimals to Fractions

Key facts: A decimal is a fraction with a power-of-10 denominator: $0.35 = 35/100 = 7/20$. Repeating decimals need a pattern: $0.333... = 1/3$.

ASVAB tip: *Know $0.5 = 1/2$, $0.25 = 1/4$, $0.75 = 3/4$, $0.125 = 1/8$ - the ASVAB favorites.*

Example: $0.6 = 6/10 = 3/5$. $0.375 = 375/1000 = 3/8$.

106 Solving Linear Equations

Key facts: To solve for x, do the same operation to both sides until x is alone. Undo addition/subtraction first, then multiplication/division.

ASVAB tip: *Check by plugging the answer back in. $3x + 7 = 22 \rightarrow x = 5$; $3(5) + 7 = 22$ checks out.*

Example: $2x - 9 = 15 \rightarrow 2x = 24 \rightarrow x = 12$.

107 Inequalities

Key facts: Solve like equations, but flip the inequality sign when you multiply or divide by a negative number.

ASVAB tip: *The flip on negative multiplication/division is the classic trap.*

Example: $-2x > 8 \rightarrow x < -4$ (sign flipped).

108 Systems of Equations

Key facts: Two equations, two unknowns. Solve by substitution (replace one variable) or elimination (add/subtract to cancel a variable).

ASVAB tip: *Elimination is often fastest when coefficients match; substitution when one equation is already solved for a variable.*

Example: $x + y = 10$ and $x - y = 4$: adding gives $2x = 14 \rightarrow x = 7$, $y = 3$.

109 Slope of a Line

Key facts: Slope = rise/run = $(y_2 - y_1)/(x_2 - x_1)$. Positive slope rises left to right; negative falls. A horizontal line has slope 0; a vertical line has undefined slope.

ASVAB tip: *Memorize the slope formula and the 'rise over run' picture; slope questions are frequent on MK.*

Example: Line through (1, 2) and (4, 8): slope = $(8 - 2)/(4 - 1) = 6/3 = 2$.

110 Linear Equations: $y = mx + b$

Key facts: $y = mx + b$ is slope-intercept form: m is the slope, b is the y-intercept (where the line crosses the y-axis).

ASVAB tip: *To graph or interpret a line, get it into $y = mx + b$ first.*

Example: $y = 2x + 3$ has slope 2 and crosses the y-axis at (0, 3).

111 Angles

Key facts: A straight line = 180 degrees. Vertical angles are equal. Adjacent angles on a line are supplementary (sum 180). Parallel lines cut by a transversal create equal corresponding and alternate interior angles.

ASVAB tip: *Angles on a straight line add to 180; angles in a triangle add to 180; around a point add to 360.*

Example: If two angles on a line are 70 and x, then $x = 110$.

112 Triangles

Key facts: Triangle angles sum to 180. Area = $1/2 \times \text{base} \times \text{height}$. Right triangles follow the Pythagorean theorem: $a^2 + b^2 = c^2$.

ASVAB tip: *Common right-triangle triples: 3-4-5, 5-12-13, 8-15-17, and multiples. Spot them to skip the math.*

Example: A right triangle with legs 6 and 8 has hypotenuse 10 (6-8-10 is a 3-4-5 multiple).

113 Quadrilaterals & Area

Key facts: Rectangle area = length x width, perimeter = $2(l + w)$. Square area = side^2 . Parallelogram area = base x height. Trapezoid area = $(b_1 + b_2)/2 \times \text{height}$.

ASVAB tip: *Height is perpendicular to the base - never the slanted side.*

Example: A parallelogram with base 10 and height 4 has area 40 (even if its sides are 6).

114 Circles

- Key facts:** Area = $\pi \times r^2$. Circumference = $2 \times \pi \times r = \pi \times \text{diameter}$. A diameter is twice the radius. π is about 3.14 (use 22/7 or 3.14 as directed).
- ASVAB tip:** *If a question gives the diameter, halve it to get the radius before using area/circumference formulas.*
- Example:** A circle with radius 5 has area $25 \times \pi$ and circumference $10 \times \pi$.

115 Volume

- Key facts:** Rectangular prism volume = length $\times$ width $\times$ height. Cylinder volume = $\pi \times r^2 \times \text{height}$. Units are cubic.
- ASVAB tip:** *Volume questions want the space-filling measure; pick the 3D formula, not area.*
- Example:** A cylinder with radius 3 and height 10 has volume $\pi \times 9 \times 10 = 90 \times \pi$.

116 Mean, Median, Mode, Range

- Key facts:** Mean = sum/count. Median = middle of sorted data. Mode = most frequent. Range = max - min.
- ASVAB tip:** *Sort first for median. With an even count, median = average of the two middle values.*
- Example:** For 3, 5, 8, 8, 11: mean 7, median 8, mode 8, range 8.

117 Probability Basics

- Key facts:** $P(\text{event}) = \text{favorable}/\text{total}$. For two independent events, multiply probabilities. 'Or' (mutually exclusive) adds; 'and' multiplies.
- ASVAB tip:** *'At least one' problems: $1 - P(\text{none})$.*
- Example:** Rolling a 3 on one die: 1/6. Rolling two 3s: $1/6 \times 1/6 = 1/36$.

118 Scientific Notation

- Key facts:** A number written as $N \times 10^k$ with $1 \leq N < 10$. Positive exponent = large number; negative = small. Move the decimal to place N, count moves (left = +, right = -).
- ASVAB tip:** $4,500,000 = 4.5 \times 10^6$ (decimal moved 6 left). $0.00032 = 3.2 \times 10^{-4}$ (moved 4 right).
- Example:** Write 2,000,000 in scientific notation: 2×10^6 .

119 Absolute Value

- Key facts:** $|x|$ is the distance from zero, always non-negative. $|3| = 3$ and $|-3| = 3$. Equations like $|x| = 5$ mean $x = 5$ or $x = -5$.
- ASVAB tip:** *Absolute value equals a positive number $\rightarrow$ two solutions.*
- Example:** Solve $|x - 2| = 7$: $x - 2 = 7 \rightarrow x = 9$, or $x - 2 = -7 \rightarrow x = -5$.

120 Ratios & Rates

- Key facts:** A rate is a ratio with units (miles per hour). Simplify rates by dividing both numbers by the common factor, like reducing a fraction.
- ASVAB tip:** *For unit rate (per one), divide the numerator by the denominator.*
- Example:** 120 miles in 2 hours = 60 miles per hour.

121 Percent & Decimals Review

- Key facts:** Percent = parts per hundred. To find what percent A is of B: $(A/B) \times 100$. Percent as decimal: move the decimal two left.
- ASVAB tip:** *Percent of change = $\text{change}/\text{original} \times 100$. 'Percent more than' compares to the ORIGINAL.*
- Example:** 12 is what percent of 80? $12/80 \times 100 = 15\%$.

122 Geometry: Composite Figures

- Key facts:** Find the area of an odd shape by splitting it into rectangles, triangles, and circles, computing each, then adding (or subtracting empty regions).
- ASVAB tip:** *Draw the split. Label every dimension before computing.*
- Example:** An L-shaped room is a 10×10 square plus a 4×6 rectangle: $100 + 24 = 124$ sq ft.

SECTION 6: ELECTRONICS INFORMATION (EI)

15 scored questions / 10 minutes (CAT). Basic electricity and electronics: what components do, how circuits behave, and safety. No advanced circuit math needed.

123 Voltage

- Key facts:** Voltage (V) is electrical pressure - the push that moves charge. It is measured in volts. Think of it as the 'water pressure' of a circuit.
- ASVAB tip:** Higher voltage = more push. Household US outlets are about 120 V.
- Example:** A 9-volt battery has more push than a 1.5-volt cell.

124 Current

- Key facts:** Current (I) is the flow of electric charge through a circuit, measured in amperes (amps). It is the 'flow rate' of electricity.
- ASVAB tip:** Current is what actually flows; voltage is what pushes it.
- Example:** A lamp draws about 0.5 amps at 120 volts.

125 Resistance

- Key facts:** Resistance (R) opposes current flow, measured in ohms. Wires have low resistance; resistors, filaments, and insulators have high resistance.
- ASVAB tip:** Higher resistance = less current for the same voltage.
- Example:** A thin wire has more resistance than a thick wire of the same material.

126 Ohm's Law

- Key facts:** Voltage = Current x Resistance ($V = I \times R$). Rearranged: $I = V/R$ and $R = V/I$.
- ASVAB tip:** The ASVAB tests the relationship more than the arithmetic: double the resistance, halve the current at fixed voltage.
- Example:** A 12 V circuit with 4 ohms draws $I = 12/4 = 3$ amps.

127 Series Circuits

- Key facts:** In a series circuit, components are one after another on a single path. The same current flows through all; resistances add; if one part opens, the whole circuit stops.
- ASVAB tip:** Series = one path, same current everywhere, total $R = R1 + R2$.
- Example:** Two 3-ohm resistors in series total 6 ohms; current is identical through both.

128 Parallel Circuits

- Key facts:** In a parallel circuit, components are on separate branches. Each branch gets full voltage; currents add; total resistance is less than the smallest branch.
- ASVAB tip:** Parallel = multiple paths. If one branch opens, the others keep working (like house wiring).
- Example:** Two 10-ohm branches in parallel give about 5 ohms total.

129 Electric Power

- Key facts:** Power (watts) = Voltage x Current ($P = V \times I$). A 60 W bulb at 120 V draws 0.5 A.
- ASVAB tip:** Power questions on EI are usually $P = V \times I$. Know the three-unit triangle: P, V, I.
- Example:** A 1200 W heater at 120 V draws 10 amps.

130 AC vs DC

- Key facts:** Direct current (DC) flows one way (batteries). Alternating current (AC) reverses direction periodically (wall outlets, generators).
- ASVAB tip:** Batteries = DC; wall outlets = AC. That pairing is the standard EI question.
- Example:** A phone battery delivers DC; the outlet that charges it supplies AC that is converted.

131 Conductors & Insulators

- Key facts:** Conductors (copper, aluminum, silver) let current flow easily. Insulators (rubber, glass, plastic, ceramic) block current.
- ASVAB tip:** *Metals conduct; nonmetals like rubber and glass insulate. Wire coatings are insulators for safety.*
- Example:** Extension cords use copper wire inside a rubber (insulating) jacket.
-

132 Switches

- Key facts:** A switch opens or closes a circuit. Open = no current (off); closed = current flows (on).
- ASVAB tip:** *'Open' means broken path, regardless of the word's everyday meaning.*
- Example:** When you flip a light switch off, the circuit is open and current stops.
-

133 Fuses & Circuit Breakers

- Key facts:** Safety devices that stop excess current. A fuse melts (blows); a breaker trips and can be reset. Both protect wires from overheating.
- ASVAB tip:** *Fuse = one-time sacrificial; breaker = reusable. Both respond to too much current.*
- Example:** A blown fuse indicates an overload or short in the circuit - fix the cause before replacing.
-

134 Batteries

- Key facts:** Batteries store chemical energy and release it as DC. Cells in series add voltage; cells in parallel add capacity (amp-hours).
- ASVAB tip:** *Series = more voltage ($2 \times 1.5 \text{ V} = 3 \text{ V}$); parallel = more runtime at the same voltage.*
- Example:** Two 1.5 V cells in series produce 3 V.
-

135 Resistors & Color Bands

- Key facts:** Resistors limit current. Their value is coded with colored bands; the color code maps digits (black 0, brown 1, red 2, orange 3, yellow 4, green 5, blue 6, violet 7, gray 8, white 9).
- ASVAB tip:** *You won't decode bands on EI, but know a resistor's job: limit current and set voltage drops.*
- Example:** A resistor in series with an LED keeps the current low enough to protect it.
-

136 Capacitors

- Key facts:** Capacitors store electrical energy in an electric field and release it quickly. They block DC and pass AC (once charged), smooth power supplies, and store charge.
- ASVAB tip:** *Capacitor = temporary charge storage; opposes voltage changes; used in filters and timing.*
- Example:** A camera flash charges a capacitor slowly, then releases it fast for the bright burst.
-

137 Diodes

- Key facts:** A diode lets current flow in one direction only and blocks it in the other. It acts as an electronic one-way valve; LEDs are light-emitting diodes.
- ASVAB tip:** *One-way valve is the whole story. Diode orientation matters.*
- Example:** An LED lights only when connected the correct way (anode to positive).
-

138 Transistors

- Key facts:** Transistors are semiconductor switches/amplifiers. A small current or voltage at the base controls a larger current between collector and emitter.
- ASVAB tip:** *Transistor = electronic switch or amplifier - the building block of modern electronics.*
- Example:** In a radio, a transistor amplifies the tiny antenna signal to drive the speaker.
-

139 Transformers

- Key facts:** Transformers change AC voltage levels using two coils and a shared core. Step-up raises voltage (lowers current); step-down lowers voltage (raises current). They only work with AC.
- ASVAB tip:** *Transformers need AC (changing field). Step-up = more volts, fewer amps (roughly, power stays the same).*
- Example:** The big gray cylinder on a utility pole steps thousands of volts down for home use.
-

140 Motors & Generators

- Key facts:** A motor converts electrical energy into mechanical motion; a generator does the reverse (mechanical into electrical). Both rely on magnetic fields and moving coils.
- ASVAB tip:** *Motor = electricity in, motion out. Generator = motion in, electricity out.*
- Example:** A fan is a motor; a hand-crank flashlight contains a generator.
-

141 Electromagnets

- Key facts:** An electromagnet is a coil of wire around an iron core that becomes magnetic when current flows. It can be turned on and off and its strength changed.
- ASVAB tip:** *More turns or more current = stronger magnet. Electromagnets power relays, cranes, and doorbells.*
- Example:** A scrapyard crane electromagnet lifts cars only while current flows.
-

142 Relays & Solenoids

- Key facts:** A relay is an electrically operated switch: a small coil current moves an armature to switch a larger circuit. A solenoid is a coil that moves a metal plunger (a linear actuator).
- ASVAB tip:** *Relay = switch controlled by another circuit; solenoid = linear push/pull from a coil.*
- Example:** A car starter solenoid lets the key's small current switch the huge starting current.
-

143 Schematic Symbols

- Key facts:** Circuit diagrams use standard symbols: a battery (long/short lines), resistor (zigzag), bulb (circle with X), switch (breakable line), capacitor (two parallel lines).
- ASVAB tip:** *Learn the five most common symbols: battery, resistor, bulb, switch, capacitor.*
- Example:** In a schematic, a zigzag line between two nodes is a resistor.
-

144 Ground & Short Circuit

- Key facts:** Ground is the reference zero-volt point and a safety return path. A short circuit is an unintended low-resistance path that lets excess current flow - dangerous and a common fuse-blowing cause.
- ASVAB tip:** *Ground = zero reference + safety; short = bad path, too much current.*
- Example:** Worn insulation letting a hot wire touch the metal chassis creates a short that trips the breaker.
-

SECTION 7: SHOP INFORMATION (SI)

10 scored questions / 6 minutes (CAT; reported with AI as the AS score). Tool identification and shop practices. Learn what each tool is FOR and the safety rule with it.

145 Hammer

- Key facts:** A hammer delivers striking force: driving nails (claw hammer), shaping metal (ball-peen), or demolition (sledgehammer).
- ASVAB tip:** Match the hammer to the job: claw = nails, sledge = heavy impact, ball-peen = metalwork.
- Example:** A claw hammer drives a nail and its claw pulls it back out.

146 Screwdriver

- Key facts:** Turns screws. Flat-head (slotted) for simple slots; Phillips for the cross-shaped head. Using the wrong size damages the screw.
- ASVAB tip:** Match tip shape to screw head: flat vs Phillips. Use the correct size to avoid cam-out.
- Example:** A Phillips screwdriver fits the cross-head screws on most electronics.

147 Adjustable Wrench

- Key facts:** A wrench with a movable jaw that can be set to fit different nut/bolt sizes. It grips flat sides of fasteners.
- ASVAB tip:** Wrenches turn fasteners; pliers grip. Pull toward the fixed jaw for the best grip.
- Example:** Turn a 13 mm bolt with an adjustable wrench set to 13 mm.

148 Pliers

- Key facts:** Gripping and cutting hand tools: slip-joint (grip), needle-nose (reach tight spots), lineman's (cut and grip wire), locking (vise-grip, clamp).
- ASVAB tip:** Needle-nose = tight spaces; lineman's = wire work; locking = clamp.
- Example:** A needle-nose pliers reaches a nut inside a tight bracket.

149 Tape Measure

- Key facts:** A flexible steel ruler for measuring length, marked in inches/feet or metric. The hook at the end accounts for its own thickness.
- ASVAB tip:** Read the smallest markings: 1/16-inch marks on most tapes. Know 12 inches = 1 foot.
- Example:** A piece of lumber measures 4 feet 6 inches = 54 inches.

150 Level

- Key facts:** A tool with a bubble vial that shows whether a surface is perfectly horizontal (level) or vertical (plumb).
- ASVAB tip:** Level = horizontal; plumb = vertical. The bubble sits centered when correct.
- Example:** A carpenter checks the bubble before hanging a shelf.

151 Square (Combination / Framing)

- Key facts:** A square checks and marks 90-degree angles. A framing square (steel L) marks rafters and framing; a combination square slides for depth and 45-degree marks.
- ASVAB tip:** Square = 90-degree accuracy. Framing = big carpentry; combination = layout and measuring.
- Example:** A combination square is set to mark a straight cut across a board.

152 Chisel

- Key facts:** A flat-edged cutting tool struck with a mallet or pushed by hand to carve wood, stone, or metal. Wood chisels have beveled edges.
- ASVAB tip:** Chisels cut and shape; never use a chisel as a pry bar or screwdriver.
- Example:** A wood chisel cleans out a mortise for a hinge.

153 File

- Key facts:** A hardened steel tool with abrasive teeth for smoothing or shaping metal (and some wood). Cross-file, round file, flat file by shape.
- ASVAB tip:** *Files cut on the push stroke. Choose shape to match the surface (round file for holes).*
- Example:** A flat file deburrs the edge of a cut metal bracket.
-

154 Hacksaw

- Key facts:** A fine-toothed saw with a removable blade for cutting metal (also plastic). Select fine teeth for thin metal, coarse for thick.
- ASVAB tip:** *Hacksaw = metal. Use firm, even strokes and proper tension.*
- Example:** A hacksaw cuts a stuck bolt or steel pipe.
-

155 Circular Saw

- Key facts:** A handheld power saw with a rotating blade for ripping and cross-cutting wood (and other sheet materials). Blade size and tooth count match the material.
- ASVAB tip:** *Circular = handheld power saw. Keep the blade guard working and cut with the good face down.*
- Example:** A circular saw with a framing blade rips plywood sheets.
-

156 Drill & Drill Bits

- Key facts:** A drill rotates a bit to make holes. Twist bits cut wood/metal/plastic; spade and hole-saw bits make larger holes; masonry bits drill concrete.
- ASVAB tip:** *Drill = round holes. Use the bit matched to the material; pilot holes prevent splitting.*
- Example:** A 1/4-inch twist bit drills the pilot hole for a screw.
-

157 Sandpaper & Sanding Blocks

- Key facts:** Abrasive paper graded by grit: coarse (40-80) removes material fast, fine (150-220+) smooths for finish. Lower number = coarser.
- ASVAB tip:** *Low grit = rough/fast; high grit = smooth/fine. Sand in stages from coarse to fine.*
- Example:** Start with 80 grit to remove paint, finish with 220 grit before staining.
-

158 C-clamp & Vise

- Key facts:** Work-holding tools. A C-clamp clamps pieces to a table; a bench vise holds work firmly in the jaws for sawing, filing, or drilling.
- ASVAB tip:** *Clamps and vises hold the work so both hands are free - a core shop safety practice.*
- Example:** A bench vise holds a pipe while you cut it with a hacksaw.
-

159 Fasteners: Nails & Screws

- Key facts:** Nails are driven (shear strength, quick); screws are twisted in (pull-out strength, removable). Screw sizes/threads match material (wood vs machine screws).
- ASVAB tip:** *Screws hold better against pulling out; nails are faster and cheaper. Choose by the load direction.*
- Example:** Deck boards are screwed (pulling force, removable); framing is often nailed (shear).
-

160 Bolts, Nuts & Washers

- Key facts:** A bolt is a threaded fastener turned with a wrench (vs a screw, turned by its head). Nuts thread onto bolts; washers spread load and prevent loosening.
- ASVAB tip:** *Bolt + nut = clamped joint; washers protect the surface and distribute force.*
- Example:** A 1/2-inch bolt through a bracket is secured with a nut and a flat washer.
-

161

Machinist's Tools: Caliper & Micrometer

Key facts:	Precision measuring tools. Calipers measure inside/outside/depth to about 0.001 inch; micrometers measure thickness/diameter to 0.0001 inch.
ASVAB tip:	<i>Micrometer = the finer measurement. Read the graduated sleeve and thimble markings.</i>
Example:	A micrometer measures a shaft's diameter to the ten-thousandth of an inch.

162

Shop Safety Basics

Key facts:	Wear eye protection, keep guards in place, disconnect power before adjusting, clamp work securely, and keep hands clear of moving blades.
ASVAB tip:	<i>Every tool question has a safety angle: the safe choice is the answer.</i>
Example:	Before changing a circular saw blade, unplug the saw.

SECTION 8: MECHANICAL COMPREHENSION (MC)

15 scored questions / 22 minutes (CAT). Simple machines, forces, and motion, explained in words and simple diagrams. Know the trade-off each machine trades: force for distance.

163 Work

- Key facts:** Work = force x distance, in the direction of the force. If an object does not move, no work is done (even if you push hard).
- ASVAB tip:** No movement = no work, no matter how hard you push.
- Example:** Lifting a 20 lb box 3 ft does 60 ft-lb of work; holding it does none.
-

164 Force & Friction

- Key facts:** A force is a push or pull. Friction opposes motion between surfaces; it is why moving things slow down and why brakes work.
- ASVAB tip:** Friction always opposes the motion. More friction = harder to slide = more grip.
- Example:** Brakes use friction between pads and rotors to slow the wheels.
-

165 Simple Machines

- Key facts:** Simple machines change the size or direction of a force: lever, pulley, wheel and axle, inclined plane, wedge, screw. They trade input distance for force (mechanical advantage).
- ASVAB tip:** The payoff: you apply a smaller force over a longer distance to move a bigger load a shorter distance.
- Example:** A ramp lets you push a barrel up with less force than lifting it straight.
-

166 Levers

- Key facts:** A lever is a rigid bar on a fulcrum. First class: fulcrum in the middle (see-saw). Second class: load in the middle (wheelbarrow). Third class: effort in the middle (tweezers, broom).
- ASVAB tip:** Class = where the fulcrum/load/effort sit. Second class always gives a mechanical advantage; third class trades force for speed/range.
- Example:** A wheelbarrow is a second-class lever: the wheel is the fulcrum, the load sits between it and your hands.
-

167 Pulleys

- Key facts:** A fixed pulley changes direction (pull down to lift up), no force advantage. A movable pulley halves the required force. Multiple pulleys (block and tackle) multiply the advantage.
- ASVAB tip:** Count supporting rope segments: more segments = less force needed, but you pull more rope.
- Example:** A double pulley system lets one person lift with about half the force.
-

168 Gears

- Key facts:** Gears transfer rotation between shafts and change speed and torque. A small gear driving a large gear reduces speed and increases torque; a large driving a small does the reverse.
- ASVAB tip:** Small-to-large = more torque, slower. Large-to-small = faster, less torque. Meshed gears turn in opposite directions.
- Example:** Bicycle low gear (small front, large rear) makes pedaling easier on hills.
-

169 Inclined Plane

- Key facts:** A slanted surface (ramp). The gentler the slope, the less force needed to move a load up it, but the longer the distance traveled.
- ASVAB tip:** Less slope = less force, more distance. The product (force x distance) stays about the same.
- Example:** A long shallow ramp needs less push than a short steep one for the same height.
-

170 Wedge

- Key facts:** A wedge is two inclined planes back to back (an axe, a chisel, a doorstop). It converts a downward force into sideways splitting force.
- ASVAB tip:** *Thin wedge + force = splitting. The sharper the wedge, the less force needed.*
- Example:** An axe blade is a wedge that splits wood as it is driven in.
-

171 Screw

- Key facts:** A screw is an inclined plane wrapped around a cylinder. The finer the threads, the more mechanical advantage (less force per turn, more turns).
- ASVAB tip:** *Fine threads = easier turning, more turns per inch; course threads = faster, harder.*
- Example:** A screw with fine threads holds more firmly and needs less turning force.
-

172 Wheel & Axle

- Key facts:** A wheel turning on an axle is a rotating lever. A large wheel with a small axle gives a force advantage (steering wheel); a small wheel with a large axle gives speed (bicycle)
- ASVAB tip:** *Steering wheel = force advantage (big wheel, small axle).*
- Example:** A ship's wheel turns the rudder with great force using a small axle.
-

173 Mechanical Advantage

- Key facts:** Mechanical advantage = output force / input force = input distance / output distance. Machines trade distance for force so the work stays roughly equal.
- ASVAB tip:** *If you push a ramp 10 ft to raise a load 2 ft, the force saving is about 5x.*
- Example:** A pulley system that needs you to pull 6 ft of rope to lift 1 ft gives about 6:1 advantage.
-

174 Pressure

- Key facts:** Pressure = force / area. The same force on a smaller area produces much higher pressure (stiletto heel vs boot).
- ASVAB tip:** *Small area = high pressure. This underlies hydraulics and why blades must be sharp.*
- Example:** A 100 lb force on a 1 sq in point = 100 psi; on 10 sq in = only 10 psi.
-

175 Hydraulics

- Key facts:** Hydraulic systems use an incompressible fluid (oil) to transmit pressure. A small piston force becomes a large piston force because pressure is equal and force = pressure x area.
- ASVAB tip:** *Small piston in, big piston out = force multiplication. Same principle as a car's brake system.*
- Example:** A hydraulic jack lifts a car: a small force on the small piston lifts the heavy car on the large piston.
-

176 Buoyancy

- Key facts:** An object floats when its weight equals the weight of the fluid it displaces (Archimedes). Dense objects sink; hollow or less-dense objects float.
- ASVAB tip:** *It is about density and displacement, not size. Steel sinks but a steel ship floats because its hull displaces a huge water weight.*
- Example:** A loaded ship sits lower in the water because it must displace more water to match its greater weight.
-

177 Gravity & Weight

- Key facts:** Gravity pulls objects toward Earth with a force proportional to mass (weight = mass x gravity). All falling objects accelerate the same in a vacuum.
- ASVAB tip:** *Weight is a force; mass is the amount of matter. On the Moon, the same mass weighs less.*
- Example:** A 60 kg person weighs about 132 lb on Earth but only about 22 lb on the Moon.
-

178 Momentum

- Key facts:** Momentum = mass x velocity. Heavier or faster objects carry more momentum and are harder to stop. Momentum is conserved in collisions.
- ASVAB tip:** *Mass and speed both add to momentum - a slow truck can beat a fast bicycle.*
- Example:** A loaded truck at 30 mph has far more momentum than a bicycle at 30 mph.
-

179 Torque

- Key facts:** Torque is rotational force: force x lever-arm distance from the pivot. A longer wrench gives more torque for the same push.
- ASVAB tip:** *Longer handle = more turning force. This is why breaker bars exist.*
- Example:** A 2-foot wrench with 50 lb of push gives 100 ft-lb of torque; a 1-foot wrench gives only 50.
-

180 Tension & Compression

- Key facts:** Tension pulls/stretches a material (ropes, cables). Compression pushes/squeezes it (columns, springs). Structures fail when either exceeds the material's strength.
- ASVAB tip:** *Ropes = tension; columns = compression. Cables are weak in compression, strong in tension.*
- Example:** A suspension bridge cable holds the deck in tension; the concrete pylons stand in compression.
-

181 Springs & Elasticity

- Key facts:** Springs store and release energy. Hooke's law: force = spring constant x stretch. Doubling the stretch doubles the force (within the spring's limit).
- ASVAB tip:** *Spring force grows with how far it is stretched or compressed - not with its length.*
- Example:** A spring stretched 2 inches exerts twice the force of when stretched 1 inch.
-

182 Balance & Center of Mass

- Key facts:** An object balances when its center of mass is over the support point. A low, wide base is stable; a high, narrow one tips easily.
- ASVAB tip:** *Lower the center of mass and widen the base to improve stability.*
- Example:** A loaded cargo ship is stable because heavy cargo lowers its center of mass.
-

183 Velocity vs Speed

- Key facts:** Speed is how fast (distance/time). Velocity is speed with a direction. Acceleration is a change in velocity (speed or direction).
- ASVAB tip:** *Turning at constant speed is still acceleration because direction changes.*
- Example:** A car rounding a curve at 40 mph is accelerating (changing direction) even though its speed is constant.
-

184 Fulcrum Position

- Key facts:** The fulcrum's position changes the lever's advantage. Fulcrum close to the load = big force advantage (heavy pry). Fulcrum in the middle = balanced see-saw.
- ASVAB tip:** *Move the fulcrum toward the load to multiply force; toward the effort to multiply speed.*
- Example:** A pry bar with the fulcrum right at the nail gives maximum lifting force.
-

SECTION 9: AUTO & SHOP INFORMATION (AS)

10 Auto + 10 Shop scored questions (CAT, reported together as AS). Car systems and their jobs plus shop tools/practices. 'What part does what' is the core of AS.

185 Four-Stroke Engine Cycle

- Key facts:** A gasoline engine runs on four strokes: intake (fuel-air in), compression (piston squeezes), power (spark ignites, pushes piston), exhaust (gases out).
- ASVAB tip:** Memorize the order: intake, compression, power, exhaust. Spark happens at the end of compression.
- Example:** During the power stroke, burning fuel expands and drives the piston down.
-

186 Cylinder & Piston

- Key facts:** The cylinder is the engine's chamber; the piston slides inside it. The piston's up-down motion is converted to rotation by the connecting rod and crankshaft.
- ASVAB tip:** Piston moves linearly; crankshaft turns it into rotation.
- Example:** Each cylinder's piston is connected to the crankshaft by a connecting rod.
-

187 Spark Plug

- Key facts:** The spark plug ignites the compressed air-fuel mixture at the right moment (end of compression) in a gasoline engine. Diesel engines have no spark plugs - they ignite by compression.
- ASVAB tip:** Gasoline = spark ignition; diesel = compression ignition.
- Example:** A worn spark plug causes misfires and rough idle.
-

188 Fuel System

- Key facts:** The fuel system stores, filters, and delivers fuel to the engine: tank, pump, filter, injectors (or carburetor on older engines). Modern engines use fuel injection.
- ASVAB tip:** Injectors spray fuel; the pump moves it; the filter protects injectors.
- Example:** A clogged fuel filter starves the engine and causes hesitation under load.
-

189 Cooling System

- Key facts:** The cooling system removes engine heat: radiator, water pump, thermostat, coolant, hoses, and fan. The thermostat keeps the engine at operating temperature.
- ASVAB tip:** Coolant circulates between engine and radiator; the thermostat regulates flow.
- Example:** A stuck-closed thermostat causes overheating; a stuck-open one prevents reaching operating temperature.
-

190 Lubrication System

- Key facts:** The lubrication system reduces friction: oil pan, oil pump, oil filter, and passages. Oil pressure keeps moving parts coated and carries away heat and debris.
- ASVAB tip:** The oil pump creates pressure; the filter removes contaminants; low oil = rapid wear.
- Example:** The low-oil-pressure warning means stop the engine immediately.
-

191 Battery

- Key facts:** The battery stores electrical energy (DC) to crank the starter and power electronics when the engine is off. It is rated in volts (12 V) and cold-cranking amps.
- ASVAB tip:** 12 V nominal; CCA measures starting power in cold weather.
- Example:** A weak battery struggles to crank on a cold morning.
-

192 Alternator

- Key facts:** The alternator generates AC and converts it to DC to recharge the battery and power the electrical system while the engine runs.
- ASVAB tip:** *Alternator = charging while running. If the battery dies while driving, check the charging system.*
- Example:** With the engine running, the alternator keeps the headlights bright and the battery charged.
-

193 Starter

- Key facts:** The starter motor cranks the engine to begin the cycle. It draws heavy current from the battery for a few seconds.
- ASVAB tip:** *Starter = cranks the engine. A clicking noise with no crank often means a weak battery or bad starter.*
- Example:** Turning the key energizes the starter solenoid, which connects battery power to the starter motor.
-

194 Transmission

- Key facts:** The transmission transfers engine power to the wheels and lets the engine run efficiently across speeds. Automatic shifts by itself; manual uses a clutch and gear lever.
- ASVAB tip:** *Transmission = torque and speed selection. The clutch connects/disconnects the engine from a manual gearbox.*
- Example:** In a manual, you press the clutch to disconnect power while shifting gears.
-

195 Brakes

- Key facts:** The brake system converts motion into heat: master cylinder, brake lines, calipers, pads, and rotors (disc) or drums and shoes (drum). Pressing the pedal applies hydraulic pressure.
- ASVAB tip:** *Hydraulic pressure pushes pads against rotors (disc brakes). Friction stops the wheels.*
- Example:** Squealing brakes often mean worn pads approaching the wear indicator.
-

196 Tires & Wheels

- Key facts:** Tires provide grip and cushioning. Air pressure affects handling, wear, and fuel economy. Tread channels water away; bald tires hydroplane.
- ASVAB tip:** *Check pressure monthly; uneven wear can signal alignment issues.*
- Example:** Underinflated tires wear the outer edges and reduce fuel economy.
-

197 Exhaust System

- Key facts:** The exhaust system removes combustion gases and reduces noise: exhaust manifold, catalytic converter, muffler, and tailpipe. The catalytic converter reduces emissions.
- ASVAB tip:** *Muffler quiets; catalytic converter cleans; leaks can enter the cabin.*
- Example:** A loud exhaust usually means a leak or failed muffler.
-

198 Suspension & Steering

- Key facts:** The suspension (springs, shock absorbers, struts, control arms) keeps tires on the road and smooths the ride. Steering (rack and pinion or recirculating ball) turns the wheels.
- ASVAB tip:** *Springs absorb bumps; shocks dampen the bounce. Steering converts wheel input to tire angle.*
- Example:** Worn shocks cause excessive bouncing after a bump.
-

199 Drive Belts & Timing System

- Key facts:** Serpentine belt drives accessories (alternator, water pump, power steering, AC). The timing belt/chain keeps the crankshaft and camshaft synchronized.
- ASVAB tip:** *Serpentine = accessories; timing belt = valve timing. A snapped timing belt can wreck the engine.*
- Example:** A squealing serpentine belt at startup often means a worn or loose belt.
-

200

Fluids Under the Hood

Key facts:

Key fluids: engine oil (lubrication), coolant (temperature), brake fluid (hydraulic pressure), transmission fluid (shifting), power-steering fluid, windshield washer fluid.

ASVAB tip:

Each fluid is checked differently and has its own reservoir/dipstick; don't mix or overfill.

Example:

Low brake fluid with a soft pedal means a leak - do not drive.

201

Maintenance & Diagnostics

Key facts:

Routine maintenance: oil and filter changes, tire rotation, fluid checks, battery testing, air-filter replacement, and scheduled services per the owner's manual.

ASVAB tip:

Follow the owner's manual schedule; a check-engine light needs a scan for codes.

Example:

A 5,000-mile oil change with a new filter keeps the engine healthy.

202

Buying & Owning Basics

Key facts:

Vehicle choice balances purchase price, fuel economy, insurance, maintenance, and reliability. Used vehicles need a pre-purchase inspection.

ASVAB tip:

Total cost of ownership matters more than the sticker price.

Example:

A car with great MPG but costly repairs may cost more per mile over time.

FINAL REVIEW: 48-HOUR RAPID REVIEW

The highest-yield items to drill in your final two days. If you only review 20 things, review these and the tip lines you marked in each section.

Verbal & Math (AFQT weight): percent change is relative to the ORIGINAL value; average uses sum/count; distance = rate x time; combined work rate = sum of the individual rates; order of operations runs left to right within equal precedence; a fraction answers keep-change-flip only on the second fraction; the median needs sorted data; $P(\text{event}) = \text{favorable}/\text{total}$. Vocabulary: if the answer choice means 'careful' it is matching prudent/meticulous; 'lessen' matches alleviate/mitigate; 'evidence' matches substantiate/corroborate; 'stubborn persistence' matches tenacious; 'bounce back' matches resilient. Paragraph comprehension: find the main idea in the first/last sentences; never pick an inference the passage does not support.

Science & Technical: mitochondria = energy, ribosomes = protein, nucleus = DNA; photosynthesis makes glucose and oxygen, respiration uses them; lower pH = more acidic (logarithmic); low pressure = cloudy/rainy; arteries away / veins back / capillaries exchange; most absorption is in the small intestine; vaccines build adaptive immunity. Electricity: $V = I \times R$; series = one path, resistances add; parallel = branches, voltage equal; batteries = DC, outlets = AC; fuse blows on overcurrent; transformers only work on AC. Mechanics: work = force x distance; levers - fulcrum/load/effort position defines the class; pulleys - count rope segments; pressure = force/area; hydraulic pressure is equal and force = pressure x area; longer wrench = more torque. Automotive: intake, compression, power, exhaust; spark plug fires gasoline engines; alternator charges while running; brakes use hydraulics and friction; battery is 12 V DC.

Shops: hammer drives, screwdriver turns screws, wrench turns nuts/bolts, pliers grip and cut, hacksaw cuts metal, level checks horizontal/plumb, square checks 90 degrees, micrometer measures precisely, clamps and vises hold work, and eye protection is non-negotiable. Auto & shop: each tool to its job, each car system to its function, and never skip the safety answer.

TEST-DAY STRATEGY

Format, pacing, and mindset for every ASVAB delivery version (CAT-ASVAB, PiCAT, MET).

- Answer EVERY question. There is no penalty for guessing. On the adaptive CAT, a blank is worse than a wrong answer because the computer uses unanswered items too.
- Know which version you are taking. The PiCAT is taken at home (no proctor) and is verified by a shorter confirmation test at MEPS - do not 'cheat' or rush the home test, because the confirmation test must match it.
- Time budget per subtest (CAT scored questions): GS 15/12 min, AR 15/55 min, WK 15/9 min, PC 10/27 min, MK 15/31 min, EI 15/10 min, AI 10/7 min, SI 10/6 min, MC 15/22 min, AO 15/18 min. Use the generous AR time for the word problems that feed the AFQT.
- The AFQT is built from AR, MK, WK, and PC. Give those four subtests your best effort - they are the enlistment gate.
- Sleep and eat normally before the test. Arrive early and bring the required ID and any paperwork your recruiter gave you.
- On test day, pace by skipping nothing: for each question, eliminate wrong choices, guess if needed, and move on. Stress management beats last-minute cramming.
- After the test, ask your recruiter to review your ASVAB scores and the composites for the jobs you want - your line/aptitude scores qualify you for specific MOS/ratings, so know the required composites for your target jobs.

Your Military Test Prep Toolkit

ASVAB Study Guide	\$29	This book -- 190+ concepts, all 9 subtests
Real Estate License Exam Prep	\$29	210 concepts, national content
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