What's on the TEST?

This will cover some basic information about what is on the AP Psychology Exam. Here are the most asked questions:

1. Format for the Exam –

   The exam is two hours long in total:
   - In Section I, students are given one hour & 10 minutes (70 minutes) to answer 100 multiple-choice questions with no penalty for incorrect answers;
   - In Section II, they must answer two free-response questions in 50 minutes.

<table>
<thead>
<tr>
<th>Section</th>
<th>% of Grade</th>
<th>Number of Questions</th>
<th>Time Allocated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section I</td>
<td>66 2/3</td>
<td>100</td>
<td>1 hour and 10 minutes</td>
</tr>
<tr>
<td>Section II</td>
<td>33 1/3</td>
<td>2 essays</td>
<td>50 minutes</td>
</tr>
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</table>

2. Percentage make-up from specific topics you studied:

   Exam Content

   The AP Psychology Exam, which debuted in 1992, is a relative newcomer among AP Exams. The exam tests knowledge of topics included in a one-semester introductory college course in psychology. The following table reflects the approximate percentage of the multiple-choice section of the exam devoted to each content area:

   - 2-4% history
   - 6-8% methods and approaches
   - 8-10% biological bases of behavior
   - 7-9% sensation and perception
   - 2-4% states of consciousness
   - 7-9% learning
   - 8-10% cognition
   - 7-9% motivation and emotion
   - 7-9% developmental psychology
   - 6-8% personality
   - 5-7% testing and individual differences
   - 7-9% abnormal psychology
   - 5-7% treatment of psychological disorders
   - 7-9% social psychology

   The free-response questions evaluate students' mastery of scientific research principles and their ability to make connections among constructs from different psychological domains. Students may be asked to analyze a general problem in psychology (e.g., depression, adaptation) using concepts from different theoretical frameworks or sub-domains in the field, or they may be asked to design, analyze, or critique a research study.
Hawthorne Effect = Showed that factory workers had improved work performance with both improved and poor lighting. Conclusion was that they improved simply because they were being observed in the experiment.

Roger Sperry = The first to propose “split-brain surgery” to help epileptic patients.

Jean Piaget = Proposed four stages of cognitive development. (Remember the acronym Socks Pulled Over Cold Feet to remember these in order.) Sensorimotor, Preoperational, Concrete, and Formal Stages.

Erik Erikson = Proposed eight stages of psychosocial development. (KNOW THESE!!)

Lawrence Kohlberg = Proposed three stages of MORAL development. (all framed around the word conventional.) This theory was criticized as it only tested young children by framing hypothetical situations for them and their responses to these. It did not test cross-culturally and between the genders.

Konrad Lorentz = Imprinting studies. Showed how baby animals would follow the first object they saw after birth. Believed to be a built-in survival mechanism.

Jerome Kagan = Studies to indicate that in-born temperament may explain many behaviors.

Harry Harlow = Showed importance of physical touch over nourishment in infant monkeys.

Mary Ainsworth = Secure infants have good bonds with mothers. Reverse is also true.

Elenor Gibson = The “visual cliff experiment”. Showed that depth perception cues are innate.

Hubel and Weisel = Studies with monkeys to show that they had specific FEATURE DEECTORS to aid them in visual processing. (Some for lines, bars, edges, shapes, etc.)

Ernest Hilgard = Studies showing that a hypnotic trance includes a “hidden observer’ suggesting that there is some subconscious control during hypnosis.

Ivan Pavlov = Famous for his classical conditioning experiments.

Robert Rescorla = Proposed that there is conscious connection between the CS and the DCS in classical conditioning experiments. (A smoker is aware that a nausea-producing drug will affect his behavior.)

John B. Watson = Famous for the controversial Little Albert classical conditioning experiment.
B.F. Skinner = Famous for me "Skinner Box to demonstrate operant conditioning in low level animals.

Albert Bandura = "Bo-Bo Doll" Experiment to demonstrate how children imitate anti-social behavior.

Wolfgang Kohler = Demonstrated the use of "insight" in apes when they used sticks to reach a banana that was out of reach.

Stanford-Binet = Modern IQ formula. MA divided by CA times 100.

David Wechsler = modern IQ tests with specialized subtests and use of factor analysis.

James and Lange = Physical before cognitive when appraising an emotional situation.

Cannon and Bard = Emotions and cognitive appraisal at the same time.

Schachter-Singer Experiment = Showed that emotions have both a physical and cognitive component.

Maslow and Rogers = The humanistic perspective and therapy approach.

Aaron Beck = Cognitive therapy approach.

Albert Ellis = Rational Emotive Therapy (RET as a form of cognitive therapy.)

Eysenck and Myers-Briggs = All did personality tests to validate the trait perspective.

Hans-Selye = General Adaptation Syndrome. (stress responses)

Solomon Asch = "Line-test" to show group conformity.

Stanley Milgram = obedience test to show the power of an authority figure.

Muzaffer Sherif = Co-operation among divisive groups when they had subordinate (shared) goals.

Elizabeth Loftus = "Misinformation Effect" shown in memory studies.

Martin Seligman = "Learned Helplessness Experiment" with dogs. Showed the external locus affect in animals (generalized to depression with humans.)

Carol Gilligan = Studied gender differences. Males value accomplishments and women value relationships.
# Common Neurotransmitters and Their Functions

<table>
<thead>
<tr>
<th>#</th>
<th>Neurotransmitter</th>
<th>Major functions</th>
<th>Excess is associated with:</th>
<th>Deficiency is associated with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acetylcholine</td>
<td>Muscle movement, attention, arousal, memory, emotion, learning</td>
<td>Alzheimer's disease (when Ach-producing neurons deteriorate); paralysis</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dopamine</td>
<td>Voluntary movement, learning, memory, emotional arousal, attention</td>
<td>Schizophrenia</td>
<td>Parkinson's disease (straved of dopamine, the brain produces the tremors and decreased mobility)</td>
</tr>
<tr>
<td>3</td>
<td>Serotonin</td>
<td>Sleep, wakefulness, appetite, mood, aggression, impulsivity, sensory perception, temperature regulation, pain suppression</td>
<td>Depression (Prozac and some other antidepressents raise serotonin levels)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Endorphins</td>
<td>Pain relief, pleasure</td>
<td>Effects interact with production and effects of serotonin and norepinephrine</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Norepinephrine</td>
<td>Learning, memory, dreaming, awakening, emotion, stress-related increase in heart rate, stress-related slowing of digestive processes</td>
<td>Depression</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>GABA</td>
<td>Main inhibitory neurotransmitter in the brain</td>
<td>Linked to seizures, tremors, and insomnia</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Glutamate</td>
<td>Main excitatory neurotransmitter in the brain, involved in memory</td>
<td>Multiple sclerosis; oversupply can overstimulate brain, causing migraines/seizures - related to MSG headaches</td>
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</tbody>
</table>
Neurotransmitters

Dopamine
Dopamine is the brain’s "pleasure button." The dopaminergic system of neurons is responsible for the sense of pleasure we feel when we eat a good meal or take a hot bath. The dopaminergic system is easily fooled by artificial substances; many illicit drugs, such as cocaine, excite dopamine receptors on neurons, giving rise to an addictive sense of pleasure.

Serotonin
Serotonin, also called 5-HT, has risen to fame as the target of Prozac and other anti-depressant drugs. Depression and other mood disorders seem to be caused by an imbalance of the neurotransmitter serotonin. Not enough serotonin is released into the synaptic cleft, so the postsynaptic neuron doesn’t receive enough of the neurotransmitter to react normally. Prozac belongs to a class of drugs called selective serotonin reuptake inhibitors (SSRIs). SSRIs prevent the presynaptic neuron from gathering and recycling leftover serotonin from the synaptic cleft. As a result, the serotonin remains there longer and the postsynaptic receptors have a better chance of catching and binding some. Thus, the postsynaptic neuron ends up with more serotonin bound to its receptors and is more likely to react to a signal in the correct way.

GABA
Gamma-aminobutyric acid (GABA) is the most common inhibitory neurotransmitter in the brain. When receptors on a postsynaptic neuron bind to GABA molecules, the neuron becomes less likely to fire an action potential to another neuron. Thus, GABA can interfere with signaling among neurons, acting like a stop sign.

Glutamate
Glutamate is the most common excitatory neurotransmitter in the central nervous system. When receptors on a postsynaptic neuron bind to glutamate molecules, the neuron becomes more likely to fire an action potential. Glutamate is usually responsible for the activation of one neuron by another.
"Confusing Pairs"

Independent Variable (What is tested) vs. Dependent Variable (What is measured)
(Ex: Recess to test attention span; recess is independent, attention span is dependent)

Random selection (of subjects for a study) vs. Random Assignment (of subjects to experimental or control groups in a study)

Experimental Group (group that is tested) vs. Control Group (compared to the experimental, i.e. receives the placebo in a drug experiment.)

Left Brain (Language and Logic) vs. Right Brain (Creative and Spatial)

Corpus Callosum (divides the brain) vs. Cerebral Cortex (covers the brain)

Sympathetic Nervous System ("flight-or-fight") vs. Parasympathetic (calming)

Neurotransmitters (in the nervous system) vs. Hormones (in the endocrine system)

Lateral Hypothalamus (stimulates hunger) vs. Ventromedial Hypothalamus (suppresses hunger)

Broca's Area (makes words) vs. Wernicke’s Area (comprehends words)

Identical Twins (Same fertilized egg) vs. Fraternal Twins (Two separate eggs)

Afferent Neurons (Sensory, body to the brain) vs. Efferent Neurons (Motor, brain to the body)

Assimilation (All four-legged animals are "doggies") vs. Accommodation ("Doggies are different than "Kitties")

Concrete Operations (logical thinking) vs. Formal Operations (Philosophical thinking)

Sensation (Bottom-up Processing) vs. Perception (Top-Down Processing)

Rods (night vision) vs. Cones (color vision)

Classical Conditioning (Involuntary) vs. Operant Conditioning (Voluntary)

Positive Reinforcement (any reward following a desirable behavior that increases the behavior) vs. Negative Reinforcement (ending “time-out” for bad behavior in playtime increases good behavior in playtime)

Primacy Effect (first items remembered) vs. Recency Effect (last items remembered)
Proactive Interference (loss of the new info) vs. Retroactive Interference (loss of the old info)

Implicit Memory (non-declarative; skills) vs. Explicit Memory (declarative, facts)

Recall Memory (no cues/fill-in) vs. Recognition Memory (Some hints/multiple choice, matching)

Algorithms (step-by-step) vs. Heuristics (Rule-of-thumb)

Representative Heuristics (Stereotypes) vs. Availability Heuristics (Based on available info, planes safer than cars)

Phonemes (Basic sound units) vs. Morphemes (Basic units of meaning)

Fluid Intelligence ("Brain power") vs. Crystallized Intelligence (Acquired knowledge)

Validity (test measure what it should) vs. Reliability (Same scores on a retest)

Achievement test (What you've learned) vs. Aptitude test (what you can do)

Intrinsic Motivation (for personal satisfaction) vs. Extrinsic Motivation (for rewards or to avoid punishment)

Theory Y (democratic) vs. Theory X (rewards or punishment)

Internal Locus (controlling the environment) vs. External Locus (the environment controls you.)

Lithium (treats bi-polar) vs. Librium (treats anxiety)

Type A (high stress) vs. Type B (low stress)

Psychoanalysis vs. Psychotherapy

Latent content vs. Manifest content
Research Methods
Psychologists use many different methods for conducting research. Each method has advantages and disadvantages that make it suitable for certain situations and unsuitable for others.

Descriptive or Correlational Research Methods
Case studies, surveys, naturalistic observation, and laboratory observation are examples of descriptive or correlational research methods. Using these methods, researchers can describe different events, experiences, or behaviors and look for links between them. However, these methods do not enable researchers to determine causes of behavior.

Remember: correlation is not the same as causation. Two factors may be related without one causing the other to occur. Often, a third factor explains the correlation.

Example:
A psychologist uses the survey method to study the relationship between balding and length of marriage. He finds that length of marriage correlates with baldness. However, he can’t infer from this that being bald causes people to stay married longer. Instead, a third factor explains the correlation: both balding and long marriages are associated with old age.

Measuring Correlation
A correlation coefficient measures the strength of the relationship between two variables. A correlation coefficient is always a number between –1 and +1. The sign (+ or –) of a correlation coefficient indicates the nature of the relationship between the variables.

A positive correlation (+) means that as one variable increases, the other does too.

Example: The more years of education a person receives, the higher his or her yearly income is.

A negative correlation (–) means that when one variable increases, the other one decreases.

Example: The more hours a high school student works during the week, the fewer A’s he or she gets in class.

The higher the correlation coefficient, the stronger the correlation. A +0.9 or a –0.9 indicates a very strong correlation; a +0.1 or a –0.1 indicates a very weak correlation. A correlation of 0 means that no relationship exists between two variables.

Common correlational research methods include case studies, surveys, naturalistic observation, and laboratory observation.
Case Studies
In a case study, a researcher studies a subject in depth. The researcher collects data about the subject through interviews, direct observation, psychological testing, or examination of documents and records about the subject.

Surveys
A survey is a way of getting information about a specific type of behavior, experience, or event. When using this method, researchers give people questionnaires or interview them to obtain information. When subjects fill out surveys about themselves, the data is called self-report data. Self-report data can be misleading because subjects may do any of the following:

- Lie intentionally
- Give answers based on wishful thinking rather than the truth
- Fail to understand the questions the survey asks
- Forget parts of the experience they need to describe

Naturalistic Observation
When using naturalistic observation, researchers collect information about subjects by observing them unobtrusively, without interfering with them in any way. Researchers create a record of events and note relationships among those events. With naturalistic observation, researchers face the challenge of getting a clear view of events without becoming noticeable to the subjects.

Laboratory Observation
As the name implies, researchers perform laboratory observation in a laboratory rather than in a natural setting. In laboratory observation, researchers can use sophisticated equipment to measure and record subjects’ behavior. They can use one-way mirrors or hidden recording devices to observe subjects more freely while remaining hidden themselves. Unlike observation in a natural setting, laboratory observation offers researchers some degree of control over the environment.

Psychological Tests
Researchers use psychological tests to collect information about personality traits, emotional states, aptitudes, interests, abilities, values, or behaviors. Researchers usually standardize these tests, which means they create uniform procedures for giving and scoring them. When scoring a test, researchers often compare subjects’ scores to norms, which are established standards of performance on a test. A well-constructed standardized test can evaluate subjects better than self-report data.
## Overview of Research Methods

<table>
<thead>
<tr>
<th>Research method</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>• Yields a lot of information</td>
<td>• Provides information about behavior that can’t be observed directly</td>
</tr>
<tr>
<td></td>
<td>• Provides a good way to generate hypotheses</td>
<td>• Relies on self-report data, which can be misleading</td>
</tr>
<tr>
<td></td>
<td>• Can provide information about many people since it’s cheap and easy to do</td>
<td>• Doesn’t allow conclusions about cause-and-effect relationships</td>
</tr>
<tr>
<td>Case study</td>
<td>• Provides a good way to generate hypotheses</td>
<td>• Sometimes gives incomplete information</td>
</tr>
<tr>
<td></td>
<td>• Yields data that other methods can’t provide</td>
<td>• Sometimes relies only on self-report data, which can be misleading</td>
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<tr>
<td></td>
<td></td>
<td>• Can be subjective and thus may yield biased results</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Doesn’t allow conclusions about cause-and-effect relationships</td>
</tr>
<tr>
<td>Naturalistic</td>
<td>• Can be useful for generating hypotheses</td>
<td>• Sometimes yields biased results</td>
</tr>
<tr>
<td>observation</td>
<td>• Provides information about behavior in the natural environment</td>
<td>• May be difficult to do unobtrusively</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Doesn’t allow conclusions about cause-and-effect relationships</td>
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<tr>
<td>Laboratory</td>
<td>• Enables use of sophisticated equipment for measuring and recording behavior</td>
<td>• Sometimes yields biased results</td>
</tr>
<tr>
<td>observation</td>
<td>• Can be useful for generating hypotheses</td>
<td>• Carries the risk that observed behavior is different from natural behavior</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Doesn’t allow conclusions about cause-and-effect relationships</td>
</tr>
<tr>
<td>Test</td>
<td>• Gives information about characteristics such as personality traits,</td>
<td>• Requires good reliability and validity before it can be used</td>
</tr>
<tr>
<td></td>
<td>emotional states, aptitudes, interests, abilities, values, and behaviors</td>
<td>• Doesn’t allow conclusions about cause-and-effect relationships</td>
</tr>
<tr>
<td>Experiment</td>
<td>• Identifies cause-and-effect relationships</td>
<td>• Can be artificial, so results may not generalize to real-world situations</td>
</tr>
<tr>
<td></td>
<td>• Distinguishes between placebo effects and real effects of drug</td>
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</table>
Experiments
Unlike correlational research methods or psychological tests, experiments can provide information about cause-and-effect relationships between variables. In an experiment, a researcher manipulates or changes a particular variable under controlled conditions while observing resulting changes in another variable or variables. The researcher manipulates the independent variable and observes the dependent variable. The dependent variable may be affected by changes in the independent variable. In other words, the dependent variable depends (or is thought to depend) on the independent variable. Note: If variable is after if, then ID AND If variable is after then, then DV.

Experimental and Control Groups
Typically, a researcher conducting an experiment divides subjects into an experimental group and a control group. The subjects in both groups receive the same treatment, with one important difference: the researcher manipulates one part of the treatment in the experimental group but does not manipulate it in the control group. The variable that is manipulated is the independent variable. The researcher can then compare the experimental group to the control group to find out whether the manipulation of the independent variable affected the dependent variable.

Example:
Suppose a researcher wants to study the effect of drug A on subjects’ alertness. He divides 100 subjects into two groups of 50, an experimental group and a control group. He dissolves drug A in saline solution and injects it into all the subjects in the experimental group. He then gives all the control group subjects an injection of only saline solution. The independent variable in this case is drug A, which he administers only to the experimental group. The control group receives a placebo: the injection of saline solution. The dependent variable is alertness, as measured by performance on a timed test. Any effect on alertness that appears only in the experimental group is caused by the drug. Any effect on alertness that appears in both the experimental and control groups could be due to the subjects’ expectations or to extraneous variables, such as pain from the injection.

Extraneous Variables
Ideally, subjects in the experimental and control groups would be identical in every way except for the variables being studied. In practice, however, this would be possible only if researchers could clone people. So researchers try to make groups with subjects that are similar in all respects that could potentially influence the dependent variable. Variables other than the independent variable that could affect the dependent variable are called extraneous variables.

One way to control extraneous variables is to use random assignment. When researchers use random assignment, they create experimental and control groups in a way that gives subjects an equal chance of being placed in either group. This guarantees the two groups’ similarity.

Reliability
A test has good reliability if it produces the same result when researchers administer it to the same group of people at different times. Researchers determine a test’s test-retest reliability by giving the test to a group of people and then giving the test again to the same group of people at a later time. A reliable test will produce approximately the same results on both occasions.

Psychologists also use alternative-forms reliability to determine a test’s reliability. They measure alternative-forms reliability by giving one version of a test to a group of people and then giving another version of the same test to the same group of people. A reliable test will produce roughly the same results no matter which version of the test is used.
Validity
A test is valid if it actually measures the quality it claims to measure. There are two types of validity:

- Content validity is a test’s ability to measure all the important aspects of the characteristic being measured. An intelligence test wouldn’t have good content validity if it measured only verbal intelligence, since nonverbal intelligence is an important part of overall intelligence.
- Criterion validity is fulfilled when a test not only measures a trait but also predicts another criterion of that trait. For example, one criterion of scholastic aptitude is academic performance in college. A scholastic aptitude test would have good criterion validity if it could predict college grade point averages.

Disadvantages of Experiments
The main disadvantage of experiments is that they usually don’t fully reflect the real world. In an experiment, researchers try to control variables in order to show clear causal links. However, to exert control in this way, researchers must simplify an event or a situation, which often makes the situation artificial.
Another disadvantage of experiments is that they can’t be used to study everything. Sometimes researchers can’t control variables enough to use an experiment, or they find that doing an experiment would be unethical—that is, it would be painful or harmful in some way to the subjects being studied.

Bias in Research
Bias is the distortion of results by a variable. Common types of bias include sampling bias, subject bias, and experimenter bias.

Sampling Bias
Sampling bias occurs when the sample studied in an experiment does not correctly represent the population the researcher wants to draw conclusions about.

Example: A psychologist wants to study the eating habits of a population of New Yorkers who have freckles and are between the ages of eighteen and forty-five. She can’t possibly study all people with freckles in that age group, so she must study a sample of people with freckles. However, she can generalize her results to the whole population of people with freckles only if her sample is representative of the population. If her sample includes only white, dark-haired males who are college juniors, her results won’t generalize well to the entire population she’s studying. Her sample will reflect sampling bias.

Subject Bias
Research subjects’ expectations can affect and change the subjects’ behavior, resulting in subject bias. Such a bias can manifest itself in two ways:

- A placebo effect is the effect on a subject receiving a fake drug or treatment. Placebo effects occur when subjects believe they are getting a real drug or treatment even though they are not. A single-blind experiment is an experiment in which the subjects don’t know whether they are receiving a real or fake drug or treatment. Single-blind experiments help to reduce placebo effects.
- The social desirability bias is the tendency of some research subjects to describe themselves in socially approved ways. It can affect self-report data or information people give about themselves in surveys.
**Experimenter Bias**
Experimenter bias occurs when researchers’ preferences or expectations influence the outcome of their research. In these cases, researchers see what they want to see rather than what is actually there.
A method called the double-blind procedure can help experimenters prevent this bias from occurring. In a double-blind procedure, neither the experimenter nor the subject knows which subjects come from the experimental group and which come from the control group.

**Measuring Central Tendency (MCT)**
Researchers summarize their data by calculating measures of central tendency, such as the mean, the median, and the mode. The most commonly used measure of central tendency is the mean, which is the arithmetic average of the scores. The mean is calculated by adding up all the scores and dividing the sum by the number of scores.
However, the mean is not a good summary method to use when the data include a few extremely high or extremely low scores. A distribution with a few very high scores is called a positively skewed distribution. A distribution with a few very low scores is called a negatively skewed distribution. The mean of a positively skewed distribution will be deceptively high, and the mean of a negatively skewed distribution will be deceptively low. When working with a skewed distribution, the median is a better measure of central tendency. The median is the middle score when all the scores are arranged in order from lowest to highest.
Another measure of central tendency is the mode. The mode is the most frequently occurring score in a distribution.

*Note:*
- Mean ($\mu$) - average
- Median – in the middle of the road
- MOde – MOst

**Statistics:** Statistics is a branch of mathematics. Psychologists need a solid foundation in math to describe, analyze, and summarize the results of their research.

**Measuring Variation**
Measures of variation tell researchers how much the scores in a distribution differ. Examples of measures of variation include the range and the standard deviation. The range is the difference between the highest and the lowest scores in the distribution. Researchers calculate the range by subtracting the lowest score from the highest score. The standard deviation provides more information about the amount of variation in scores. It tells a researcher the degree to which scores vary around the mean of the data. *Note: $(SD)^2 = Variance$*

**Inferential Statistics**
After analyzing statistics, researchers make inferences about how reliable and significant their data are.

**Example:** The researcher’s survey of the students in three classes showed differences in how long the students studied for each course. The mean number of hours for students in Course A was about eight hours, and for students in Courses B and C, the average was about six hours. Does this mean Course A requires the most hours of study? Were the differences the researcher observed in study time real or just due to chance? In other words, can he generalize from the samples of students he surveyed to the whole population of students? He needs to determine the reliability and significance of his statistics.

If researchers want to generalize confidently from a sample, the sample must fulfill two criteria:

- It must be large and varied enough to be representative.
- It must not have much variation in scores.
Researchers can use inferential statistics to figure out the likelihood that an observed difference was just due to chance. If it’s unlikely that the difference was due to chance, then the observed difference could be considered statistically significant. Psychologists usually consider a result to be statistically significant if such a result occurs just by chance 5 or fewer times out of every 100 times a study is done. They call this statistical significance at the $p \leq .05$ level ($p$ less than or equal to point oh-five). However, statistical significance alone does not make a finding important. Statistical significance simply means that a result is probably not due to chance.

Darkest is less than one standard deviation from the mean. For the normal distribution, this accounts for 68.27% of the set; while two standard deviations from the mean (medium and dark gray) account for 95.45%; and three standard deviations (light, medium, and dark gray) account for 99.73%.

**Standard Deviation**
The Standard Deviation ($\sigma$) is a measure of how spread out numbers are. The formula is easy: it is the square root of the Variance. So now you ask, "What is the Variance?"

**Variance**
The Variance (which is the square of the standard deviation, ie: $\sigma^2$) is defined as: The average of the squared differences from the Mean.

A distribution is skewed if one of its tails is longer than the other. The first distribution shown has a positive skew. This means that it has a long tail in the positive direction. The distribution below it has a negative skew since it has a long tail in the negative direction. Finally, the third distribution is symmetric and has no skew. Distributions with positive skew are sometimes called "skewed to the right" whereas distributions with negative skew are called "skewed to the left."