ASVAB TEST INFO

The <u>Armed Services Vocational Aptitude Battery</u> is a multiple-choice test that helps you identify which Army jobs (Military Occupational Specialties) are best for you. It measures your knowledge and ability in ten different areas. It is not an IQ test, but the ASVAB does help the Army assess which jobs you are best suited to perform.

This test covers the following topics:

- General Science - measures knowledge of life science, earth and space science, and physical science
- Arithmetic Reasoning - measures ability to solve basic arithmetic word problems
- Word Knowledge - measures ability to understand the meaning of words through synonyms
- Paragraph Comprehension - measures ability to obtain information from written material
- Mathematics Knowledge - measures knowledge of mathematical concepts and applications
- Electronics Information - measures knowledge of electrical current, circuits, devices and electronic systems
- Auto and Shop Information - measures knowledge of automotive maintenance and repair, and wood and metal shop practices
- Mechanical Comprehension - measures knowledge of the principles of mechanical devices, structural support and properties of materials
- Assembling Objects - measures ability with spatial relationships

While there is no "failing" the ASVAB, you will need to score at least a 31 on the exam to be considered for enlistment in the Army. Your scores will be provided to you on a report called the ASVAB Student Results Sheet, with additional information to help you understand your score.

The AFQT score is the most important ASVAB score, because it determines if you can enlist in the U.S. Army. However, the U.S. Army also converts the ASVAB test scores into 10 other composite score areas known as "line scores" that determine what MOS an individual may qualify for. Listed below are the parts of the ASVAB that affect your AFQT test scores and each of the ten line scores.

- Armed Forces Qualification Test (AFQT) - Paragraph Comprehension, Word Knowledge, Mathematics Knowledge, and Arithmetic Reasoning.
- Clerical (CL) — Word Knowledge, Paragraph Comprehension, Arithmetic Reasoning and Mathematics Knowledge.
- Combat (CO) - Word Knowledge, Paragraph Comprehension, Auto & Shop and Mechanical Comprehension.
- Electronics (EL) — General Science, Arithmetic Reasoning, Mathematics Knowledge and Electronic Information.
- Field Artillery (FA) - Arithmetic Reasoning, Mathematics Knowledge and Mechanical Comprehension.
- General Maintenance (GM) — General Science, Auto & Shop, Mathematics Knowledge and Electronics Information.
- General Technical (GT) - Word Knowledge, Paragraph Comprehension and Arithmetic Reasoning (AR).
- Mechanical Maintenance (MM) — Auto & Shop, Mechanical Comprehension and Electronic Information.
- Operators and Food (OF) - Word Knowledge, Paragraph Comprehension, Auto & Shop and Mechanical Comprehension.
- Surveillance and Communications (SC) - Word Knowledge, Paragraph Comprehension, Arithmetic Reasoning, Auto & Shop and Mechanical Comprehension.
- Skilled Technical (ST) - Word Knowledge, Paragraph Comprehension, General Science, Mechanical Comprehension and Mathematics Knowledge.

ASVAB Extra Sample Test 1

Word Knowledge

1. **Collusion** most nearly means:

   A. Amateur
   B. Directive
   C. Conspiracy
   D. Odyssey

2. **Foible** most nearly means:

   A. Trickery
   B. Rumor
   C. Rubble
   D. Shortcoming

3. **Repugnant** most nearly means:

   A. Revolting
   B. Mistrustful
   C. Earnest
   D. Confident

4. **Malleable** most nearly means:

   A. Rowdy
   B. Hateful
   C. Adaptable
   D. Forthright

5. **Coalesce** most nearly means:

   A. Referee
   B. Combine
   C. Reveal
   D. Encircle

6. **Luminous** most nearly means:

   A. Fertile
   B. Corrupt
   C. Mild
   D. Bright

For questions 7 to 11, choose the word that has nearly the same meaning as the underlined word.

7. **Mr. Emerson rebuffed his coworker by refusing all offers of assistance.**

   A. Snubbed
   B. Regretted
   C. Collected
   D. Alerted

8. **The Salvation Army has many services to help the city's indigent population.**

   A. Important
   B. Needy
   C. Fortunate
   D. Young

9. It was many years before church members could put the bitter schism behind them and move forward together.

   A. Secret
   B. Idol
   C. Belief
   D. Split

10. It didn't take long for the malcontent factory workers to voice their anger over the new rules.

    A. Developed
    B. Experienced
    C. Sympathetic
    D. Dissatisfied

11. Quitting his job with no prospects for new employment left Joseph in a precarious position.

    A. Practical
    B. Risky
    C. Tired
    D. Healthy

12. The word most opposite in meaning to foray is:

    A. Raid
    B. Retreat
    C. Species
    D. Pattern

13. The word most opposite in meaning to trite is:

    A. Enraged
    B. Famous
    C. Devilish
    D. Original

14. The word most opposite in meaning to precipitous is:

    A. Lavish
    B. Gradual
    C. Random
    D. Coarse

15. The word most opposite in meaning to subjugate is:

    A. Submit
    B. Risk
    C. Arrange
    D. Stretch

16. The word most opposite in meaning to brevity is:

    A. Goodness
    B. Ancestry
    C. Length
    D. Support

Paragraph Comprehension

Read the passage below and answer questions 1 to 6.

In 1962, the Cuban Missile Crisis placed the world on the verge of a nuclear war. Although not a single missile was launched, the crisis is considered by many to be the closest man has come to a nuclear war.

After the failed attempt in 1961 by Cuban exiles to invade Cuba, Fidel Castro, Cuba's leader, was certain of another attack by the United States. To help defend his country, Castro, an ally of the Soviet Union, asked Premier Nikita Khrushchev for military aid. The USSR sent missiles and supplies to build launch pads in Cuba. These missiles could easily reach American soil.

In October of 1962, the United States discovered the Cuban missile bases. U.S. President John F. Kennedy met with government officials and for seven days debated the situation. He decided to impose a blockade around Cuba to prevent further shipment from the Soviet Union to Cuba. The situation was made public and the American people waited tensely. Kennedy secretly brokered an agreement with Khrushchev. The Soviet Union agreed to remove the weapons from Cuba. Kennedy agreed not to invade Cuba and to also remove US missiles from Turkey.

1.   **What caused Castro to think the U.S. would attack Cuba?**

   A.   Khrushchev sent aid to Cuba.
   B.   Kennedy alerted Castro of an attack.
   C.   There had been a previous failed attack.
   D.   The situation had been made public.

2.   **Which of the following is the main idea of this passage?**

   A.   The standoff in 1962 over Soviet Missiles in Cuba is known as The Cuban Missile Crisis.
   B.   An agreement between President John F. Kennedy and Premier Nikita Khrushchev ended the Cuban Missile Crisis.
   C.   The Cuban Missile Crisis of 1962
   D.   The world waited nervously as tensions built up between the United States and the Soviet Union.

3. **What would be a good title for the third paragraph of the passage?**

   A. Kennedy Imposes a Blockade around Cuba
   B. USSR Agrees to Remove Missiles from Cuba
   C. U.S. and the Soviet Union Secretly Negotiate End to the Missile Crisis
   D. The World Waits Nervously While Tensions Rise Between Two Countries

4. **According to the passage, Kennedy's first act was to:**

   A. Remove missiles from Turkey
   B. Impose a blockade around Cuba
   C. Inform the American people
   D. Support Cuban exiles in an invasion of Cuba

5. **Based on the passage, the author would agree that:**

   A. The Soviet Union was falling behind in the arms race
   B. The world is a much safer place after end of the Cuban Missile Crisis
   C. President Kennedy was not an effective leader in a time of crisis
   D. The Cuban Missile Crisis was one of the United States' most tense situations

6. **What would be a good title for the second paragraph of the passage?**

   A. Nuclear Weapons Able to Reach U.S.
   B. Cuba Defends Itself with Soviet Nuclear Weapons
   C. Cuban Exiles Fail in Attempt to Invade Cuba
   D. Cuba and Soviet Union Are Allies

Read the passage below and answer questions 7 to 11.

A topic of debate among drivers is frequently whether a motorcycle is more dangerous that an automobile. Most experienced drivers would agree that while it is more exhilarating to ride a motorcycle than to drive an automobile, it is illogical to therefore conclude that this exhilaration leads to careless driving and, therefore, more accidents, deaths, and injuries to motorcycle riders than car drivers. The critical concept to be understood here is not exhilaration, which is a given, but how the exhilaration comes about and is a cause of serious injury and death of motorcycle riders.

There is safe and unsafe thrill seeking. "Exhilaration" is defined as the "state of being stimulated, refreshed, or elated." An example of safe exhilaration is the excitement of sledding downhill, which results in the sled rider feeling stimulated, refreshed, or elated.

Unsafe exhilaration, which is usually the consequence of reckless thrill seeking, is therefore a state of being over-stimulated, frightened, and depressed by terror.

Which then causes exhilaration that is more dangerous, the car or the motorcycle? The answer is that the two forms of exhilaration are the consequences not of the motorcycle or the automobile, per se, but of the operation of the respective vehicles. Without an operator, both vehicles are metal entities, sitting in space, neither threatening nor harmful to anyone.

Therefore, neither the motorcycle nor the car is more or less dangerous than the other is; it is the attitude of their operators that creates the danger, death, and dismemberment resultant from accidents.

7. **According to the passage, an example of safe exhilaration is:**

   A. Riding a motorcycle
   B. Driving a car
   C. Sledding downhill
   D. Parachuting

8. **According to the passage, the author would agree that:**

   A. It is unsafe to ride a motorcycle
   B. Motorcycles can be safe
   C. Cars are safer than motorcycles
   D. Exhilaration leads to careless driving

9. **What would be a good title for this passage?**

   A. Exhilaration
   B. Automobile and Motorcycle Safety
   C. How to Drive Safely
   D. Which is Safer—the Car or the Motorcycle?

10. According to the passage, unsafe exhilaration is the result of:

A. Driving
B. Reckless thrill seeking
C. Over stimulation
D. Elation

11. According to the passage, what causes danger resulting in driving accidents?

A. Driving a motor cycle
B. Driving a sports car
C. Exhilaration
D. The attitude of the driver

Arithmetic Reasoning

1. Family Video stocks 1003 drama movies, 518 science fiction movies and 253 children's movies. How many more drama titles than children's titles does Family Video have in stock?

A. 750
B. 1003
C. 485
D. 265

2. Mr. Vlasic needs to buy 2 pens each for the 17 students in his class. If pens come in packs of 6 and each pack costs $2.35, what is the minimum amount that Mr. Vlasic must spend?

A. $11.75
B. $14.10
C. $7.05
D. $15.00

3. Brandon earns $1,050 a week and Brad earns $160 a day. If both of them work 8 hours a day, 5 days a week who earns a higher hourly wage? How much higher is it?

A. Brad; $6.25
B. Brandon; $6.25
C. Brad; $10.00
D. Brandon; $10.00

4. Matthew's dad is 5 times as old as him. If the difference of their ages is 28, how old is Matthew?

A. 4
B. 5
C. 6
D. 7

5. Dana and Megan have to fill 500 envelopes for a charity. At the end of the morning Dana has filled 3/20 of the envelopes and Megan has filled 1/4 of them. How many envelopes have they filled together?

A. 75
B. 125
C. 200
D. 50

6. A school garden had been divided into 7/8 square meter plots for students. If the area of the garden is 210 square meters, how many students can get plots?

A. 240
B. 210
C. 184
D. 78

7. 300 school children went on a field trip. 30% of them were first graders, 45% second graders, and the rest were third graders. How many more first graders were there than third graders?

A. 5
B. 15
C. 30
D. 45

8. A dress that costs $155.00 is on sale with a discount of 25%. What is the sale price of the dress?

A. $38.75
B. $116.25
C. $130.00
D. $122.50

9. Marlo pays $750 rent each month. Bea's rent is 12% higher. What is the ratio of Marlo's rent to Bea's rent?

A. 5:6
B. 15:16
C. 25:28
D. 25:26

10. A cake recipe calls for 5 cups of flour to bake 2 cakes. How many cups of flour will be needed to bake 7 cakes?

A. 35
B. 24.5
C. 17.5
D. 12

11. The scale of the model of a car is 1:24. If the full-size car is 12 ft long, how long is the model?

A. 4 inches
B. 5 inches
C. 6 inches
D. 7 inches

12. On the throw of a six-sided die, what is the probability that you will roll a number less than 3?

A. 1/2
B. 1/6
C. 1/3
D. 2/3

13. A bag contains 6 black marbles and 4 white marbles. Sally takes out a black marble and does not put it back. What is the probability that the next marble she picks will also be black?

A. 6/10
B. 9/25
C. 1/2
D. 5/9

14. Mangoes are sold at $8.40 a dozen. How much will 15 mangoes cost?

A. $12.60
B. $11.50
C. $10.70
D. $10.50

15. Rosita buys 300 feet of yarn for a craft project. If the yarn costs 12 cents a yard, how much does Rosita spend?

A. $36.00
B. $1,200.00
C. $360.00
D. $12.00

16. Mrs. Lafferty's 5 children are 6, 8, 14, 15, and 17 years old. What is their average age?

A. 14
B. 13
C. 12
D. 11

Mathematics Knowledge

1. $\dfrac{10!}{7!}$ is equal to:

   A. 6
   B. 61
   C. 120
   D. 720

2. $\dfrac{6^4}{6^3 \times 6^2} = ?$

   A. 6
   B. 6^9
   C. 6^{-1}
   D. 6^5

3. $\sqrt[3]{64} = ?$

   A. 9
   B. 4
   C. 6
   D. 8

4. $2\left(5 - \sqrt{16}\right) \div \left(14 - 12\right) \times 3 = ?$

   A. 3
   B. 20
   C. 32
   D. −4

5. Solve for *a*:
   $7a + 2 = 3a - 5 + 2a$

   A. −2
   B. 2
   C. $-3\dfrac{1}{2}$
   D. $3\dfrac{1}{4}$

6. Solve for *x*:
   $5(2x - 1) = 3(4x + 3)$

   A. $\dfrac{1}{6}$
   B. −7
   C. 2
   D. −3

7. Evaluate the expression
   $(x + y)^3 - 5x + 7y$,
   if *x* = 0 and *y* = 3.

   A. 48
   B. 102
   C. 84
   D. −8

8. Solve: $3 + 6x \le 3x - 3$

   A. $x \ge -2$
   B. $x \le -2$
   C. $x \le 0$
   D. $x \ge 1$

9. What is the name of a quadrilateral with four equal sides?

   A. Trapezoid
   B. Parallelogram
   C. Rhombus
   D. Pentagon

10. A 55° angle is:

   A. A right angle
   B. An acute angle
   C. An obtuse angle
   D. An exterior angle

11. **An isosceles triangle:**

A. Has no equal sides
B. Has two equal angles
C. Has no acute angles
D. Has two obtuse angles

12. **The side of an equilateral triangle is 20 cm. Its perimeter is:**

A. 20 cm
B. 40 cm
C. 60 cm
D. 80 cm

13. **The area of a rectangle is 144 in². If the length of the rectangle is 16 in., what is its width?**

A. 3 in.
B. 5 in.
C. 9 in.
D. 12 in.

14. **The circumference of a circle is equal to 10π cm. Its radius is:**

A. 10 cm
B. 7.5 cm
C. 5 cm
D. 10π cm

15. **How much will it cost to paint a circular patio of radius 7 m if the cost of the paint per square meter is $2.00?**

A. $308.00
B. $154.00
C. $77.00
D. $616.00

16. **A rectangular box has a length of 7 ft, a width of 3 ft, and a height of 2 ft. What is its volume?**

A. 67 ft³
B. 42 ft³
C. 42 ft²
D. 24 ft³

General Science

1. **The scale used to measure how acidic or alkaline a substance is is called the:**

    A. pH scale
    B. Celsius scale
    C. Richter scale
    D. dB scale

2. **Which of the following is not a compound?**

    A. Baking soda
    B. Concrete
    C. Table salt
    D. Water

3. **C is the chemical symbol for the element:**

    A. Calcium
    B. Carbon
    C. Chlorine
    D. Chromium

4. **A rainbow is formed as a result of:**

    A. Reflection of light
    B. Interference of light
    C. Diffraction of light
    D. Dispersion of light

5. **A jar with a metal lid is hard to open. You hold the lid near the fire and the lid loosens. This is because:**

    A. The heated metal lid expands less than the glass jar
    B. The heated glass jar contracts while the metal lid expands
    C. The heated metal lid expands more than the glass jar
    D. The heated glass jar expands while the metal lid contracts

6. **A car goes from 0 to 60 mph in 5 seconds. What is its average acceleration?**

    A. 60 mph per second
    B. 5 mph per second
    C. 300 mph per second
    D. 12 mph per second

7. **The arrangement of stars called the big dipper is part of the:**

    A. Great Bear constellation
    B. Little Bear constellation
    C. Orion constellation
    D. Andromeda constellation

8. **A black hole is a volume of space:**

   A. From which no radiation can escape
   B. That does not contain any matter
   C. That is extremely cold
   D. That contains no energy

9. **The great red spot seen on Jupiter is:**

   A. A large crater
   B. A vast desert
   C. An area of very high temperature
   D. A giant storm

10. **A dormant volcano:**

   A. Has never erupted
   B. Is capable of erupting
   C. Will never erupt again
   D. Is currently erupting

11. **Earthquake magnitudes are measured using a:**

   A. Barometer
   B. Micrometer
   C. Seismograph
   D. Chronograph

12. **An occluded front is:**

   A. A type of cold front
   B. A type of warm front
   C. A warm front overrun by a cold front
   D. A cold front overrun by a warm front

13. **Isobars are lines connecting regions of equal:**

   A. Pressure
   B. Temperature
   C. Humidity
   D. Wind speed

14. **Which of these is an abiotic component of an ecosystem?**

   A. Primary producer
   B. Detrivore
   C. Herbivore
   D. Sunlight

15. **Which of these are not arthropods?**

   A. Crustaceans
   B. Worms
   C. Insects
   D. Arachnids

16. **The four blood groups are:**

   A. A, B, C, and D
   B. A, B, AB, and O
   C. A, B, AB, and BA
   D. AB, BC, CD, and DA

Mechanical Comprehension

1. **The bar shown in the diagram below pivots about point P. Forces F1 and F2 are applied at the points shown. If F1 and F2 are equal in magnitude then which of the following is true?**

   A.   F1 exerts a greater torque on the bar than F2.
   B.   F2 exerts a greater torque on the bar than F1.
   C.   F1 and F2 exert equal torques on the bar.
   D.   We cannot tell whether F1 or F2 exerts a greater torque.

2. **Why is it easier to punch a hole in a piece of paper with a sharp needle than with a blunt pencil?**

   A.   The needle magnifies the force applied
   B.   The pencil is too thick
   C.   For the same force, the needle applies greater pressure on the paper
   D.   The needle is longer and applies force for a longer duration

3. **A machine does not:**

   A.   Change the direction of a force
   B.   Reduce the effort needed to lift a heavy load
   C.   Transfer a force to a different location
   D.   Reduce the amount of energy needed to perform a task

4. **The lever below pivots on a fulcrum. An effort of 2 lbs is applied on one side of the fulcrum to lift a load of 8 lbs on the other side of the fulcrum. What is the mechanical advantage of the lever?**

2   8
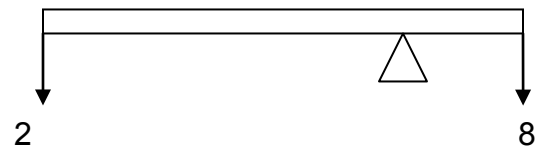
   A.   2
   B.   4
   C.   8
   D.   16

5. **The lever described in the previous question is a:**

   A.   First class lever
   B.   Second class lever
   C.   Third class lever
   D.   Fourth class lever

6. The force F needed to lift the 100 lb load in the pulley system below is:

F
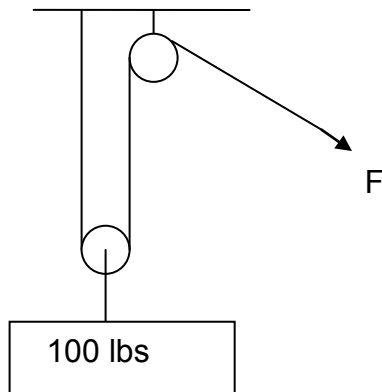
A. 50 lbs
B. 33 lbs
C. 100 lbs
D. 75 lbs

7. A block and tackle system consists of:

A. Levers and wheel and axle
B. A lever and an inclined plane
C. Fixed and moveable pulleys
D. A pulley and a lever

8. What kind of a simple machine is a swinging door?

A. Lever
B. Inclined plane
C. Wheel and axle
D. Screw

9. What type of simple machine is used to force material apart?

A. Lever
B. Screw
C. Pulley
D. Wedge

10. The four basic types of gears are:

A. Spur, bevel, worm, rack and pinion
B. Spur, bevel, worm, crust
C. Screw, bevel, worm, rack and pinion
D. Spur, screw, worm, rack and pinion

11. Which of the following is not an inclined plane?

A. Stairs
B. Parking ramp
C. Moving walkway
D. Ladder

12. A rack and pinion gear:

A. Changes the angle of rotation
B. Changes the direction of linear motion
C. Changes rotational motion into linear motion
D. Reverses the direction of rotation

13. **The gear ratio of a set of meshed gears is 4. If the number of teeth on the driven gear is 100, what is the number of teeth on the driver?**

    A. 400
    B. 100
    C. 104
    D. 25

14. **The primary function of a spring in a machine is to:**

    A. Magnify force
    B. Store energy
    C. Change direction of rotation
    D. Change speed of movement

15. **The lift on an airplane wing can be explained using:**

    A. Pascal's principle
    B. Archimedes' principle
    C. Bernoulli's principle
    D. Boyle's law

16. **When pressure is applied to one part of a confined fluid:**

    A. It is transmitted undiminished in all directions
    B. It is reduced by the time it reaches the other parts
    C. It increases as it moves through the fluid
    D. It is not transmitted to any other part

Electronics Information

1. **A circuit segment contains only two capacitors of equal value, connected in parallel. If the total capacitance of the circuit segment is 300 uF, what is the value of each capacitor?**

    A.   50 uF
    B.   150 uF
    C.   300 uF
    D.   600 uF

2. **The speed of electricity is approximately the same as the speed of:**

    A.   Light
    B.   Sound
    C.   Magnetism
    D.   Heat

3. **The Ohm is a unit of:**

    A.   Capacitance
    B.   Resistance
    C.   Luminance
    D.   Inductance

4. **The power law states that:**

    A. $P = I \times E$
    B. $P = I^2 \times E$
    C. $P = I \times E^2$
    D. $P = I^2 \times E^2$

5. **Dielectric material is:**

    A.   Magnetic
    B.   Nonmagnetic
    C.   Conductive
    D.   Nonconductive

6. **Which type of capacitor is best suited for high frequency applications?**

    A.   Mylar
    B.   Mica
    C.   Tantalum
    D.   Electrolytic

7. **Motors are used to convert:**

    A.   Radiant energy to electrical energy
    B.   Electrical energy to radiant energy
    C.   Mechanical energy to electrical energy
    D.   Electrical energy to mechanical energy

9. **A core of a typical inductor core is made of:**

    A.   Tin
    B.   Copper
    C.   Iron
    D.   Carbon

9. **In an AC circuit, inductors behave like:**

A. Frequency-dependent voltage sources
B. Frequency-dependent resistors
C. Frequency-independent voltage sources
D. Frequency-independent resistors

10. **In which band of the electromagnetic spectrum is 60 MHz?**

A. ULF
B. VLF
C. VHF
D. UHF

11. **What type of mechanical switch will connect two circuits to one of two positions?**

A. SPST
B. SPDT
C. DPST
D. DPDT

12. **What is the AC voltage delivered to a typical household outlet?**

A. 60 volts
B. 100 volts
C. 120 volts
D. 200 volts

13. **In an AC circuit, the term X refers to:**

A. Resistance
B. Reactance
C. Impedance
D. Inductance

14. **A solar cell can be used to convert:**

A. Radiant energy to electrical energy
B. Electrical energy to radiant energy
C. Mechanical energy to electrical energy
D. Electrical energy to mechanical energy

15. **Which is the worst electrical conductor?**

A. Gold
B. Silver
C. Copper
D. Iron

16. **What is the smallest number of diodes required to make a half-wave rectifier?**

A. 1
B. 2
C. 4
D. 8

Shop Information

1. **Which statement is true?**

   A. A hammer is a type of sledge.
   B. A sledge is a type of mallet.
   C. A hammer is a type of mallet.
   D. A mallet is a type of hammer.

2. **How does handle length affect the force of a hammer?**

   A. The longer the handle, the greater the force
   B. The shorter the handle, the greater the force
   C. The longer the handle, the smaller the force
   D. Handle length does not affect the force of a hammer

3. **Kayla measures the length of a piece of wood with a tape measure. The length is $39\frac{1}{4}$". What is this length in feet and inches?**

   A. 39 feet 25 inches
   B. 3 feet 25 inches
   C. 3 feet 9.25 inches
   D. 3 feet 3.25 inches

4. **The Phillips screw is an evolved form of what type of screw?**

   A. Slot head
   B. Cross slot
   C. Frearson
   D. Square

5. **A machine that rotates a piece of wood or other material and shapes it is called a:**

   A. Lathe
   B. Gouge
   C. Slip roll
   D. Band saw

6. **A chisel with an angled cutting blade that is used for finishing work is called a:**

   A. Butt chisel
   B. Corner chisel
   C. Skew chisel
   D. Gouge

7. **A spanner is another name for a:**

   A. Caliper
   B. Wrench
   C. Level
   D. Lathe

8. **Which type of wrench is also called a Crescent wrench?**

    A. Pipe wrench
    B. Adjustable-end wrench
    C. Socket wrench
    D. Combination wrench

9. **Breaker bars are used with:**

    A. Screwdrivers
    B. Chisels
    C. Sledges
    D. Wrenches

10. **Which type of caliper is used to scribe metal surfaces?**

    A. Digital caliper
    B. Micrometer caliper
    C. Vernier caliper
    D. Divider caliper

11. **A crocus cloth is used for:**

    A. Polishing
    B. Removing paint
    C. Applying paint
    D. Applying sealant

Auto Information

1. **How often should oil be changed?**

    A. Every one month or 1,000 miles
    B. Every five months or 5,000 miles
    C. According to the manufacturer's recommendations
    D. Yearly

2. **The mass air flow sensor does what?**

    A. Measures in pounds per square inch the compression of the cylinders
    B. Measures the amount of air going into the engine
    C. Measures the speed of the vehicle by metering the air flow into the engine compartment
    D. Measures the amount of air going out the exhaust

3. **The harmonic balancer is part of the:**

    A. Engine
    B. Transmission
    C. Radiator
    D. Differential

4. **Which of the following is a part of the transmission?**

   A. The intake valve
   B. The clutch plate
   C. The valve body
   D. The flywheel

5. **Where can you find a dampener spring?**

   A. In the exhaust gas recirculation valve
   B. As part of the muffler
   C. In the water pump
   D. As part of a strut

6. **In automotive electronics, red wires typically indicate:**

   A. Positive current
   B. Negative current
   C. Grounded circuits
   D. High voltage

7. **Engine coolant is typically made from propylene glycol. What is one advantage of using this over plain water?**

   A. It is orange, so you can see leaks better.
   B. It prevents corrosion.
   C. It lubricates the radiator.
   D. It is thicker than water.

8. **Directional tires can only be rotated how?**

   A. Directional tires can't be rotated
   B. Side to side
   C. Front to back, across
   D. Front to back, same side

9. **How are lug nuts used?**

   A. To hold the axle to the wheel
   B. To hold the rim to the hub
   C. To hold the axle in the transmission
   D. To hold the brake to the hub

10. **The compression ratio is a measurement of the:**

    A. Difference in volume between the piston down and up
    B. Amount of air in different sized tires
    C. Difference between the engine compression at high and low rpm
    D. Difference between the engine compression at high and low speed

11. **The evaporator is found in the:**

    A. Cooling system
    B. Emissions system
    C. Electrical system
    D. Air conditioning system

Assembling Objects

For each pair of labeled shapes in questions 1 to 8, choose the figure that shows the shapes connected correctly.

1.

| A | B | C | D |

2.
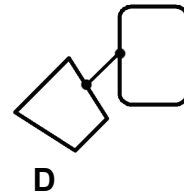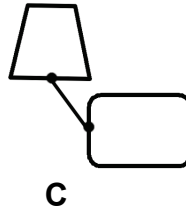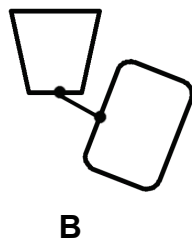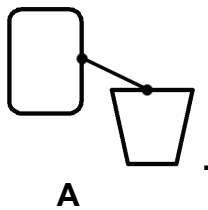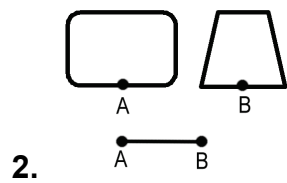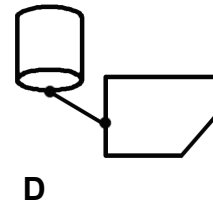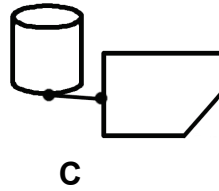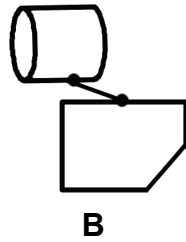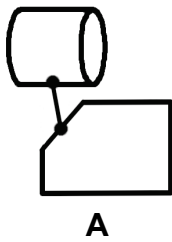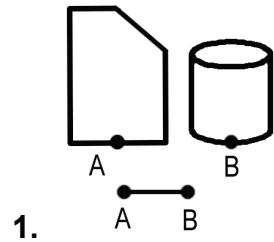
| A | B | C | D |

3.
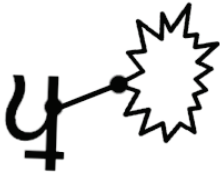
A   B   C   D

4.

A   B   C   D

5.

A   **B**   **C**   **D**

6.

A   **B**   **C**   **D**

7.

A   **B**   **C**   **D**

8.
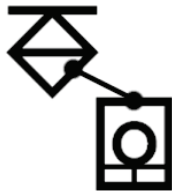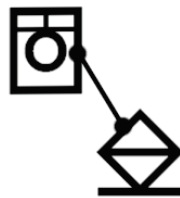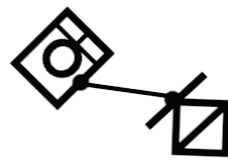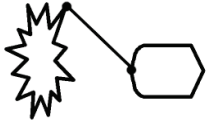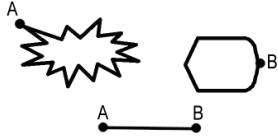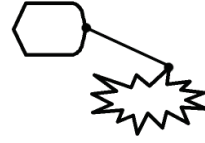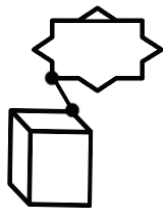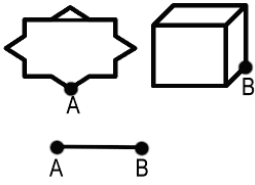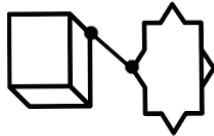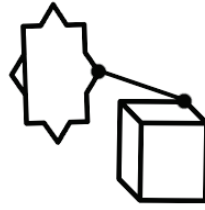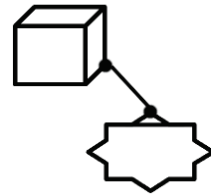
A   **B**   **C**   **D**

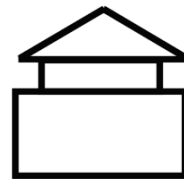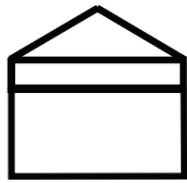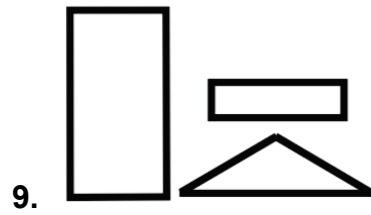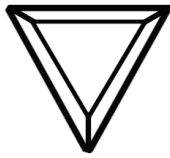**For each set of shapes in questions 9 to 16, choose the figure that shows the shapes assembled into an object.**

9.

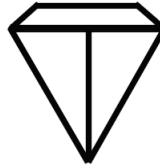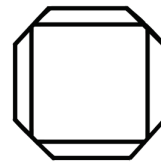A   B   C   D

10.
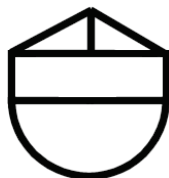

A   B   C   D

11.

| A | B | C | D |

12.

| A | B | C | D |

13.

14.

15.

A B C D

16.
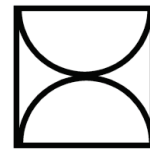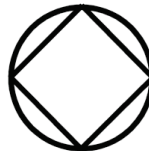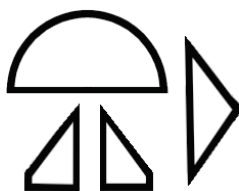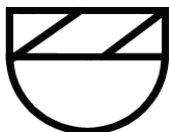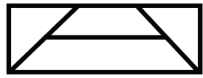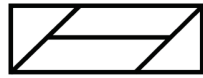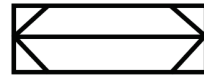
A B C D

ASVAB Extra Sample Test 1

Answer Key

WK	PC	AR	MK	GS	MC	EI	SI	AI	AO
1. C	1. C	1. A	1. D	1. A	1. B	1. B	1. D	1. C	1. C
2. D	2. A	2. B	2. C	2. B	2. C	2. A	2. A	2. B	2. A
3. A	3. C	3. B	3. B	3. B	3. D	3. B	3. D	3. A	3. B
4. C	4. B	4. D	4. A	4. D	4. B	4. A	4. B	4. C	4. B
5. B	5. D	5. C	5. C	5. C	5. A	5. D	5. A	5. D	5. A
6. D	6. B	6. A	6. B	6. D	6. A	6. B	6. C	6. A	6. C
7. A	7. C	7. B	7. A	7. A	7. C	7. D	7. B	7. B	7. D
8. B	8. B	8. B	8. B	8. A	8. A	8. C	8. B	8. D	8. A
9. D	9. D	9. C	9. C	9. D	9. D	9. B	9. D	9. B	9. D
10. D	10. B	10. C	10. B	10. B	10. A	10. C	10. D	10. A	10. B
11. B	11. D	11. C	11. B	11. C	11. C	11. D	11. A	11. D	11. A
12. B		12. C	12. C	12. C	12. C	12. C			12. D
13. D		13. D	13. C	13. A	13. D	13. B			13. A
14. B		14. D	14. C	14. D	14. B	14. A			14. D
15. A		15. D	15. A	15. B	15. C	15. D			15. C
16. C		16. C	16. B	16. B	16. A	16. A			16. D

ASVAB Extra Sample Test 1 with Rationales

Word Knowledge

1. **Collusion** **most nearly means:**

    A.   Amateur
    B.   Directive
    C.   Conspiracy
    D.   Odyssey

Answer: C. Conspiracy
The word *collusion* has nearly the same meaning as the word *conspiracy*. They both mean *a secret agreement*.

2. **Foible** **most nearly means:**

    A.   Trickery
    B.   Rumor
    C.   Rubble
    D.   Shortcoming

Answer: D. Shortcoming
The word *foible* has nearly the same meaning as the word *shortcoming*. They both mean *a weak point or failing*.

3. **Repugnant** **most nearly means:**

    A.   Revolting
    B.   Mistrustful
    C.   Earnest
    D.   Confident

Answer: A. Revolting
The word *repugnant* has nearly the same meaning as the word *revolting*. They both mean *offensive or distasteful*.

4.   Malleable most nearly means:

      A.   Rowdy
      B.   Hateful
      C.   Adaptable
      D.   Forthright

Answer: C. Adaptable
The word *malleable* has nearly the same meaning as the word *adaptable*. They both mean *capable of being shaped or formed; capable of being altered or influenced*.

5.   Coalesce most nearly means:

      A.   Referee
      B.   Combine
      C.   Reveal
      D.   Encircle

Answer: B. Combine
The word *coalesce* has nearly the same meaning as the word *combine*. They both mean *to unite into a single body or group*.

6.   Luminous most nearly means:

      A.   Fertile
      B.   Corrupt
      C.   Mild
      D.   Bright

Answer: D. Bright
The word *luminous* has nearly the same meaning as the word *bright*. They both mean *emitting light; glowing*.

For questions 7 to 11, choose the word that has nearly the same meaning as the underlined word.

7.   Mr. Emerson <u>rebuffed</u> his coworker by refusing all offers of assistance.

    A.   Snubbed
    B.   Regretted
    C.   Collected
    D.   Alerted

Answer: A. Snubbed
The word *rebuffed* has nearly the same meaning as the word *snubbed*. They both mean *rejected*.

8.   The Salvation Army has many services to help the city's <u>indigent</u> population.

    A.   Important
    B.   Needy
    C.   Fortunate
    D.   Young

Answer: B. Needy
The word *indigent* has nearly the same meaning as the word *needy*. They both mean *impoverished; destitute*.

9.   It was many years before church members could put the bitter <u>schism</u> behind them and move forward together.

    A.   Secret
    B.   Idol
    C.   Belief
    D.   Split

Answer: D. Split
The word *schism* has nearly the same meaning as the word *split*. They both mean *a rift; a division or separation of a group*.

10. **It didn't take long for the <u>malcontent</u> factory workers to voice their anger over the new rules.**

    A. Developed
    B. Experienced
    C. Sympathetic
    D. Dissatisfied

Answer: D. Dissatisfied
The word *malcontent* has nearly the same meaning as the word *dissatisfied*. They both mean *discontented or rebellious*.

11. **Quitting his job with no prospects for new employment left Joseph in a <u>precarious</u> position.**

    A. Practical
    B. Risky
    C. Tired
    D. Healthy

Answer: B. Risky
The word *precarious* has nearly the same meaning as the word *risky*. They both mean *dangerous or uncertain*.

12. **The word most opposite in meaning to <u>foray</u> is:**

    A. Raid
    B. Retreat
    C. Species
    D. Pattern

Answer: B. Retreat
The word *foray* is most opposite in meaning to the word *retreat*. *Foray* means *a quick raid in order to seize something*.

13.   The word most opposite in meaning to <u>trite</u> is:

      A.   Enraged
      B.   Famous
      C.   Devilish
      D.   Original

Answer: D. Original
The word *trite* is most opposite in meaning to the word *original*. *Trite* means *stale or worn out by constant use*.

14.   The word most opposite in meaning to <u>precipitous</u> is:

      A.   Lavish
      B.   Gradual
      C.   Random
      D.   Coarse

Answer: B. Gradual
The word *precipitous* is most opposite in meaning to the word *gradual*. *Precipitous* means *very steep*.

15.   The word most opposite in meaning to <u>subjugate</u> is:

      A.   Submit
      B.   Risk
      C.   Arrange
      D.   Stretch

Answer: A. Submit
The word *subjugate* is most opposite in meaning to the word *submit*. *Subjugate* means *to bring under control; conquer*.

16.   The word most opposite in meaning to <u>brevity</u> is:

      A.   Goodness
      B.   Ancestry
      C.   Length
      D.   Support

Answer: C. Length
The word *brevity* is most opposite in meaning to the word *length*. *Brevity* means *shortness; briefness*.

Paragraph Comprehension

Read the passage below and answer questions 1 to 6.

In 1962, the Cuban Missile Crisis placed the world on the verge of a nuclear war. Although not a single missile was launched, the crisis is considered by many to be the closest man has come to a nuclear war.

After the failed attempt in 1961 by Cuban exiles to invade Cuba, Fidel Castro, Cuba's leader, was certain of another attack by the United States. To help defend his country, Castro, an ally of the Soviet Union, asked Premier Nikita Khrushchev for military aid. The USSR sent missiles and supplies to build launch pads in Cuba. These missiles could easily reach American soil.

In October of 1962, the United States discovered the Cuban missile bases. U.S. President John F. Kennedy met with government officials and for seven days debated the situation. He decided to impose a blockade around Cuba to prevent further shipment from the Soviet Union to Cuba. The situation was made public and the American people waited tensely. Kennedy secretly brokered an agreement with Khrushchev. The Soviet Union agreed to remove the weapons from Cuba. Kennedy agreed not to invade Cuba and to also remove US missiles from Turkey.

1.   What caused Castro to think the U.S. would attack Cuba?

> A.   Khrushchev sent aid to Cuba.
> B.   Kennedy alerted Castro of an attack.
> C.   There had been a previous failed attack.
> D.   The situation had been made public.

Answer: C. There had been a previous failed attack.
Choice A and D are actions that take place after Castro believed the U.S. might invade. They are effects, not a cause. Choice B is not an accurate statement. Choice C is the reason or cause for Castro's belief that the U.S. might attack.

2.   Which of the following is the main idea of this passage?

A.   The standoff in 1962 over Soviet Missiles in Cuba is known as The Cuban Missile Crisis.
B.   An agreement between President John F. Kennedy and Premier Nikita Khrushchev ended the Cuban Missile Crisis.
C.   The Cuban Missile Crisis of 1962
D.   The world waited nervously as tensions built up between the United States and the Soviet Union.

Answer: A. The standoff in 1962 over Soviet Missiles in Cuba is known as The Cuban Missile Crisis.
Choice B and D are details within the passage. Choice C is the topic of the passage rather than the main idea. Choice A is the main idea.

3.   What would be a good title for the third paragraph of the passage?

A.   Kennedy Imposes a Blockade around Cuba
B.   USSR Agrees to Remove Missiles from Cuba
C.   U.S. and the Soviet Union Secretly Negotiate End to the Missile Crisis
D.   The World Waits Nervously While Tensions Rise Between Two Countries

Answer: C. U.S. and the Soviet Union Secretly Negotiate End to the Missile Crisis
Choices A, B, and D are details within the passage. Choice C is the main idea and therefore the best title.

4.   According to the passage, Kennedy's first act was to:

A.   Remove missiles from Turkey
B.   Impose a blockade around Cuba
C.   Inform the American people
D.   Support Cuban exiles in an invasion of Cuba

Answer: B. Impose a blockade around Cuba
Choices A, C, and D are details within the passage but they are not Kennedy's *first* action. Choice B is the *first* action Kennedy took after hearing of the missiles in Cuba.

5.   Based on the passage, the author would agree that:

      A.   The Soviet Union was falling behind in the arms race
      B.   The world is a much safer place after end of the Cuban Missile Crisis
      C.   President Kennedy was not an effective leader in a time of crisis
      D.   The Cuban Missile Crisis was one of the United States' most tense situations

Answer: D. The Cuban Missile Crisis was one of the United States' most tense situations
Choices A may be a true statement, but it is not supported by information in the passage. Choice B is not the correct answer because the passage does not imply or state the condition of the world *after* the crisis. Choice C is incorrect because the evidence in the passage suggests that he was, in fact, an effective leader during the crisis. It ended peacefully. Choice D is correct. The passage states that this incident was the closest the world has come to a nuclear attack. That is a most tense situation.

6.   What would be a good title for the second paragraph of the passage?

      A.   Nuclear Weapons Able to Reach U.S.
      B.   Cuba Defends Itself with Soviet Nuclear Weapons
      C.   Cuban Exiles Fail in Attempt to Invade Cuba
      D.   Cuba and Soviet Union Are Allies

Answer: B. Cuba Defends Itself with Soviet Nuclear Weapons
Choices A, C, and D are details within the passage. Choice B is the main idea and therefore the best title.

Read the passage below and answer questions 7 to 11.

A topic of debate among drivers is frequently whether a motorcycle is more dangerous that an automobile. Most experienced drivers would agree that while it is more exhilarating to ride a motorcycle than to drive an automobile, it is illogical to therefore conclude that this exhilaration leads to careless driving and, therefore, more accidents, deaths, and injuries to motorcycle riders than car drivers. The critical concept to be understood here is not exhilaration, which is a given, but how the exhilaration comes about and is a cause of serious injury and death of motorcycle riders.

There is safe and unsafe thrill seeking. "Exhilaration" is defined as the "state of being stimulated, refreshed, or elated." An example of safe exhilaration is the excitement of sledding downhill, which results in the sled rider feeling stimulated, refreshed, or elated.

Unsafe exhilaration, which is usually the consequence of reckless thrill seeking, is therefore a state of being over-stimulated, frightened, and depressed by terror.

Which then causes exhilaration that is more dangerous, the car or the motorcycle? The answer is that the two forms of exhilaration are the consequences not of the motorcycle or the automobile, per se, but of the operation of the respective vehicles. Without an operator, both vehicles are metal entities, sitting in space, neither threatening nor harmful to anyone.

Therefore, neither the motorcycle nor the car is more or less dangerous than the other is; it is the attitude of their operators that creates the danger, death, and dismemberment resultant from accidents.

7.   According to the passage, an example of safe exhilaration is:

    A.   Riding a motorcycle
    B.   Driving a car
    C.   Sledding downhill
    D.   Parachuting

Answer: C. Sledding downhill
Choice C is the example given by the author in the second paragraph.

8.   According to the passage, the author would agree that:

    A.   It is unsafe to ride a motorcycle
    B.   Motorcycles can be safe
    C.   Cars are safer than motorcycles
    D.   Exhilaration leads to careless driving

Answer: B. Motorcycles can be safe
Choice A and C are incorrect. The author states that neither the motorcycle nor the car determine safety, rather it is the driver. Choice D is incorrect. The author states that it is illogical to conclude that exhilaration leads to careless driving. Choice B is correct. The author states that it is the attitude of the operator that creates the danger. Therefore, both the car and the motorcycle *can* be safe when the operator is driving with a safe attitude.

9.   What would be a good title for this passage?

    A.   Exhilaration
    B.   Automobile and Motorcycle Safety
    C.   How to Drive Safely
    D.   Which is Safer—the Car or the Motorcycle?

Answer: D. Which is Safer—the Car or the Motorcycle?
Choice A and B are too broad to be good titles. Choice C does not reflect what the passage is about. Choice D addresses the main idea. The author presents a logical answer to the question of which is safer, the car or the motorcycle.

10.   According to the passage, unsafe exhilaration is the result of:

    A.   Driving
    B.   Reckless thrill seeking
    C.   Over stimulation
    D.   Elation

Answer: B. Reckless thrill seeking
Choice A is incorrect. It is too broad an answer. Choice C is part of the definition of unsafe exhilaration. It is not the *result* of unsafe exhilaration. Choice D is part of the definition of exhilaration. Choice B is correct.

11. **According to the passage, what causes danger resulting in driving accidents?**

    A.   Driving a motor cycle
    B.   Driving a sports car
    C.   Exhilaration
    D.   The attitude of the driver

Answer: D. The attitude of the driver
Choice A and B are incorrect. The author argues that it is not the vehicle that presents danger. Choice C is incorrect. Exhilaration can be both safe and unsafe. Choice D is correct as stated in the final paragraph of the passage.

Arithmetic Reasoning

1.	**Family Video stocks 1003 drama movies, 518 science fiction movies and 253 children's movies. How many more drama titles than children's titles does Family Video have in stock?**

	A.	750
	B.	1003
	C.	485
	D.	265

Answer: A. 750
There are 1003 drama movies and 253 children's movies. So Family Video has 1003 – 253 = 750 more drama titles than children's titles.

2.	**Mr. Vlasic needs to buy 2 pens each for the 17 students in his class. If pens come in packs of 6 and each pack costs $2.35, what is the minimum amount that Mr. Vlasic must spend?**

	A.	$11.75
	B.	$14.10
	C.	$7.05
	D.	$15.00

Answer: B. $14.10
Mr. Vlasic needs to but 34 pens in all. Since the pens come in packs of 6, Mr. Vlasic must buy at least 6 packs (36 pens) in order to have enough pens for all his students. So Mr. Vlasic must spend at least 6 × $2.35 = $14.10.

3.	**Brandon earns $1,050 a week and Brad earns $160 a day. If both of them work 8 hours a day, 5 days a week who earns a higher hourly wage? How much higher is it?**

	A.	Brad; $6.25
	B.	Brandon; $6.25
	C.	Brad; $10.00
	D.	Brandon; $10.00

Answer: B. Brandon; $6.25
To find out who earns more and by how much, find out each person's hourly wage. Brandon earns $1,050 for 8 × 5 = 40 hours of work. So his hourly wage is $1,050/40 = $26.25. Brad earns $160 for 8 hours of work. So his hourly wage is $160/8 = $20. Therefore, Brandon earns $26.25 – $20.00 = $6.25 more an hour.

4. **Matthew's dad is 5 times as old as him. If the difference of their ages is 28, how old is Matthew?**

    A.   4
    B.   5
    C.   6
    D.   7

Answer: D. 7
Let Matthew's age be x. Then Matthew's dad is $5x$ years old. The difference of their ages is 28. Therefore $5x - x = 28$. Solving this equation we get, $4x = 28$; $x = 7$. So Matthew is 7 years old.

5. **Dana and Megan have to fill 500 envelopes for a charity. At the end of the morning Dana has filled 3/20 of the envelopes and Megan has filled 1/4 of them. How many envelopes have they filled together?**

    A.   75
    B.   125
    C.   200
    D.   50

Answer: C. 200
The fraction of envelopes Dana and Megan have filled together = 3/20 + 1/4. Expressing this sum in terms of the common denominator 20, 3/20 + 1/4 = 3/20 + 5/20 = 8/20 = 2/5. 2/5 of 500 = (2/5) × 500 = 200. So Dana and Megan have filled 200 envelopes together.

6. **A school garden had been divided into 7/8 square meter plots for students. If the area of the garden is 210 square meters, how many students can get plots?**

    A.   240
    B.   210
    C.   184
    D.   78

Answer: A. 240
Since the 210 square meter garden has been divided into plots of area 7/8 square meter each, the number of plots is 210 divided by 7/8. To divide by 7/8, flip the fraction to 8/7 and multiply. 210 × (8/7) = 240. So there are 240 plots.

7. **300 school children went on a field trip. 30% of them were first graders, 45% second graders, and the rest were third graders. How many more first graders were there than third graders?**

    A. 5
    B. 15
    C. 30
    D. 45

Answer: B. 15
Since 45% + 30% = 75%, 75% of the children were first and second graders. The percentage of third graders = 100% − 75% = 25%. The number of third graders = (25/100) × 300 = 75. The number of first graders = (30/100) × 300 = 90. So there were 90 − 75 = 15 more first graders than third graders.

8. **A dress that costs $155.00 is on sale with a discount of 25%. What is the sale price of the dress?**

    A. $38.75
    B. $116.25
    C. $130.00
    D. $122.50

Answer: B. $116.25
The discount amount is 25% of $155 = (25/100) × $155 = $38.75. So the sale price of the dress = $155 − $38.75 = $116.25.

9. **Marlo pays $750 rent each month. Bea's rent is 12% higher. What is the ratio of Marlo's rent to Bea's rent?**

    A. 5:6
    B. 15:16
    C. 25:28
    D. 25:26

Answer: C. 25:28
First find Bea's rent. 12% of $750 = (12/100) × 750 = $90. So Bea's rent = $750 + $90 = $840. The ratio of Marlo's rent to Bea's rent is 750:840. Dividing by the common factor 30, 750:840 = 25:28.

10. A cake recipe calls for 5 cups of flour to bake 2 cakes. How many cups of flour will be needed to bake 7 cakes?

A. 35
B. 24.5
C. 17.5
D. 12

Answer: C. 17.5
Set up the proportion 5/2 = x/7. To solve for x, multiply both sides of the equation by 14 to get 35 = 2x. So x = 17.5.

11. The scale of the model of a car is 1:24. If the full-size car is 12 ft long, how long is the model?

A. 4 inches
B. 5 inches
C. 6 inches
D. 7 inches

Answer: C. 6 inches
Set up the proportion 1/24 = x/12. To solve for x, multiply both sides of the equation by 24 to get 1 = 2x. So x = 1/2 ft = 6 inches.

12. On the throw of a six-sided die, what is the probability that you will roll a number less than 3?

A. 1/2
B. 1/6
C. 1/3
D. 2/3

Answer: C. 1/3
To find the probability, divide the number of acceptable outcomes by the total number of possible outcomes. The acceptable outcomes are 1 and 2, so there are 2 of them. The total number of possible outcomes is 6. So the probability of rolling a number less than 3 is 2/6 which reduces to 1/3.

13. A bag contains 6 black marbles and 4 white marbles. Sally takes out a black marble and does not put it back. What is the probability that the next marble she picks will also be black?

  A.   6/10
  B.   9/25
  C.   1/2
  D.   5/9

Answer: D. 5/9
Since Sally has taken out a black marble, the bag now contains 5 black marbles and 4 white marbles. So the probability of the next marble being black is 5/9.

14. Mangoes are sold at $8.40 a dozen. How much will 15 mangoes cost?

  A. $12.60
  B. $11.50
  C. $10.70
  D. $10.50

Answer: D. $10.50
The cost of one mango = $8.40/12 = $0.70. The cost of 15 mangoes = $0.70 × 15 = $10.50.

15. Rosita buys 300 feet of yarn for a craft project. If the yarn costs 12 cents a yard, how much does Rosita spend?

  A. $36.00
  B. $1,200.00
  C. $360.00
  D. $12.00

Answer: D. $12.00
Since the cost of the yarn is given in yards, first convert the length of yarn Rosita bought into yards. Since 3 feet = 1 yard, 300 feet = 300/3 = 100 yards. Rosita spent 100 × 12 cents = 1200 cents = $12.00.

16. **Mrs. Lafferty's 5 children are 6, 8, 14, 15, and 17 years old. What is their average age?**

    A.   14
    B.   13
    C.   12
    D.   11

Answer: C. 12

To find the average age, add the ages of all the children and divide by the number of children. The sum of the ages of the children = 6 + 8 + 14 + 15 + 17 = 60. So their average age = 60/5 = 12.

Mathematics Knowledge

1. $\dfrac{10!}{7!}$ is equal to:

     A.   6
     B.   61
     C.   120
     D.   720

Answer: D. 720
10! is 10 factorial, which is defined as 10! = 10 × 9 × 8 × 7 × 6 × 5 × 4 × 3 × 2 × 1.
7! is 7 factorial, which is defined as 7! = 7 × 6 × 5 × 4 × 3 × 2 × 1.
When 10! is divided by 7!, the common terms 7, 6, 5, 4, 3, 2, and 1 in the numerator
and denominator get cancelled. So $\dfrac{10!}{7!}$ = 10 × 9 × 8 = 720.

2. $\dfrac{6^4}{6^3 \text{x} 6^2} = ?$

     A.   6
     B. 6^9
     C. 6^{-1}
     D. 6^5

Answer: C. 6^{-1}
These are rules for multiplying and dividing terms with exponents:
$$a^m \times a^n = a^{m+n}; \frac{a^m}{a^n} = a^{m-n}.$$
So $\dfrac{6^4}{6^3 \text{x} 6^2} = \dfrac{6^4}{6^{3+2}} = \dfrac{6^4}{6^5} = 6^{4-5} = 6^{-1}$.

3. $\sqrt[3]{64} = ?$

     A.   9
     B.   4
     C.   6
     D.   8

Answer: B. 4
4 × 4 × 4 = 64. Therefore, $\sqrt[3]{64} = 4$.

4. $2(5 - \sqrt{16}) \div (14 - 12) \times 3 = ?$

    A. 3
    B. 20
    C. 32
    D. −4

Answer: A. 3
First perform the operation inside parentheses. This gives
$2(5 - \sqrt{16}) \div (14 - 12) \times 3 = 2(5 - 4) \div (14 - 12) \times 3 = 2(1) \div 2 \times 3 = 2 \div 2 \times 3$.
Now do the multiplications and divisions from left to right:
$2 \div 2 \times 3 = 1 \times 3 = 3$.

5. **Solve for a: 7a + 2 = 3a − 5 + 2a**

    A. −2
    B. 2
    C. $-3\dfrac{1}{2}$
    D. $3\dfrac{1}{4}$

Answer: C. $-3\dfrac{1}{2}$
First subtract 7a from both sides to get all the a terms on one side. Then 2 = 3a − 5 + 2a − 7a. Combine all the a terms: 2 = −2a − 5. Add 5 to both sides to get 7 = −2a.
Dividing both sides by −2, a = −7/2 = $-3\dfrac{1}{2}$.

6. **Solve for x: 5(2x −1) = 3(4x +3)**

    A. $\dfrac{1}{6}$
    B. −7
    C. 2
    D. −3

Answer: B. −7
First use the distributive law on both sides to write the equation as 10x − 5 = 12x + 9. Subtract 12x from both sides: −2x − 5 = 9. Add 5 to both sides: −2x = 14. Divide both sides by −2: x = −7.

7.   **Evaluate the expression** $(x+y)^3 - 5x + 7y$ **, if x = 0 and y = 3.**

    A.   48
    B.   102
    C.   84
    D.   −8

Answer: A. 48
First substitute the variable values in the expression. Then use order of operations to evaluate the expression.
$(x+y)^3 - 5x + 7y = (0+3)^3 - 5(0) + 7(3) = 3^3 + 21 = 27 + 21 = 48$.

8.   **Solve:** $3 + 6x \le 3x - 3$

    A. $x \ge -2$
    B. $x \le -2$
    C. $x \le 0$
    D. $x \ge 1$

Answer: B. $x \le -2$
Subtract 3x from both sides and combine the x terms: $3 + 6x - 3x \le -3$; $3 + 3x \le -3$.
Subtract 3 from both sides: $3x \le -3 - 3$; $3x \le -6$. Divide both sides by 3: $x \le -2$.

9.   **What is the name of a quadrilateral with four equal sides?**

    A.   Trapezoid
    B.   Parallelogram
    C.   Rhombus
    D.   Pentagon

Answer: C. Rhombus
A quadrilateral with four equal sides is called a rhombus. A square is a special kind of rhombus with all right angles.

10.   **A 55° angle is:**

   A.   A right angle
   B.   An acute angle
   C.   An obtuse angle
   D.   An exterior angle

Answer: B. An acute angle
Angles smaller than 90 degrees are called acute angles.

11.   **An isosceles triangle:**

   A.   Has no equal sides
   B.   Has two equal angles
   C.   Has no acute angles
   D.   Has two obtuse angles

Answer: B. Has two equal angles
An isosceles triangle, by definition, has two equal sides and two equal angles.

12.   **The side of an equilateral triangle is 20 cm. Its perimeter is:**

   A.   20 cm
   B.   40 cm
   C.   60 cm
   D.   80 cm

Answer: C. 60 cm
Since all three sides of an equilateral triangle are equal, its perimeter is three times its side. So the perimeter of the triangle = 20 × 3 = 60 cm.

13.   **The area of a rectangle is 144 in^2. If the length of the rectangle is 16 in., what is its width?**

   A.   3 in.
   B.   5 in.
   C.   9 in.
   D.   12 in.

Answer: C. 9 in.
The area of a rectangle = length × width. So the width of a rectangle = area / length. The width of the given rectangle = 144 in^2 / 16 in = 9 in.

14. The circumference of a circle is equal to 10π cm. Its radius is:

    A.   10 cm
    B.   7.5 cm
    C.   5 cm
    D.   10π cm

Answer: C. 5 cm
The circumference of the circle = π × diameter = 10π cm, so the diameter of the circle = 10 cm. Therefore the radius = diameter/2 = 5 cm.

15. How much will it cost to paint a circular patio of radius 7 m if the cost of the paint per square meter is $2.00?

    A. $308.00
    B. $154.00
    C. $77.00
    D. $616.00

Answer: A. $308.00
The area of the patio = $\pi r^2 = \pi(7^2) = 49\pi = 154$ sq. m. Therefore the cost of painting the patio = 154 × 2 = $308.00.

16. A rectangular box has a length of 7 ft, a width of 3 ft, and a height of 2 ft. What is its volume?

    A.   67 ft^3
    B.   42 ft^3
    C.   42 ft^2
    D.   24 ft^3

Answer: B. 42 ft^3
The volume of the rectangular box = length × width × height = 7 × 3 × 2 = 42 ft^3. Note that choice C also has the right number but the wrong unit.

General Science

1.   The scale used to measure how acidic or alkaline a substance is is called the:

    A.   pH scale
    B.   Celsius scale
    C.   Richter scale
    D.   dB scale

Answer: A. pH scale
The pH scale goes from 0 to 14. A pH less than 7 indicates that a substance is acidic. A pH greater than 7 indicates that a substance is alkaline. Neutral substances have pH equal to 7.

2.   Which of the following is not a compound?

    A.   Baking soda
    B.   Concrete
    C.   Table salt
    D.   Water

Answer: B. Concrete
Concrete is a mixture of cement, water, sand, and crushed rock. All the other options are compounds. Baking soda is sodium bicarbonate, table salt is sodium chloride, and water is a compound of hydrogen and oxygen.

3.   C is the chemical symbol for the element:

    A.   Calcium
    B.   Carbon
    C.   Chlorine
    D.   Chromium

Answer: B. Carbon
C is the chemical symbol for carbon, an element that has millions of known compounds.

4.   A rainbow is formed as a result of:

A.   Reflection of light
B.   Interference of light
C.   Diffraction of light
D.   Dispersion of light

Answer: D. Dispersion of light
Dispersion is the separation of white light into its constituent colors. A rainbow is formed because light of each color bends at a slightly different angle as it passes through a raindrop.

5.   A jar with a metal lid is hard to open. You hold the lid near the fire and the lid loosens. This is because:

A.   The heated metal lid expands less than the glass jar
B.   The heated glass jar contracts while the metal lid expands
C.   The heated metal lid expands more than the glass jar
D.   The heated glass jar expands while the metal lid contracts

Answer: C. The heated metal lid expands more than the glass jar
The metal lid has a higher coefficient of thermal expansion than glass. So it expands more than the glass does when heated.

6.   A car goes from 0 to 60 mph in 5 seconds. What is its average acceleration?

A.   60 mph per second
B.   5 mph per second
C.   300 mph per second
D.   12 mph per second

Answer: D. 12 mph per second
Acceleration is the rate of change of velocity. Since the velocity change is 60 mph in 5 seconds, the average rate of change is 12 mph per second.

7. **The arrangement of stars called the big dipper is part of the:**

    A.   Great Bear constellation
    B.   Little Bear constellation
    C.   Orion constellation
    D.   Andromeda constellation

Answer: A. Great bear constellation
The seven stars forming the big dipper are the brightest stars of the constellation named the Great Bear or Ursa Major.

8. **A black hole is a volume of space:**

    A.   From which no radiation can escape
    B.   That does not contain any matter
    C.   That is extremely cold
    D.   That contains no energy

Answer: A. From which no radiation can escape
A black hole is created when a supergiant star implodes. Even light cannot escape from a black hole. That is why it looks black.

9. **The great red spot seen on Jupiter is:**

    A.   A large crater
    B.   A vast desert
    C.   An area of very high temperature
    D.   A giant storm

Answer: D. A giant storm
The great red spot on Jupiter is a high pressure storm that people have been observing for hundreds of years.

10. **A dormant volcano:**

    A.   Has never erupted
    B.   Is capable of erupting
    C.   Will never erupt again
    D.   Is currently erupting

Answer: B. Is capable of erupting
The word *dormant* means *sleeping*. A dormant volcano is currently inactive but may have erupted in the past and is capable of erupting again.

11.   Earthquake magnitudes are measured using a:

A.   Barometer
B.   Micrometer
C.   Seismograph
D.   Chronograph

Answer: C. Seismograph
A seismograph is an instrument that is used to detect seismic or earthquake waves.

12.   An occluded front is:

A.   A type of cold front
B.   A type of warm front
C.   A warm front overrun by a cold front
D.   A cold front overrun by a warm front

Answer: C. A warm front overrun by a cold front
An occluded front is a front formed when a cold front has caught up to a warm front and has intermingled, usually by sliding under the warmer air.

13.   Isobars are lines connecting regions of equal:

A.   Pressure
B.   Temperature
C.   Humidity
D.   Wind speed

Answer: A. Pressure
Weather maps often show lines connecting points of equal atmospheric pressure. These lines are known as isobars.

14.   Which of these is an abiotic component of an ecosystem?

A.   Primary producer
B.   Detrivore
C.   Herbivore
D.   Sunlight

Answer: D. Sunlight
The abiotic components of an ecosystem are the non-living components such as sunlight, water, and soil.

15. **Which of these are not arthropods?**

    A. Crustaceans
    B. Worms
    C. Insects
    D. Arachnids

Answer: B. Worms
Worms are annelids, not arthropods. Arthropods, such as spiders and shellfish, have jointed legs, segmented bodies, and a hard outer shell or skin.

16. **The four blood groups are:**

    A. A, B, C, and D
    B. A, B, AB, and O
    C. A, B, AB, and BA
    D. AB, BC, CD, and DA

Answer: B. A, B, AB, and O
People with blood group A have A antigens on the surface of their red blood cells and B antigens in their blood plasma. People with blood group B have B antigens on the surface of their red blood cells and A antigens in their blood plasma. People with blood group AB have both A and B antigens on the surface of their red blood cells. People with blood group O have both A and B antigens in their blood plasma.

Mechanical Comprehension

1.   **The bar shown in the diagram below pivots about point P. Forces F1 and F2 are applied at the points shown. If F1 and F2 are equal in magnitude then which of the following is true?**
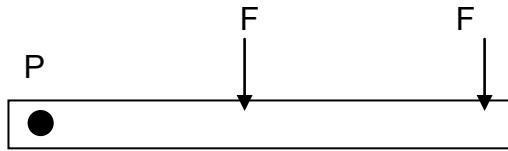
A.   F1 exerts a greater torque on the bar than F2.
B.   F2 exerts a greater torque on the bar than F1.
C.   F1 and F2 exert equal torques on the bar.
D.   We cannot tell whether F1 or F2 exerts a greater torque.

Answer: B. F2 exerts a greater torque on the bar than F1.
The torque exerted on the bar is a product of the force and the distance of the force from the pivot point: Torque = Force × Distance. Since both forces are equal, the one further away from the pivot point, F2, exerts a greater torque.

2.   **Why is it easier to punch a hole in a piece of paper with a sharp needle than with a blunt pencil?**

A.   The needle magnifies the force applied
B.   The pencil is too thick
C.   For the same force, the needle applies greater pressure on the paper
D.   The needle is longer and applies force for a longer duration

Answer: C. For the same force, the needle applies greater pressure on the paper
Pressure is the force exerted on unit area of a surface. It is given by the formula
$P = \dfrac{F}{A}$ where F is the force exerted and A is the total area on which the force is exerted. So the same force applied on a smaller area results in greater pressure.

3.   A machine does not:

    A.   Change the direction of a force
    B.   Reduce the effort needed to lift a heavy load
    C.   Transfer a force to a different location
    D.   Reduce the amount of energy needed to perform a task

Answer: D. Reduce the amount of energy needed to perform a task
Machines help us do work more easily by reducing effort needed, by changing its direction or transferring a force to a different place. But the total amount of energy required to do a task does not change.

4.   The lever below pivots on a fulcrum. An effort of 2 lbs is applied on one side of the fulcrum to lift a load of 8 lbs on the other side of the fulcrum. What is the mechanical advantage of the lever?

       2   8
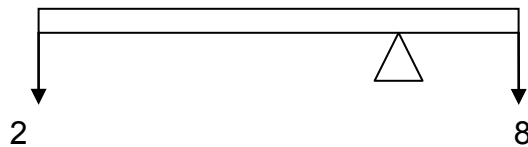
    A.   2
    B.   4
    C.   8
    D.   16

Answer: B. 4

$$\text{Mechanical advantage} = \frac{\text{Output force}}{\text{Input force}} = \frac{\text{Load}}{\text{Effort}} = 8 \text{ lbs}/ 2 \text{ lbs} = 4.$$

5.   The lever described in the previous question is a:

    A.   First class lever
    B.   Second class lever
    C.   Third class lever
    D.   Fourth class lever

Answer: A. First class lever
In a first class lever, the fulcrum is between the input (effort) and output (load). In a second class lever, the load is between the fulcrum and effort. In a third class lever, the effort is between the fulcrum and load. There is no such thing as a fourth class lever.

6. The force F needed to lift the 100 lb load in the pulley system below is:
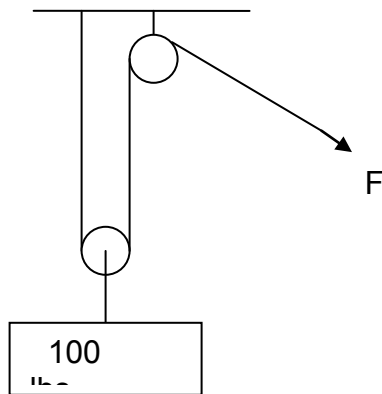
A. 50 lbs
B. 33 lbs
C. 100 lbs
D. 75 lbs

Answer: A. 50 lbs
Since 2 ropes are holding up the moveable pulley to the left, the system has a mechanical advantage of 2. (The fixed pulley to the right does not give any mechanical advantage.) Since $\dfrac{\text{Load}}{\text{Effort}} = 2$, Effort = Load/2 = 100/2 = 50 lbs.

7. **A block and tackle system consists of:**

A. Levers and wheel and axle
B. A lever and an inclined plane
C. Fixed and moveable pulleys
D. A pulley and a lever

Answer: C. Fixed and moveable pulleys
A block and tackle combines two or more pulleys into a system where one block of pulleys is fixed while the other remains moveable.

8.   What kind of a simple machine is a swinging door?

    A.   Lever
    B.   Inclined plane
    C.   Wheel and axle
    D.   Screw

Answer: A. Lever
A swinging door is a second class lever with the fulcrum at the hinge at one end and the effort applied at the other end.

9.   What type of simple machine is used to force material apart?

    A.   Lever
    B.   Screw
    C.   Pulley
    D.   Wedge

Answer: D. Wedge
A wedge is used to force material apart. The blade of an axe is a wedge.

10.   The four basic types of gears are:

    A.   Spur, bevel, worm, rack and pinion
    B.   Spur, bevel, worm, crust
    C.   Screw, bevel, worm, rack and pinion
    D.   Spur, screw, worm, rack and pinion

Answer: A. Spur, bevel, worm, rack and pinion
A gear is a wheel with teeth on it. These teeth can mesh with teeth on other gears so that when one gear moves, the other one moves as well. The four basic types of gears are spur gears, bevel gears, worm gears, and rack and pinion gears.

11.   Which of the following is not an inclined plane?

      A.   Stairs
      B.   Parking ramp
      C.   Moving walkway
      D.   Ladder

Answer: C. Moving walkway
Even though stairs are not shaped like a smooth incline, they use a slope to make it easier for people to climb upwards. Parking ramps and ladders also use angled surfaces to make it easier to move up. A moving walkway is typically horizontal and not set at an incline.

12.   A rack and pinion gear:

      A.   Changes the angle of rotation
      B.   Changes the direction of linear motion
      C.   Changes rotational motion into linear motion
      D.   Reverses the direction of rotation

Answer: C. Changes rotational motion into linear motion
A rack and pinion arrangement has one toothed wheel (pinion) meshed with a flat toothed surface (rack). It converts the rotational motion of the pinion into a linear motion of the rack.

13.   The gear ratio of a set of meshed gears is 4. If the number of teeth on the driven gear is 100, what is the number of teeth on the driver?

      A.   400
      B.   100
      C.   104
      D.   25

Answer: D. 25

The gear ratio of a set of meshed gears = $\dfrac{\text{number of teeth on driven gear}}{\text{number of teeth on driver}}$. So the number of teeth on the driver = number of teeth on driven gear / gear ratio = 100/4 = 25.

14.   The primary function of a spring in a machine is to:

    A.   Magnify force
    B.   Store energy
    C.   Change direction of rotation
    D.   Change speed of movement

Answer: B. Store energy
You can compress or extend a spring to store energy in it. Machines often use springs to store energy for part of a cycle and release it later.
.

15.   The lift on an airplane wing can be explained using:

    A.   Pascal's principle
    B.   Archimedes' principle
    C.   Bernoulli's principle
    D.   Boyle's law

Answer: C. Bernoulli's principle
According to Bernoulli's principle, where the velocity of a fluid is high, the pressure is low and vice versa. Since the upper surface of the airplane wing is more curved, air must flow faster and the pressure is lower above the wing than below the wing. This gives the wing its lift.

16.   When pressure is applied to one part of a confined fluid:

    A.   It is transmitted undiminished in all directions
    B.   It is reduced by the time it reaches the other parts
    C.   It increases as it moves through the fluid
    D.   It is not transmitted to any other part

Answer: A. It is transmitted undiminished in all directions
According to Pascal's principle, when pressure is applied to a confined fluid it is transmitted undiminished in all directions. When you press the bottom of a toothpaste tube, the pressure is transmitted to the top and the toothpaste comes out.

Electronics Information

1. **A circuit segment contains only two capacitors of equal value, connected in parallel. If the total capacitance of the circuit segment is 300 uF, what is the value of each capacitor?**

    A. 50 uF
    B. 150 uF
    C. 300 uF
    D. 600 uF

Answer: B. 150 uF
The total value of two capacitors connected in parallel can be calculated using the formula
       C = C1 + C2
Since the two capacitors have the same value, each capacitor must be 150 uF.

2. **The speed of electricity is approximately the same as the speed of:**

    A. Light
    B. Sound
    C. Magnetism
    D. Heat

Answer: A. Light
The speed of electricity is almost as fast as the speed of light.

3. **The Ohm is a unit of:**

    A. Capacitance
    B. Resistance
    C. Luminance
    D. Inductance

Answer: B. Resistance
Resistance is measured in Ohms, represented by the symbol Ω.

4.   **The power law states that:**

A. $P = I \times E$
B. $P = I^2 \times E$
C. $P = I \times E^2$
D. $P = I^2 \times E^2$

Answer: A. P = I × E
Power is equal to current times voltage.

5.   **Dielectric material is:**

A.   Magnetic
B.   Nonmagnetic
C.   Conductive
D.   Nonconductive

Answer: D. Nonconductive
Dielectric material is nonconductive material, typically used in capacitors.

6.   **Which type of capacitor is best suited for high frequency applications?**

A.   Mylar
B.   Mica
C.   Tantalum
D.   Electrolytic

Answer: B. Mica
Mica has a very special use in electronics. Mica capacitors are used for high frequency applications.

7.   **Motors are used to convert:**

A.   Radiant energy to electrical energy
B.   Electrical energy to radiant energy
C.   Mechanical energy to electrical energy
D.   Electrical energy to mechanical energy

Answer: D. Electrical energy to mechanical energy
Motors are used to convert electrical energy to mechanical energy, for example, the turning of the wheels on a car.

9. **A core of a typical inductor core is made of:**

    A.   Tin
    B.   Copper
    C.   Iron
    D.   Carbon

Answer: C. Iron
A typical inductor is made of copper wire coiled around a ferromagnetic core (iron).

9. **In an AC circuit, inductors behave like:**

    A.   Frequency-dependent voltage sources
    B.   Frequency-dependent resistors
    C.   Frequency-independent voltage sources
    D.   Frequency-independent resistors

Answer: B. Frequency-dependent resistors
In an AC circuit, inductive reactance goes up as frequency goes up and inductive reactance goes down as frequency goes down.

10. **In which band of the electromagnetic spectrum is 60 MHz?**

    A.   ULF
    B.   VLF
    C.   VHF
    D.   UHF

Answer: C. VHF
Very High Frequency (VHF) band ranges from 30 MHz to 300 MHz.

11. **What type of mechanical switch will connect two circuits to one of two positions?**

    A.   SPST
    B.   SPDT
    C.   DPST
    D.   DPDT

Answer: D. DPDT
DPDT is an acronym for double-pole, double-throw, also known as a two-way switch.

12. **What is the AC voltage delivered to a typical household outlet?**

    A.   60 volts
    B.   100 volts
    C.   120 volts
    D.   200 volts

Answer: C. 120 volts
The AC voltage required by a typical household appliance, such as a toaster or vacuum cleaner, is 120 volts.

13. **In an AC circuit, the term X refers to:**

    A.   Resistance
    B.   Reactance
    C.   Impedance
    D.   Inductance

Answer: B. Reactance
Reactance can be capacitive or inductive.

14. **A solar cell can be used to convert:**

    A.   Radiant energy to electrical energy
    B.   Electrical energy to radiant energy
    C.   Mechanical energy to electrical energy
    D.   Electrical energy to mechanical energy

Answer: A. Radiant energy to electrical energy
A solar cell converts light (a type of radiant energy) to electricity.

15. **Which is the worst electrical conductor?**

    A.   Gold
    B.   Silver
    C.   Copper
    D.   Iron

Answer: D. Iron
Of the four metals listed, iron is the worst electrical conductor; silver is the best.

16. **What is the smallest number of diodes required to make a half-wave rectifier?**

    A.   1
    B.   2
    C.   4
    D.   8

Answer: A. 1
A half-wave rectifier is usually made with one diode and one resistor.

Shop Information

1.   Which statement is true?

      A.   A hammer is a type of sledge.
      B.   A sledge is a type of mallet.
      C.   A hammer is a type of mallet.
      D.   A mallet is a type of hammer.

Answer: D. A mallet is a type of hammer.
Mallets and sledges are types of hammers. Most hammers feature a large head area, which adds mass to the tool to aid in the delivery of a forceful impact, and a long handle that works as a force multiplier.

2.   How does handle length affect the force of a hammer?

      A.   The longer the handle, the greater the force
      B.   The shorter the handle, the greater the force
      C.   The longer the handle, the smaller the force
      D.   Handle length does not affect the force of a hammer

Answer: A. The longer the handle, the greater the force
The longer the handle, the greater the force multiplier. The handle acts as a simple lever.

3.   Kayla measures the length of a piece of wood with a tape measure. The length is $39\frac{1}{4}$". What is this length in feet and inches?

      A.   39 feet 25 inches
      B.   3 feet 25 inches
      C.   3 feet 9.25 inches
      D.   3 feet 3.25 inches

Answer: D. 3 feet 3.25 inches
There are 12 inches in 1 foot., so begin by dividing 39 by 12 to convert from inches to feet.

4.   The Phillips screw is an evolved form of what type of screw?

A.   Slot head
B.   Cross slot
C.   Frearson
D.   Square

Answer: B. Cross slot
The Phillips screw is an evolved form of the cross slot screw. It is designed to cam the screwdriver out of the screw when the screw stalls, preventing damage to the screw head caused by overdriving.

5.   A machine that rotates a piece of wood or other material and shapes it is called a:

A.   Lathe
B.   Gouge
C.   Slip roll
D.   Band saw

Answer: A. Lathe
A lathe is a machine that rotates a piece of material and shapes it. Lathes can be used to shape wood, metal, glass, and pottery.

6.   A chisel with an angled cutting blade that is used for finishing work is called a:

A.   Butt chisel
B.   Corner chisel
C.   Skew chisel
D.   Gouge

Answer: C. Skew chisel
A skew chisel has an angled cutting blade that is used for finishing work.

7.   A spanner is another name for a:

    A.   Caliper
    B.   Wrench
    C.   Level
    D.   Lathe

Answer: B. Wrench
A spanner is another name for a wrench. It is a tool used to provide mechanical advantage while
applying torque.

8.   Which type of wrench is also called a Crescent wrench?

    A.   Pipe wrench
    B.   Adjustable-end wrench
    C.   Socket wrench
    D.   Combination wrench

Answer: B. Adjustable-end wrench
Adjustable-end wrenches are commonly called Crescent wrenches because they were initially
developed by the Crescent Tool and Horseshoe Company.

9.   Breaker bars are used with:

    A.   Screwdrivers
    B.   Chisels
    C.   Sledges
    D.   Wrenches

Answer: D. Wrenches
Hand wrenches that are used to torque heavy bolts or bolts that are seized often have very long handles or attachable handles known as breaker bars.

10. **Which type of caliper is used to scribe metal surfaces?**

    A.   Digital caliper
    B.   Micrometer caliper
    C.   Vernier caliper
    D.   Divider caliper

Answer: D. Divider caliper
In metalworking, divider calipers are used to measure distance and scribe metal surfaces by scratching them.

11. A crocus cloth is used for:

    A.   Polishing
    B.   Removing paint
    C.   Applying paint
    D.   Applying sealant

Answer: A. Polishing
A crocus cloth can be used for extra-fine polishing. It is similar to sand paper but uses an applied polishing or lapping compound in place of bonded abrading particles.

Auto Information

1.   How often should oil be changed?

      A.   Every one month or 1,000 miles
      B.   Every five months or 5,000 miles
      C.   According to the manufacturer's recommendations
      D.   Yearly

Answer: C. According to the manufacturer's recommendations
While three months or 30,000 miles was the old standard, changes in manufacture, oil design (especially with synthetics), and heavy use all determine how often oil should be changed.

2.   The mass air flow sensor does what?

      A.   Measures in pounds per square inch the compression of the cylinders
      B.   Measures the amount of air going into the engine
      C.   Measures the speed of the vehicle by metering the air flow into the engine compartment
      D.   Measures the amount of air going out the exhaust

Answer: B. Measures the amount of air going into the engine
The mass air flow sensor lets the car's computer know how much air the engine is taking in so it can adjust the fuel and timing.

3.   The harmonic balancer is part of the:

      A.   Engine
      B.   Transmission
      C.   Radiator
      D.   Differential

Answer: A. Engine
The harmonic balancer is mounted on the end of the crank shaft. It reduces vibration in the engine and serves as a drive pulley for belts.

4. **Which of the following is a part of the transmission?**

    A.   The intake valve
    B.   The clutch plate
    C.   The valve body
    D.   The flywheel

Answer: C. The valve body
The valve body controls the clutches in the transmission by channeling pressurized fluid through a series of valves.

5. **Where can you find a dampener spring?**

    A.   In the exhaust gas recirculation valve
    B.   As part of the muffler
    C.   In the water pump
    D.   As part of a strut

Answer: D. As part of a strut
The dampener spring absorbs the impact of bumps in the road.

6. **In automotive electronics, red wires typically indicate:**

    A.   Positive current
    B.   Negative current
    C.   Grounded circuits
    D.   High voltage

Answer: A. Positive current
In most automotive applications, red wires are connected to the positive (+) side of the battery, and black wires are connected to the negative (–) side of the battery.

7. **Engine coolant is typically made from propylene glycol. What is one advantage of using this over plain water?**

    A.   It is orange, so you can see leaks better.
    B.   It prevents corrosion.
    C.   It lubricates the radiator.
    D.   It is thicker than water.

Answer: B. It prevents corrosion.
Plain water fosters corrosion, especially in the presence of heat.

8.   Directional tires can only be rotated how?

A.   Directional tires can't be rotated
B.   Side to side
C.   Front to back, across
D.   Front to back, same side

Answer: D. Front to back, same side
Directional tires have tread which is designed to rotate in only one direction, so they cannot be moved from the right to the left.

9.   How are lug nuts used?

A.   To hold the axle to the wheel
B.   To hold the rim to the hub
C.   To hold the axle in the transmission
D.   To hold the brake to the hub

Answer: B. To hold the rim to the hub
The lugs are the threaded rods on which the wheel is mounted. The rim is the metal part of the wheel (the rim/tire assembly).

10.   The compression ratio is a measurement of the:

A.   Difference in volume between the piston down and up
B.   Amount of air in different sized tires
C.   Difference between the engine compression at high and low rpm
D.   Difference between the engine compression at high and low speed

Answer: A. Difference in volume between the piston down and up
Compression takes place in the engine as the piston rises and squeezes the air/fuel mixture.

11.   The evaporator is found in the:

      A.   Cooling system
      B.   Emissions system
      C.   Electrical system
      D.   Air conditioning system

Answer: D. Air conditioning system

Chilled refrigerant runs through the evaporator where air is blown over it to cool it for the car's interior.

Assembling Objects

For each pair of labeled shapes in questions 1 to 8, choose the figure that shows the shapes connected correctly.

1.

A   B

A   B

A   B   C   D

Answer: C

2.

Answer: A

3.

Answer: B

4.

A

B

C

D

Answer: B

5.

A

B

C

D

Answer: A

6.

A   B   C   D

Answer: C

7.

A   B   C   D

Answer: D

8.

A
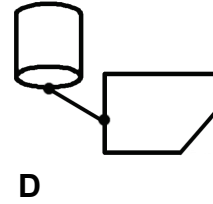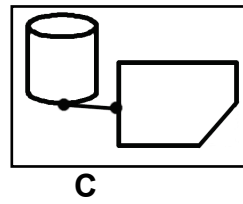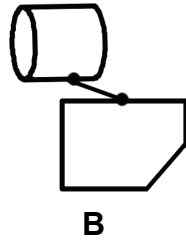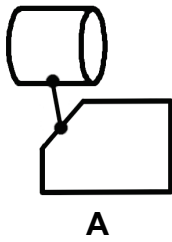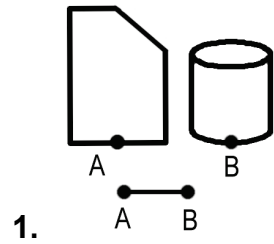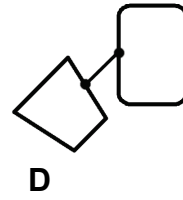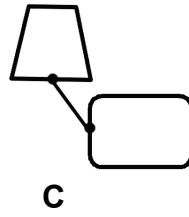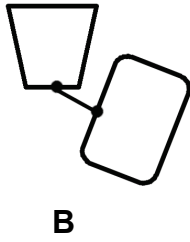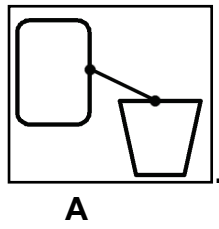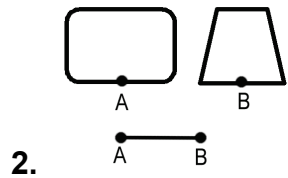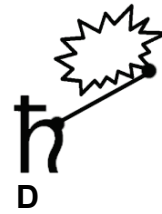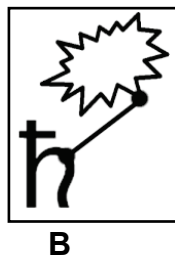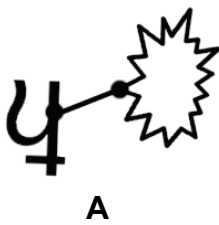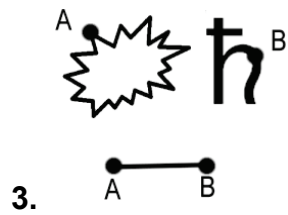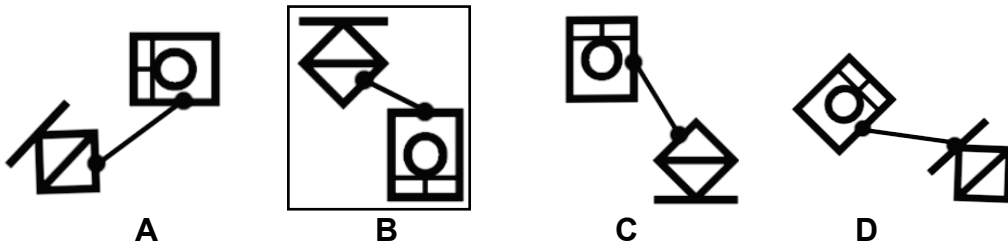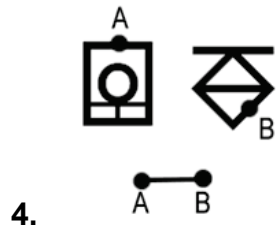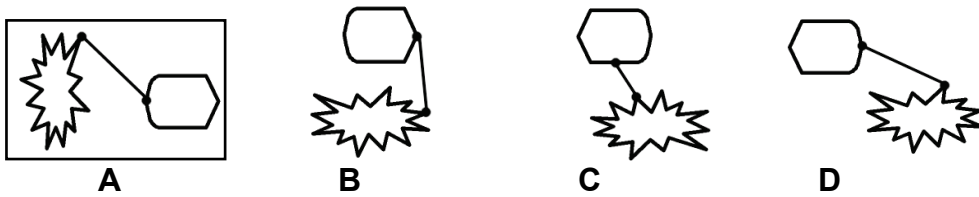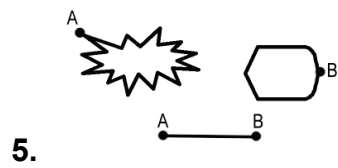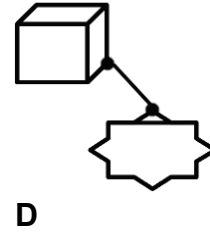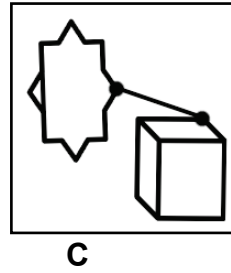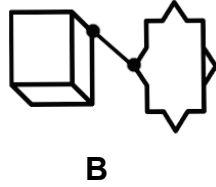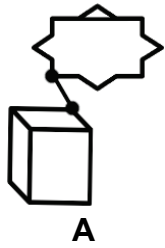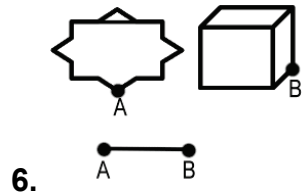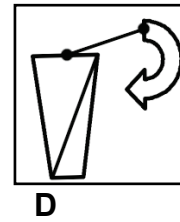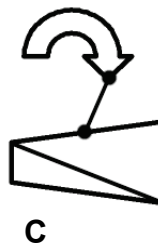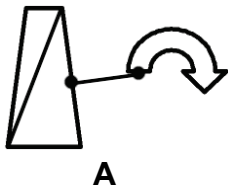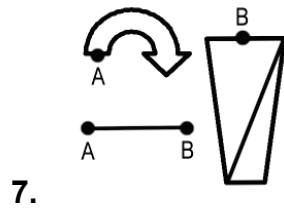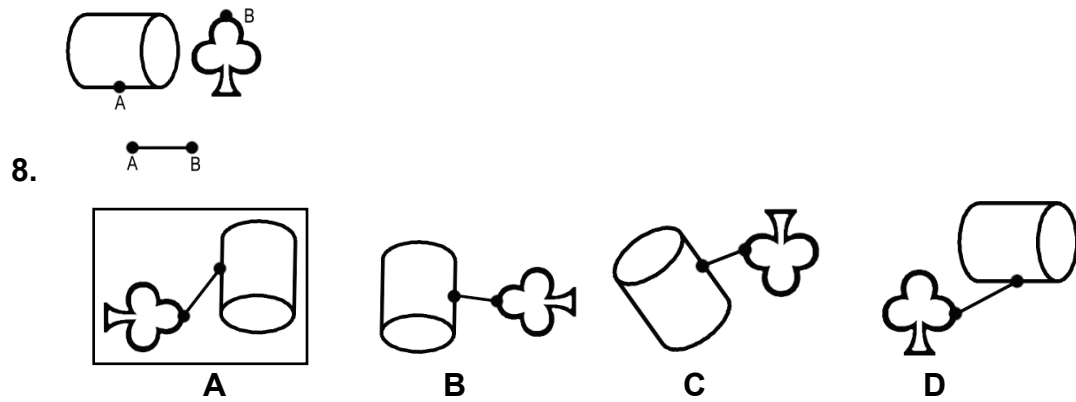
Answer: A

For each set of shapes in questions 9 to 16, choose the figure that shows the shapes assembled into an object.

9.
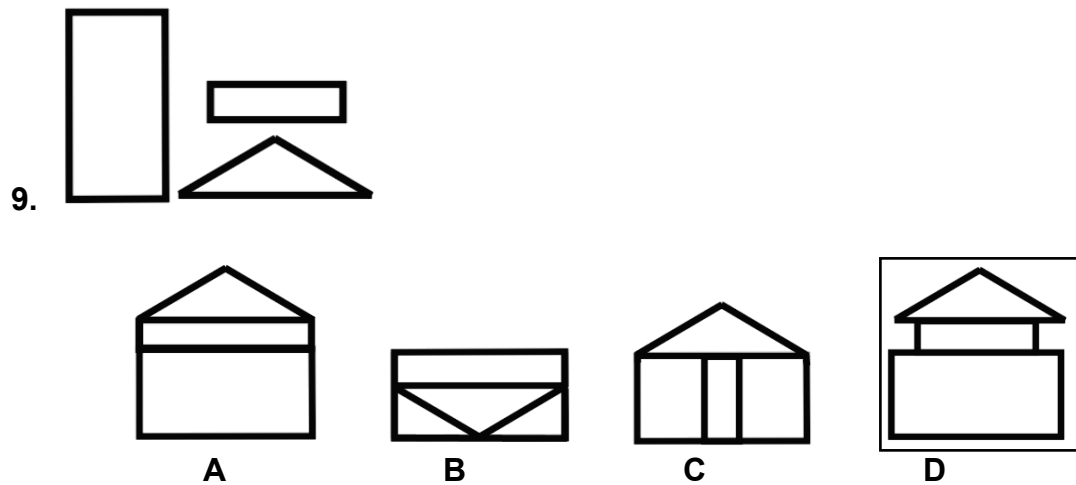
A   B   C   D

Answer: D

10.
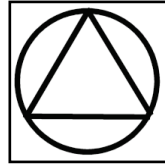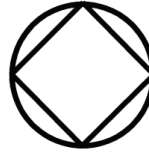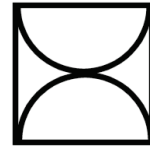
A   B   C   D

Answer: B

11.

A   B   C   D

Answer: A

12.

| A | B | C | D |

Answer: D

13.

| A | B | C | D |

Answer: A

14.

A B C D

Answer: D

15.
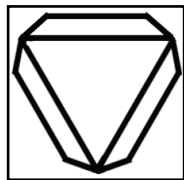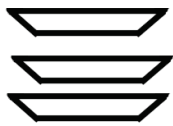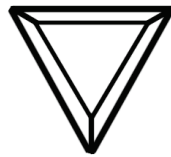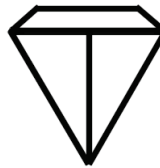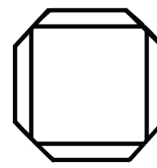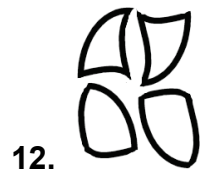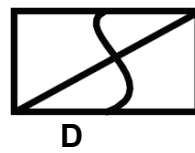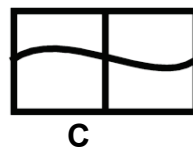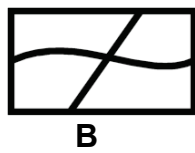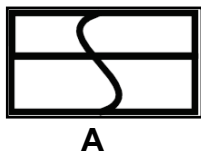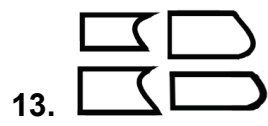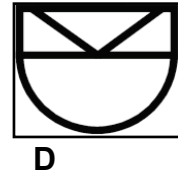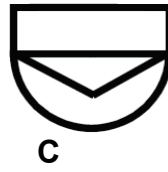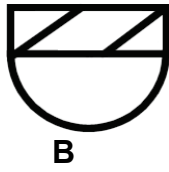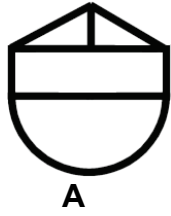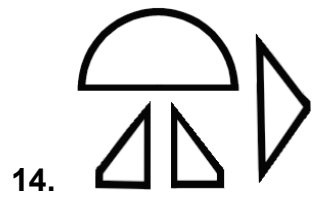
A B C D

Answer: C

16.

A   B   C   D

Answer: D