

IPC 1B Practice Exam

The following practice exam will help prepare you for the CBE. The questions are similar to those on the CBE, though not identical, and the format is similar. The practice exam is presented to help you study for the CBE. Work straight through the practice exam as if you were actually taking the proctored test. When you encounter a question you don't know at all or a topic that isn't fresh in your memory, mark that question so that you will know to go back and study the topic more thoroughly.

Formula Bank

The following formulas are covered in the scope of this course. Although you will not be required to use them all, your knowledge of these formulas will help you in reasoning through many of the questions on this exam.

$D = m/v$	$p = F/A$
$V = l \times w \times h$	$w = F \times d$
$A = l \times w$	$P = W/t$
$s = d/t$	GPE = weight \times height
$d = v \times t$	$KE = \frac{m \times v^2}{2}$
$MA = R/E$	$H = m \times \Delta T \times s.h.$
momentum = $m \times g$	$V = I \times R$
$F = m \times a$	$P = V \times I$
$W = m \times g$	$E = P \times t$
$v = \lambda \times f$	

Multiple Choice

Circle the letter of the response that *best* answers the question or completes the statement.

1. The law of conservation of energy states that
 - A. energy can be gained but not lost.
 - B. energy can be lost but not gained.
 - C. energy cannot be lost or gained.
 - D. kinetic energy is conserved, but potential energy is not.

2. A distance-time graph for acceleration is always a _____ line.
- A. straight
 - B. crooked
 - C. curved
 - D. wavy
3. Which of the following is accelerating?
- A. A car traveling 33 km/hr slows to 25 km/hr.
 - B. A car traveling 33 km/hr speeds up to 42 km/hr.
 - C. A car traveling 35 km/hr due north turns east while still traveling 35 km/hr.
 - D. All of the above.
4. A bus leaves at 9 a.m. with a group of tourists. They travel 350 km before stopping for lunch. Then they travel an additional 250 km until the end of their trip at 3 p.m. What was the average speed of the bus?
- A. 55 km/h
 - B. 75 km/h
 - C. 100 km/h
 - D. 600 km/h
5. A change of position relative to some reference point is
- A. speed.
 - B. velocity.
 - C. acceleration.
 - D. motion.
6. Balanced forces cause
- A. a moving particle to slow down.
 - B. a moving particle to speed up.
 - C. no change in motion.
 - D. a change in direction.
7. One newton equals one
- A. kg.
 - B. $\text{kg} \cdot \text{m}$.
 - C. $\text{kg} \cdot \text{m}/\text{sec}$.
 - D. $\text{kg} \cdot \text{m}/\text{sec}/\text{sec}$.
8. A newton in SI is most like which unit in the system of measurement used in the United States?
- A. watt
 - B. pound
 - C. pound-foot
 - D. joule

9. The attractive force between all objects in the universe is called
- A. inertia.
 - B. gravity.
 - C. magnetism.
 - D. a push or a pull.
10. A force
- A. is a push or a pull.
 - B. gives energy to an object.
 - C. can cause an object to change its motion.
 - D. can do all of the above.
11. An astronaut with a mass of 80 kg experiences *weightlessness* when she is in space. What will her weight be when she returns to Earth?
- A. 80 kg
 - B. 80 lbs
 - C. 800 kg
 - D. 784 N
12. Two balls are dropped from the top of a ladder. They are both the same size, but one is very light and the other is very heavy. Which ball will hit the floor first?
- A. the heavier ball
 - B. the lighter ball
 - C. Both will hit at the same time.
 - D. Not enough information is given to determine the answer.
13. The relationship between buoyant force and weight of displaced fluid was stated by
- A. Archimedes.
 - B. Newton.
 - C. Orville Wright.
 - D. Bernoulli.
14. Compared with the slow-moving water along the edge of a river, the rapidly-moving stream in the middle exerts _____ pressure.
- A. less
 - B. no
 - C. more
 - D. the same
15. In order for a submarine to float, the density of the ocean water must be
- A. greater than the density of the submarine.
 - B. less than the density of the submarine.
 - C. equal to or greater than the density of the submarine.
 - D. The density of the submarine is not related to either mass or volume.

16. In a hydraulic system, the pressure of the fluid in the system is
- A. the same throughout the system.
 - B. greater in the smaller piston.
 - C. greater in the larger piston.
 - D. multiplied in the larger piston.
17. Which of the following would cause an increase in pressure?
- A. increasing the area without changing force
 - B. decreasing the area without changing force
 - C. decreasing the force without changing area
 - D. decreasing both force and area by the same amount
18. An example of work being done is
- A. a child lifting a doll.
 - B. a person pushing against a locked door.
 - C. a person sitting beside an assembly line, checking the quality of glass bottles passing by.
 - D. All of the above.
19. Sharpening a wedge
- A. decreases the mechanical advantage.
 - B. increases the effort force.
 - C. decreases the mechanical advantage and increases the effort force.
 - D. increases the mechanical advantage and decreases the effort force.
20. In a second-class lever, the resistance is between the fulcrum and the effort force. Which of the following is a second-class lever?
- A. a screwdriver used to open a can of paint
 - B. a wheelbarrow
 - C. a pair of scissors
 - D. a broom handle
21. A wedge is a moving
- A. wheel and axle.
 - B. lever.
 - C. pulley.
 - D. inclined plane.
22. Because of _____, no machine has 100% efficiency.
- A. resistance forces
 - B. an increase in distance
 - C. friction
 - D. None of the above

23. Energy is defined as
- A. power.
 - B. the ability to produce heat.
 - C. a change in motion.
 - D. the ability to do work or cause change.
24. Visitors at an amusement park can plunge from a 20-m tower, attached to a bungee cord. A guest standing at the top of the tower has _____ energy.
- A. kinetic
 - B. gravitational potential
 - C. chemical
 - D. elastic potential
25. The amusement-park bungee jumper leaps from the tower, pulling the bungee cord taut at the bottom of his plunge and then bouncing back upward. What form of energy is being stored as he plunges downward?
- A. kinetic energy
 - B. gravitational potential energy
 - C. chemical energy
 - D. elastic potential energy
26. Kinetic energy depends upon
- A. velocity only.
 - B. mass only.
 - C. mass and velocity.
 - D. position.
27. Heat is **not** transferred
- A. from cold to hot.
 - B. by convection.
 - C. by conduction.
 - D. by radiation.
28. An example of a good conductor is
- A. glass.
 - B. silver.
 - C. wood.
 - D. plastic.
29. A temperature of 15°C is the same as
- A. 0 K.
 - B. 15 K.
 - C. 273 K.
 - D. 288 K.

30. The specific heat of a substance is the
- A. amount of heat needed to raise the temperature of 1 g of the substance from its melting point to its boiling point.
 - B. number of calories needed to raise the temperature of 1 g of the substance 1°C.
 - C. caloric value of the substance.
 - D. kinetic energy of the substance.
31. If it takes 1 cal of heat to raise the temperature of 1 g of water 1°C, the specific heat of water is
- A. 1 cal/g°C.
 - B. 2 cal/g°C.
 - C. 3 cal/g°C.
 - D. 4 cal/g°C.
32. In which stroke of an internal combustion engine does a spark plug ignite the fuel-air mixture?
- A. intake stroke
 - B. compression stroke
 - C. power stroke
 - D. exhaust stroke
33. Insulation materials reduce heat loss because they
- A. are poor conductors.
 - B. reduce evaporation.
 - C. block out the sun.
 - D. promote convection.
34. Active and passive heating are two types of _____ heating systems.
- A. radiant
 - B. hot-water
 - C. solar
 - D. warm-air
35. When a neutral object gains electrons,
- A. its overall charge is positive.
 - B. its overall charge is negative.
 - C. it stays neutral.
 - D. it loses as many protons as it has gained electrons.
36. Static electricity is **not** produced by
- A. conduction.
 - B. insulation.
 - C. induction.
 - D. friction.

37. Electrons are described as
- A. stationary charges.
 - B. moving charges.
 - C. nuclear particles.
 - D. lacking charge.
38. A good electrical conductor is
- A. copper.
 - B. rubber.
 - C. glass.
 - D. wood.
39. A circuit is in series if
- A. different parts are on separate branches.
 - B. electrons may take several paths.
 - C. electrons have only one path at all times.
 - D. only one circuit is open and the other branches are closed.
40. As a positively charged object touches the knob of an uncharged electroscope,
- A. the positive charges are transferred to the knob.
 - B. the positive charges are transferred to the leaves.
 - C. free electrons from the knob and leaves are attracted to the object.
 - D. the leaves become negatively charged.
41. Magnetic domains are groups of aligned magnetic fields of
- A. atoms.
 - B. neutrons.
 - C. nuclei.
 - D. protons.
42. The ends of a bar magnet are called the
- A. tips.
 - B. fields.
 - C. cores.
 - D. poles.
43. An electromagnet is weakened by
- A. increasing the number of loops.
 - B. decreasing the current.
 - C. increasing the current.
 - D. using an iron core.

44. What happens to magnetic force as the distance between two magnetic poles decreases?
- A. It remains constant.
 - B. It decreases.
 - C. It increases.
 - D. It first increases and then decreases as they draw nearer.
45. Which of the following devices contains an electromagnet?
- A. electric doorbell
 - B. speakers of a sound system
 - C. telephone
 - D. All of the above
46. Before electricity can come from the high voltage wires that travel from a power plant into a city, the voltage must be reduced from 2,400 V to 120 V. If the primary coil has 500 turns of wire, how many turns are on the secondary coil?
- A. 200
 - B. 25
 - C. 50
 - D. 2,280
47. If a wire carrying current is twisted into loops, the strength of its magnetic field
- A. is increased.
 - B. is decreased.
 - C. is not affected.
 - D. increases and then decreases.
48. Energy traveling through matter may be
- A. a series of waves.
 - B. a disturbance along the surface of that matter.
 - C. transferred from one part to another.
 - D. All of the above.
49. In a transverse wave, a trough is _____ of particles of the medium.
- A. any displacement
 - B. any maximum displacement
 - C. a maximum displacement downward
 - D. a maximum displacement upward
50. All waves
- A. are both transverse and longitudinal.
 - B. transfer energy through a medium.
 - C. move at right angles to the medium.
 - D. move parallel to the medium.

51. If you read “60 Hz,” you know that means
- A. waves are 60 mm long.
 - B. 60 waves pass a given point each second.
 - C. waves have an amplitude of 60 mm.
 - D. waves travel at 60 λ /sec.
52. If you reach your hand into an aquarium, you may notice that your arm looks bent or broken. This is because of a phenomenon called
- A. refraction.
 - B. reflection.
 - C. diffraction.
 - D. interference.
53. Sound travels as a
- A. series of compressions and rarefactions.
 - B. series of compressions only.
 - C. series of up-and-down vibrations.
 - D. wave without a medium.
54. Which of the following materials would transmit sound most quickly?
- A. air
 - B. oil
 - C. iron
 - D. water
55. Sounds above how many dB may cause permanent hearing damage in humans?
- A. 1
 - B. 10
 - C. 20
 - D. 120
56. Sounds with intensities great enough to damage human hearing might be generated by
- A. jet airplanes.
 - B. amplification systems at rock concerts.
 - C. jackhammers and other machines at construction sites.
 - D. All of the above.
57. High pitch is produced by sound waves that have
- A. acoustical properties.
 - B. ultrasonic properties.
 - C. high frequencies.
 - D. low frequencies.

58. The property of sound that increases when sounds get louder is
- A. frequency.
 - B. pitch.
 - C. intensity.
 - D. wavelength.
59. The Doppler effect may be generated when
- A. the source of sound and the observer move away from each other.
 - B. an observer moves toward the source of sound.
 - C. an observer moves away from the source of sound.
 - D. All of the above.
60. Examples of waves that travel in vacuums are _____ waves.
- A. light
 - B. sound
 - C. water
 - D. surface
61. Infrared rays
- A. cannot be seen.
 - B. are felt as heat.
 - C. have lower frequencies than visible red light.
 - D. All of the above.
62. The electromagnetic spectrum does **not** include
- A. gamma rays.
 - B. infrared rays.
 - C. X-rays.
 - D. sound rays.
63. A person waiting to see a grand parade may hear the sounds of a band coming even before the band turns the corner to march along the street the watcher is on, but the sound is not very clear. This effect is described as
- A. reflection.
 - B. refraction.
 - C. diffraction.
 - D. rarefaction.

continued →

Written Response

Answer the following questions on your own paper in complete sentences. Show all work, including units, cancellations, etc. Partial credit may be given even if the final answer is incorrect, as long as your work is shown.

64. People living at the Earth's equator are traveling at a speed of about 1,670 km/hr as the Earth spins on its axis. Explain why these people do not feel themselves moving at this rapid speed.
65. Describe how a submarine rises and falls in the ocean. Be sure you demonstrate an understanding of the physical property involved and name the scientist credited with discovering and describing that property.
66. At a lake, a large number of dead fish are washed up on the shore near a pipe that is pouring forth water from a nearby electric plant. Explain why the fish died and how to correct the problem.
67. Draw a transverse wave. Label the following: *crest*, *trough*, *wavelength*, and *amplitude*.
68. Describe energy conversions that take place as a person jumps on a trampoline.