

## 780 Multiple-Choice Questions for Physical Science:

These multiple choice questions are most suited for grades 9-12, but could be used in grades 6-8 with advanced students. [Answers are given in blue text](#). The questions are unnumbered for easier incorporation into your materials. Just copy and paste selected questions into your test document.

Some historical questions are included. That content may not be covered in your text, but it makes a great take-home assignment for online research. These questions were developed for the course Harvard Project Physics. HPP introduced the scientists behind the science, and how they used the scientific method. The course starts with astronomy, using it to show examples of the scientific method in action, how science corrects and updates its theories, and how scientific models evolve.

All questions are "classroom tested" and have been revised as needed to resolve clarity issues and minimize arguments about the right answer. The answer key is guaranteed correct.

A calculator will be required to answer some of the questions.

The following topics are included:

- Page 02: Astronomy (133 questions)
- Page 17: Significant Figures (18 questions, with graphics)
- Page 19: Kinematics (56 questions)
- Page 26: Dynamics (85 questions)
- Page 36: Gravity (35 questions)
- Page 40: Vectors-1 (27 questions, text only)
- Page 43: Vectors-2 (20 questions, with graphics)
- Page 48: Impulse & Momentum (37 questions)
- Page 53: Work & Energy (36 questions)
- Page 57: Kinetic Theory (52 questions)
- Page 63: Thermodynamics (61 questions)
- Page 70: Waves (53 questions)
- Page 76: Electricity & Magnetism (119 questions)
- Page 90: Light & Optics (48 questions)

## From Kinematics

You cover a distance of 12 miles moving at an average speed of 3 mi/hr. Elapsed time =

- a. 0.25 hr
- b. 0.33 hr
- c. 0.50 hr
- d. 4.0 hr

You increase your speed by 20 m/s in a time of 4 seconds. Your rate of acceleration was

- a.  $0.5 \text{ m/s}^2$ .
- b.  $2 \text{ m/s}^2$ .
- c.  $5 \text{ m/s}^2$ .
- d.  $80 \text{ m/s}^2$ .

If a distance vs. time graph records those quantities in units of feet and hours, then a plot from (2,3) to (5,9) represents a speed of

- a. 0.5 ft/hr.
- b. 2 ft/hr.
- c. 3 ft/hr.
- d. 6 ft/hr.

On a graph of distance vs. time, deceleration is properly represented by a plot having

- a. increasing positive slope
- b. decreasing positive slope
- c. shortening horizontal slope
- d. All of the above are possible answers.

What is meant by the term *negative acceleration*?

- a. speed is increasing, but ever less rapidly
- b. speed is changing randomly
- c. speed is decreasing
- d. None of the above are correct choices.

You are moving at 20 m/s and decelerate at a rate of  $3 \text{ m/s}^2$  for a time of 2 seconds.  $V_f =$

- a. 10 m/s.
- b. 14 m/s.
- c. 15 m/s.
- d. 17 m/s.

You are moving at a speed of 4 m/s and accelerate at a rate of  $+2 \text{ m/s}^2$  for 5 seconds.  $V_f =$

- a. 6 m/s.
- b. 8 m/s.
- c. 14 m/s.
- d. 22 m/s.

On a graph of  $d$  vs.  $t$ , the slope of a line drawn tangent to the curve at any point equals the

- a. average speed maintained up to that point in time.
- b. acceleration occurring at that instant.
- c. instantaneous speed at that point in time.
- d. area under the curve.

What is the acceleration of a car that goes from 30 mph to 80 mph in a time of 0.25 minutes?

- a. 200 mi/hr/min
- b. 240 mi/hr/min
- c. 360 mi/hr/min
- d. 360 mi/hr/min

## From Electricity & Magnetism

When current flows through a conductor some of its energy is always lost to resistance. What happens to this "lost" energy? It

- a. shows up as charge leakage in a corona around the wire.
- b. is converted into heat which then dissipates.
- c. continues to flow until it is "recharged" at the battery.
- d. rebounds from the resistance and flows back to the source.

How much energy is gained by 2 C of charge as it falls through a potential difference of 8 V?

- a. 0.25 J
- b. 4 J
- c. 10 J
- d. 16 J

What is the purpose of a *resistor* in an electrical circuit?

- a. limiting current flow
- b. increasing voltage
- c. multiplying output power
- d. slowing the electrical force field

If you double the voltage in a circuit the current flow will

- a. also double.
- b. be cut in half.
- c. increase by a factor of four.
- d. remain the same.

If you double the resistance in an electric circuit the power output of the voltage source will

- a. also double.
- b. be cut in half.
- c. be reduced by a factor of four.
- d. remain the same.

Which of the following factors has no effect on the resistance of a given piece of wire?

- a. length
- b. diameter
- c. type of metal
- d. voltage applied

If you double the diameter of a conducting wire its resistance

- a. also doubles.
- b. will be cut in half.
- c. will be reduced by a factor of four.
- d. remains the same.

Who provided the first good evidence that there was a link between electricity and magnetism?

- a. Hans Oersted
- b. Benjamin Franklin
- c. Michael Faraday
- d. Charles Coulomb

An *electron volt* is equal to the amount of

- a. energy carried by a single charge in a 1 volt circuit.
- b. voltage needed to accelerate a single electron.
- c. energy released when an electron annihilates a positron.
- d. charge carried by a single coulomb in one amp.

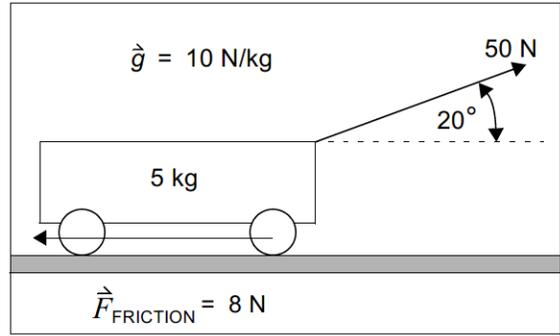
## From Vectors

What is the net horizontal force on the cart?

- a. zero
- b. 10 N
- c. 39 N
- d. 47 N

What is the net vertical force on the cart?

- a. zero
- b. 33 N
- c. 50 N
- d. 67 N

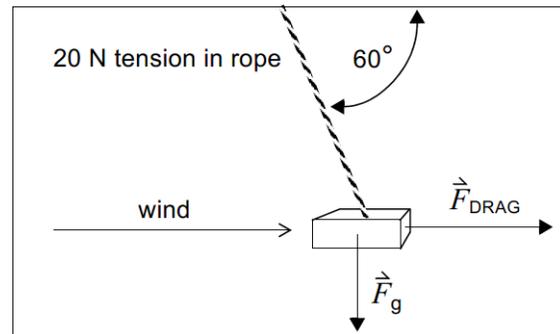


How much drag force is acting on the brick?

- a. 10 N
- b. 20 N
- c. 30 N
- d. 40 N

What is the weight of the brick?

- a. 7.3 N
- b. 17.3 N
- c. 27.3 N
- d. 40 N

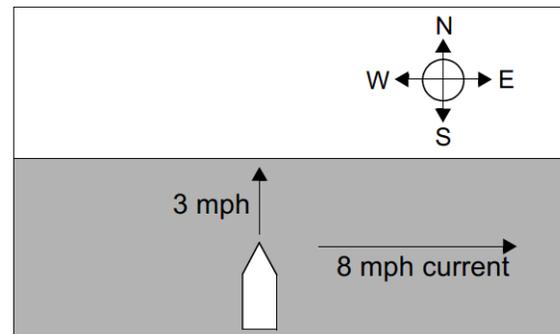


What is the boat's resultant velocity?

- a. 5 mph
- b. 7.4 mph
- c. 8.5 mph
- d. 11 mph

What is the boat's direction of motion?

- a. 12° east of north
- b. 31° east of north
- c. 45° east of north
- d. 69° east of north



A boxcar is rolling to the left at 20 mph. Inside is a lizard slinking to the right at a speed of 30 mph (relative to the boxcar). On the lizard's back is a spider who is crawling to the left at a speed of 4 mph (relative to the lizard). What is the speed of the spider relative to the ground?

- a. 6 mph
- b. 10 mph
- c. 14 mph
- d. 26 mph

