

- 1 If you are sitting in a train, looking out the window, and you see another train pass, what is your frame of reference to tell which train is moving?
- A your body
 - B your train
 - C the passing train
 - D the landscape
- 2 Lori says, My house is 2 km north and 1 km west. What do you need to know to determine where Lori's house is?
- A Lori's point of reference
 - B the direction Lori is moving
 - C the size of Lori's house
 - D what unit she is using to measure
- 3 What is the standard way to describe a position that is 10 cm to the left of a reference point?
- A 0 cm
 - B -10 cm
 - C +10 cm
 - D 10 cm
- 4 Which tool could a track coach use to help determine a runner's speed if the distance is known?
- A camera
 - B computer
 - C video recorder
 - D stopwatch
- 5 Marlon traveled for one hour at an average speed of 50 km/h. Which of the following can you conclude from this information?
- A Marlon accelerated during the trip.
 - B Marlon did not change direction during the trip.
 - C Marlon traveled at the same speed for the entire trip.
 - D Marlon traveled 50 km in all.
- 6 Average speed equals

- A the speed at each instant.
- B the speed and direction of motion.
- C total distance divided by total time.
- D total time divided by total distance.

- 7 Colleen used a ruler to measure the distance a snail traveled along the sidewalk. Which of the following is the closest to the snail's average speed for these five minutes?

Snail Travel	
Minutes	Distance Traveled (cm)
1	0.76
2	1.10
3	1.40
4	1.52
5	1.54

- A 0.31 cm/min
 - B 0.70 cm/min
 - C 0.76 cm/min
 - D 1.3 cm/min
- 8 Ellen's family drove 345 km in 4.6 hours. What was their average speed?
- A 1,600 km/h
 - B 345 km/h
 - C 75 km/h
 - D 4.6 h/km

- 9 The data shown were collected as four toy cars rolled down tracks made of ramps with the same angles. Given these data, one can conclude that

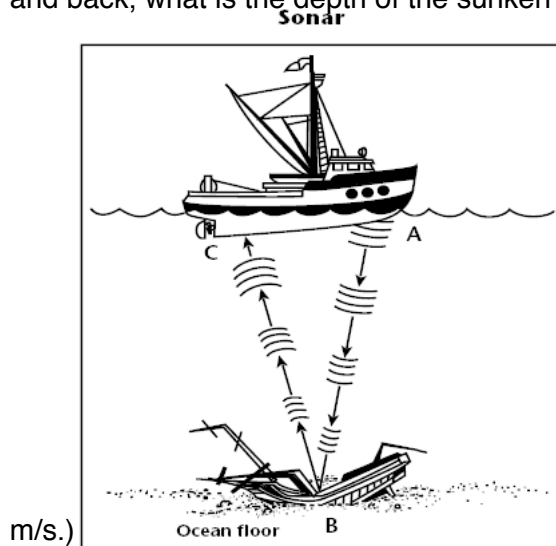
Race Time			
Car	Track 1	Track 2	Track 3
1	2.0 s	2.3 s	4.0 s
2	2.5 s	3.0 s	4.5 s
3	4.0 s	4.6 s	8.0 s
4	1.5 s	2.0 s	3.5 s

- A cars 1 and 2 are the fastest cars.
- B car 3 is the heaviest car.
- C track 3 is the longest track.
- D track 2 is the shortest track.

- 10 If the cars were rolled down a fourth track, which car would *most* likely finish first?

Race Time			
Car	Track 1	Track 2	Track 3
1	2.0 s	2.3 s	4.0 s
2	2.5 s	3.0 s	4.5 s
3	4.0 s	4.6 s	8.0 s
4 \	1.5 s	2.0 s	3.5 s

- A car 1
B car 2
C car 3
D car 4
- 11 Earth's crust is made up of large plates that move slowly over the surface. If one of Earth's plates moves at a speed of 5 cm/year, how far will it move in 500 years?
- A 25 cm
B 25 m
C 250 m
D 25 km
- 12 Suppose that the sound waves of a sonar device on the ship are sent down and reflected back up by the sunken ship. If it takes 3.00 seconds for the waves to travel from their source to the sunken ship and back, what is the depth of the sunken ship? (Assume that the speed of the sound waves is 1,520



- A 1,520 m
B 3,040 m
C 4,560 m
D 2,280 m
- 13 What do you know about an object when you know the speed and direction in which the object moves? (Assume that the speed is constant.)

- A the acceleration of the object
- B the velocity of the object
- C the momentum of the object
- D the weight of the object

14 How is velocity different from speed?

- A Speed includes information about direction, and velocity does not.
- B Speed includes information about distance, and velocity does not.
- C Velocity includes information about direction, and speed does not.
- D Velocity includes information about distance, and speed does not.

15 Which of the following is a statement of velocity?

- A 20 km/h north
- B 20 km north
- C 20 km/h
- D 20 km

16 An object that is moving at constant speed will be accelerating if it is

- A moving in a straight line.
- B moving in a curved line.
- C moving away from you.
- D moving toward you.

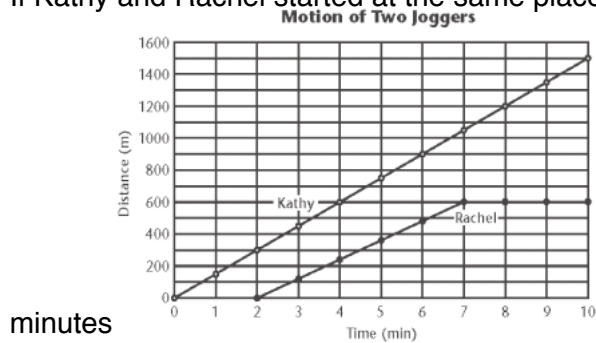
17 Which of the following is *not* an example of acceleration?

- A moving faster to pass someone
- B slowing down to turn a corner
- C turning the corner
- D moving backward at a constant speed

18 As a ball rolls down a hill with an even slope, what happens to the speed and acceleration of the ball?

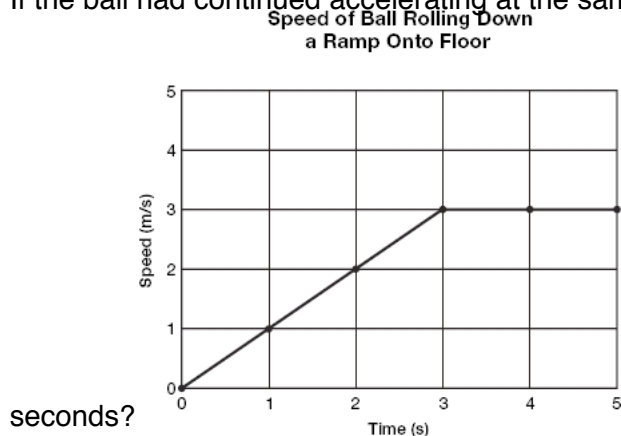
- A Speed and acceleration both increase.
- B Speed and acceleration both decrease.
- C Speed increases and acceleration stays constant.
- D Speed decreases and acceleration increases.

- 19 If Kathy and Rachel started at the same place and followed the same course, after 5



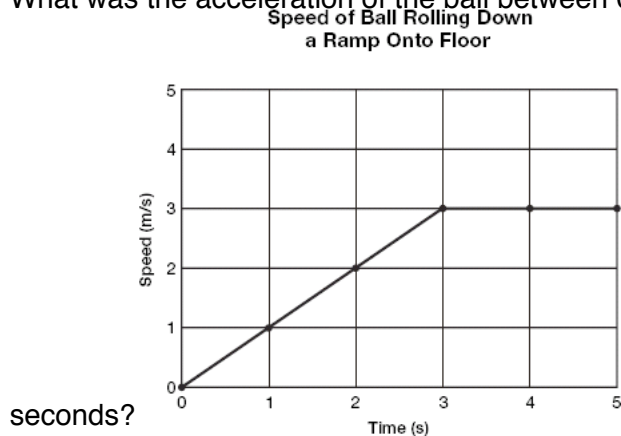
- A they were at the same place.
- B Kathy was 375 m ahead of Rachel.
- C Kathy was 750 m ahead of Rachel.
- D Rachel was 375 m ahead of Kathy.

- 20 If the ball had continued accelerating at the same rate, what would its speed have been after 4



- A 0 m/s
- B 3 m/s
- C 4 m/s
- D 6 m/s

- 21 What was the acceleration of the ball between 0 and 3



- A 0 m/s^2
- B 1 m/s^2
- C 2 m/s^2
- D 3 m/s^2

22 A force can be described by its magnitude and its

- A direction.
- B mass.
- C speed.
- D velocity.

23 What is meant by the magnitude of a force?

- A how fast it moves
- B how long it acts
- C how much mass it affects
- D how strongly it acts

24 Joseph uses a spring scale to measure the force of friction caused by four different materials. Which material produced the *greatest* force?

Material	Carpet	Wood	Tile	Asphalt
Force	13 N	5 N	3 N	12 N

- A asphalt
- B carpet
- C tile
- D wood

25 What is the term for the combination of all forces acting on an object?

- A conservation of momentum
- B center of mass
- C net force
- D frame of reference

26 You exert a force of 120 N to push a box down the hallway. Your friend helps by exerting a force of 150 N against the box in the same direction. What net force do you and your friend exert on the box?

- A 30 N
- B 120 N
- C 150 N
- D 270 N

27 Robin and Wes push on opposite sides of a wheeled chair. Robin pushes with a force of 80 N to the left. Wes pushes with a force of 100 N to the right. What is the resulting force on the chair?

- A 20 N to the left
- B 20 N to the right
- C 180 N to the left
- D 180 N to the right

28 Two students on opposite sides of a box apply forces to the box. What must be true if the box does *not* accelerate?

- A The forces are balanced.
- B The forces are unbalanced and in the same direction.
- C The forces are unbalanced and opposite, with the greater force to the left.
- D The forces are unbalanced and opposite, with the greater force to the right.

29 Can you always detect motion when paired forces are in action?

- A yes
- B only if the forces acting on the object add up to zero
- C only if the forces acting on the object are balanced
- D only if the forces acting on the object are not balanced

30 A light hangs from a ceiling without moving. What must be true about the forces acting on the light?

- A All the forces acting on the light act in a downward direction.
- B All the forces acting on the light balance each other.
- C The forces acting in a downward direction are greater than those acting in an upward direction.
- D The forces acting in an upward direction are greater than those acting in a downward direction.

31 Gillian attached a block to a spring scale and put the block on her desk. She pulled gently on the spring scale until the block just barely started moving. The spring scale read 15 N. Gillian had to use 15 N of force to overcome the force of

- A gravity.
- B static friction.
- C sliding friction.
- D momentum.

32



What kind of force acts against the motion of the cart shown in the diagram?

- A static friction
- B sliding friction
- C rolling friction
- D fluid friction

- 33 Suppose the wheels on the cart in the diagram are locked in place. If the force applied by the girl is balanced, so that the cart does not move, what is the cause of the balanced



force?

- A static friction
- B sliding friction
- C rolling friction
- D fluid friction

- 34 During a tug of war, the rope accelerates toward the left. What is true about the forces acting on the rope?

- A The force toward the right is greater than the force toward the left.
- B The force toward the left is equal to the force toward the right.
- C The force toward the left is greater than the force toward the right.
- D The only force is pulling toward the left.

CA Physical Science Benchmark Test 3

- 35 If two forces on an object at rest act in the same direction, what must be true about the motion of the object?
- A The object must remain at rest.
 - B The object must move at constant velocity.
 - C The object must accelerate in the direction of the forces.
 - D The object must accelerate in the direction opposite the forces.
- 36 A 25,000 N force acts on a train in the forward direction, while a 26,000 N force acts in the opposite direction. What is the resulting motion of the train?
- A The train speeds up.
 - B The train moves at constant speed.
 - C The train slows down.
 - D The train remains at rest.
- 37 If a 2-kg train car (X) travels at 100 km/hr and a 4-kg train car (Y) travels at 80 km/hr and the same force is applied to the brakes, which car will travel farther before it stops?
- A car X, because it is faster
 - B car Y, because it has more mass
 - C car X, because it has less momentum
 - D car Y, because it has greater momentum
- 38 Four balls roll across a smooth floor at the same speed. The balls have different masses and diameters. Which ball will require the *greatest* force to increase its speed by 1 m/s?
- A the ball with the greatest diameter
 - B the ball with the least diameter
 - C the ball with the greatest mass
 - D the ball with the least mass
- 39 If an equal force is applied to four different objects, which will accelerate the *most*?
- A the one with the least acceleration
 - B the one with the least density
 - C the one with the least mass
 - D the one with the least velocity

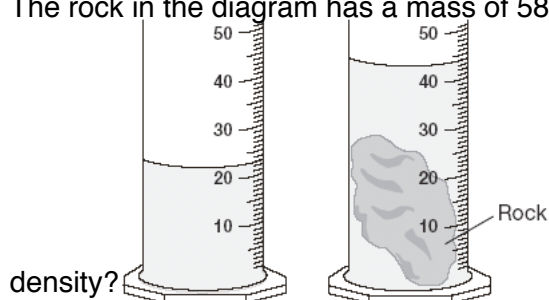
- 40 A 25.0 mL sample of an unknown liquid has a mass of 20.5 g at 20°C. Based on the table, what is the unknown liquid?

DENSITIES OF VARIOUS SUBSTANCES	
Substance	Density (g/mL)
ethyl alcohol	0.79
kerosene	0.82
turpentine	0.87
water	0.998

- A ethyl alcohol
B kerosene
C turpentine
D water
- 41 An object has a mass of 64 g and a volume of 22 cm³. What is the density of the object?
- A 1,408 g/cm³
B 64 g/cm³
C 2.9 g/cm³
D 0.3 g/cm³
- 42 What is the density of a material that has a mass of 6.2 g and a volume of 5 mL?
- A 31 g/mL
B 6.2 g/mL
C 5.0 g/mL
D 1.2 g/mL
- 43 You have a sample of a substance that has a mass of 380 g and a volume of 22 cm³. What is the substance's density?

- A 17.3 g/cm³
B 22 g/cm³
C 380 g/cm³
D 8,360 g/cm³

- 44 The rock in the diagram has a mass of 58.8 g. What is the rock's



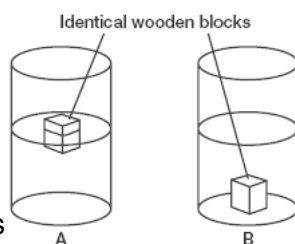
- A 1.3 g/mL
- B 2.0 g/mL
- C 2.6 g/mL
- D 2.8 g/mL

- 45 Which metal has the greatest density?

Metal	Mass of Sample(g)	Volume of Sample(cm ³)
Copper	Copper	20
Lead	227.4	20
Silver	315.0	30
Cobalt	264.0	30

- A cobalt
- B copper
- C lead
- D silver

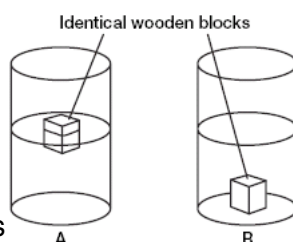
- 46



The buoyant force in container A is

- A greater than the buoyant force in container B.
- B the same as the buoyant force in container B.
- C less than the buoyant force in container B.
- D zero.

- 47



In each container, the buoyant force equals

- A the density of the object.
- B the force of gravity on the object.
- C the mass of the object.
- D the weight of the displaced fluid.

48 The net force on an object that is submerged in a fluid is equal to

- A the buoyant force on the object.
- B the force of gravity on the object.
- C the difference between the downward force of gravity and the upward buoyant force.
- D the difference between the upward force of gravity and the downward buoyant force.

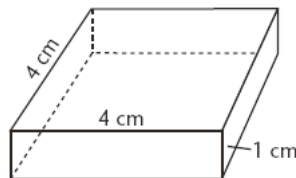
49 What will happen to an object if its weight is greater than the buoyant force?

- A It will remain in place.
- B It will rise.
- C It will bob up and down.
- D It will sink.

50 Which explains why an ice cube floats in a glass of water?

- A The density of water in a solid state is less than the density of water in a liquid state.
- B The mass of a glass of water is greater than the mass of an ice cube.
- C The specific gravity of an ice cube is greater than that of the liquid state of water.
- D The hydrogen bonds between solid water molecules are weaker than those of liquid molecules.

51



Will this object float in water? Mass of Object = 8 g
Density of Water = 1.0 g/cm³

- A No, because it is more dense than water.
- B No, because it is less dense than water.
- C Yes, because it is more dense than water.
- D Yes, because it is less dense than water.

CA Physical Science Benchmark Test 3

52 Vegetable oil has a density of 0.93 g/cm^3 . If you pour vegetable oil slowly into a container of water, what will happen?

- A The oil will form a layer on top of the water.
- B The oil will sink below the water.
- C The water and oil will form currents.
- D The water and oil will mix evenly.

53 Why does a hot air balloon rise in cooler air?

- A Hot air has greater density than cooler air.
- B Hot air has greater mass than cooler air.
- C Hot air has less buoyant force than cooler air.
- D Hot air has a lower density than cooler air.

54 Which item(s) in the table will sink in gasoline?

Material	Density(g/cm^3)
Paper	0.929
Graphite	2.163
Seawater	1.025
Gasoline	0.721
Maple Wood	0.689

- A maple wood
- B graphite and seawater
- C paper, graphite, and seawater
- D paper, graphite, seawater, and maple wood

55 The formula for the volume of a rectangular prism is $V = lwh$. What is the height of a box whose volume is 80 cm^3 and which is 16 cm long and 2 cm wide?

- A 2 cm
- B 2.5 cm
- C 5 cm
- D 16 cm

56 Density equals mass divided by volume. What is the mass of 4.2 mL of a liquid that has a density of 1.6 g/mL ?

- A 6.7 g
- B 6.7 mL
- C 0.38 g
- D 3.8 mL

CA Physical Science Benchmark Test 3

- 57 Vanessa runs 40.0 m at an average speed of 3.20 m/s. How long does her run take? Remember that $v = d/t$.

A 12 s
B 12.5 m/s
C 12.5 s
D 120 s

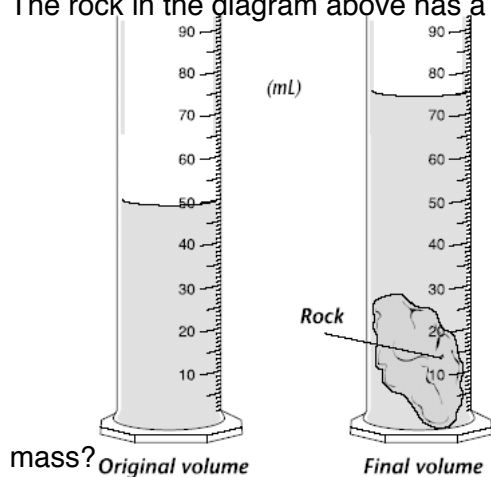
- 58 One kind of coal has a density of 1.25 g/cm^3 . A lump of this coal has a mass of 100 g. What is its volume?

A 8 cm^3
B 12.5 cm^3
C 80 cm^3
D 125 cm^3

- 59 If Ben can run for 20 seconds at a speed of 4.1 m/s, how far will he run?

A 82 m
B 20 m
C 5 m
D 41 m

- 60 The rock in the diagram above has a density of 2.9 g/cm^3 . What is the rock's



A 8.6 g
B 25 g
C 73 g
D 220 g