1. While travelling on a train, two boys play catch in the aisle. The train is moving north at 30.0

m/s. The ball is tossed front to back at 5.0 m/s relative to the boys. A bystander on the highway

observes the ball being tossed toward the back. To the bystander, what is the relative speed of

the ball?

(A) 5.0 m/s [N]

(B) 25 m/s [N]

(C) 35 m/s [N]

(D) (D) 35 m/s [S]

2. A boat attempts to move due East across a river at 9.0 km/hr. If the river runs South at 12 km/hr,

what will be the boat's resultant velocity?

(A) 15 km/hr at 37° SE

(B) (B) 15 km/hr at 53° SE

(C) 15 km/hr at 37°

(D)(D) (D) 15 km/hr at 53°

3. A bus is moving East at 20.0 m/s, while a car moves toward it at 20.0 m/s. If a man walks from

the back to the front of the bus at 5.0 m/s, what is the velocity of the man relative to the car?

(A) 35 m/s [E]

(B) 35 m/s [W]

(C) 45 m/s [E]

(D) 45 m/s [W]

4. A pilot wants to travel East in an airplane with an air speed of 350 km/h. The wind is blowing

from the South at 20 km/h. What should be the plane’s heading?

(A) Directly East

(B) Slightly East of South

(C) Slightly North of East

(D) Slightly South of East

5. A slug traveling through a cabbage patch travels 7.0 cm [E], 5.0 cm [W], then 2.0 cm [S]. How

far and in what direction did it end up with reference to its original position?

(A) 2.8 cm [E 45 N]

(B) 2.8 cm [N 45 W]

(C) 2.8 cm [S 45E]

(D) 2.8 cm [S 45W]

6. What is the opposite of the following vector: 20 km [N 30 E]?

(A) 20 km [E 30 N]

(B) 20 km [S 30 W]

(C) 20 km [E 60 N]

(D) (D) 20 km [S 60W]

7. Which of the following vectors is the same as 26 m/s [W 78S]?

(A) 26 m/s [ E 78 N]

(B) 26 m/s [S 12 W]

(C) 26 m/s [S 78 W]

(D) 26 m/s [W 12 S]

8. Truck X is traveling North at 50 km/h while directly behind it truck Y is traveling South at

30 km/h. What is the velocity of Y relative to X?

(A) 20 km/h [N]

(B) 20 km/h [S]

(C) 80 km/h [N]

(D) 80 km/h [S]

9. Three identical boats set out to cross a river that has a current. Boat A points directly across the

river, boat B points 20º downstream from a point straight across the river, and boat C points 20º

upstream from a point straight across the river. Which boat will arrive on the opposite shore

first?

(A) all three boats will arrive at the same time

(B) boat A

(C) boat B

(D) boat C

10. The current in a river moves at 2.4 m/s [S]. How fast and in what direction must a swimmer

move through the water in order to have a resultant velocity relative to the river bank of:

A) 5.6 m/s [S] {2 marks}

B) 5.6 m/s [N] {2 marks}

11. A motorboat heads due east at 16 m/s across a river that flows due north at 9.0 m/s.

A) What is the resultant velocity of the boat?

B) If the river is 136 m wide, how long does it take the motorboat to reach the other side?

C) H

1) A particle moving with respect to fixed frame of reference is called as \_\_\_\_\_\_\_\_\_\_

a. absolute motion

b. relative motion

c. rectilinear motion

d. none of the above

Answer Explanation

ANSWER: absolute motion

Explanation:

No explanation is available for this question!

2) A boat sails across a river with a velocity of 10 km/hr. If resultant boat velocity is 14 km/hr, then what is the velocity of river water?

a. 17.20 km/hr

b. 10 km/hr

c. 9.79 km/hr

d. 4.88 km/hr

Answer Explanation

3) What are the limitations of string law?

a. Direction of motion cannot be specified

b. Valid only when more than three particles are connected by a single string

c. Both a. and b.

d. None of the above

Answer Explanation

4) Two cars X and Y move on adjacent roads in opposite directions. If velocity of car X and Y is 80 km/hr and 60 km/hr respectively, then what will be the relative velocity of car X w.r.t. Y?

a. 70 km/hr

b. 100 km/hr

c. 140 km/hr

d. Insufficient data

Answer Explanation

5) In 5 seconds a body covers a distance of 50 m and in 10 seconds it covers 80 m with uniform acceleration. What is the distance traveled in 15 seconds?

a. 100 m

b. 110 m

c. 1000 m

d. None of the above

Answer Explanation

Questions and Answers

1.

Study the motion of the body in each case:a. a ship moving at 10 knots in a straight path.b. a car moving on a straight path and then slowing down to stopc. a storm initially moving at 50 km/h northeast and then 60 km/h eastwardd. a bus moving at 40 km/h around a curve.Which bodies move with constant speed?

Discuss

A.

C and d only

B.

A and d only

C.

B and c only

D.

A, b and c

2.

Study the motion of the body in each case:a. a ship moving at 10 knots in a straight path.b. a car moving on a straight path and then slowing down to stopc. a storm initially moving at 50 km/h northeast and then 60 km/h eastwardd. a bus moving at 40 km/h around a curve.Which body move with constant velocity?

Discuss

A.

A only

B.

B only

C.

C only

D.

D only

3.

Study the motion of the body in each case:a. a ship moving at 10 knots in a straight path.b. a car moving on a straight path and then slowing down to stopc. a storm initially moving at 50 km/h northeast and then 60 km/h eastwardd. a bus moving at 40 km/h around a curve.Which bodies are accelerating?

Discuss

A.

A and b only

B.

B and c only

C.

C and d only

D.

B, c and d only

4.

A car travels at a constant speed of 20 m/s. After 4 sec, its speed is \_\_\_\_.

Discuss

A.

10 m/s

B.

20 m/s

C.

60 m/s

D.

80 m/s

5.

Two boys are pushing a jeep, with a force of 20 N each. The jeep does not move. The force of friction between the tires and the road is \_\_\_\_\_\_\_\_.

Discuss

A.

Less than 40 N

B.

Greater than 40 N

C.

Equal to 20 N

D.

Equal to 40 N

6.

As an object freely falls, its \_\_\_\_\_\_\_\_\_.

Discuss

A.

Velocity remains constant

B.

Velocity increases

C.

Velocity decreases

D.

Acceleration increases

7.

While a car travels around a circular track at constant speed, its \_\_\_\_\_\_\_\_.

Discuss

A.

Acceleration is zero

B.

Speed is zero

C.

Both a and b

D.

Neither a nor b

8.

The force of friction on a sliding object is 10 N. The applied force needed to maintain a constant velocity is \_\_\_\_\_\_\_\_.

Discuss

A.

More than 10 N

B.

Less than 10 N

C.

0 N

D.

10N

9.

Neglecting friction, a large block of ice and a small block of ice start sliding down an inclined plane together. The heavier block will get to the bottom \_\_\_\_\_.

Discuss

A.

Before the light block

B.

After the light block

C.

At the same time as the light block

D.

Melted and same size as the light block

10.

A block is dragged without acceleration in a straight-line path across a level floor surface by a force of 6 N. What force of friction between the block and the surface?

Discuss

A.

Less than 6 N

B.

Greater than 6 N

C.

6 N

D.

0 N

11.

<!--[if !supportLists]-->14. <!--[endif]-->The frictional force between two surfaces in contact does not depend on \_\_\_\_\_\_\_\_\_\_\_\_\_.

A.

The normal force pressing one against the other

B.

The areas of the surfaces

C.

If the surfaces are stationary or in relative motion

D.

Whether or not a lubricant is used

12.

How many forces are acting on box m in diagram (a) below? \*Friction is present in all surfaces.

Discuss

A.

3

B.

4

C.

5

D.

6

13.

How many forces are acting on box M in diagram (a)?\*Friction is present in all surfaces.

Discuss

A.

3

B.

4

C.

5

D.

6

14.

Relative velocity Conceptual questions

A. A gun is mounted on a train roof .Train is travelling with the velocity v in north direction.A car is also moving on a parallel track with train with velocity w in north direction.Two bullet are fired from the muzzle of the gun . Take north as positive and south as negative

1. Bullet one is fired in the north direction with the muzzle velocity u.Find the velocity of the bullet as seen from the observer on the earth

a u+v

b u-v

c u

d v

2. find the velocity of the bullet as seen from the observer on the moving car

a u+v-w

b u-v-w

c u

d v

3.Bullet one is fired in the south direction with the muzzle velocity u.Find the velocity of the bullet as seen from the observer on the earth

a u+v

b v-u

c u

d v

4.find the velocity of the second bullet as seen from the observer on the moving car

a u+v-w

b v-u-w

c u

d v

B.A train is moving in the west direction with a velocity 15m/s.A monkey runs on the roof of the train against its motion with a velocity 5m/s with respect to train .Take the motion along west as positive

5.Velocity of train relative to its driver

a. 0

b. 15 m/s

c. -15 m/s

d. 20 m/s

6. What is the velocty of train with respect to monkey

a. 5m/s

b -5 m/s

c. 15 m/s

d -15 m/s

7. find the velocty of ground with respect to monkey

a. 5 m/s

b. -5 m/s

c. 10 m/s

d. -10 m/s

C.Two particles start from the origin of the horizontal x-y plane.Particle A moves along +x axis with uniform velocity u.Particle B moves along -y axis with velocity u. i and j are the unit vectors along x and y direction

8. find the relative velocity of particle B wrt to A at time t

a -u(i+j)

b u(i+j)

c 0

d none of the above

9. find the relative velocity of particle A wrt to B at time t

a -u(i+j)

b u(i+j)

c 0

d none of the above

10. find the relative position vector of particle A wrt to B at time t

a -ut(i+j)

b ut(i+j)

c. 0

d. None of the above

Solutions

Detailed Solutions

Ans 1

Velocity of bullet w.rt to train=u

Velcity of train=v

Velocity of bullet w.rt to train=Velocity of bullet w.r.t earth -Velocity of train w.r.t earth

So Velocity of bullet w.r.t earth =Velocity of bullet w.rt to train+Velocity of train w.r.t earth

=u+v

Ans 4.

Velocity of bullet w.rt to train=-u

Velcity of train=v

velocity of car

Velocity of bullet w.rt to car=Velocity of bullet w.r.t earth -Velocity of car w.r.t earth

= v-u-w

Clicker Question

• A large, light beach ball is falling towards the

beach on a windless day. The force of gravity on

the ball, 𝐹

𝑔, is greater than the upward drag force

from the air, 𝐹

𝐷. Which of the following directions

is closest to the direction of the net force

𝐹

net = 𝐹

𝑔 + 𝐹

𝐷 on the ball?

A.North

B.East

C.South

D.West

E.The net force makes an angle of 90° with respect

to all four of these directions.

𝐹

𝐷

𝐹

𝑔

East

2

Clicker Question

• A mouse digs a tunnel 1 m down, then turns

and continues digging 1 m East, then turns

again and digs 1 m North.

• Draw a diagram of the path of the mouse.

• How far is the mouse from his starting

position?

A. 3 m

B. 2 m

C. 1 m

D. 3 m

E. 2 m

Last Class I asked:

• One bullet

Ans 5

Velocity of train w.r.t to driver=Velocity of train w.r.t earth -Velocity of driver w.r.t earth

so =0

Ans 6

Given

velocity of train=15m/s

velocity of monkey w.r.t train=-5 m/s

Now velocity of monkey w.r.t train=-velocity of train w.r.t monkey

So velocity of train w.r.t monkey=5 m/s

Ans 8.

Velocity of A=ui

Velocity of B =-uj

Velocity of B w.r.t to A=Velocity of B-Velocity of A

=-u(i+j)

Ans 9

Velocity of A=ui

Velocity of B =-uj

Velocity of A w.r.t to B=Velocity of A-Velocity of B

=u(i+j)