

Answer on Question #40928 – Physics - Mechanics | Kinametics | Dynamics

Of the following situations, which one is impossible?

- A. A body having velocity east and acceleration east
- B. A body having velocity east and acceleration west
- C. A body having zero velocity and non-zero acceleration
- D. A body having constant acceleration and variable velocity
- E. A body having constant velocity and variable acceleration

Solution:

All situations are possible instantaneous initial states, but only (a,c) are not possible quasi-steady final states.

Instantaneous initial state examples:

A) an object has velocity directed east and acceleration directed east
Car traveling east, step on gas.

B) an object has velocity directed east and acceleration directed west
Car traveling east, step on brakes.

C) an object has zero velocity but nonzero acceleration
Car at rest, step on accelerator.

D) an object has constant nonzero acceleration and changing velocity
Object in freefall

E) an object has constant nonzero velocity and changing acceleration
Car cruising at 55mph; step on brakes or gas.

Thus, all situations possible.

If this question is referring to the condition/situation as a quasi-steady final state (rather than an instantaneous one) then

A) an object has velocity directed east and acceleration directed east
Possible: car moving east hits the accelerator.

B) an object has velocity directed east and acceleration directed west
Possible: car moving east hits the brakes.

C) an object has zero velocity but nonzero acceleration
Not possible: non-zero acceleration will eventually produce a velocity:

D) an object has constant nonzero acceleration and changing velocity
Possible: object in freefall

E) an object has constant nonzero velocity and changing acceleration

Not possible: velocity cannot be constant in the presence of a non-zero acceleration.

So (C, E) are not possible quasi-steady final states.

Answer: impossible situations:

C) an object has zero velocity but nonzero acceleration

E) an object has constant nonzero velocity and changing acceleration

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