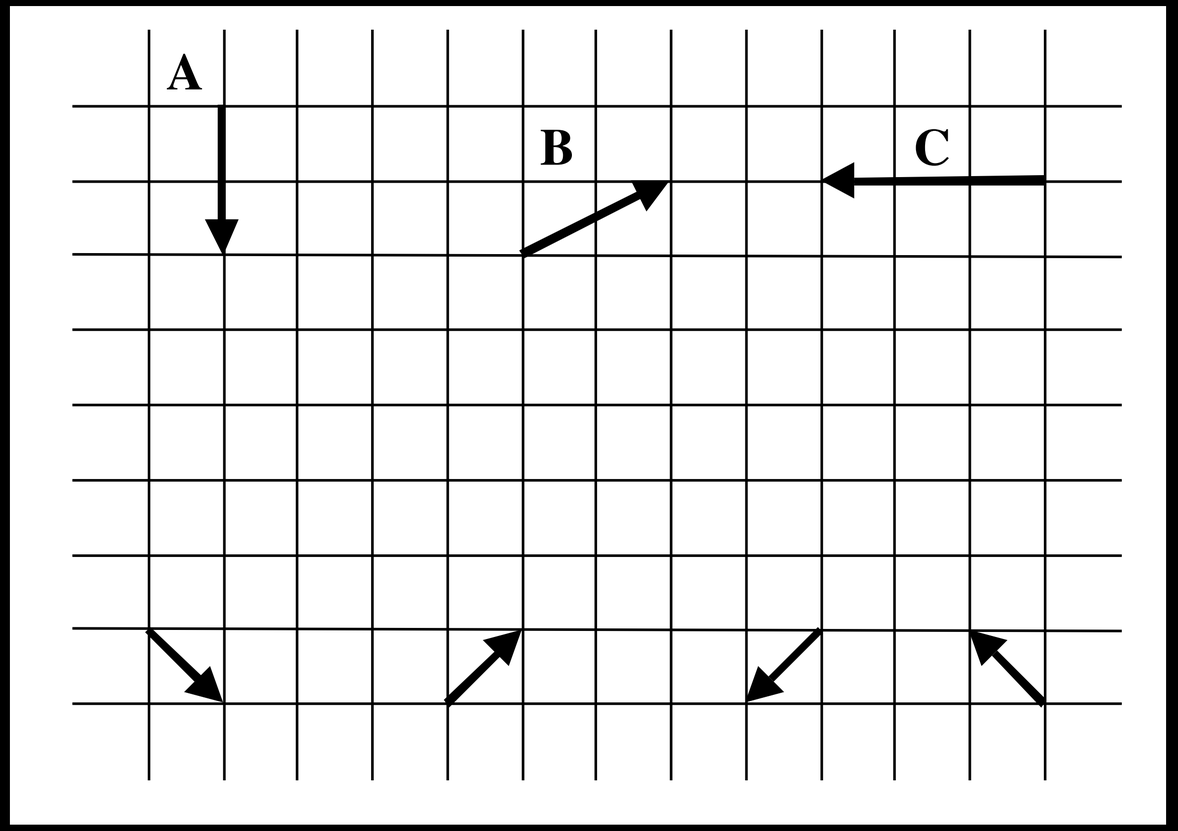
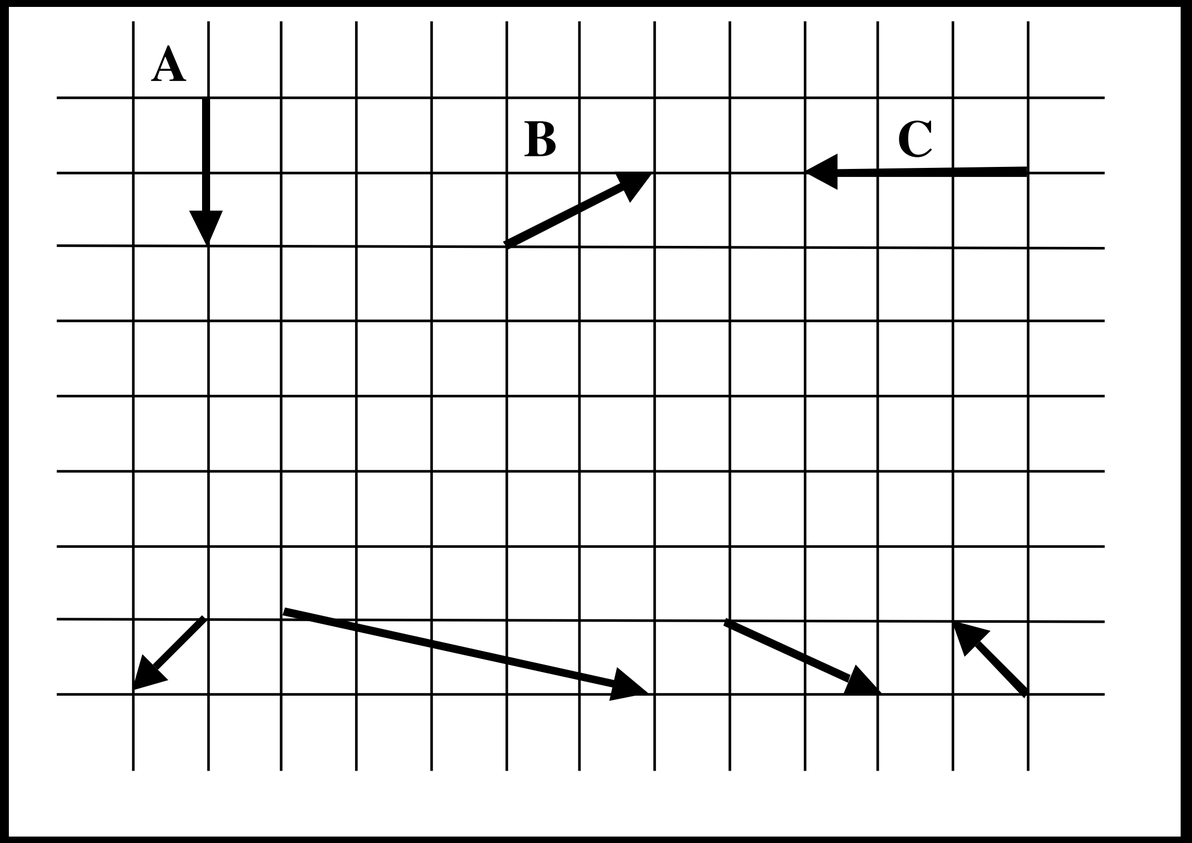
Three vectors, **A**, **B**, and **C** are shown. Which of the four vectors at the bottom is the sum of these three (**A**+**B**+**C**)?



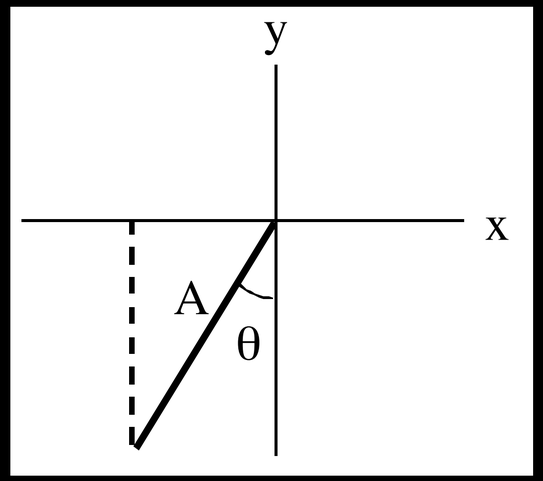
A B C D

Three vectors, **A**, **B**, and **C** are shown.
Which of the four vectors at the bottom is
A+B-C?



A B C D

The solid line has a length A, and makes an angle of θ with the negative y-axis, as shown.



What is the length of the dotted line?

A) A cos θ

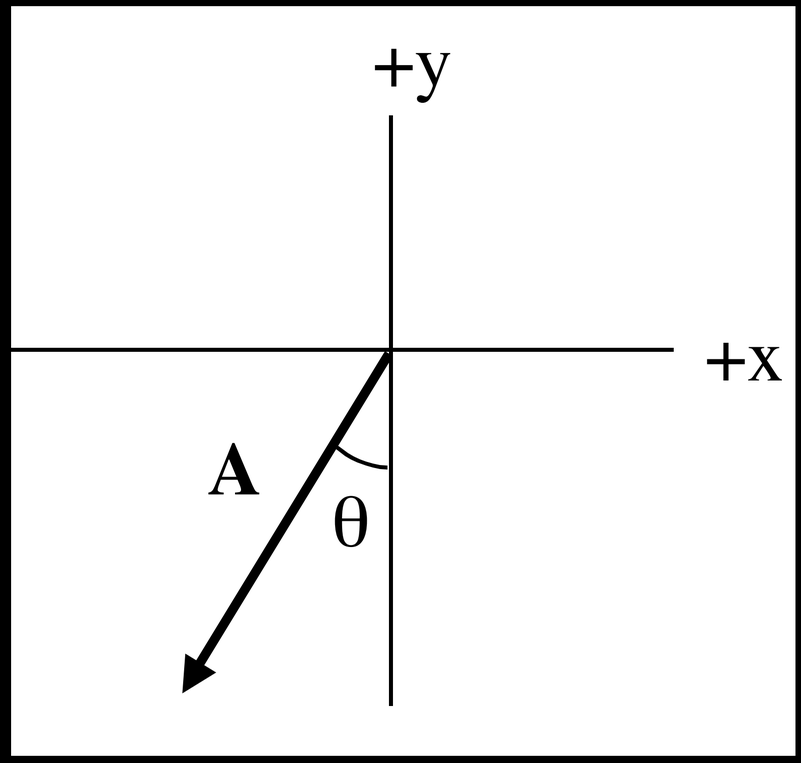
B) A sin θ

C) A tan θ

D) sin θ/A

E) cos θ/A

What is the x-component of the vector **A**?



A) A cos θ

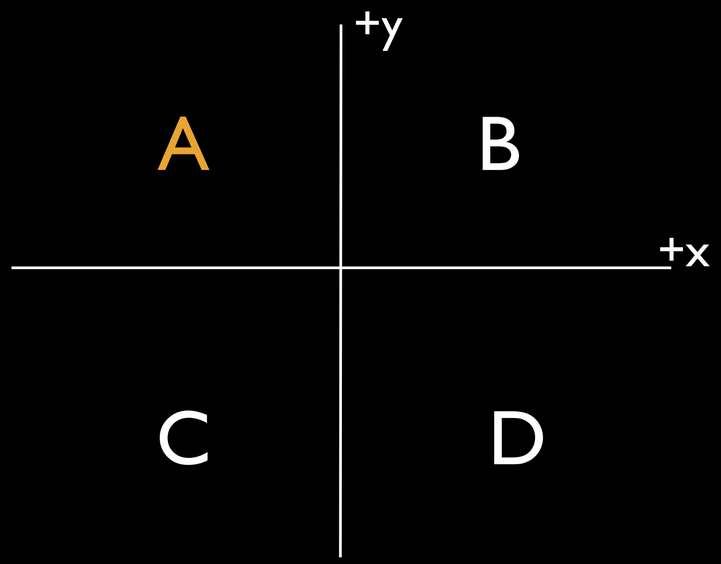
B) A sin θ

C) neither of the above - it's -A sin θ

A and **B** have components:

$A_x=1, A_y=1, B_x=-2, B_y=2$

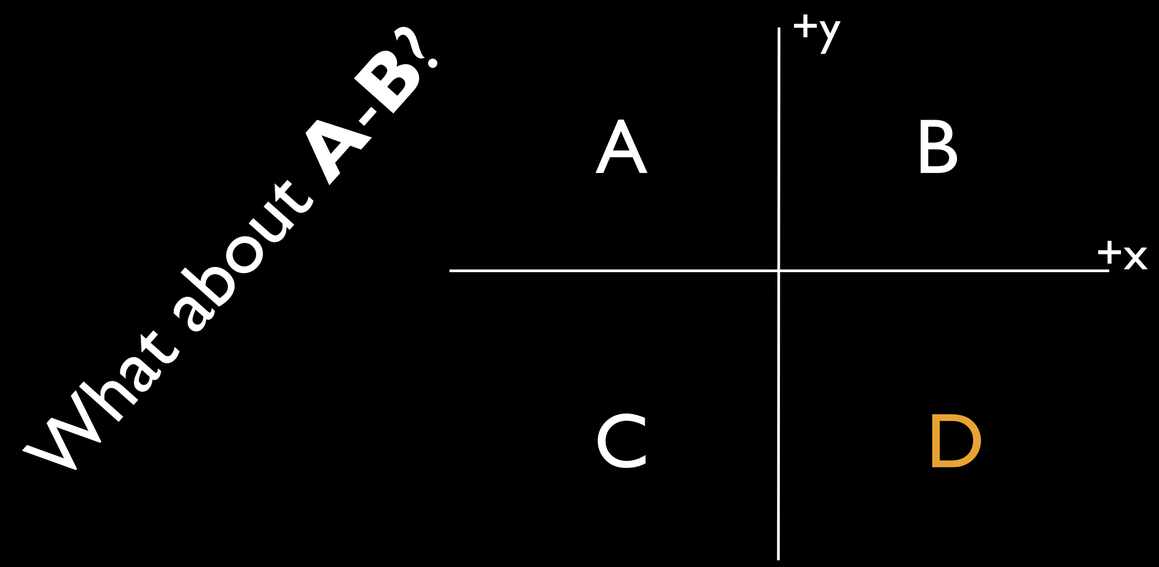
In what quadrant is vector **S**=**A**+**B**?



A and **B** have components:

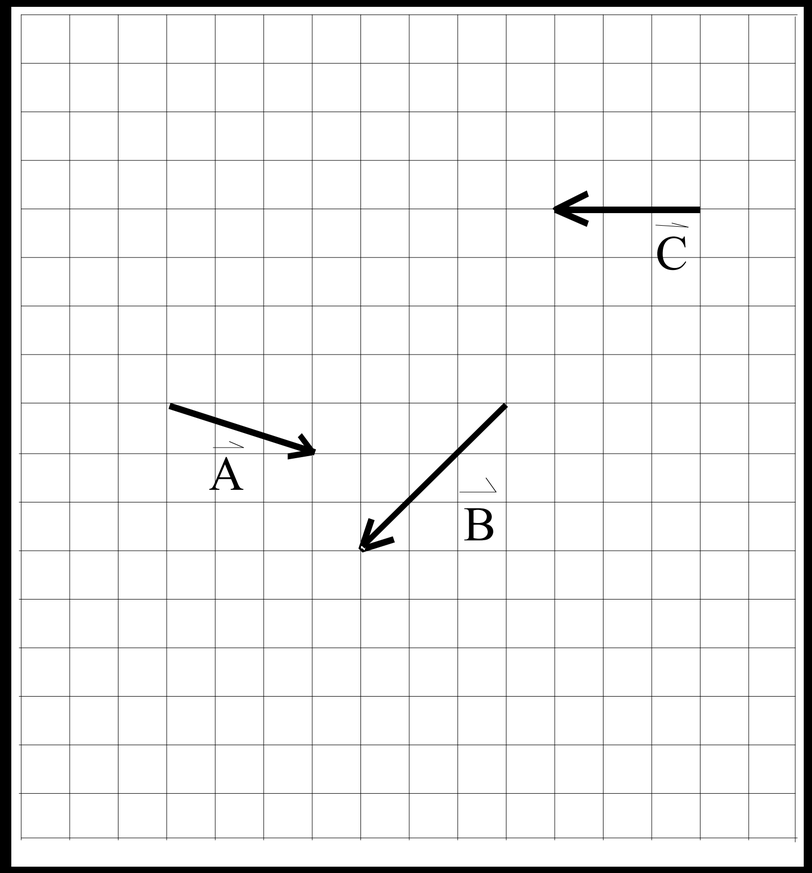
$A_x=1, A_y=1, B_x=-2, B_y=2$

In what quadrant is vector **S**=**A**+**B**?



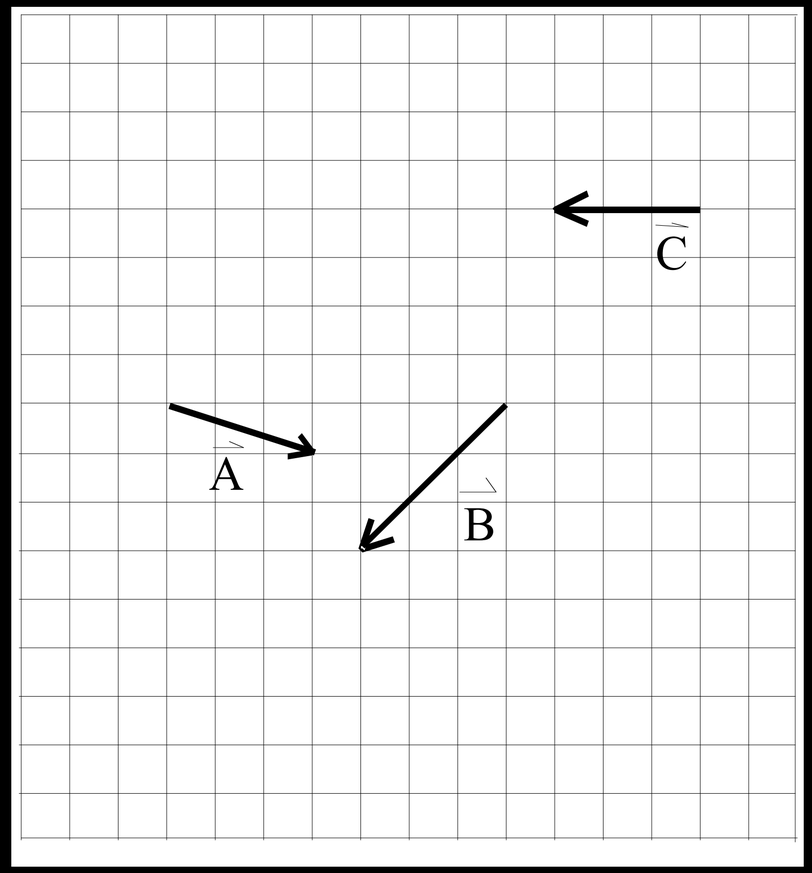
What about **A**-**B**?

Three vectors **A**, **B**, and **C** are shown. The vector sum of these vectors is **S** = **A** + **B** + **C**. What is the value of S_x, the x-component of **S**?



A) +2
B) -4
C) -2
D) +3
E) None of the above - it's -3

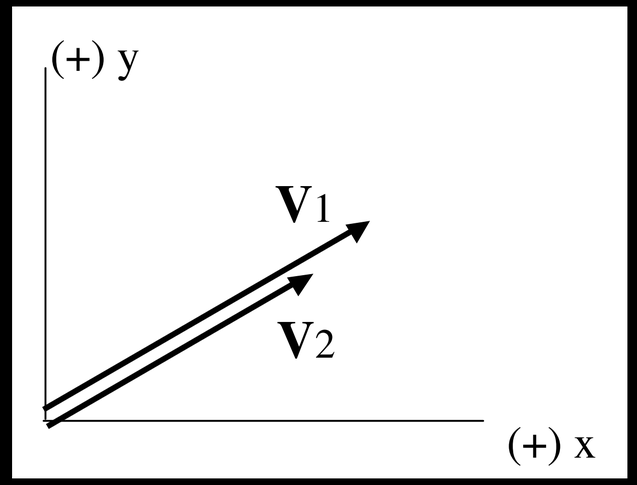
Three vectors **A**, **B**, and **C** are shown. The vector sum of these vectors is **S** = **A** + **B** + **C**. What is the value of S_x, the x-component of **S**?



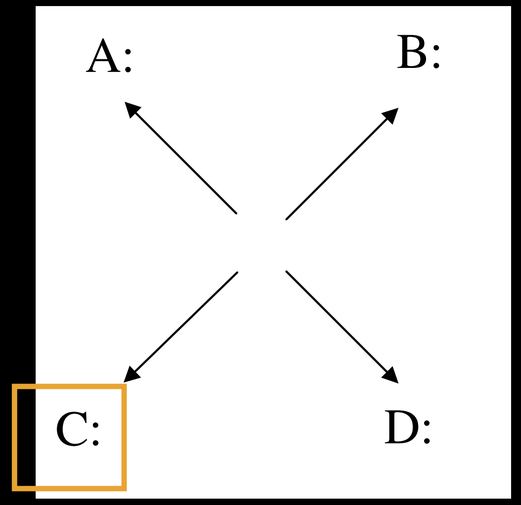
What about S_y?

A) +2
B) -4
C) -2
D) +3
E) None of the above

A particle is moving with constant acceleration. Its velocity vector at two different times ($t_1 < t_2$) is shown below.

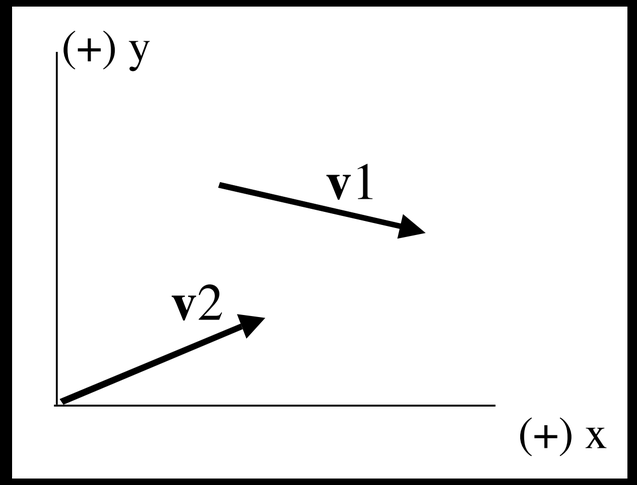


What is the direction of the ***acceleration***?

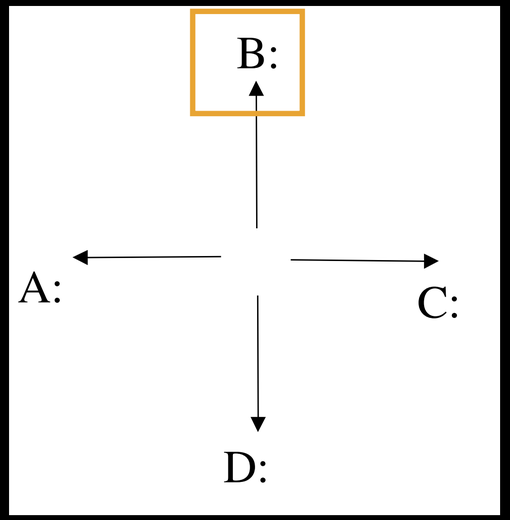


E) None of these

A particle is moving with constant acceleration. Its velocity vector at two different times ($t_1 < t_2$) is shown below.

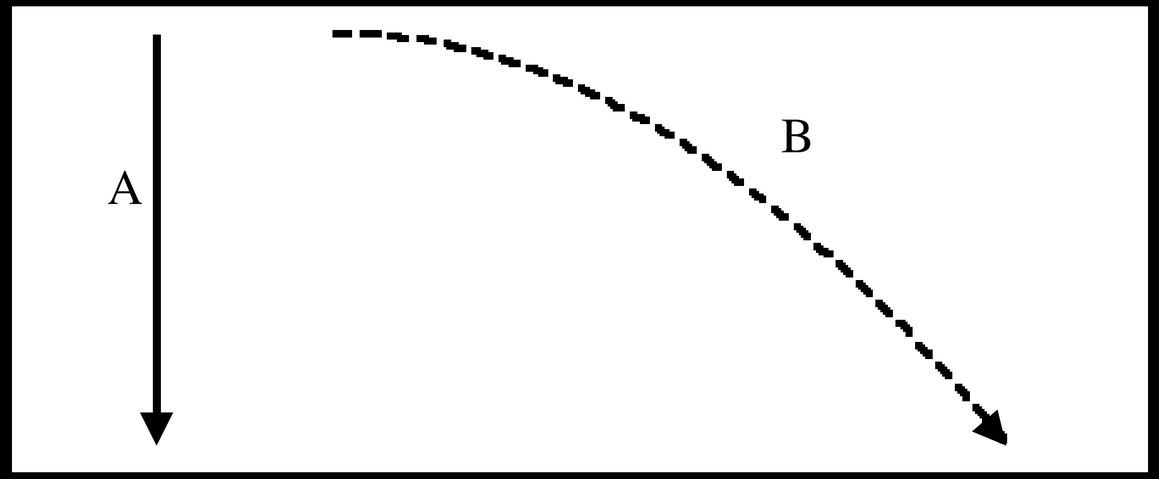


What is the direction of the acceleration?



E) None of these

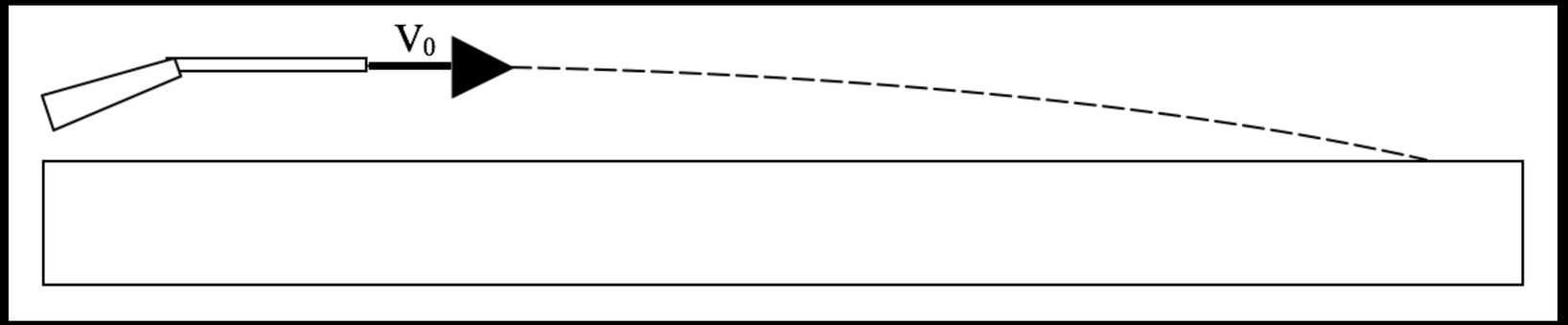
Two balls begin at rest at the same height (but not at the same place). At time t=0, one of them (A) is simply released and the other one (B) is launched straight horizontally (after t=0, both of them are freely falling).



Which one hits the ground first?

A) A
B) B
C) They both hit at the same time
D) Depends on the mass

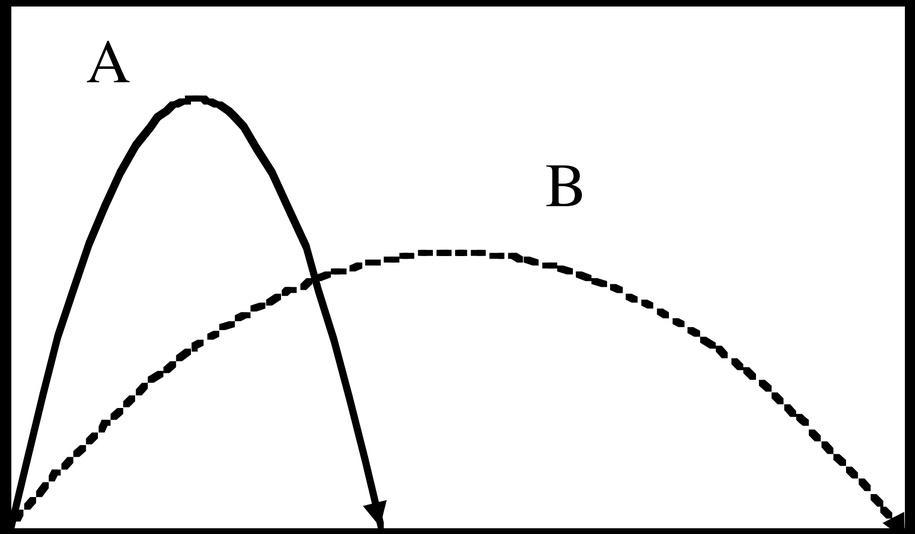
A bullet is fired horizontally from a rifle on the Moon (where there is no air). The initial speed of the bullet when it leaves the gun barrel is v_0. Assume that the ground is perfectly level (and endless).



I) During its entire flight, the minimum speed of the bullet is v_0.
II) The acceleration of the bullet is constant during its flight.
III) The time it takes for the bullet to hit the ground increases as v_0 is increased.

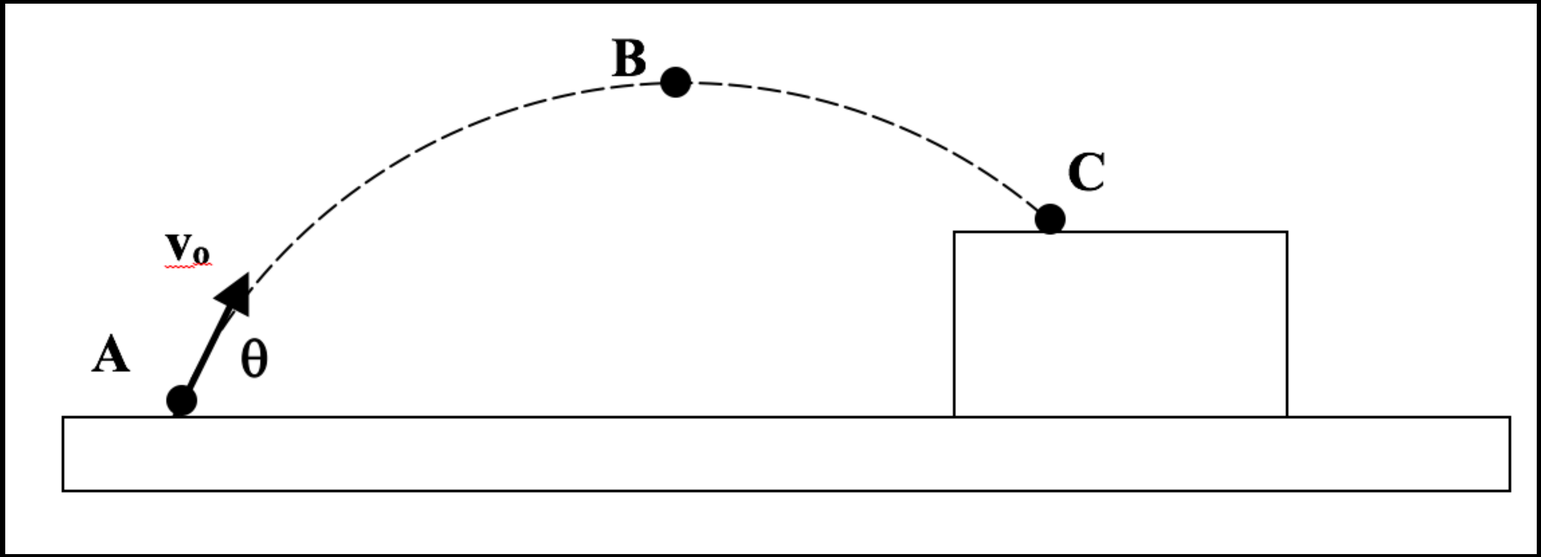
A) All of the above statements are true.
B) Two of these statements are true. (III isn't true)
C) Only one of these statements is true.

Two pitchers are standing side by side and simultaneously throw baseballs A and B. If the balls follow the trajectories shown, which ball hits the ground first?



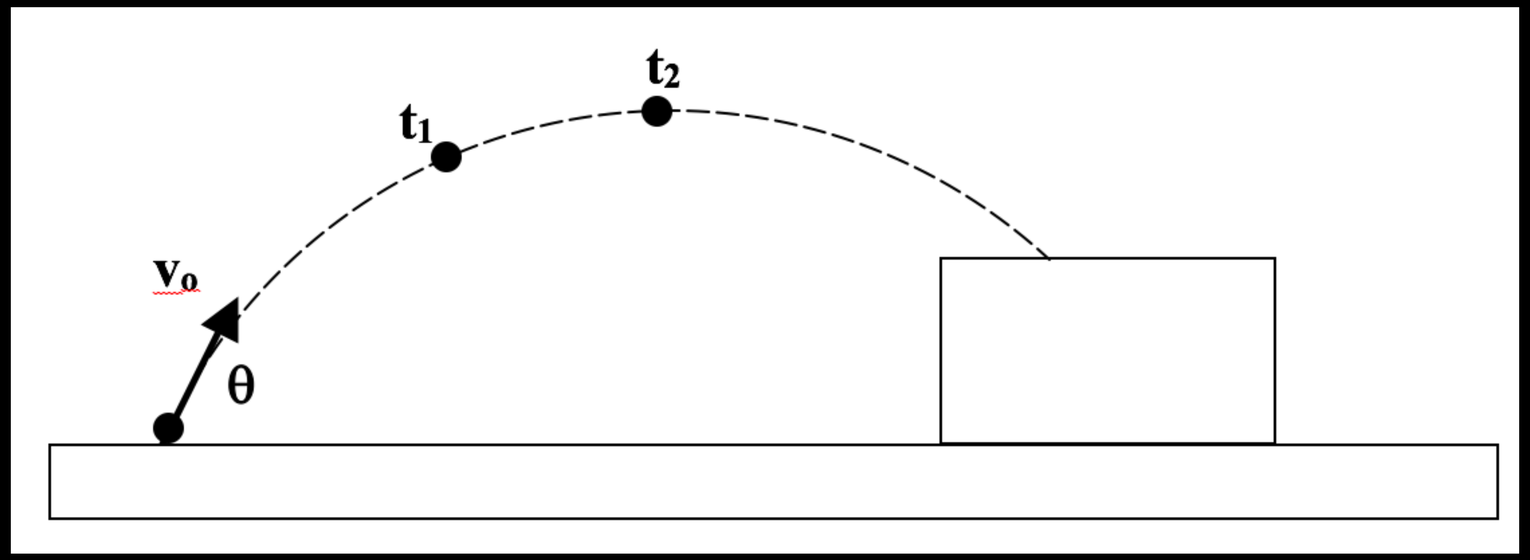
A) A
B) B
C) both hit at the same time
D) need more information

A pellet is fired from a slingshot with initial speed v_0 at an angle θ. The projectile lands on a building. Where during its flight is the speed of the projectile a **minimum**?



A) Immediately after the pellet is launched.
B) At the apex of the trajectory.
C) Just before the pellet hits the building.
D) None of these, the speed is constant

Consider the velocities at times t_1 and t_2. These are the velocity vectors V_1 and V_2. What is the direction of ΔV, the change in velocity between t_1 and t_2?



A) Straight Up ↑

B) Straight Down ↓

C) Upper Right ↗

D) Lower Right ↘

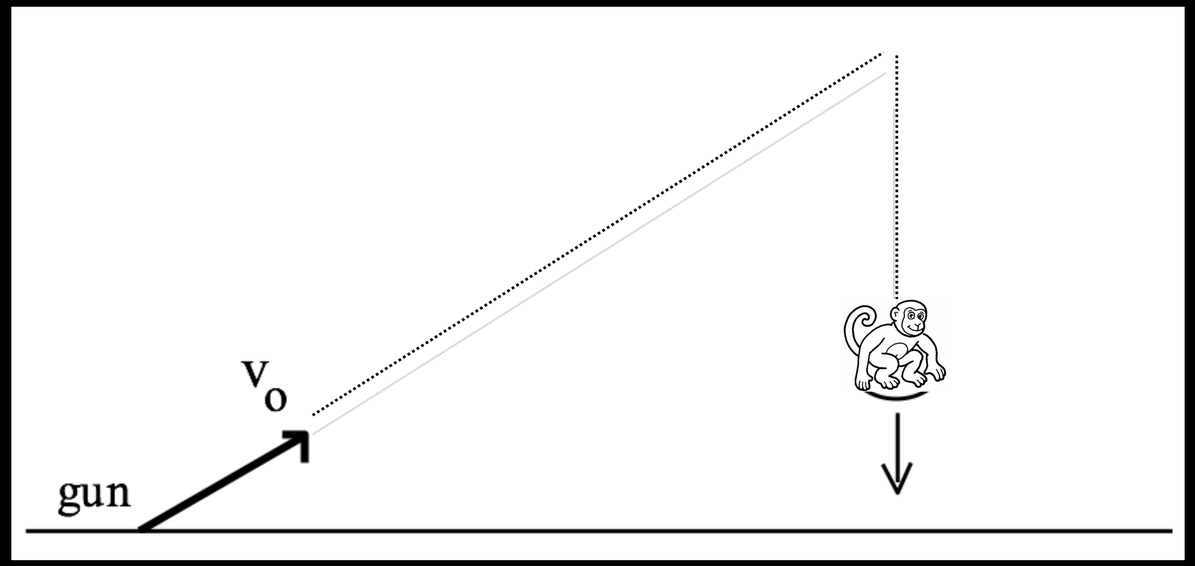
A helicopter takes off vertically, with a constant speed v_0. While rising, the pilot releases a cigarette butt out the open window. (Neglect air resistance!)
The cigarette will . . .

A) Initially rise with speed v_0, reduce its speed, come to rest, and then increase its speed as it goes down.

B) Not go up at all, but will immediately start to gain downwards speed as it drops to the ground.

C) Drop to the ground with a constant speed.

A rabid monkey is hanging from the branch of a tree. An animal control officer is aiming a tranquilizer dart gun at him. The instant the gun is fired, the monkey releases the branch and starts falling. The monkey is well within the range of the rifle. Where should the animal control officer aim?



A) At the monkey.
B) Below the monkey.
C) Above the monkey.
D) It depends on the initial speed of the bullet.