A sports car drives along the coastal highway at a constant speed. The acceleration of the car is

1. zero
2. sometimes zero
3. never zero
4. constant

Answer 2: Whenever the car is moving in a straight line at constant speed the acceleration is zero. On the photo this may occur in a few places.
As the object speeds up along the circular path in a counterclockwise direction, shown below, its acceleration points:

1. toward the center of the circular path.
2. in a direction tangential to the circular path.
3. outward.
4. none of the above.

Answer 4: The object always has a component of the acceleration pointing inward. When it is speeding up, it has a component of the tangential acceleration in the direction of motion (counterclockwise). The vector sum of these two components points somewhere between the arrow 1 and 2.
An object moves counter-clockwise along the circular path shown below. As it moves along the path its acceleration vector continuously points toward point $S$. The object

1. speeds up at $P$, $Q$, and $R$.
2. slows down at $P$, $Q$, and $R$.
3. speeds up at $P$ and slows down at $R$.
4. slows down at $P$ and speeds up at $R$.
5. speeds up at $Q$.
6. slows down at $Q$.
7. No object can execute such a motion.

Answer 3: A the point $P$ the acceleration has a positive tangential component so it is speeding up. A the point $S$ the acceleration has a zero tangential component so it is moving at a constant speed. At the Point $R$ the acceleration has a negative tangential component so it is slowing down.
You are a passenger in a racecar approaching a turn after a straight-away. As the car turns left on the circular arc at constant speed, you are pressed against the car door. Which of the following is true during the turn (assume the car doesn't slip on the roadway)?

1. A force pushes you away from the door.
2. A force pushes you against the door.
3. There is no force that pushes you against the door.
4. The frictional force of the between you and the seat pushes you against the door.
5. There is no force acting on you.
6. You cannot analyze this situation in terms of the forces on you since you are accelerating.
7. Two of the above.
8. None of the above.

Answer: 1

The force acting on you pushing you away from the door in this example is the normal component of the contact force between you and the door and pushing toward the center of the circle. Although you may feel a tendency to move outward (continue in your linear motion), there is no force pushing you outward.