8.1 ♣ Notation, words, pictures for position, velocity, and acceleration. (Sections 3.1 and 10.1)

Complete each blank with a word: point | reference frame | position | velocity | acceleration

$\vec{\mathbf{r}}^{Q/P}$ $\vec{\mathbf{r}}$ denotes ____. P is a ____. Q is a ____.	${}^N\vec{\mathbf{v}}^Q$ $\vec{\mathbf{v}}$ denotes ____. N is a ____. Q is a ____.	${}^N\vec{\mathbf{a}}^Q$ $\vec{\mathbf{a}}$ denotes ____. N is a ____. Q is a ____.
Draw P, Q, and $\vec{\mathbf{r}}^{Q/P}$.	**Draw** Q and N.	

8.2 ♣ What is a point and a particle? (Section 3.1)

To visualize center of mass, draw a doughnut.

Statement	True or False
A point has all the attributes of a particle.	**True/False**
A particle has all the attributes of a point.	**True/False**
A point with mass (massive point) is a particle.	**True/False**
The center of mass of a rigid body is a point.	**True/False**
The center of mass of a rigid body is a particle.	**True/False**

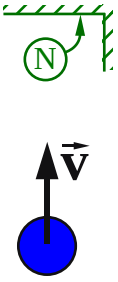
8.3 ♣ Concept: What objects have a unique velocity/acceleration? (Section 10.1)

The velocity $\vec{\mathbf{v}}$ of some object S relative to Earth is to be determined.
This object S could be a (circle ***all*** objects that have an ***unambiguously*** defined velocity $\vec{\mathbf{v}}$):

Real number	Line	Set of points	Center of a circle
Vector	Triangle	Reference frame	Mass center of set of particles
Matrix	Point	Rigid body	Mass center of a rigid body
3D orthogonal basis	Particle	Flexible body	System of particles and bodies

Repeat for the acceleration $\vec{\mathbf{a}}$ of some object S relative to Earth box appropriate objects.

8.4 ♣ Concept: Velocity, acceleration, and differentiation. (Sections 1.6.1 and 10.1)



A baseball (particle) is thrown straight upward on Earth (a Newtonian reference frame N). Knowing the baseball's velocity $\vec{\mathbf{v}} = \vec{\mathbf{0}}$ when the ball reaches maximum height and Earth's gravitational acceleration constant $g \approx 9.8 \frac{\text{m}}{\text{s}^2}$, decide if the following statement about $\vec{\mathbf{a}}$ (the ball's acceleration in N) is true. If false, box the incorrect part of the statement.

$$\vec{\mathbf{a}} \triangleq \frac{{}^N d\vec{\mathbf{v}}}{dt} = \frac{{}^N d\,(\vec{\mathbf{0}})}{dt} = \frac{d\,\vec{\mathbf{0}}}{dt} = \vec{\mathbf{0}} \qquad \textbf{True/False}$$

Explain: