(#3-5 MC) Relationship between speed, velocity, and acceleration:

Answers:

1. Velocity is positive and constant.	√
2. Velocity is negative and constant.	Speed is positive and constant
3. Velocity is zero and constant.	√
4. Velocity is positive and increasing.	√
5. Velocity is negative and increasing.	Speed is positive and decreasing
6. Velocity is zero and increasing.	√*
7. Velocity is positive and decreasing.	√
8. Velocity is negative and decreasing.	Speed is positive and increasing
9. Velocity is zero and decreasing.	Speed is positive and increasing*

**Taken out of context, these are the answers that make sense, and you would get credit for them. However, the only way velocity can be zero and either increasing or decreasing is if velocity is passing through zero (from positive to negative or negative or negative to positive). At these times, speed is decreasing just before it reaches zero and increasing just after it passes zero. Therefore, when speed is exactly zero, there is no reason to consider that it is increasing more than it is decreasing, or vice versa. There's really no one correct answer, except that speed is definitely not constant at these times.*

(#6-9 MC) Matching Graphs:

Answers: Graphs that may represent the same event are… AHO, BKO, CIN, DJM, EGN, FLM

(#10-11 MC) Phases of a Symmetric Flight In Free-Fall

Answers:

A: Velocity: positive and decreasing Speed: positive and decreasing

Acceleration: negative and constant ($-9.8 m/s^2$)

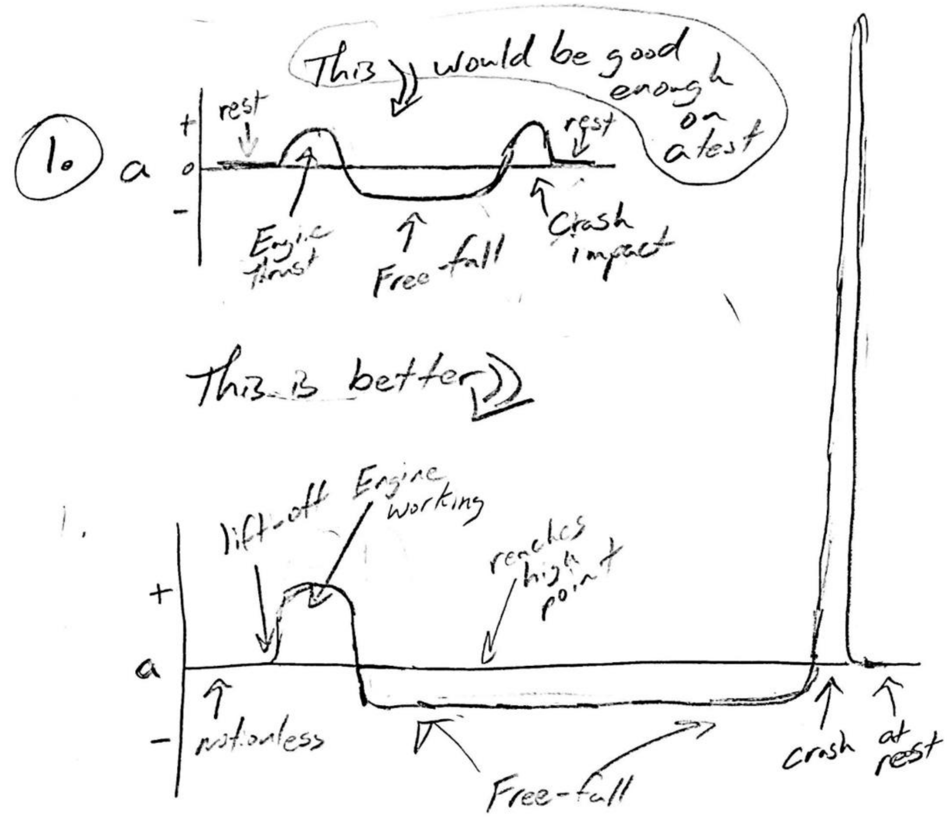
B: Velocity: zero and decreasing Speed: between decreasing and increasing

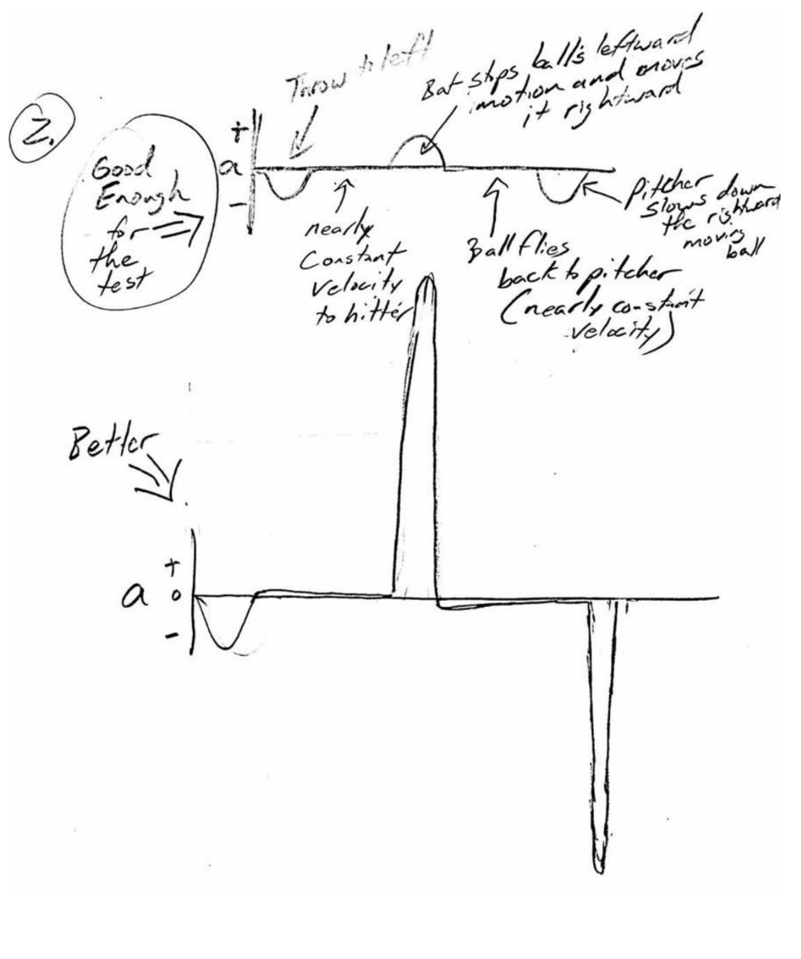
Acceleration: negative and constant ($-9.8 m/s^2$)

C: Velocity: negative and decreasing Speed: positive and increasing

Acceleration: negative and constant ($-9.8 m/s^2$)

(#12 Sketchig Graphs) Sketch graphs of acceleration for these events:





Extended Problem:

A ball is carried directly upward on a conveyor belt for 25 seconds at a speed of 1.9m/s. After this ascent, the ball sits at rest for 2 seconds, until a lever throws the ball directly downward in the absence of air resistance. The lever that throws the ball causes a constant acceleration of $-286 m/s^2$ over a vertical distance of 0.7m. Three seconds after leaving the lever, the ball makes contact with the ground, compresses downward a bit, and bounces back upward. This period of contact with the ground lasts 0.05 seconds, and during this time of contact, the ball undergoes constant acceleration. After losing contact with the ground, the ball travels upward 50m before losing all of its speed. This is the end of "the event."

1. What is the velocity of the ball just after it is accelerated by the lever? **-20m/s**

2. What is the velocity of the ball just before it makes contact with the ground? **-49.4m/s**

3. How far does the ball travel between the time it is released from the lever and the moment it contacts the ground? **104.1m**

4. What is the average velocity of the ball between its release from the lever and its moment of contact with the ground? **-34.7m/s**

5. What is the velocity of the ball just after its bouncing contact with the ground? **31.3m/s**

6. What acceleration does the ball experience during the bounce? **1,614**$\mathbf{m/s^2}$

7. What is the ball's overall displacement during this entire event? **-7.3m**