

Momentum

NAME

DATE __

Scenario

A ball is thrown straight up into the air with an initial speed v_0 . After a few seconds, it returns to the height from which it was thrown. Air resistance is negligible.

Using Representations

PART A: Sketch the following graphs as functions of time for the time the ball is in the air.

| Potential Energy of Ball/Earth System [®] Momentum of the Ball | ilime : | | | | ernal | I Forc | ce or | a the | Ball | |
|----------------------------------------------------------------------------------|-----------|----|-----|-----|-------|--------|-------|-------|------|------|
| Potential Energy of Ball/Earth System [®] Momentum of the Ball | | | Net | Ext | ernal | I Forc | ce or | the | Ball | |
| Potential Energy of Ball/Earth System [®] Momentum of the Ball | | | Net | Exb | ernal | I Forc | ce or | the | Ball | |
| Potential Energy of Ball/Earth System Momentum of the Ball | | | Net | Ext | ernal | I Forc | ce or |) the | Ball | |
| Potential Energy of Ball/Earth System Momentum of the Ball | | | Net | Ext | ernal | I Foro | ce or | a the | Ball | |
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| Potential Energy of Ball/Earth System [®] Momentum of the Ball | | | Net | Exb | ernal | I Forc | ce or | the | Ball | |
| Potential Energy of Ball/Earth System [®] Momentum of the Ball | | | Net | Exb | ernal | I Forc | ce or | the | Ball | |
| Potential Energy of Ball/Earth System [®] Momentum of the Ball | | | Net | Ext | ernal | I Forc | ce or | the | Ball | |
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| Total Mechanical Energy Kinetic Energy of the Ball of the Ball/Earth System | | | | | | | | | | |
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| Total Mechanical Energy Kinetic Energy of the Ball of the Ball/Earth System | | | | | | | | | | - |
| Total Mechanical Energy * Kinetic Energy of the Ball of the Ball/Earth System | + + | | + | - | | | - | + + | - | - |
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| Total Mechanical Energy * Kinetic Energy of the Ball of the Ball/Earth System | + + | | - | - | | | - | - | - | - |
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| Total Mechanical Energy * Kinetic Energy of the Ball of the Ball/Earth System | | 11 | | | | | | | | |
| of the Ball/Earth System | | | | | | | | | | |
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Data Analysis

| PART B: | | e following sentences discuss the relationships between these graphs and the physical ideas they resent. Fill in the blanks. |
|---------|-----|---------------------------------------------------------------------------------------------------------------------------------|
| | 1. | The slope of the position vs. time graph is equal to |
| | 2. | The slope of the velocity vs. time graph is equal to |
| | 3. | The area under the acceleration vs. time curve is equal to the |
| | 4. | The area under the velocity vs. time curve is equal to the, |
| | 5. | The graph of momentum vs. time is the same shape as the vs. time graph because momentum is equal to |
| | 6. | The net force graph vs. time is the same shape as the vs. time graph because the net force is equal to |
| | 7. | The slope of the momentum vs. time graph is equal to |
| | 8. | The area under the curve of the net external force vs. time graph is equal to or |
| | 9. | The potential energy vs. time graph is the same shape as the vs. time graph because the potential energy is equal to |
| | 10. | The kinetic energy vs. time graph is related to the vs. time graph because the |
| | | kinetic energy is equal to |
| | 11. | The total mechanical energy graph is because it represents the sum of the |
| | | vs. time and the vs. time graphs. |
| | | Also, there are no forces on the system, so there is no work done. Therefore, the total mechanical energy is |