Work and Energy: Take 2

CHANGE = FINAL - INITIAL

* Energy cannot be created or destroyed. It can only change form.
* If an object gains or loses energy, that energy is transferred to or from the surroundings.
* The change in energy is called WORK

Eo + W = E

**Type One:**

1. An object has 100J of energy. The object then gains 200J of energy. What is its final energy?

2. An object has 500J of energy. The object then gains 200J of energy. What is its final energy?

3. A 320kg object has 2500J of energy. The object then gains 300J of energy. What is its final energy?

4. An object has 700J of energy. The object then loses 200J of energy. What is its final energy?

5. 250J of energy is added to a purple object with 440J of energy. What is the final energy?

6. 137.5J of energy is added to a system of objects with 913.2J of energy. What is the final energy?

7. 4000J of energy is removed from a system of objects with 18 000J of energy. What is the final energy?

8. A 630g object initially has 300J of energy. The object’s final energy is 300J. What is the change in energy?

9. An object initially has 1300J of energy. The object’s final energy is 1420J. What is the change in energy?

10. An object initially has 420J of energy. The object’s final energy is 300J. What is the change in energy?

11. A 2.2kg object has 216J of energy at the beginning of some process and 216J of energy at the end of the process. What is the change in energy?

12. An object has 134J of energy. Then some stuff happens. After the stuff the object has 16J of energy. What is the change in energy?

**Type Two:**

1. An object initially has 100J of energy. 200J of work is done to the object. What is its final energy?

2. An object initially has 500J of energy. 0J of work is done to the object. What is its final energy?

3. A 13kg object initially has 2500J of energy. 300J of work is done to the object. What is its final energy?

4. An object initially has 700J of energy. -200J of work is done to the object. What is its final energy?

5. 0J of work is performed on an object with 440J of energy. What is the final energy?

6. 137.5J of work is done to a system of objects with 913.2J of energy. What is the final energy?

7. -4000J of work is done to a system of objects with 18 000J of energy. What is the final energy?

8. 0J of work is done to a ball with 216.12J of energy. What is the final energy?

9. An object has 6000J of energy initially and 8000J of energy finally. How much work was done to the object?

10. An object has 8000J of energy initially and 6000J of energy finally. How much work was done to the object?

11. An object has 12J of energy initially and 18J of energy finally. How much work was done to the object?

12. An object has 16J of energy initially and 500J of energy finally. How much work was done to the object?

13. An object has 327.92J of energy initially and 116.87J of energy finally. How much work was done to the object?

14. How much work must be done to change an object’s energy from 25J to 35J?

15. How much work must be done to change the energy of a 2566kg object from 40J to 15J?

16. How much work does it take to change an object’s energy ***to*** 750J ***from*** 650J?

17. After 100J of work is performed, a 220lb object has 400J of energy. What was the initial energy of the object?

18. After -200J of work is performed an object has 900J of energy. What was the initial energy of the object?

19. An object has 230J of energy after 0J of work is done to it. How much energy did it start with?

20. A 137kg roller-coaster cart has 2400J of energy after -600J is done to it. What was its energy at the beginning?

21. A 35kg genetically modified hamster, named Tiny, has 53.1J of energy after -17.7J has been performed. What was her initial energy?

22. What amount of work is required to change the energy of a bowling ball from 19.6J to 28.3J?

**Type Three:**

1. An object initially has 100J of kinetic energy and 20J of potential energy. 0J of work is done to it. What is its final energy?

2. A 27g object initially has 70J of kinetic energy and 130J of potential energy. -90J of work is done to it. What is its final energy?

3. An object initially has 14 420J of kinetic energy and 6 975J of potential energy. 1313.7J of work is done to it. What is its final energy?

4. An object initially has 3333J of kinetic energy and 4444J of potential energy. -5555J of work is done to it. What is its final energy?

5. An object initially has 3.774J of kinetic energy and 20.54J of potential energy. -14.333J of work is done to it. What is its final energy?

6. An object initially has 137.6J of kinetic energy and 216J of potential energy. 0J of work is done to it. What is its final energy?

7. An object initially has 25J of kinetic energy and 18J of potential energy. Finally the object has 33J of kinetic energy and 27J of potential energy. What is the change in energy? What is the work done?

8. An object initially has 65J of kinetic energy and 128J of potential energy. Finally the object has 42J of kinetic energy and 29J of potential energy. What is the change in energy? What is the work done?

9. An object initially has 25J of kinetic energy and 18J of potential energy. Finally the object has 33J of kinetic energy and 10J of potential energy. What is the change in energy? What is the work done?

10. At the end of some process a 263kg thing has 24 000J of kinetic energy and 12 000J of potential energy. At the start of the process the thing had 13 000J of kinetic energy and 18 000J of potential energy. What is the change in energy? What is the work done?

11. At the beginning of some process a thing has 160J of kinetic energy and 10 000J of potential energy. At the end of the process the thing has 400J of kinetic energy and 8 000J of potential energy. What is the change in energy? What is the work done?

12. At the beginning of some process a thing has 13.744J of kinetic energy and 74.2J of potential energy. At the end of the process the thing has 9.78J of kinetic energy and 63.24J of potential energy. What is the change in energy? What is the work done?

13. At the beginning of some process a thing has 24 000J of kinetic energy and 12 000J of potential energy. During the process the object loses 6000J of energy. What is the final energy of the object?

14. At the end of some process a thing has 24 000J of kinetic energy and 12 000J of potential energy. During the process 2600J of work was done to the object. What was the initial energy?

**Type Four:**

1. An object has 630J of kinetic energy and 240J of potential energy initially. -170J of work is done. Finally the object has 450J of kinetic energy. What is the final potential energy?

2. An object has 270J of kinetic energy and 1160J of potential energy initially. -495J of work is done. Finally the object has 830J of potential energy. What is the final kinetic energy?

3. An object has 2230J of kinetic energy and 7890J of potential energy initially. 6000J of energy is lost. Finally the object has 3550J of potential energy. What is the final kinetic energy?

4. An object has 630J of kinetic energy and 240J of potential energy initially. 680J of energy is gained. Finally the object has 450J of kinetic energy. What is the final potential energy?

5. An object has 1000J of kinetic energy and 0J of potential energy initially. 0J of work is done. Finally the object has 0J of kinetic energy. What is the final potential energy?

6. An object has 0J of kinetic energy and 4000J of potential energy initially. 0J of work is done. Finally the object has 1000J of kinetic energy. What is the final potential energy?

7. An object has 897J of kinetic energy and 1455J of potential energy initially. 888J is lost to the surroundings as heat and sound. Finally the object has 750J of potential energy. What is the final kinetic energy?

8. An object has 220 000J of kinetic energy and 170 000J of potential energy initially. The object loses 65 000J of energy as heat and sound during some process. Finally the object has 310 000J of potential energy. What is the final kinetic energy?

9. A roller coaster cart has 4000J of potential energy and 200J of kinetic energy at the top of a hill. The cart then rolls down one hill and up another. At the top of this hill the cart has 1000J of potential energy and 2000J of kinetic energy. What is the change in energy? How much work has been done?

10. A roller coaster cart has 8000J of potential energy and 0J of kinetic energy at the top of a hill. The cart then rolls down one hill and up another. At the top of this hill the cart has 4000J of potential energy and 2000J of kinetic energy. What is the change in energy? How much work has been done?

11. A roller coaster cart has 4000J of gravitational energy and 200J of kinetic energy at the top of a hill. The cart then rolls down one hill and up another. At the top of the second hill the cart has 1000J of gravitational energy. Assuming no friction (0J of work done), find the final kinetic energy.

12. A roller coaster cart has 4000J of gravitational energy and 200J of kinetic energy at the top of a hill. The cart then rolls down one hill and up another. In this process the cart loses 1200J of energy as heat and sound. At the top of the second hill the cart has 1000J of gravitational energy. Find the final kinetic energy.

13. A ball is dropped from a point where it has 620J of gravitational energy and 0J of kinetic energy. After falling for some time it has 400J of kinetic energy. Assuming no air resistance (0 J of work done), find the final gravitational energy.

14. A car is driving up a hill. At the bottom of the hill the car has 75 000J of kinetic energy and 0J of gravitational energy. At the top of the hill the car has 200 000J of kinetic energy and 80 000J of gravitational energy. How much work was done to the car? What is the change in the car’s energy?

15. A car is driving up a hill. At the bottom of the hill the car has 75 000J of kinetic energy and 0J of gravitational energy. As the car drives up the hill 205 000J of work are done. At the top of the hill the car has 200 000J of kinetic energy. What is the final potential energy?

16. A 23 333kg tanker truck filled with a new type of synthetic liquid cheese made entirely from recycled plastic bottles and carrot peels is driving down a hill. At the top of the hill the truck has 2 800 000J of gravitational energy and 4 700 000J of kinetic energy. As the truck descends the hill -2 400 000J of work is done. At the bottom the hill the truck has 0J of gravitational energy. What is the final kinetic energy of the truck?

17. A 23 333kg tanker truck filled with a new type of synthetic liquid cheese made entirely from recycled plastic bottles and carrot peels is driving down a hill. At the top of the hill the truck has 2 800 000J of gravitational energy and 4 700 000J of kinetic energy. As the truck descends the hill loses 2 000 000J of gravitational energy while gaining 300 000 of kinetic energy. What is the change in energy? How much work is done? How much heat/sound is produced?