Energy Stores Practice

1 Which of these have energy in an energy store?

(a) A pebble sinking in a pond

(b) An empty battery

(c) A tree branch being pulled down

(d) A human

2 Link each situation with the right energy store.

A hot water bottle		gravitational potential energy
A moving trolley		thermal energy
Two charged balloons		kinetic energy
A book on a table		electrostatic energy

3 Which energy store is the energy moved from and to which one(s) does it go to? Circle the correct energy stores.

(a) An atom of Uranium breaking apart. (**magnetic, nuclear, kinetic, elastic potential**)
Energy is transferred from the ______________ energy store to the _____________ energy store.

(b) A burning marshmallow. (**magnetic, chemical, kinetic, thermal**)
Energy is transferred from the _______________ energy store to the ______________ energy store.

(c) A cyclist pedalling up a hill. (**magnetic, chemical, kinetic, elastic potential, gravitational potential**)
Energy is transferred from the _______________ energy store to the _____________ energy and the ____________________________ energy stores.

4 Which energy store is the energy moved from and to which one(s) does it go to?

(a) A burning fire

(b) A spaceship taking off from Earth

(c) A diver jumping off a flexible 5 m-diving board.

5 Complete the conservation of energy equation.

total energy in the system __________ = total energy in the system __________

6 A wheelchair user is moving along a track. They have a 400 J kinetic energy store.

(a) Complete the sentence: At the start, the wheelchair user has $\boxed{}$ J of energy in its energy store.

(b) They roll to the top of a ramp and come to stop. They will have a store $\boxed{}$ J of gravitational potential energy.

(c) The wheelchair user rolls down the other side using the brakes to come to a stop at the bottom. The wheelchair brakes now have $\boxed{}$ J of thermal energy.

(d) The total energy equation can be written as:

$$\begin{array}{ccc} \text{total energy at the start (J)} & = & \text{total energy at the end (J)} \\ \text{kinetic energy (J)} & = & \text{thermal energy (J)} \\ \boxed{} & = & \boxed{} \end{array}$$

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7 A wheelchair user is moving along a track. They have a 500 J kinetic energy store. This time they roll up the ramp and keep going.

(a) To what stores has the energy transferred to?

(b) At the top of the ramp they have a store 400 J of gravitational potential energy. How much is in the other energy store?

$$\begin{array}{ccccc} \text{total energy at the start (J)} & = & \text{total energy at the end (J)} & & \\ \text{kinetic} & = & \text{gravitational} & + & \underline{} \\ \text{energy} & = & \text{potential energy} & & \text{energy} \\ \boxed{500} & = & \boxed{400} & + & \boxed{} \end{array}$$

(c) The wheelchair user performs a jump off the edge of the ramp. How much extra energy can go to their gravitational potential energy store?

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8 You want to climb Ben Nevis. At the top, you will have a gravitational potential energy of 807000 J. You want to bring chocolate bars with you as a snack. If a chocolate bar has 810000 J of chemical energy, how many chocolate bars will you need to to give you enough chemical energy to reach the top?

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9 A battery is used to power a drill. When the drill head spins it has a store of kinetic energy and a store of thermal energy. The battery has a total chemical store of 4000 J. How much energy is in

(a) the kinetic energy store of the drill if it takes $3/4$ of the battery's energy?

(b) the thermal energy store of the drill?

10 A toy hot air balloon floats 4 m off the ground. At this height, it has a gravitational potential energy of 40 J.

(a) How much energy was needed in its thermal store to get it to that height?

(b) In reality, only 1/8 of stored thermal energy is useful energy, the rest is dissipated to its surroundings. How high would the hot air balloon rise if it had 40 J of stored thermal energy at the start?

(c) Will it float at the same height, or higher or lower than before?

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11 A battery is used to power a portable speaker. The battery has a chemical energy store of 420 J. Sound is created by moving a curved surface backwards and forwards.

(a) $2/3$ of the battery's energy is transferred to the kinetic energy store of the surface. How much is in that store at the end?

(b) How much energy is dissipated as sound?

(c) Is the energy radiated as sound useful?

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12 A cyclist travels down a mountain at the same speed. They have a kinetic energy of 2240 J. The altitude of the cyclist and their gravitational potential energy is recorded in the table below.

Altitude (m)	800	700	600	500	400
Gravitational potential energy (J)	560 000	490 000	420 000	350 000	280 000

(a) By how much does the cyclist's gravitational potential energy store go down every 100 m?

	Top of the mountain	Halfway point
Gravitational potential energy (J)	560 000	280 000
Kinetic energy (J)	0	2240

(b) The table above shows the energy in the cyclist's gravitational potential and kinetic energy at the top of the hill and halfway down the mountain. How much energy is not in one of these stores at the halfway point?

(c) Where does this energy go?

(d) Is this a useful store in this case?