Energy Stores Practice

1 Which of these have energy in an energy store?

(a) A pebble falling into 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.

Situation		Energy store
A hot water bottle		gravitational potential energy
A moving trolley		thermal energy
Two charged balloons		kinetic energy
A book on a table		electromagnetic 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) A nuclear explosion. (**thermal, nuclear, kinetic, elastic potential**)
Energy is transferred from the ______________ energy store to the ______________ and ______________ energy stores.

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

(c) A cyclist pedalling up a hill. (**nuclear, 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 log to heat a house.

(b) A spaceship taking off from Earth and reaching space.

(c) A diver jumping off a flexible 5 m-diving board and landing in the water.

5 Complete the conservation of energy equation.

total stored energy in the system __________ = total stored 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 in their kinetic energy store.

(b) They roll to the top of a ramp and come to stop. They will have a store of $\boxed{}$ 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 brakes and surrounding air now have $\boxed{}$ J of thermal energy.

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

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\begin{aligned}
\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{aligned}
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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) What stores has the energy transferred to?

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

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

(c) The wheelchair user performs a jump off the edge of the ramp. At the top of the jump, how much energy is in their gravitational potential energy store now?

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8 You want to climb Ben Nevis. At the top, you will have a gravitational potential energy of $807\,000$ J. You want to bring chocolate bars with you as a snack. If a chocolate bar has $810\,000$ J of chemical energy, how many chocolate bars will you need to give you enough chemical energy to reach the top?

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9 A battery is used to power a drill. After drilling 5 holes, the drill and surrounding air are hot. The battery had a chemical store of 4000 J at the start. Three quarters of that energy was used to make holes. How much energy was transferred to the thermal energy store of the drill and air?

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) At least how much energy was needed in its thermal store to get it to that height?

(b) In reality, only a small amount of stored thermal energy is useful energy, the rest is dissipated to the hot air balloon's surroundings. If only $\frac{1}{8}$ of the 40 J of thermal energy is useful, how high would the hot air balloon rise?

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

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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) If $1/6$ of the battery's energy store is used to power the surface, how much energy is radiated as sound?

(b) Is the energy radiated as sound useful?

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12 A cyclist travels down a mountain at a steady 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 $(\mathbf{m})$	800	700	600	500	400
Gravitational potential energy $(\mathbf{J})$	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 $(\mathbf{J})$	560 000	280 000
Kinetic energy $(\mathbf{J})$	2240	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?