

# GCSE Physics

## Worksheet: Energy stores and systems

|                |                   |                       |                            |
|----------------|-------------------|-----------------------|----------------------------|
| TIME<br>30 min | TOTAL<br>29 marks | CALCULATOR<br>Allowed | DIFFICULTY<br>Easy, Medium |
|----------------|-------------------|-----------------------|----------------------------|

Topics: Energy stores and systems

|      |       |      |
|------|-------|------|
| NAME | CLASS | DATE |
|------|-------|------|

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Energy can be stored in different ways.

0 1 . 1

A student stretches a rubber band.  
Which energy store of the rubber band increases?  
Tick (✓) **one** box.

|                         |                          |
|-------------------------|--------------------------|
| Chemical                | <input type="checkbox"/> |
| Elastic potential       | <input type="checkbox"/> |
| Gravitational potential | <input type="checkbox"/> |
| Kinetic                 | <input type="checkbox"/> |

[1 mark]

0 1 . 2

The student heats some water in an electric kettle.  
Name the energy store of the water that increases.

.....

.....

.....

[1 mark]

0 1 . 3

Energy is transferred to the kettle electrically, by a current.

Give **two** other ways that energy can be transferred from one store to another.

.....

.....

.....

.....

[2 marks]

0 2

0 2 . 1

Which energy store increases when a battery is charged?

Tick (✓) **one** box.

Chemical

☐

Elastic potential

☐

Gravitational potential

☐

Kinetic

☐

[1 mark]

0 2 . 2

Name the energy store of a stretched elastic band.

.....

.....

.....

[1 mark]

0 2 . 3

Which **two** of these involve an increase in the gravitational potential energy store?

Tick (✓) **two** boxes.

A ball rolling along flat ground

☐

A lift moving upward

☐

A skydiver falling

☐

A child climbing up a slide

☐

[2 marks]

0 3

0 3 . 1

Which energy store is associated with two magnets held close together, repelling each other?

Tick (✓) **one** box.

Chemical

☐

Elastic potential

☐

Kinetic

☐

Magnetic

☐

[1 mark]

0 3 . 2

The dome of a Van de Graaff generator becomes charged.  
Which energy store of the dome has increased?

Tick (✓) **one** box.

Chemical

☐

Electrostatic

☐

Nuclear

☐

Thermal

☐

[1 mark]

0 3 . 3

Name the energy store of the uranium fuel used in a nuclear power station.

.....

.....

.....

[1 mark]

0 3 . 4

Which **two** of these are examples of energy stored chemically?

Tick (✓) **two** boxes.

A charged phone battery

☐

A compressed spring

☐

Food in a cupboard

☐

A hot cup of tea

☐

[2 marks]

0 4

0 4 . 1

A cup of tea cools down on a table.

Which energy store of the tea decreases?

Tick (✓) **one** box.

Chemical

☐

Elastic potential

☐

Kinetic

☐

Thermal

☐

[1 mark]

0 4 . 2

State the energy store that decreases in a torch's battery as it powers a lamp.

.....

.....

.....

[1 mark]

0 4 . 3

Which **two** of the following describe energy being dissipated to the surroundings?

Tick (✓) **two** boxes.

A car engine getting hot

☐

A fully charged battery

☐

Sound from a running motor

☐

A stationary book on a shelf

☐

[2 marks]

0 5

A student throws a tennis ball vertically upwards. The ball rises, stops for an instant at its highest point and then falls back down.

0 5 . 1

Describe the changes in the way energy is stored as the ball moves from the student's hand to its highest point.

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[2 marks]

0 5 . 2

Explain why the ball has no kinetic energy at its highest point.

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[1 mark]

0 5 . 3

Air resistance acts on the ball as it moves.

Explain how air resistance affects the maximum height the ball reaches.

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[2 marks]

0 5 . 4

The student catches the ball at the same height it was thrown from.  
Compare the kinetic energy of the ball just before it is caught with its kinetic energy just after it was thrown.  
Give a reason for your answer.

.....

.....

.....

.....

[2 marks]

0 6

A skateboarder is moving at a constant speed across a flat park. The skateboarder rolls into a foam safety barrier and comes to rest, sinking into the foam.

0 6 . 1

Describe the changes in energy stores as the skateboarder is brought to rest by the barrier.

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.....

.....

.....

.....

.....

[3 marks]

0 6 . 2

The foam barrier becomes slightly warm after the collision.  
Explain why.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS



# Mark scheme

## GCSE Physics · Worksheet: Energy stores and systems · 29 marks

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### Question 1 (4 marks)

01.1 [1 mark]

**Correct:** Elastic potential

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01.2 [1 mark]

**Answer:** Thermal (internal) energy store

- thermal / internal (energy store) (1)

**Notes:** Do not accept 'heat' or 'kinetic'.

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01.3 [2 marks]

**Answer:** Any two of: by heating; mechanically (by a force doing work); by radiation (e.g. light or sound waves)

- by heating (1)
- mechanically / by (a) force(s) doing work (1)
- by radiation / (light or sound) waves (1)

Any 2 of the points above.

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### Question 2 (4 marks)

02.1 [1 mark]

**Correct:** Chemical

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02.2 [1 mark]

**Answer:** Elastic potential

- elastic potential (energy store) (1)
- 

02.3 [2 marks]

**Correct:** A lift moving upward; A child climbing up a slide

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### Question 3 (5 marks)

03.1 [1 mark]

**Correct:** Magnetic

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03.2 [1 mark]

**Correct:** Electrostatic

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03.3 [1 mark]

**Answer:** Nuclear

- nuclear (energy store) (1)
- 

03.4 [2 marks]

**Correct:** A charged phone battery; Food in a cupboard

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### Question 4 (4 marks)

04.1 [1 mark]

**Correct:** Thermal

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04.2 [1 mark]

**Answer:** Chemical

- chemical (energy store) (1)
- 

04.3 [2 marks]

**Correct:** A car engine getting hot; Sound from a running motor

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## Question 5 (7 marks)

### 05.1 [2 marks]

**Answer:** The kinetic energy store of the ball decreases and its gravitational potential energy store increases.

- kinetic energy (store of the ball) decreases (1)
- gravitational potential energy (store of the ball) increases (1)

**Notes:** Allow 'kinetic energy is transferred to gravitational potential energy' for 2 marks.

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### 05.2 [1 mark]

**Answer:** Its speed is zero at the highest point.

- the speed / velocity of the ball is zero (at the highest point) (1)
- 

### 05.3 [2 marks]

**Answer:** Work is done against air resistance, so some energy is dissipated to the thermal store of the surroundings and less is transferred to the gravitational potential store — the ball does not rise as high.

- (work is done against air resistance so) some energy is dissipated / transferred to the thermal store of the surroundings / air (1)
  - so less energy is transferred to the gravitational potential energy store (so the maximum height is lower) (1)
- 

### 05.4 [2 marks]

**Answer:** The kinetic energy is less when it is caught, because energy has been dissipated by air resistance on the way up and on the way down.

- kinetic energy is less (when it is caught) (1)
- (because) energy has been dissipated (to the surroundings) due to air resistance / work done against air resistance (1)

**Notes:** Second mark depends on the first.

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## Question 6 (5 marks)

### 06.1 [3 marks]

**Answer:** The kinetic energy store of the skateboarder decreases; energy is transferred to the elastic potential energy store of the compressed foam and to the thermal energy store of the foam and skateboarder; some energy is dissipated as sound.

- the kinetic energy store of the skateboarder decreases (1)
- energy is transferred to the elastic potential energy store of the (compressed) foam (1)
- some energy is transferred to the thermal energy store of the foam / skateboarder, or dissipated as sound (1)

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### 06.2 [2 marks]

**Answer:** Work is done compressing (deforming) the foam against internal resistive forces, so energy is transferred to the thermal energy store of the foam.

- work is done compressing / deforming the foam (against internal resistive forces) (1)
  - so energy is transferred to the thermal energy store of the foam (1)
-