



Unit 7 • Energy in Daily Life: energy, heat and temperature

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. energy
2. renewable
3. fossil fuels
4. energy crisis
5. geothermal energy
6. temperature
7. thermometer
8. kelvin

K • 4

Each carries 0.5 mark.

2 Multiple choice

- i. c. hydroelectricity

K • 1

Hydroelectricity gives no smoke or harmful gases when it is used. Diesel, petrol and coal all pollute the air when burnt.

- ii. a. firewood

U • 1

Firewood is renewable and is not a fossil fuel. Coal, petrol and diesel are all non-renewable fossil fuels.

- iii. c. -10°C to 110°C

K • 1

A laboratory thermometer usually reads from -10°C to 110°C , a little below melting ice and a little above boiling water, so both fixed points can be measured.

- iv. c. Rita and Sarita have the same body temperature.

A • 1

37°C and 98.6°F are the same temperature on two scales (Example 1), and both are normal. Nobody has a fever.

- v. b. Heat flows from the object at the higher temperature to the object at the lower temperature.

U • 1

Heat is what flows, and it flows from the higher temperature to the lower one. Temperature never flows.

3 Label the diagram

- | | |
|---------------------------|-------------------------|
| 1. swamp forest | 5. heat from deep below |
| 2. tiny sea creatures | 6. gas |
| 3. layers of mud and sand | 7. coal |
| 4. pressure | 8. oil |

K • 4

Each carries 0.5 mark.

4 Very short answers

- a. MARKING SCHEME

K • 1

✓ Flowing water (hydroelectricity).

- b. MARKING SCHEME

K • 1

✓ 98.6°F .

- c. MARKING SCHEME

K • 1

✓ Joule (J).



- d. MARKING SCHEME U · 1
✓ It stops the liquid falling back, so the reading stays after it is taken out.

5 Short answers

- a. MARKING SCHEME U · 2
✓ Any one difference, e.g. a biofuel is made from things that were alive recently; a fossil fuel formed from plants and animals buried millions of years ago.
✓ Any second difference, e.g. biofuel is renewable, fossil fuel non-renewable (or an example of each: gobar gas; coal).
- b. MARKING SCHEME K · 2
✓ Any one advantage, e.g. they give a large amount of heat (easy to get or carry).
✓ Any one disadvantage, e.g. they pollute the air when burnt (or they may run out).
- c. MARKING SCHEME U · 2
✓ Any one difference, e.g. heat is a form of energy; temperature is the degree of hotness or coldness.
✓ Any second difference, e.g. heat is measured in joules, temperature in kelvin (or heat flows, temperature tells its direction; heat depends on the amount of substance).
- d. MARKING SCHEME U · 2
✓ The water is at the low temperature of its cold surroundings, while the body is at about 37 °C.
✓ Heat flows from the hand into the water; losing heat is felt as cold.

6 Long answer

ANSWER

A · 4

A shortage of energy, caused by using too much non-renewable energy, is called an **energy crisis**.

Two efforts (any two, from what you see around you):

1. **Using alternative energy:** families build gobar gas plants and fit solar panels and solar water heaters, often with a subsidy from the government, so they use less LP gas and kerosene.
2. **Using hydroelectricity instead of fuels:** more people cook on induction stoves and ride electric scooters, buses and cars, which run on Nepal's own electricity instead of imported LP gas and petrol.
3. **Saving energy:** people switch to LED bulbs and switch off lights and machines that are not in use.

MARKING SCHEME

- ✓ Energy crisis: a shortage of energy caused by using too much non-renewable energy.
- ✓ One effort named, e.g. using alternative energy (gobar gas, solar panels).
- ✓ Explained, e.g. families use less LP gas and kerosene, often with a government subsidy.
- ✓ A second effort with its explanation, e.g. cooking on induction stoves and riding electric vehicles on Nepal's own hydroelectricity (or saving energy with LED bulbs, switching off).



7 Numerical problems

a. ANSWER

A · 2

$(C - 0)/100 = (F - 32)/180$, so $50/100 = (F - 32)/180$, $F - 32 = 50 \times 180 \div 100 = 90$, and $F = 122$ °F.

MARKING SCHEME

- ✓ The formula used with the values: $50/100 = (F - 32)/180$.
- ✓ $F = 122$ °F.

b. ANSWER

A · 2

$C/100 = (104 - 32)/180 = 72/180$, so $C = 72 \times 100 \div 180 = 40$ °C. Yes: normal is 37 °C (98.6 °F), so 40 °C is a high fever.

MARKING SCHEME

- ✓ $C = (104 - 32) \times 100 \div 180 = 40$ °C.
- ✓ Yes, she has a fever: it is above the normal 37 °C (98.6 °F).

8 Think

ANSWER

HA · 2

From the tea into the bathwater. Heat flows from a higher temperature to a lower one; the tea is at a higher temperature, even though the bucket holds more heat.

MARKING SCHEME

- ✓ From the tea into the bathwater.
- ✓ Heat flows from the higher temperature to the lower; temperature, not the amount of heat, decides the direction.

9 Activity: Which way does heat flow? (Activity 7.6)

(not marked)

WHAT STUDENTS SHOULD FIND

The mixture is cooler than the hot water and warmer than the cold water (about halfway, with equal amounts). The hot water gave heat to the cold water: its temperature fell while the cold water's rose, until they were the same.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	15	9	9	2	35





Unit 7 • Energy in Daily Life: waves and light

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. medium → h. the substance a wave travels through K • 4
2. compression → a. a region where the particles of a sound wave are crowded together
3. frequency → e. the number of complete waves made in one second
4. amplitude → b. the greatest displacement of a particle from its mean position
5. normal → c. a line drawn at 90° to a mirror at the point of incidence
6. periscope → i. an instrument with two plane mirrors at 45°, for seeing over a wall
7. regular reflection → d. parallel rays stay parallel after striking a smooth surface
8. luminous → f. giving out its own light

Each carries 0.5 mark.

2 Multiple choice

- i. d. solid, liquid and gas K • 1
Sound can travel through any medium: solids (a wall, the ground), liquids (water) and gases (air). It can't travel through empty space.
- ii. b. electromagnetic wave K • 1
Electromagnetic waves, such as light and radio waves, can travel through empty space. Mechanical waves (transverse or longitudinal) need a medium.
- iii. a. 10 Hz A • 1
 $v = \lambda \times f$, so $f = v \div \lambda = 10 \div 1 = 10$ Hz.
- iv. b. 40° A • 1
 $\angle i = \angle r$, and together they make the 80°. So $\angle i = 80^\circ \div 2 = 40^\circ$.
- v. c. virtual, erect, and as far behind the mirror as the object is in front U • 1
The image in a plane mirror is virtual, erect, the same size as the object, as far behind the mirror as the object is in front, and laterally inverted (left and right swapped), but not upside down.

3 Label the diagram

1. trough
2. wavelength (λ)
3. crest
4. amplitude (A)
5. mean position

Each carries 0.5 mark.

4 Very short answers

- a. MARKING SCHEME K • 1
✓ Hertz (Hz).
- b. MARKING SCHEME K • 1
✓ About 340 m/s.
- c. MARKING SCHEME K • 1
✓ The angle of incidence equals the angle of reflection.



- d. MARKING SCHEME
✓ 60°.

U · 1

5 Short answers

- a. MARKING SCHEME

U · 2

- ✓ Any one difference, e.g. in a longitudinal wave the particles vibrate along the direction the wave travels; in a transverse wave at right angles to it.
- ✓ Any second difference, e.g. a longitudinal wave forms compressions and rarefactions, a transverse wave crests and troughs (or an example of each: sound; a wave on a rope).

- b. MARKING SCHEME

U · 2

- ✓ Any one difference, e.g. regular reflection happens at a smooth surface, irregular at a rough surface.
- ✓ Any second difference, e.g. in regular reflection parallel rays stay parallel and form an image; in irregular reflection they scatter and form no image.

- c. MARKING SCHEME

U · 2

- ✓ Sound needs a medium (solid, liquid or gas) to travel; it can't travel through empty space.
- ✓ A wave that needs a medium is a mechanical wave.

- d. MARKING SCHEME

U · 2

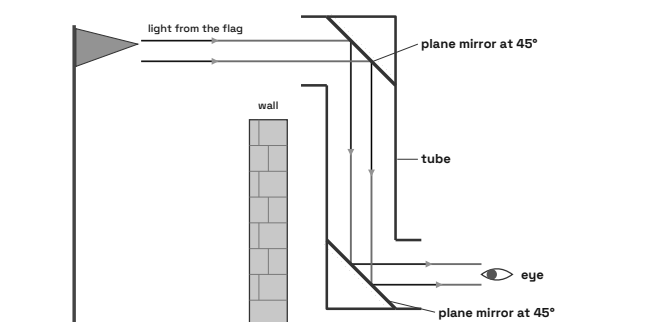
- ✓ Hitting harder gives the drum skin more energy, so it moves farther from its rest position.
- ✓ It pushes the air harder, so the air molecules move farther from their mean positions: a bigger amplitude (a louder sound).

6 Long answer

ANSWER

U · 4

A periscope is a tube with two **plane mirrors**, one at each end, at **45°** and parallel to each other. Light from an object enters the top opening and strikes the top mirror at 45°. It is reflected through 90°, straight down the tube. At the bottom it strikes the second mirror, again at 45°, and is reflected through 90° once more, out of the bottom opening into the eye. So the eye sees the object, which is high up, from a lower place. It works by the laws of reflection of light.



MARKING SCHEME

- ✓ A tube with two plane mirrors, one at each end, at 45° and parallel to each other.
- ✓ Light from the object strikes the top mirror and is reflected through 90°, down the tube.
- ✓ The bottom mirror reflects it through 90° again, out to the eye.
- ✓ A correct ray diagram (both mirrors at 45°, the ray turned twice).



7 Numerical problems

a. ANSWER

A · 2

Given: $\lambda = 2$ m, $v = 10$ m/s. To find: $f = ?$

We know, $v = \lambda \times f$

or, $10 = 2 \times f$

or, $f = 10 \div 2 = 5$ Hz.

So 5 complete waves pass each second.

MARKING SCHEME

✓ $v = \lambda \times f$ used: $10 = 2 \times f$.

✓ $f = 5$ Hz.

b. ANSWER

A · 2

Given: $v = 340$ m/s, $f = 680$ Hz. To find: $\lambda = ?$

We know, $v = \lambda \times f$

or, $340 = \lambda \times 680$

or, $\lambda = 340 \div 680 = 0.5$ m (50 cm).

MARKING SCHEME

✓ $v = \lambda \times f$ used: $340 = \lambda \times 680$.

✓ $\lambda = 0.5$ m.

8 Think

ANSWER

HA · 2

Sound travels about 340 m/s, roughly 1 km every 3 seconds, so 9 seconds means about 3 km. Light reaches us almost at once, because it is far faster than sound.

MARKING SCHEME

✓ About 3 km ($9 \div 3$, or $340 \text{ m/s} \times 9 \text{ s} \approx 3 \text{ km}$).

✓ Light travels far faster than sound, so the flash arrives almost at once.

9 Activity: The angle of incidence and the angle of reflection (Activity 7.10)

(not marked)

WHAT STUDENTS SHOULD FIND

In every row the angle of reflection comes out equal to the angle of incidence (within a degree or two, because pins and pencil lines are never perfect): the first law of reflection.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	11.5	14	6	2	33.5

