

# MARK SCHEME

# GCSE

## PHYSICS

## AQA - TRIPLE SCIENCE

---

P1 - TEST 1

ENERGY

Beginner

## Mark schemes

- 1.** (a) any **two** from:
- bungee rope may snap
  - rope may extend too much
  - student may land in the river
- 2
- (b) gravitational potential
- 1
- correct order only*
- kinetic
- 1
- elastic potential
- 1
- (c)  $\frac{1}{2} \times 40 \times 35^2$
- 1
- 24 500 (J)
- 1
- accept 25 000 (J) (2 significant figures)*
- 1
- allow 24 500 (J) with no working shown for 2 marks*
- [7]**
- 2.** (a) chemical
- 1
- kinetic
- 1
- in this order only*
- (b)  $E_k = 0.5 \times 80 \times 12^2$
- 1
- $E_k = 5760$  (J)
- 1
- an answer of 5760 (J) scores 2 marks*
- (c)  $E = 0.040 \times 480 \times 50$
- 1
- $E = 960$  (J)
- 1
- an answer of 960 (J) scores 2 marks*
- (d) increased
- 1
- [7]**

- 3.** (a) it would decrease the time 1
- (b) 720 (J) 2  
*allow 1 mark for correct substitution ie  $12 \times 60$  provided no subsequent step*
- (c) decreases 1
- decreases 1
- decreases 1
- more than one tick in any row negates the mark*
- [6]**
- 4.** (a) 46 200 2  
*accept 46 000*  
*allow 1 mark for correct substitution*  
*ie  $0.5 \times 4200 \times 22$  provided no subsequent step*
- (b) Energy is used to heat the kettle. 1
- [3]**

<b>5.</b>	(a) geothermal	1
	nuclear	1
	biofuel	1
	(b) gravitational (potential)	1
	kinetic	1
	sound	1
	(c) (i) 90% or 0.9(0) <i>an answer of 0.9(0) with a unit gains 1 mark</i>	2
	(ii) 60 (MW) <i>allow 10%</i>	1
	(iii) increased	1
		<b>[10]</b>
<b>6.</b>	(a) $P = \frac{120\,000}{8.0}$	1
	P = 15 000 (W)	1
	<i>an answer of 15 000 (W) scores 2 marks</i>	
	(b) energy is transferred in heating the surroundings	1
	friction causes energy to be transferred in non-useful ways	1
	(c) the switches are in parallel	1
	(so) closing either switch completes the circuit	1
	(d) gravitational potential energy = mass × gravitational field strength × height <i>allow <math>E_p = m g h</math></i>	1

(e)  $E_p = 280 \times 9.8 \times 14$

1

$E_p = 38\,416 \text{ (J)}$

1

$E_p = 38\,000 \text{ (J)}$

*an answer that rounds to 38 000 scores 2 marks*

1

*an answer of 38 000 scores 3 marks*

**[10]**

**7.**

(a) any **two** from:

- nuclear
- oil
- (natural) gas

2

(b) 4 (hours)

1

(c) a system of cables and transformers

1

(d) The power output of wind turbines is unpredictable

1

(e)  $1500 / 0.6$

1

2500 (wind turbines)

1

*allow 2500 with no working shown for 2 marks*

(f) Most energy resources have negative environmental effects.

1

**[8]**

**8.**

(a)  $20 \text{ (}^\circ\text{C)}$

1

(b) largest temperature decrease

*allow larger temperature decrease*

1

(c) insulation is thicker

1

so temperature decrease will be lower (for all insulation types)

1

- (d) Higher 1
- Lower 1
- (d) polyurethane foam 1
- lowest thermal conductivity 1

[8]

9.

- (a) higher 1
- (b) low(er) 1
- hot(ter) 1
- allow warm(er)* 1
- (c) advantage: 1
- water heated continuously (by the Sun)
- one** disadvantage from:
- temperature of water is lower (for most of the time than water heated by immersion heater)
  - water may not be hot enough  
*allow less control over water temperature*
  - it takes longer to heat the water 1
- (d)  $\frac{4\,030\,000}{4\,070\,000}$  1
- 0.99
- an answer of 99% scores 2 marks*
- an answer of 99 or 0.99% scores 1 mark* 1
- an answer of 0.99 scores 2 marks*
- allow an answer that rounds to 0.99 for 2 marks*
- (e) power = energy transferred / time 1
- allow  $P = E / t$*

(f)  $5000 = \frac{4070000}{t}$

1

$$t = \frac{4070000}{5000}$$

1

$$t = 814$$

1

seconds

*other units of time must be consistent with numerical value*

1

*an answer of 814 seconds scores 4 marks*

*an answer of 13.57 minutes scores 4 marks*

**[12]**