Mark scheme

Energy, work and power

Physics 0625 · Questions from Paper 3 and Paper 4

Total marks

78

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
6	7	8	9	7	7	7	8	9	10	**78**

Question 1 [6]

1(a)	2nd line – advantage	**B1**
	3rd line – advantage	**B1**
	4th line – disadvantage	**B1**
1(b)	any three from: (cold) water is pumped into the ground warm rocks heat water / hot water turns to steam / water boils (steam) drives or turns or moves turbine (turbine) drives or turns or moves generator	**B3**

Question 2 [7]

2(a)(i)	chemical (energy)	**B1**
2(a)(ii)	any **two** from: friction thermal / heat vibrations / sound resistance in wires	**B2**
2(b)	any **two** advantages: free fuel renewable no air pollution / no SO_2 / no acid rain no greenhouse gases / CO_2 emissions little / no maintenance quiet	**B2**
	any **two** disadvantages: needs a lot of space no energy at night less energy when cloudy / winter D.C.	**B2**

STEM | Exam Builder

Question 3 [8]

3(a)	chemical (energy)	**B1**
	gravitational potential (energy)	**B1**
3(b)	4.8 (J)	**A3**
	(work done =) 8(.0) × 0.6	(C2)
	(work done =) force × distance (moved in direction of force)	(C1)
3(c)	2.4 (W)	**A3**
	(power input =) 0.4(0) × 6(.0)	(C2)
	(power input =) $I \times V$	(C1)

Question 4 [9]

4(a)(i)	50 (J)	**A3**
	(work done =) 25 × 2.0	(C2)
	(work done =) force × distance (moved in the direction of the force)	(C1)
4(a)(ii)	same as answer to (a)(i) **OR** 50 (J)	**B1**
4(a)(iii)	(some input energy is transferred as) thermal energy	**B1**
	to surroundings / motor	**B1**
4(b)	(power output =) 16 (W)	**A3**
	(power output =) 80 ÷ 5(.0)	(C2)
	(power output =) energy output ÷ time	(C1)

Question 5 [7]

5(a)	energy cannot be created or destroyed	**B1**
	energy can be transferred / transformed (between energy stores)	**B1**
5(b)(i)	energy transferred in one hour at a rate of transfer of 1 kW	**B1**
5(b)(ii)	7200 (kWh)	**A2**
	(Δ)E = Pt **OR** (ΔE) = Pt **OR** 1800 × 4.0 **OR** 1.8 × 4.0 **OR** 7.2 × 10^n	(C1)
5(c)	any **two** from: • geothermal • nuclear • tidal	**B2**

STEM | Exam Builder

Question 6 [7]

6 **(a)** ½mv^2 OR ½ × 900 x 30^2 C1
405 000 J A1

(b) force x distance OR 2000 x 30 C1
60 000 J OR 60 kJ A1

(c) 60 000 W OR 60 000 J/s OR 60kW OR 60 kJ/s ecf from (b) B1

(d) chemical B1

(e) idea of energy loss / heat / sound / inefficiency / energy used within car / possibility of increase in P.E. Ignore work done against against friction B1 [7]

Question 7 [7]

7 **(a)** **(i)** *mgh* in any form OR 2.0 × 10 × 4.8 C1
96 J A1

(ii) GPE → KE (+ heat and/or sound)
→ heat and/or sound
–1 e.e.o.o. B2

(b) **(i)** force × distance/time OR 520 × 3/5 C1
312 W A1

(ii) 2600 W ecf **(i)** B1 [7]

Question 8 [8]

8(a)(i)	*any one from*: • fossil fuel / named fossil fuel • biofuel / wood / crops • hydro • wave • wind • solar cell / panel.	**B1**
8(a)(ii)	geothermal **OR** nuclear	**B1**
8(b)(i)	yes **OR** it is renewable	**B1**
	tides are continuous / regular / happen every day / always there / owtte **OR** Moon / Sun always there **OR** nothing is consumed / used up **OR** tides are an unlimited resource	**B1**
8(b)(ii)	(power =) 4800 W	**A4**
	KE = ½*mv*^{2}	C1
	(*P* =) *E* / *t* **OR** (*P* =) KE / s **OR** (KE / s =) ½ × 6(.0)×10^3 × 2(.0)^2	C1
	electrical (output) power = 40% of KE / s **OR** 0.4 × 12 000	C1

STEM | Exam Builder

Question 9 [9]

9 **(a)** strain / elastic (potential) (energy) B1

(b) **(i)** (KE =) ½ m v^2 in any form C1

1200 J A1

(ii) (G)PE (gained) = KE (lost) in any form C1

(G)PE = mgh OR h = PE ÷ mg in any form C1

1.8 m e.c.f. from **(b)(i)** A1

(iii) friction with air OR air resistance OR thermal energy / heat produced/lost B1

(c) **(i)** limit of proportionality B1

(ii) Hooke's law B1

Question 10 [10]

10(a)(i)	straight line begins at (15 s, 120 m) **and** continues to end of given line	**B1**
10(a)(ii)	curve with increasing gradient from origin to beginning of candidate's **(a)(i)**	**B1**
10(b)	(E_k =) ½mv^2 in any form	**C1**
	½ × 1.8 × 10^5 × 20^2	**C1**
	3.6 × 10^7 J	**A1**
10(c)(i)	(work done =) force × distance (moved in the direction of the force)	**C1**
	(work done =) force × distance moved in the direction of the force	**A1**
10(c)(ii)	240 m **c.a.o.**	**B1**
10(c)(iii)	3.6 × 10^7 / 240 **or** kinetic energy / distance **or** (a =) 20 / 24 **or** $\Delta v / t$ in any form **or** 0.83 **or** (F =) ma in any form	**C1**
	1.5 × 10^5 N	**A1**

STEM | Exam Builder