



Rewarding Learning

**General Certificate of Secondary Education
2011**

Science: Physics

**Paper 2
Foundation Tier**

[G7603]

WEDNESDAY 15 JUNE, MORNING

**MARK
SCHEME**

- 1 (a) (i) The coils touch/spring cannot be compressed further [1]
- (ii) 6 (cm) [1]
- (iii) Load 0 2 4 8
 Compression 0 1 2 4 [3]
 ½ each round down
- (iv) Compression proportional to load/they are proportional [1]
 Double the load doubles the compression/
 $\frac{\text{compression}}{\text{load}} = 0.5$ or constant [1]
- (b) (i) Pivot P at centre of wheel [1]
 X at the end of arrow showing weight/directly above arrow [1]
 Effort at handles acting upwards through the handle [1]
- (ii) Effort is further from pivot than the load/ [1]
 Load is closer to pivot than effort
- (c) (i) Moment = force \times distance
 $= 15 \times 0.4$ or 15×40 [1]
 $= 6$ 600 [1]
 Nm or Ncm if work in cm [1]
 Direction – clockwise or ↻ [not down] [1]
- (ii) Upward force at the biceps/within the upper arm [1]
- (iii) They are equal/balanced/in equilibrium [1]
- (d) (i) A [1]
- (ii) Tension [1]
- (iii) B [1]

AVAILABLE
MARKS

20

2	(a) (i)	Bunsen burner	chemical to heat	[1]
		Catapult	strain (elastic) to kinetic	[1]
		Microphone	sound to electricity	[1]
	(ii)	Energy cannot be created or destroyed		[1]
		It can only change its form/be converted		[1]
	(b) (i)	Plants/vegetation absorb sunlight		[1]
		Plants are buried/over a long time, $\geq 10^6$ yrs, many years		[1]
		High temperature/pressure convert them to coal		[1]
		(ii) Oil/gas/turf Two needed – [1] mark each		[2]
		(iii) Solar radiation heats up the surface or short λ radiation gets through the atmosphere [1] Heat re-radiated from surface/absorbed by atmosphere [1]		[3]
		(iv) Climate change/flooding		[1]
	(v)	Gases such as carbon dioxide/sulphur dioxide not released		[1]
	(vi)	Radioactive waste products/nuclear waste products or possibility of nuclear accident/radiation release		[1]
	(c)	Work done = force \times distance		[1]
		= 200×3		[1]
= 600 (J)		[1]		
(d) (i)	Efficiency = useful output energy/total input energy		[1]	
	= $30/40$		[1]	
	= 0.75 or 75% not 0.75% not 0.75J		[1]	
(ii)	Power = work done/time taken		[1]	
	= $30 \text{ (kJ)}/12$		[1]	
	= 2.5 kW unit needed or 2500W or 2500J/S		[1]	

AVAILABLE
MARKS

25

- 3 (a) (i)** Transverse – examples water, on a string, em waves or a named em
 Longitudinal – example – sound/ultrasound [2]
- (ii)** Transverse – atoms move perpendicular to direction of wave travel
 Longitudinal – atoms move along direction of wave travel
 If “vibrate” used give [1] mark [3]
- (b) (i)** Wavelength in deep water = 2 cm [1]
- (ii)** $20/5$ – [1]
 $= 4$ [1]
 Hz [1] indep mark [3]
- (iii)** $v = f\lambda$ [1]
 $= 4 \times 2.0$ allow ecf for wavelength from (c) (i) [2]
 $= 8$ (cm/s) [1]
- (iv)** Wavefronts refracted towards the boundary [1]
 Straight and parallel [1]
 Shorter wavelength only if refraction is correct [1]
 Refracted wavefronts continuous with incident waves. [1]
- (v)** Refraction [1]
- (vi)** Wave slows down [2] change of speed only give 1 [2]

AVAILABLE
MARKS

20

			AVAILABLE MARKS	
4	(a) (i)	Clockwise		
		Springy metal strip	[1]	
		Make and break contact	[1]	
		Soft iron core	[1]	
		(ii)	Current flows	[1]
			Electromagnet energised/ IRON CORE MAGNETIZED	[1]
			Soft iron bar / ARMATURE attracted	[1]
		(iii)	Circuit is broken/current stops/contact broken	[1]
			Springy metal strip pulls it back	[1]
			QWC	[1]
		(iv)	The contact closed/circuit is complete again/current flows again	[1]
	(b)	(i)	Direct current flows in one direction	[1]
			Alternating current reverses direction	[1]
		(ii)	a.c. waveform	[1]
d.c. any line/curve that does not cross the zero			[1]	
(iii)		battery – d.c.	[1]	
		mains – a.c.	[1]	
(c)	(i)	1000 (J)	[1]	
		$1 \times 3 = 3\text{kWh}$	[1]	
	(iii)	$3 \times 13 = 39$ pence ecf from (ii)	[1]	
(d)		Wire moves out of the page	[1]	

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			AVAILABLE MARKS
5	(a) Ticks at 1, 2, 5, 7 and 8 1 mark each	[5]	
	(b) (i) The Moon	[1]	
	(ii) Communications Sat nav, Weather	[2]	
	(c) (i) The distance Light travels in a year	[1] [1]	
	(ii) Take too long/insufficient fuel/food/life support	[1]	
	(d) (i) (Gas) particles are drawn closer together/contract/condenses Due to gravity (independent marks)	[1] [1]	
	(ii) The gas needs to heat up/temperature has to rise/be compressed	[1]	
	(iii) Nuclear Fusion	[1]	15
	Total		100