Pocket answer section for SQA Credit Physics 2001 – 2005

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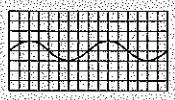
Physics Credit Level 2001

1. (*a*) (i) 1500 m/s
(ii) depth = 150 m
(iii) $\lambda = 0{\cdot}05$ m

(*b*)

Transmitted



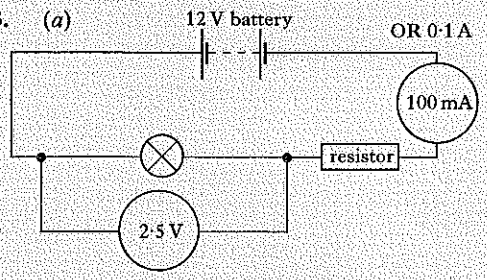
amplitude less
wavelength same

Reflected

(*c*) Time interval unchanged because the distance **or** the speed is unchanged

2. (*a*) $I = 0{\cdot}025$ A (*b*) 100 mA

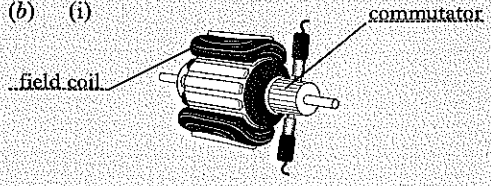
3. (*a*)



(*b*) (i) $V_R = 9{\cdot}5$ V
(ii) $R = 95\,\Omega$

4. (*a*) Swap/reverse/change round/ change over the battery (connections)/ current
Swap/reverse/change round/ change over the magnet (or magnetic field)/poles of magnet

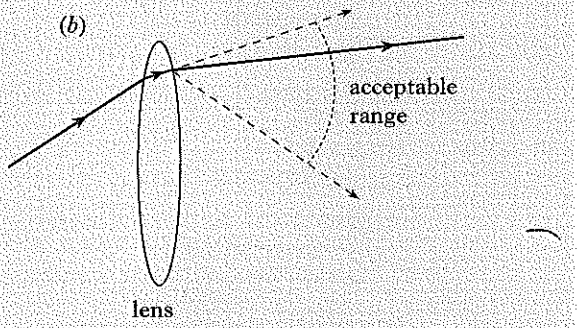
(*b*) (i)



(ii) (A) smoother rotation/ operation/more even motion/more powerful/increases rotating force/ease of starting
(B) easier to control/can shape field easier/more compact/ less mass/field stronger/can be switched off/ use on a.c. or d.c./permanent magnets can lose strength/can be reversed

5. (*a*) (i) Any **one** from:
can only see far away objects clearly **or** can not focus on near objects **or** image formed behind retina **or** can not see near objects clearly
(ii) $f = 0{\cdot}4$ m

(*b*)



lens

6. (*a*) It takes 5730 years for the activity to reduce to half its original value **or** a "stock" half-life definition

(*b*) (i) becquerel **or** Bq
(ii) Radiation causes flashes (of light)
These flashes are counted
(iii) ionisation **or** fogs photographic film
or kills (living) cells
or sterilisation
or changes (nature of) living cells

7. (*a*) (i) $R_{Th} = 700\,\Omega$
(ii) (A) 80 °C
(B) (If $R > 4300\,\Omega$), then $R_{Th} > 700\,\Omega$
(to maintain switching $V = 0{\cdot}7$ V) so switching temperature decreases

(*b*) (i) (npn) transistor
(ii) As temperature falls:

input { R_{Th} increases; V_{Th} increases }

process { (at 0·7 V) transistor switches on current in relay coil }

output { closes relay switch; completes heater circuit }

Physics Credit Level 2001 (cont.)

8. (*a*) (i) Power gain = 4000

(ii) $V = 24\,V$

(*b*) $R_T = 4{\cdot}5\,\Omega$

(*c*) 256 Hz

9. (*a*) (i) $\overline{v} = 15{\cdot}2$ m/s

(ii) Instantaneous speed is over a (very) small time interval/is (always) changing

Average speed is taken over a long time interval

(*b*) (i) $E_k = 8410\,J$

(ii) $F = 168{\cdot}2\,N$

10. (*a*) (i) $a = 1{\cdot}5\,m/s^2$

(ii) $F = 402\,000\,N$

(iii) greater during 10 – 40 s because the gradient of the v–t graph is greater **or** acceleration is greater

(iv) distance (length of runway) = area under graph

$= (\frac{1}{2} \times 10 \times 15) + (30 \times 15)$

$+ (\frac{1}{2} \times 30 \times 65)$

$= 75 + 450 + 975$

$= 1500$ m

(*b*) (i) The engine thrust is **greater than** the air friction force.

(ii) The lift is **equal to** the weight.

11. (*a*) (i) Fossil fuel: Waste is not radioactive

Nuclear: More energy/ kilogram of fuel **or** Small mass of waste produced

(ii) Coast or river

Both need (a large mass of) cooling water

(*b*) (i) Nuclear → heat

(ii) Kinetic → electrical

(*c*) (i) Stage 1: A uranium nucleus is bombarded by a **neutron**.

Stage 2: The uranium nucleus disintegrates, producing fission fragments, two **neutrons** and **heat**.

(ii) Each fission reaction produces (two) neutrons

These can cause further fissions.

More neutrons are produced from these fissions.

12. (*a*) $E_h = 4008\,J$

(*b*) From the water/drink

(*c*) (i) $E_h = 2508\,J$

(ii) Any temperature in range 12·0 °C → 15·0 °C

Because less heat is transferred to the contents from the surroundings **or** heat to melt ice comes from water only

13. (*a*) X-rays are absorbed by the (Earth's) atmosphere

(*b*)

Gamma rays	**X-rays**	Ultraviolet	**(Visible) light**	Infrared	Microwaves	**Radio waves**

(*c*) Different signals have different wavelengths.

Different wavelengths need different types of detectors.

(*d*) Q is fired (for a short time) then switched off.

P is fired (for the same time) then switched off.