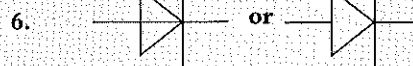


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1. B 2. C 3. A

4. A 5. E



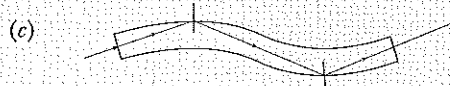
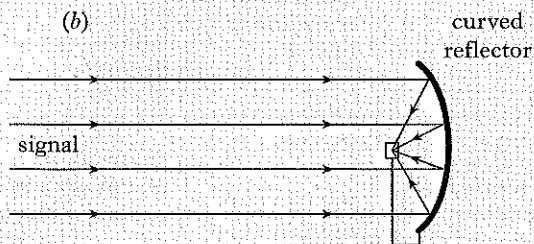
7. (a) (i) $f = 2$ hertz
(ii) $\lambda = 1.5$ metres
(iii) $v = 3$ metres per second
- (b) (i) Amplitude = 1 centimetre
(ii) (Smaller amplitude means) less energy (at Q than P)
or strength less or waves weaker

7. (b) (ii) or deeper water at Q than P
or losing power

8. (a) (i)

Stage	How the message is transmitted
1	Sound
2	Microwave
3	Light
4	Electrical

- (ii) Stage 1



9. (a) (i)

	Lamp 1	Lamp 2	Lamp 3
Current (amperes)	0.3	0.3	0.3
Voltage (volts)	12	12	12

- (ii)

	Lamp 1	Lamp 2	Lamp 3
Current (amperes)	0.1	0.1	0.1
Voltage (volts)	4	4	4

- (b) (i) Circuit 1
(ii) Any suitable (virtually anything plugged into a switched socket.)

10. (a) 230 volts

- (b) Any **two** from:
• Same/correct voltage across each
• Independent of each other/easier to add more lamps
• If one goes out, the rest stay on

- (c) (i) Total power = 6.4 kilowatts
(ii) (A) Energy = 19.2 (kilowatt hours)
(B) Cost = 96 pence

- (d) (Miniature) circuit breaker

11. (a) (i) Thermometer P or Digital
Ice melts at 0°C or within range of scale

11. (a) (ii) Thermometer Q or clinical thermometer or mercury thermometer

More precise scale or maintains temperature reading (when removed from body)

- (b) Shake to reset (or switch on if electronic)
Place in contact with body
Leave for suitable length of time
Take reading
- (c) Normal body temperature is 37 degrees celsius or 39 degrees celsius is higher than normal body temperature or 2 degrees celsius above normal body temperature indicates patient has a fever/is unwell/is ill

12. (a) (i) Infra red detector
(ii) Light dependent resistor
- (b) (i) (A) AND
(B)

Input P	Input Q	Output
0	0	0
0	1	0
1	0	0
1	1	1

- (ii) AND

13. (a) Weight is a **Force** and is the Earth's pull on an object.
The weight of a mass of 1 kilogram is **10 newtons**.

- (b) (i) Balance P
Scale only goes up to 2 newtons or
Scale does not go up to 10 newtons
- (ii) 10 newtons would only extend it a short way or not precise enough or difficult to read precisely or only goes up in 10 newton steps

14. (a) (i) $E_p = 8\,025\,600$ joules
(ii) $t = 40\,128$ seconds

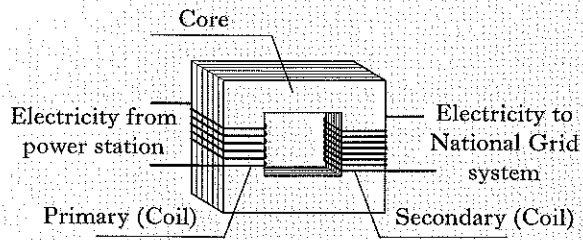
- (b) Heat is transferred to the (cooler) surroundings

15. (a) (i) Excess electricity (at night time) is used to raise water (to the reservoir)
(ii) Never runs out of water
or
Maintains high efficiency

- (b) $E_p = 4000$ joules
(if $g = 9.8$, answer = 3920 joules)

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15. (c) (i)



(ii) 165 000 (turns)

(iii) To reduce energy/heat/power loss
To reduce voltage drop along lines

16. (a) (i) Europa

(ii) Jupiter

(iii) Sun

(b) (i) Lens X is called the **eyepiece** lens. Its purpose is to **magnify**.

(ii) Lens Y is called the **objective** lens. Its purpose is to **collect light** and produce an image of the object.