



**Cambridge Assessment International Education**  
Cambridge International General Certificate of Secondary Education

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**PHYSICS**

**0625/32**

Paper 3 Core Theory

**May/June 2018**

MARK SCHEME

Maximum Mark: 80

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**Published**

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This document consists of **10** printed pages.



| Question | Answer                                                                                                                                                       | Marks |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1(a)     | <p>section of graph                      description of the motion</p> <p>1 mark for each correct line. 2 or more lines from any section loses the mark.</p> | 3     |
| 1(b)     | (distance travelled) = area under graph OR $\frac{1}{2} \times \text{base} \times \text{height}$                                                             | 1     |
|          | $\frac{1}{2} \times 40 \times 20$                                                                                                                            | 1     |
|          | 400 (m)                                                                                                                                                      | 1     |
| 1(c)     | 1st section/WX/from 0 s to 30 s has greater gradient than last (section)/YZ/from 60 s to 100 s                                                               | 1     |

| Question | Answer                                                           | Marks |
|----------|------------------------------------------------------------------|-------|
| 2(a)     | $(W =) m \times g$                                               | 1     |
|          | $650 \times 8$                                                   | 1     |
|          | 5200 (N)                                                         | 1     |
| 2(b)(i)  | (volume of log $=$ ) $3 \times 0.04 = 0.12 \text{ (m}^3\text{)}$ | 1     |
|          | $D = M / V$ OR $(D =) M / V$                                     | 1     |
|          | 550 (kg / m <sup>3</sup> )                                       | 1     |
| 2(b)(ii) | The density of logs is less than density of water owtte.         | 1     |

| Question | Answer                                         | Marks |
|----------|------------------------------------------------|-------|
| 3(a)(i)  | (moment $=$ ) force $\times$ distance          | 1     |
|          | $150 \times 0.5$                               | 1     |
|          | 75                                             | 1     |
|          | N m                                            | 1     |
| 3(a)(ii) | accept any example involving turning forces    | 1     |
| 3(b)     | increase distance (of force from pivot point ) | 1     |

| Question | Answer                                                                                                                                                                                                                                                                     | Marks |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 4(a)(i)  | 38 (°C)                                                                                                                                                                                                                                                                    | 1     |
| 4(a)(ii) | 2nd box ticked i.e. expansion of liquid                                                                                                                                                                                                                                    | 1     |
| 4(b)     | conduction                                                                                                                                                                                                                                                                 | 1     |
| 4(c)     | any <b>three</b> from:<br>water is a fluid<br>water molecules gain (kinetic) energy/move faster/further apart<br>water expands/volume increases<br>warm/hot water or molecules rises<br>convection (current created)<br>cooler/cold/water falls/sinks (to be heated again) | 3     |
|          | correct reference to density change of water                                                                                                                                                                                                                               | 1     |

| Question  | Answer                                                              | Marks |
|-----------|---------------------------------------------------------------------|-------|
| 5(a)      | (focal length =) 5 (cm)                                             | 1     |
| 5(b)(i)   | straight line through F and then parallel to PA from centre of lens | 1     |
| 5(b)(ii)  | straight line from top of object through centre of lens             | 1     |
| 5(b)(iii) | image indicated at point where rays cross                           | 1     |
|           | arrow drawn inverted on RHS of lens                                 | 1     |

| Question | Answer                                                                                                                                                                                 | Marks |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 6(a)     | (thermal energy is used) to produce steam                                                                                                                                              | 1     |
|          | steam turns a turbine                                                                                                                                                                  | 1     |
|          | (turbine) turns a generator                                                                                                                                                            | 1     |
| 6(b)     | any <b>two</b> from:<br>radioactive material/waste produced<br>problems storing waste<br>long half-life of waste/fission products<br>(accidental) leak of nuclear/radioactive material | 2     |

| Question  | Answer                                                                                                                                                    | Marks |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 7(a)(i)   | microwaves                                                                                                                                                | 1     |
| 7(a)(ii)  | $3.0 \times 10^8$ (m / s)                                                                                                                                 | 1     |
| 7(a)(iii) | ultraviolet or X-rays or gamma/ $\gamma$ -rays                                                                                                            | 1     |
| 7(b)(i)   | X-rays any one from: detecting broken bones/damaged teeth or detecting/treating cancer                                                                    | 1     |
|           | gamma: any one from: detecting/treating cancer or sterilising (hospital) equipment/food                                                                   | 1     |
| 7(b)(ii)  | any <b>two</b> from:<br>ionising radiations/high frequency/high energy (e-m radiation)<br>(may) damage or mutate cells/DNA<br>(may) cause radiation burns | 2     |

| Question  | Answer                                           | Marks |
|-----------|--------------------------------------------------|-------|
| 8(a)(i)   | vibrates                                         | 1     |
| 8(a)(ii)  | longitudinal                                     | 1     |
| 8(a)(iii) | vacuum                                           | 1     |
| 8(b)(i)   | 1000 (Hz)                                        | 1     |
| 8(b)(ii)  | frequency in range 10 001 to 30 000 (Hz)         | 1     |
| 8(b)(iii) | lowest frequency heard by humans is 20 Hz        | 1     |
|           | (but) elephants can hear frequencies below 20 Hz | 1     |
| 8(b)(iv)  | ultrasound                                       | 1     |

| Question  | Answer                                                                                      | Marks |
|-----------|---------------------------------------------------------------------------------------------|-------|
| 9(a)(i)   | top box (electrons) ticked                                                                  | 1     |
| 9(a)(ii)  | 12 + 6 seen or 18 ( $\Omega$ )                                                              | 1     |
| 9(a)(iii) | (V =) $I \times R$                                                                          | 1     |
|           | (V =) $0.50 \times 18(.0)$                                                                  | 1     |
|           | (V =) 9.0 (V) ecf from (a)(ii)                                                              | 1     |
| 9(b)      | (reading/current) increases                                                                 | 1     |
|           | (because effective circuit) resistance decreases/resistors in parallel have less resistance | 1     |

| Question  | Answer                                          | Marks |
|-----------|-------------------------------------------------|-------|
| 10(a)(i)  | second box (The balloon loses electrons) ticked | 1     |
| 10(a)(ii) | positive (charge)                               | 1     |
|           | like charge(s) repel                            | 1     |
| 10(b)     | circle around copper <b>AND</b> silver          | 1     |

| Question   | Answer                                                                                                                                                                                                                                                                             | Marks |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 11(a)(i)   | (Q is the) secondary/output (coil)                                                                                                                                                                                                                                                 | 1     |
| 11(a)(ii)  | 1. (soft–) iron                                                                                                                                                                                                                                                                    | 1     |
|            | 2. core                                                                                                                                                                                                                                                                            | 1     |
| 11(a)(iii) | magnetic field <b>OR</b> e.m.f. <b>OR</b> magnet                                                                                                                                                                                                                                   | 1     |
|            | changing <b>OR</b> alternating                                                                                                                                                                                                                                                     | 1     |
| 11(a)(iv)  | EITHER<br>more ... <b>AND</b> step-down<br><b>OR</b><br>fewer ... <b>AND</b> step-up                                                                                                                                                                                               | 1     |
| 11(b)      | any <b>two</b> from:<br>smaller current (in wires)<br>smaller drop in p.d./voltage (across cables)<br>smaller heating effect<br>less energy wasted/more efficient<br>thinner cables can be used<br>fewer pylons needed<br>(electricity) can be transmitted over long(er) distances | 2     |

| Question   | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Marks |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 12(a)      | <div style="display: flex; justify-content: space-around;"> <div> <p><b>symbol</b></p> <div style="border: 1px solid black; padding: 5px; width: 40px; height: 40px; margin: 10px; display: flex; align-items: center; justify-content: center;">A</div> <div style="border: 1px solid black; padding: 5px; width: 40px; height: 40px; margin: 10px; display: flex; align-items: center; justify-content: center;">Z</div> <div style="border: 1px solid black; padding: 5px; width: 40px; height: 40px; margin: 10px; display: flex; align-items: center; justify-content: center;">X</div> </div> <div> <p><b>description</b></p> <div style="border: 1px solid black; padding: 5px; width: 200px; height: 30px; margin: 10px; text-align: center;">number of neutrons</div> <div style="border: 1px solid black; padding: 5px; width: 200px; height: 30px; margin: 10px; text-align: center;">element symbol</div> <div style="border: 1px solid black; padding: 5px; width: 200px; height: 30px; margin: 10px; text-align: center;">proton number</div> <div style="border: 1px solid black; padding: 5px; width: 200px; height: 30px; margin: 10px; text-align: center;">nucleon number</div> <div style="border: 1px solid black; padding: 5px; width: 200px; height: 30px; margin: 10px; text-align: center;">number of atoms</div> </div> </div> <p>1 mark for each correct line. 2 or more lines from any section loses the mark.</p> | 3     |
| 12(b)(i)   | 18 / 6 or 3 half lives seen or implied                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1     |
|            | 1 / 8 or division by 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1     |
|            | 1.5 (mg)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1     |
| 12(b)(ii)  | any <b>two</b> from:<br>high energy/fast-moving<br>electron/negatively charged particle<br>about 2000 times smaller than a proton/neutron                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2     |
| 12(b)(iii) | any <b>one</b> from:<br>new element formed<br>neutron becomes/turns into a proton<br>Z/proton number increases by one<br>neutron number decreases by one                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1     |