Mass and weight

Mark Scheme 1

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	General Physics
Sub-Topic	Mass and weight
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 1

Time Allowed: **46 minutes**

Score: **/38**

Percentage: **/100**

1 **(a** $W = mg$ in any form OR $(m =) W \div g$ OR $80\,000 \div 10$ C1
     $8000\,kg$ A1

    (b) $\rho = m \div V$ in any form OR $(V =) m \div \rho$ OR $8000 \div 1000$ C1
     $= 8.0\,m^3$ ecf **(a)**   A1

    (c) mgh OR weight $\times h$ OR $8000 \times 10 \times 4$ C1
     $= 320\,000\,J$ OR $320\,kJ$ ecf **(a)**   A1

    (d) (efficiency =) output (energy) $\div$ input (energy) ($\times$ 100)
     OR $96 \div 320$ ($\times$ 100)   C1

     $= 0.30$ OR 30% ecf **(c)**   A1

                                               [Total: 8]

2 **(a (i)** $(W = mg = 1440 \times 10 =)\ 14\,400\ N$ B1

     (ii) $(P =) F / A$ OR $14\,400 / (1.5 \times 1.2)$ C1

        $8000\ Pa$ OR N / m^2 A1

    (b) (i) $(P =) h\rho g$ OR $1.4 \times 1000 \times 10$ C1

        $14\,000\ Pa$ OR N / m^2 A1

    (b) (ii) pressure on base of **P** smaller / **Q** greater

        (with same volume removed) smaller decrease in depth in Q
        OR height in **Q** is greater   A1

                                               [Total: 7]

3   **(a**   **(i)**   180 N   B1

           (ii) $(P =) F \div A$ **OR** $180 \div (0.30 \times 0.04)$ C1
                15 000 Pa   A1

    (b)   **(i)**   arrow (labelled *W*) from / to correct centre of mass   B1

           (ii)   **1.** force × (perpendicular) distance **OR** 40 × 0.60 **OR** 180 × 0.15 in **2.**   C1
                   24 N m   A1

                   2. 27 N m   e.c.f. from **(a)(i)**   A1

        (iii)   slab topples / rotates (about point D) **OR** corner C lifts from ground
                  OR falls over   B1

                  <u>moment</u> of force at B becomes bigger than <u>moment</u> of weight / W
                  OR anticlockwise <u>moment</u> becomes bigger than clockwise <u>moment</u>
                  OR weight/centre of mass outside base   B1

                                                            [Total: 9]

4   **(a**   85 000 N (accept 83 300 N)

    (b) **(** $(P =)F/A$ OR 85 000/3.4 OR 85 000/3.4 × 2 OR 85 000/6.8 (e.c.f. from **(a)(i)**)   C1
               $1.2/1.25/1.3 \times 10^4$ Pa (e.c.f. from **(a)(i)**)   A

           (ii)   larger area   M1
                  smaller pressure   A1

                                                             B1

  (c)   **(i)**   (measure of) turning effect OR $F \times x$

                                                             B1
       (ii)   no resultant/net force   B1
            no resultant/net turning effect/moment   B1   [8]

5   **(a**   mass = (1.5 × 10 × 12)/(30 × 10) OR = (1.5 × 12)/30

      OR any correct moment equation with force or mass but not mixture   C1

      = 0.6(0) kg   A1   [2]

  (b)   21 N ecf from **(a)**   B1   [1]

  (c)   **(i)**   stays in position   B1

      (ii)   any two from:
- clockwise moment = anticlockwise moment   B1
- centre of mass at pivot   B1
- no (resultant) moment/turning force acting on sculpture
- balanced/in equilibrium
- relative distances from pivot unchanged   [3]

              [Total: 6]