

Moments 2 Answers

- 1)
- (i) arrow (labelled W) from/to correct centre of mass B1
- (ii) 1. force \times (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 B1
OR falls over
- moment of force at B becomes bigger than moment of weight / W B1
OR anticlockwise moment becomes bigger than clockwise moment
OR weight/centre of mass outside base
- 2)
- (a) (i) 3 appropriate examples: e.g. spanner, scissors, tap etc. –1e.e.o.o. B2
- (ii) there is a resultant force **OR** more force down than up B1
 there is a resultant moment **OR** clockwise moment is not equal to
 anticlockwise moment B1
- (b) (i) $F \times 0.5 = 12 \times 0.3$ C1
 7.2 N A1
- (ii) weight has no moment about centre of rod/has no perpendicular distance
 from centre of rod B1
OR weight acts at centre of rod/pivot/centre of mass
- [Total: 7]**
- 3)
- (a) mass = $(1.5 \times 10 \times 12)/(30 \times 10)$ **OR** $(1.5 \times 12)/30$ C1
OR any correct moment equation with force or mass but not mixture A1
 = 0.6(0)kg [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]**

Moments 2 Answers

4)

- (a) force AND perpendicular distance (of force) from the point. B1
- (b) (i) downward arrow at centre of bar B1
- (ii) 0.5(0) m / 50 cm B1
- (iii) 40×1.2 OR 48 seen anywhere C1
 (+) 30×0.5 OR 15 seen anywhere C1
 = 63 N m A1
- (iv) $F \times 0.2 = 63$ C1
 $F = 63/0.2 = 315$ N A1
- (v) make bar / B longer
 OR move pivot / stone to the left
 OR increase distance between force and pivot (by moving pivot to left)
 OR increase mass of the bar / B B1 [9]

5)

- (a) Any three from: max. B3
- string with mass on pin in front of card
 - hang card on pin from a hole
 - make sure card can swing freely
 - (place plumb line on pin) and mark line/position on card
 - repeat using at least one more hole
 - where lines cross is centre of mass
- (b) card will balance at that point B1
OR repeat using third hole
 accept place pivot beneath centre of mass

[Total: 4]