

Moments

Mark scheme

1. lever
turning effect
pivot *for 1 mark each* [3]
2. (a) *idea* 2
- line of action of weight/force/gravity
(if drawn: a vertical line through the centre of mass)
 - falls outside the (wheel) base (mark NOT from diagram)
for 1 mark each
- (b) ideas that 3
- less stable/topples more easily
 - centre of mass at a higher level
 - so need small angle to make line of action of weight fall outside (wheel) base
for 1 mark each
- (c) idea that 1
- this is the most unstable condition (when bus used)
- or this makes c. of m. as high as it is likely to be
for 1 mark [6]
3. (a) 810 000 *allow 45 000 × 18 for 1 mark* 2
- newton-metres / Nm 1
- (b) any **three** from: (*ignore references to force throughout*)
- their weight / mass can be altered / adjusted
 - so that the crane remains stable **allow** *does not topple*
 - so that the (total) clockwise moment equals the (total) anticlockwise moment
do not allow just 'moments are equal'
 - because not all containers are the same weight / mass
do not allow 'not all containers are the same size / volume'
 - because not all containers will be / need to move the same distance (from the crane)
 - to keep the centre of mass (of the upper crane and container) in/ above the base of the tower
 - so that the crane remains in equilibrium/balanced 3
- [6]