Name of the Student:_____

Max. **Marks : 17 Marks**   **Time : 17 Minutes**

Mark Schemes

Q1.

(a)   moment

>   **or** *torque do **not** credit 'leverage'*

1

(b)   4 (2)

>   ***either** 0.20 × 20 (1) **or** allow '400' (1)*

2

(c)   use a longer spanner

>   **or** *increases the perpendicular distance / length*

>   **or** 'fit a pipe over the (end of the) spanner (to lengthen it)'
>   *note 'lever' refers to 'spanner'*
>   *note <u>change</u> the . . . (0)*
>   *ignore references to wider / larger nut*

1

use a greater force / pull
>   *either order*

1

[5]

Q2.

(a)   (i)   as one goes up so does the other

>   **or** (directly) proportional
>   *accept change by the same ratio*

1

(ii)   steeper straight line through the origin
>   *judge by eye*

1

(iii)   Yes with reason

>   eg   data would have been checked / repeated
>   *accept produced by a reliable/ official/ government source*
>   *do **not** accept it needs to be reliable*

>   **or** No with reason

>   eg   does not apply to all conditions / cars / drivers

or are only average values

or Maybe with a suitable reason

    eg   cannot tell due to insufficient information

                    1

(b)   (i)   stopping distance = thinking distance + braking distance

                    1

    (ii)   any **two** from:
factors must be to do with increasing braking distance

- smooth road / loose surface

- rain / snow / ice
accept wet road/ petrol spills
*do **not** accept condition of road unless suitably qualified*

- badly maintained brakes
accept worn brakes
accept bad/ worn/ rusty brakes
*do **not** accept old brakes*

- worn tyres
accept bald tyres
accept lack of grip on tyres
*do **not** accept old tyres*

- downhill slope/gradient

- heavily loaded car

                    2

                    [6]

Q3.

(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

[6]