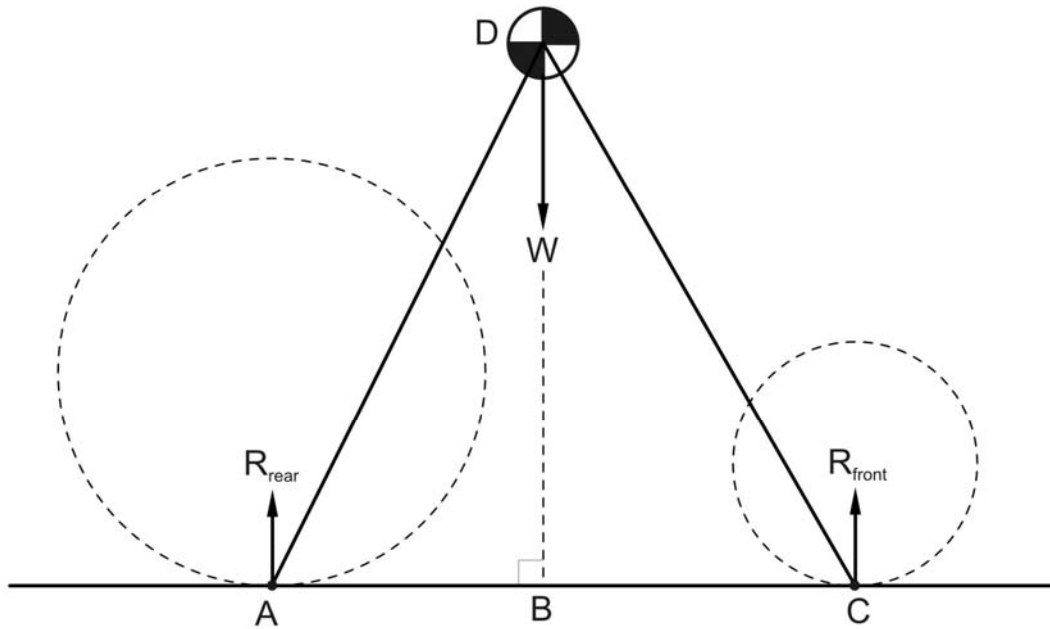## WHEELCHAIR STABILITY MEASUREMENT SYSTEM

Considering the diagram below to find the total weight:
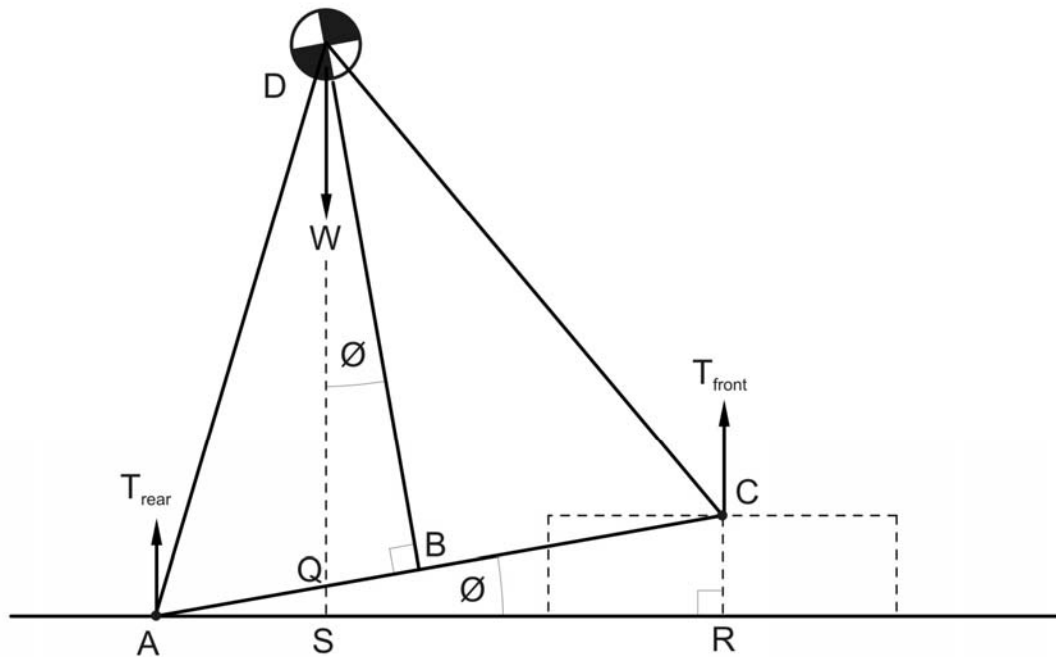

$$R_{rear} = Mass_{rear} \; x \; 9.81$$

$$R_{front} = Mass_{front} \; x \; 9.81$$

$$W = R_{rear} + R_{front}$$

Considering the following diagram:

Taking moments about A to find AB:

$$AB \times W = AC \times R_{front}$$

$$AB = (AC \times R_{front}) / W$$

Also,

$$\sin ø = CR/AC$$

$$ø = \arcsin (CR/AC)$$

The mass on one pair of wheels is measured to provide an angle of tip.

$$T_{front} = M_{front} \times 9.81$$

To find AR:

$$\cos ø = AR/AC$$

$$AR = AC \times \cos ø$$

Taking moments about A to find AS:

$$AS \times W = AR \times T_{front}$$

$$AS = (AR \times T_{front}) / W$$

To find AQ:

$$\cos \emptyset = AS / AQ$$

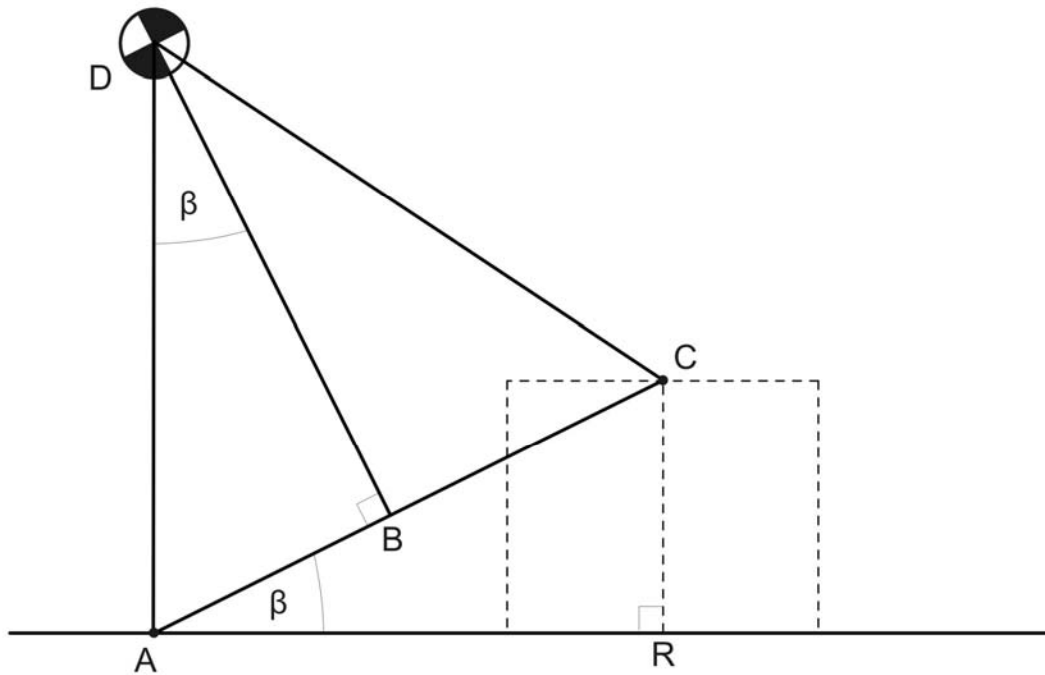$$AQ = AS / \cos \emptyset$$

To find BQ:

$$AB = AQ + BQ$$

$$BQ = AB - AQ$$

To find BD:

$$\tan \emptyset = BQ / BD$$

$$BD = BQ / \tan \emptyset$$

Consider the following diagram to find the tip and the maximum kerb height

To find the angle of tip in a rearward direction:

$$\tan \beta = AB / BD$$

$$\beta = \arctan (AB / BD)$$

To find maximum height of kerb:

$$\sin \beta = CR / AC$$

$$CR = AC \sin \beta$$

To find the angle of tip in a forward direction:

$$\tan \delta = BC / BD$$

$$\delta = \arctan (BC / BD)$$

To find the maximum height of kerb:

$$\sin \delta = AR / AC$$

$$AR = AC \sin \delta$$