

關關難過？罐罐過！

Tanker Turn Challenge

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一、活動緣起

在馬路上，你一定看過油罐車或砂石車吧？這類大卡車如果在下坡或轉彎時，載運的東西晃來晃去，就很容易失去平衡而翻車。這個關卡活動就是把這種「真實的危險」變成「好玩的遊戲」！我們把油罐車縮小搬到桌上，設計斜坡和彎道，讓大家來挑戰看看：車子到底能不能安全過彎呢？原來，一點小小的差別——裝水或裝砂子、有沒有隔板、滿罐或半罐——都會改變結果喔！



Have you ever seen a tanker truck or gravel truck on the road? When these big trucks go downhill or make a turn, the load inside can slosh or shift, making them unstable and sometimes causing accidents. This activity turns that “real danger” into a “fun challenge” ! We bring a mini version of a tanker truck onto the table, with a slope and a curve. Your mission: see if the truck can pass the curve safely. Just a small difference—liquid or sand, with or without partitions, full or half-full—can completely change the outcome!

二、科學原理

1. **重心 (Center of Mass)**：重心愈低，車輛愈穩；偏一邊，容易翻車。

Center of Mass: Lower = more stable; shifted to the side = easier to tip over.

2. **慣性 (Inertia)**：進入彎道時，車裡的東西還想直直往前衝，產生側向推力。

Inertia: Inside contents want to keep moving straight, creating sideways force in a curve.

3. **液體晃動 (Sloshing)**：半滿的水最容易在車裡「晃來晃去」，危險度最高。

Sloshing: Half-full water tanks slosh the most and are the riskiest.

4. **隔板 (Partitions/Baffles)**：幫忙分散水的力量，讓車子更穩。

Partitions (Baffles): Spread out the liquid's force, keeping the truck steadier.

5. **堆積 (Granular Pile-up)** : 砂子不像水會亂晃，但會滑到一側，讓重心偏掉。

Granular Pile-up: Sand doesn't slosh like water, but piles to one side, shifting the center of mass.

三、闖關流程



1. 選一台油罐車 (液體 / 砂子、有隔板 / 無隔板)。

Pick a tanker truck (liquid/sand, with/without partitions).

2. 從斜坡頂端放下，滑進彎道。

Release it from the top of the slope.

3. 看看會不會翻車或灑出。

Watch if it passes the curve or tips over.

4. 想一想：是什麼原因造成差異呢？

Think: What caused the difference?