

Activity Instructions

Part 1: Weight Reduction

Part 1.1 – Baseline Vehicle Material Price

Calculate the baseline vehicle's material costs using the given mass values, baseline materials, and cost rates (from the Material Option Cards table). Fill in the following table:

Subsystem	Baseline Materials	Mass (kg)	Price
Body & Chassis	Mild Steel	585	
Exterior Panels	Mild Steel	490	
Powertrain (Engine + Trans)	Cast iron (60%) + Steel (40%)	410	
Suspension & Breaks	Steel	155	
Wheels	Steel	70	
Other (Exhaust, Tank...)	Steel	90	
Total:		1800	

Part 1.2 – Lightweight Redesign

Redesign the vehicle by selecting new materials using the Material Option Cards and Ashby diagram.

Your goal:

- Achieve minimum cost
- Meet strength & corrosion requirements (see Requirements Table)
- Achieve ≥ 200 kg mass reduction

Subsystem	Baseline Materials	Mass (kg)	New Material	New Mass (kg)	$\Delta Cost$
Body & Chassis	Mild Steel	585			
Exterior Panels	Mild Steel	490			
Powertrain (Engine + Trans)	Cast iron (60%) + Steel (40%)	410			
Suspension & Breaks	Steel	155			
Wheels	Steel	70			
Other (Exhaust, Tank...)	Steel	90			
Total:		1800			

(Note: I pasted it here as picture for better view. For workshop it should be printed horizontally with bigger size)

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Part 2: Fuel Reduction and CO2 calculations

Use the Fuel and GHG emission formulas to calculate the fuel saved and emissions avoided.

Fill in the table below for:

- One vehicle’s lifecycle
- 100,000-vehicle production run
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Scope	Fuel Saved (L)	GHG Saved (kg CO2 - eq)
1 Vehicle (lifecycle)		
100,000 vehicles		

Part 3 – Summary

Summarize your final results:

Metric	Value	Units
Total weight reduction		kg
New total vehicle weight		kg
Total redesigned vehicle cost		USD
Total fuel saved in lifecycle		L
Total GHG saved in lifecycle		kg CO ₂ -eq