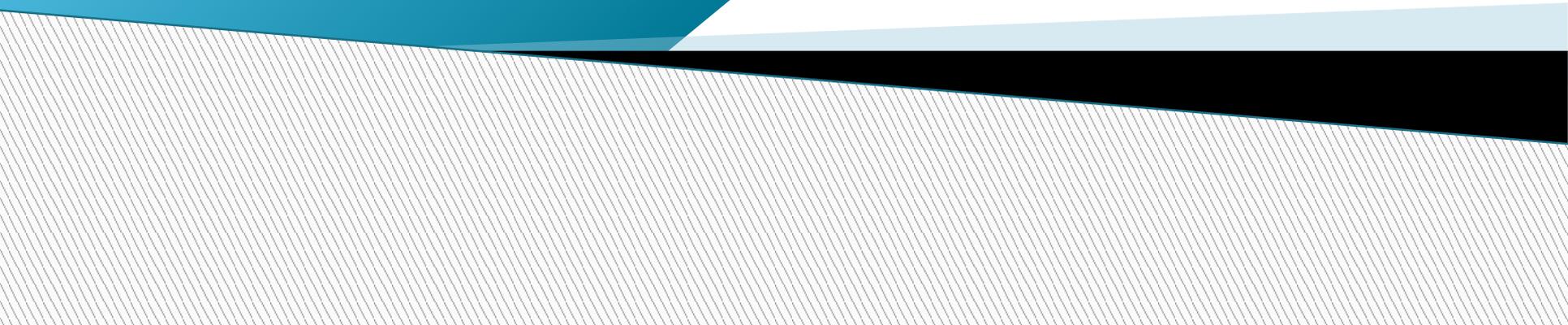
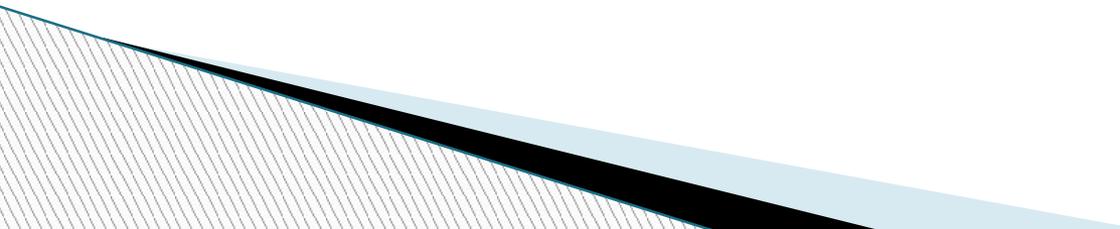
A large teal triangle pointing downwards, positioned on the left side of the slide.

Simple Physics Calculation for the engine in the Hastings Crash

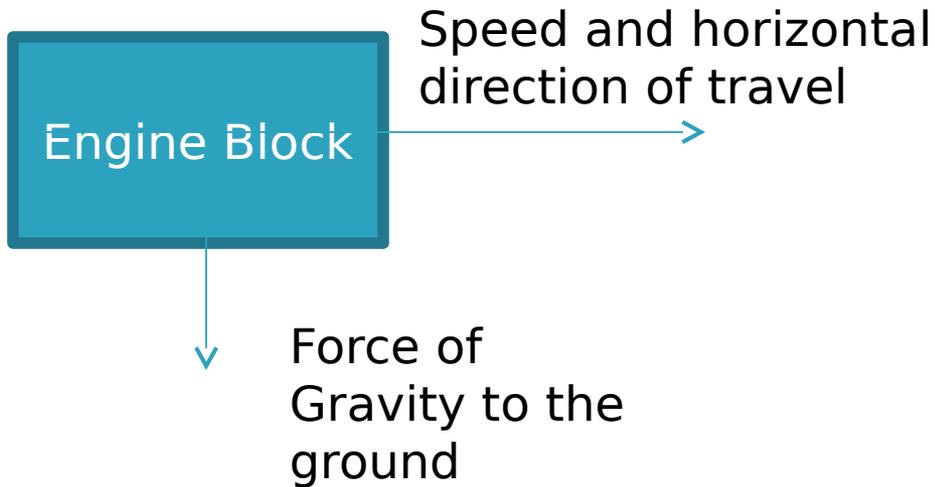
Decorative background elements at the bottom of the slide, including a light blue gradient bar, a black horizontal bar, and a grey hatched area.

Newton's First Law

- ▶ Every body will remain at rest or remain in motion until a force is applied.
 - ▶ This is the law of inertia.
 - ▶ The engine block would be traveling at the same speed as the car when it hit the tree.
 - ▶ To determine the speed we must first determine the time it takes for gravity to pull the block from its rest position to the ground,
 - ▶ Assuming the only significant vertical force is gravity on the engine.
- 

Basic 2D diagram

For a conservative estimate, let's say the Engine block is 4 feet off the ground when it's in the car traveling.



Calculation of Gravity

- ▶ This is a rough calculation of the time it would take for the engine to fall to the ground from 4 ft

$$\text{time} = \sqrt{\frac{\text{distance}}{\text{gravity}}} = \sqrt{\frac{4\text{ft}}{32\text{ft}/\text{sec}^2}} = 0.354\text{sec}$$

Speed of the Engine

- ▶ Since we know the time that it takes for the engine to fall then we should be able to give a rough estimate of its speed.

$$\begin{aligned} \text{speed} &= \frac{\text{distance}}{\text{time}} = \frac{130\text{ft}}{0.354\text{sec}} = 367.70\text{ft}/\text{sec} \left(\frac{1\text{mile}}{5280\text{ft}} \right) \left(\frac{3600\text{sec}}{1\text{hour}} \right) \\ &= 250.70\text{miles}/\text{hour} \end{aligned}$$

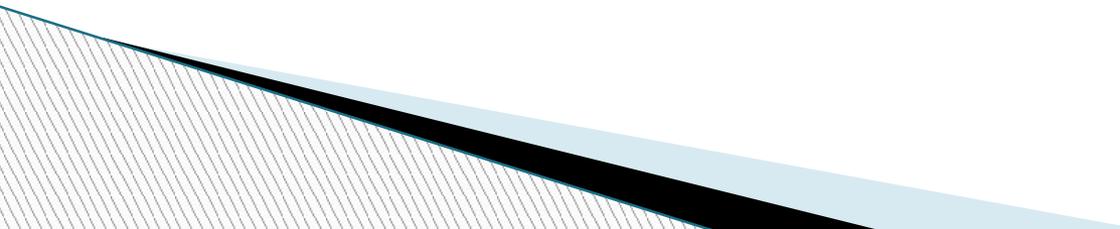
Imagine concept

- ▶ If these calculations are correct, then the car would have had to be traveling at least 250 miles per hour.
- ▶ When it hit the tree the static forces that hold the engine inside the car would have had to be overcome
 - For every action there is an equal opposite reaction
- ▶ So, the bolts, wires, differential, etc have to be ripped apart causing energy to do that wasted
- ▶ Also note that even to send the engine upward and at an arc to travel would require an upward force upon it.

This means that the car would have hit the tree at this angle going 250 miles per hour in this neighborhood



Conclusion

- ▶ From this really simple 2D calculation it can be seen that the speed of the engine to travel a distance 130 from on the force of gravity acting on it is extremely large.
 - ▶ Without calculating other forces such as friction from the holdings of the engine, the circular force to throw the engine to the side of the road, and many others, it still raises questions about the crash.
 - ▶ Also, this calculation does NOT include things that would fasten the engine to the car such as bolts or other connections, NOR any external forces that would send it airborne.
- 

Was this really a Car accident?

- ▶ Think about it