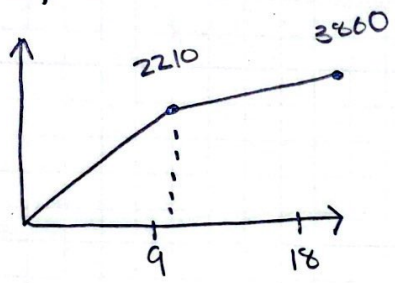
3-6-1 | 11/10/22 | Isaac Abella

Problem) A: Determine the acceleration of the bus at 9 seconds.

B: Determine the velocity of the bus at 9 seconds

C: Determine the velocity of the bus at 18 seconds.

Represent:



Organize:

Mass = 1670 kg

t = 9 sec, 18 sec

$F = MA$ $V = \frac{d}{t}$

area under Force - Time graph.

Solution

A: $A = \frac{F}{M} \rightarrow a = \frac{2210}{1670} = 1.32\ m/s^2$

B: Area under $F-t$ graph = displacement

$\frac{1}{2}(1.320)(9) = 5.94\ m/s.$

C: Velocity = $3860 = \sqrt{1670 \cdot 18}$

$3860 / 173.37$ $V = 22.2\ m/s.$

3-6-2	11/10/22	Isaac Abella

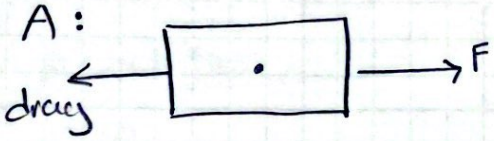
Problem) A: Determine the acceleration of the car when it is driving at 39 mph on level road?

B: Determine acceleration when the car is driving 39 mph into an 8 mph headwind

C: Determine the acceleration of the car going up a 2.5° hill at 39 mph.

given: 2550 lb car $C_d = .23$ density $= 2.3 \times 10^{-3}$
Area $= 20.7 ft^2$ Force $= 260$ lb $F = MA$

A:



Solution, calculate drag subtract from force then divide by mass

$$drag = \frac{.0023 \cdot (57.2)^2 (.23)(20.7)}{2}$$

convert 39 mph to fph $= \frac{39 \cdot 5280}{60^2} = 57.2$

$260 - 17.91 = 242 / 2550 = .0944 \cdot 32.2$

$\boxed{a = 3.05 \text{ ft/s}^2}$

B: add the 8 mph to 39 and do the same as A.

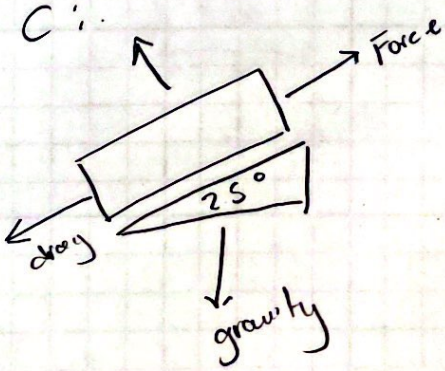
$\frac{47 \cdot 5280}{60^2} = 68.93$

$$drag = \frac{.0023 (68.93)^2 (.23)(20.7)}{2}$$

$= 260 - 25.99 = 234/2850 = .0918$

$.0918 \cdot 32.2 = \boxed{2.95 \text{ ft/s}^2}$

C:



subtract your acceleration by gravity in the y direction.

$3.05 - 32.2 \sin(2.5)$

$= \boxed{1.652 \text{ ft/s}^2}$

3-6-3 | 11/10/22 | Isaac Abella

Problem) A: Maximum constant acceleration the boulder can have and still get out of the quarry?

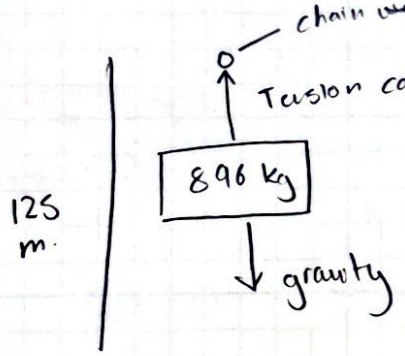
B: What is the magnitude of upward force exerted by the chain on the boulder.

R:

Organize: 896 kg boulder
125 m deep quarry.
chain mass = 431 kg.
Max tension = 3.5 x it's weight. = 14798.3 N

A solution:

FBD



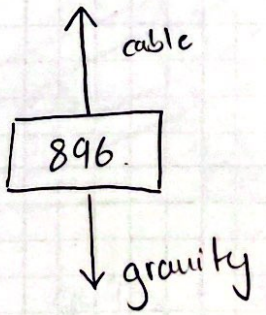
$M_T - F_{NET} = Ma_y$

$14798.3 - (1327 \cdot 9.81)$

$= -1780.93 = 1327 \cdot a_y$

$a = 1.34 \text{ m/s}^2$

B Solution:



upward force.

$= (896 \cdot 9.81) = 8789.76 \text{ N}$

$8789.76 \text{ N} = 896 \cdot 1.34$

$= 9992.192 \text{ N}$.

3-6-4 | 11/10/22 | Isaac Abella

Problem:) A: What is the force in coupling between the engine and freight car #1

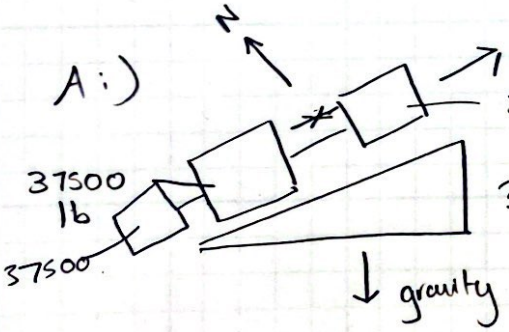
B: What is the force in the coupling between freight car #1 and freight car #2.

given: 37500 lb engine pulling 2 freight cars up a 2.5% incline $F = MA$

$F_{c_1} = 37500$ lb, $F_{c_2} = 14500$ lbs.

Train accelerating at .31 ft/s^2 uphill.

A:)



F_{NET} + gravity cos · m

$= 37500 + 14500$

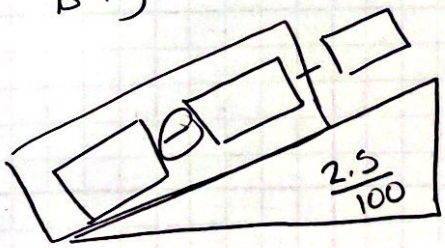
$= 52000 \cdot 32.2$

$= 1674400$ slugs.

$16120 + 32.2 \sin(\tan^{-1}\frac{2.5}{100}) \cdot 52000$

B:)

Force between 2 carts



$4495 + 32.2 \sin(\tan^{-1}(\frac{2.5}{100})) \cdot 14500 \cdot$

$= 16163.85$ lb./32.2

$= 501$ lb