



S.T.E.M. EXPERIENCE



TODAY'S AGENDA

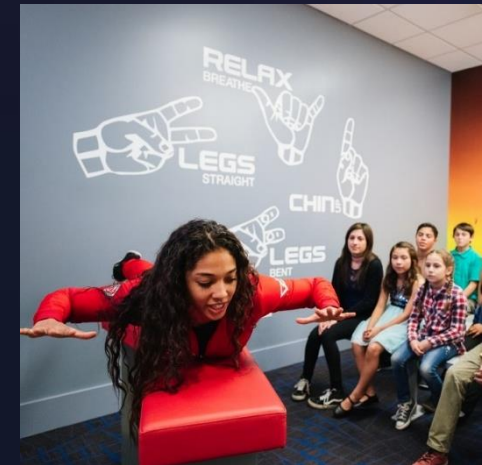
- PHYSICS DEMO

- PRESENTATION

- STEM ACTIVITIES

- FLY!!!

- WRAP UP



WHAT IS STEM?



SCIENCE



TECHNOLOGY



ENGINEERING



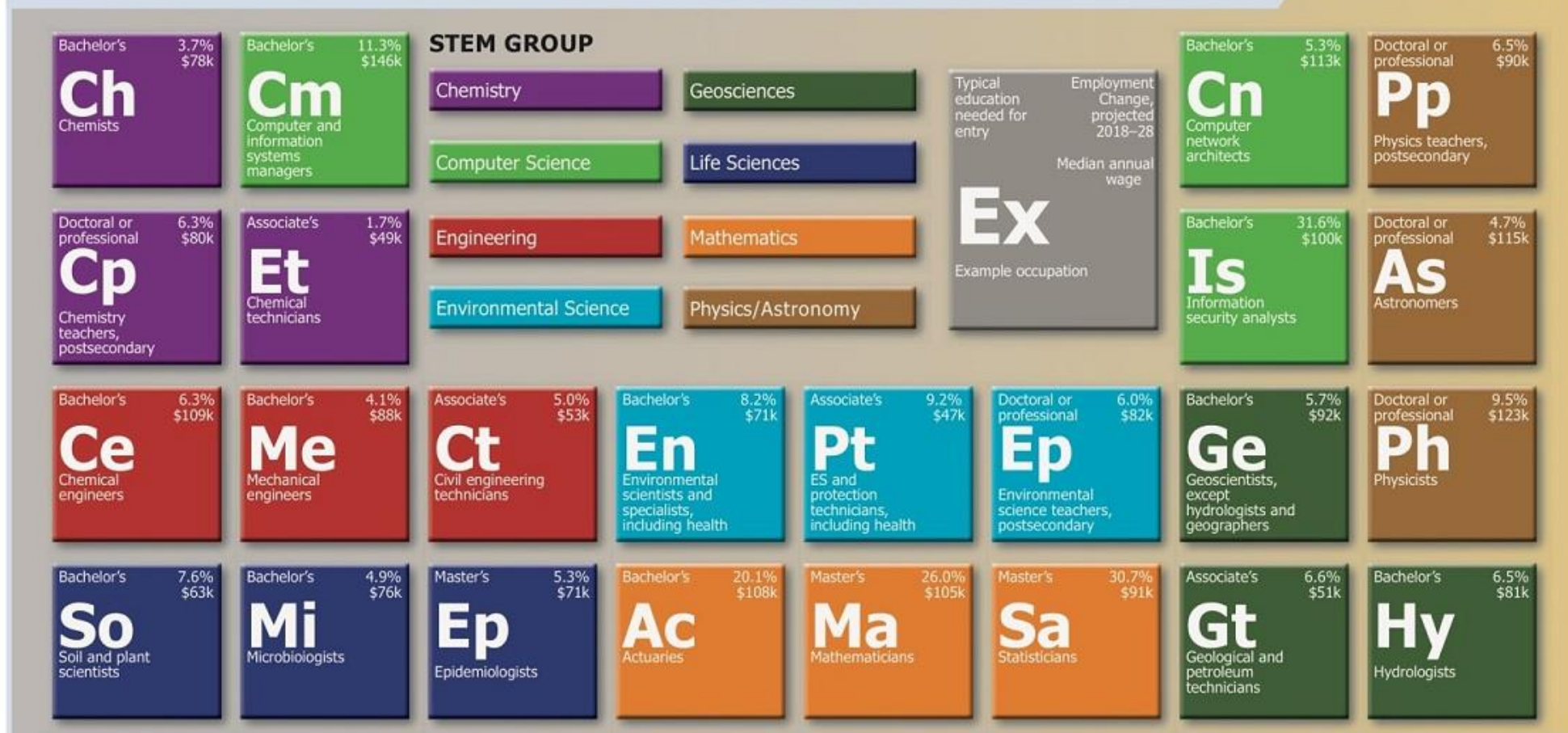
MATH

EXCITING FUTURES IN STEM



BLS periodic table of science, technology, engineering and mathematics (STEM) occupations

The periodic table of chemical elements, created by Dmitry Mendeleev in 1869, is one of the most important achievements in modern science. To celebrate this achievement, BLS has created our own periodic table! Instead of elements, we have used Science, Technology, Engineering and Math (STEM) occupations. Workers in STEM occupations use science and mathematics to understand how the world works and to solve problems.



SOLVE REAL PROBLEMS



STEM is used in the real world to solve problems and improve lives.

WIND TUNNEL TESTING

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WE MAKE STEM FUN!

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***Learning about the science of
wind tunnels.***



NEWTON'S LAW OF INERTIA

Any object in motion
remains in motion

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Any object at rest
remains at rest
unless acted upon by an
unbalanced force.



PHYSICS OF SKYDIVING

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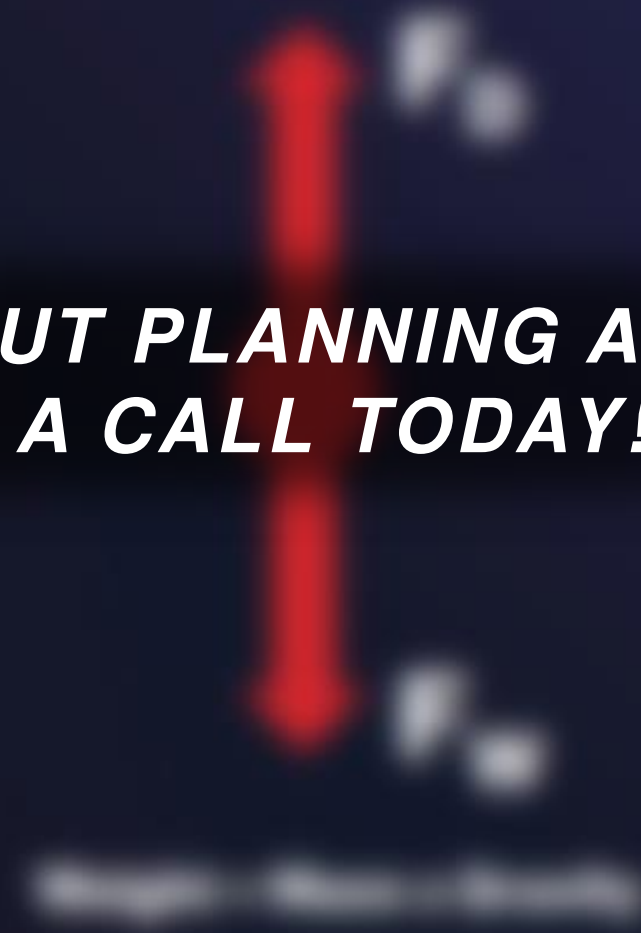


PHYSICS OF SKYDIVING

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WHAT FORCES ARE AT PLAY?

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WHAT FORCES ARE AT PLAY?

Diagram illustrating the forces acting on a skydiver:



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SCIENCE OF SKYDIVING

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WHAT FORCES ARE AT PLAY?

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INDOOR VS. OUTDOOR

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INDOOR VS. OUTDOOR

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TERMINAL VELOCITY FORMULA

Terminal Velocity is when the Force of Weight F_g is equal to the Force of Drag F_d

$$F_g = mg$$

$$F_d = \frac{1}{2} \rho v^2 C_d A_f$$

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$$F_g = \frac{1}{2} \rho v^2 C_d A_f$$

$$mg = \frac{1}{2} \rho v^2 C_d A_f$$

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TERMINAL VELOCITY FORMULA

Example 1:

$$1) v_{\text{terminal}} = 50 \text{ m/s}$$

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$$v_{\text{terminal}} = 50 \text{ m/s}$$

$$2) \text{ Mass of person } = 70 \text{ kg}$$

$$g = 9.8 \text{ m/s}^2$$

$$3) \text{ Find the terminal velocity of the person in air.$$

TERMINAL VELOCITY FORMULA

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MASS



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MASS is a member of the iFLY network of indoor skydiving centers.

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GRAVITY

$$g = \frac{2\pi \rho R^2}{A \cdot C \cdot \rho}$$

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Gravity is the force that pulls objects toward the center of the Earth at 9.8 m/s².

Gravity is directly proportional to the mass of the object.

Gravity is directly proportional to the distance from the center of the Earth.

FRONTAL AREA



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1. *Frontal Area: The portion of an object that the wind can push on at any given time.*

Frontal area is directly proportional to velocity cubed. Therefore:

Velocity Frontal area = 1000/1000000 velocity cubed

FRONTAL AREA

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FLY INTO THE FUTURE. EXPERIENCE IT ALL AT iFLY.

DRAG COEFFICIENT

$$v = \sqrt{\frac{2mg}{AC_D}}$$

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Drag Coefficient: Dimensionless, experimentally determined number based on the shape of an object.

Drag Coefficient is directly proportional to terminal velocity. Therefore,

Lower drag coefficient = slower terminal velocity

DRAG COEFFICIENTS

FOR SIMPLE OBJECTS

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	C_d	
	1.00	Flat Plate
	0.47	Sphere

AIR DENSITY

$\rho =$

$$\rho = \frac{2mg}{A \cdot C_d \cdot v^2}$$

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...the density of air is constant to a good extent. Pressure, temperature and humidity all affect air density.

...density is directly proportional to absolute humidity. Therefore:

Humidity in density — 100% relative humidity

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The background is a dark blue gradient with a collage of faint, white scientific and mathematical sketches. These include a 3D coordinate system with x, y, and z axes, a chemical structure of a substituted benzene ring with labels like HO, H3C, and Cl, a graph of a curve passing through the origin, a vector field with arrows, a 3D rectangular prism, a circular diagram with internal structures, and various mathematical symbols and formulas like $F = 1/2$ and $\rho \times$.

QUESTIONS?



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