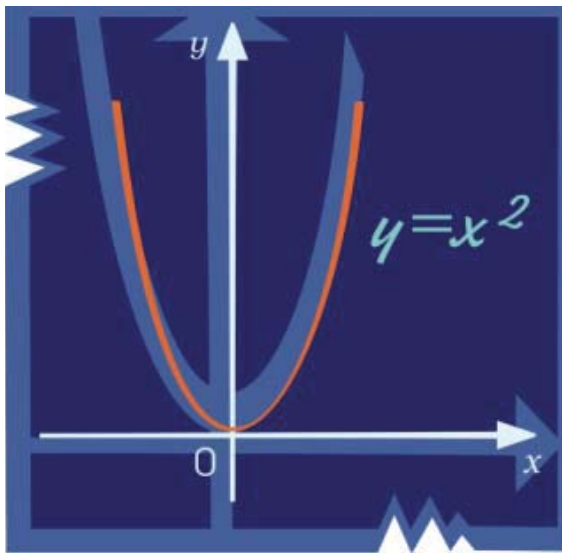


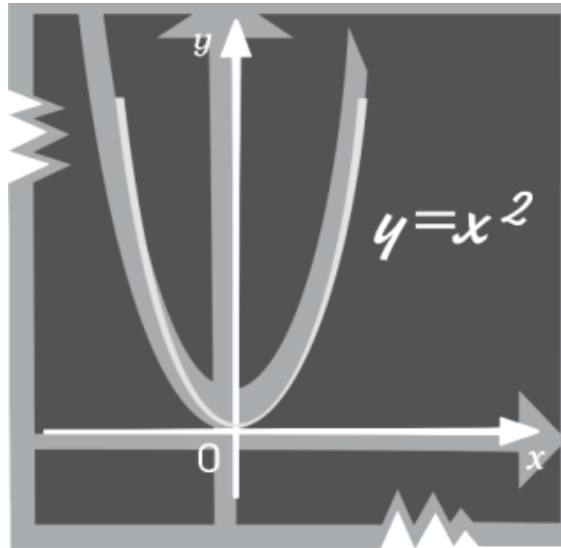
# PHYSICS FLIPCARDS™

CONCEPTS ON-THE-GO



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# PHYSICS FLIPCARDS



## Physics FlipCards

When dealing with the fascinating field of physics, many students feel threatened and apprehensive. I tell my students that physics is the study of mathematics being used to solve everyday problems. Physics is around us every day in everything we do. This card spiral is an attempt to address many of the types of problems found on the physics portion of the UIL Science Test. It also can be extremely helpful in preparing one for success in the physics classroom. I have by no means provided you with the answers to every physics problem you might face, but by using this as a reference (along with the Concept Manual and instruction from your science teacher or UIL coach), you will find success in physics.

Good luck in your science endeavors!

## Velocity

- Vector quantity (magnitude and direction)
- Average velocity is a change in objects displacement over time

$$\mathbf{V}_{avg} = \Delta\mathbf{x}/\Delta\mathbf{t} = \mathbf{x}_f - \mathbf{x}_i / \mathbf{t}_f - \mathbf{t}_i$$

$\mathbf{V}_{avg}$  = average velocity

$\Delta\mathbf{x}$  = change in x displacement

$\Delta\mathbf{t}$  = change in time

- Measured in units of distance/time (Ex. km/sec)
- When answering these types of problems give direction or heading.

## Resolving Vectors in Two Dimensions at Right Angles

- Sketch vectors to allow general idea of position.
- **Pythagorean Theorem**  
$$a^2 + b^2 = c^2$$
- Calculate direction using Trig functions
  - $\sin \theta = \text{opposite/hypotenuse}$
  - $\cos \theta = \text{adjacent/hypotenuse}$
  - $\tan \theta = \text{opposite/ adjacent}$

## Angular Acceleration

Used to calculate the **change in velocity** of a circular object in a given time period.

$$\alpha_{\text{avg}} = \Delta \omega / \Delta t$$

$\alpha_{\text{avg}}$  = angular acceleration in radians/ second<sup>2</sup>

$\Delta \omega$  = change in angular velocity rad/sec

$\Delta t$  = change in time in seconds

## Mechanical Advantage

- Ratio of the force applied by machine to the force applied to the machine

$$\mathbf{MA = F_{out} / F_{in}}$$

- Some machines like third class levers provide mechanical advantage not by magnifying force, but **magnifying distance** through which force is applied.

$$\mathbf{MA = d_{in} / d_{out}}$$

- MA is unit less and tells us the number of times a machine multiplies effort force or effort distance.

## Harmonics of Open-Ended Pipe

- Example exhibited by flute and pipe organ sometimes

$$f_n = n (v / 2L) \quad (n) = 1, 2, 3$$

$f_n$  = frequency

$n$  = harmonic #

$v$  = speed of sound

$L$  = length of air column vibrating (m)

## Harmonics of Closed-End Pipe

- Sax, trumpet, clarinet

$$f_n = n (v / 4L) \quad (n) = 1, 3, 5 \dots$$

variables same as above



## **KENNETH DAVIS**

The author, Kenneth Davis, earned his B.S. from Texas A&M University and an M.S. in microbiology from The University of Texas Health Science Center. He has taught science for 25 years in the areas of elementary enrichment, middle school, high school, Advanced Placement, dual credit, and at the college level.

Mr. Davis has developed curriculum for both middle and high school science, and has coached numerous UIL Science teams. Many of his UIL students and teams have won District and Regional championships and have achieved success at the State level.

Currently, he serves as a Science teacher at Tivy High School at Kerrville ISD and teaches Medical Microbiology for Austin Community College.



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