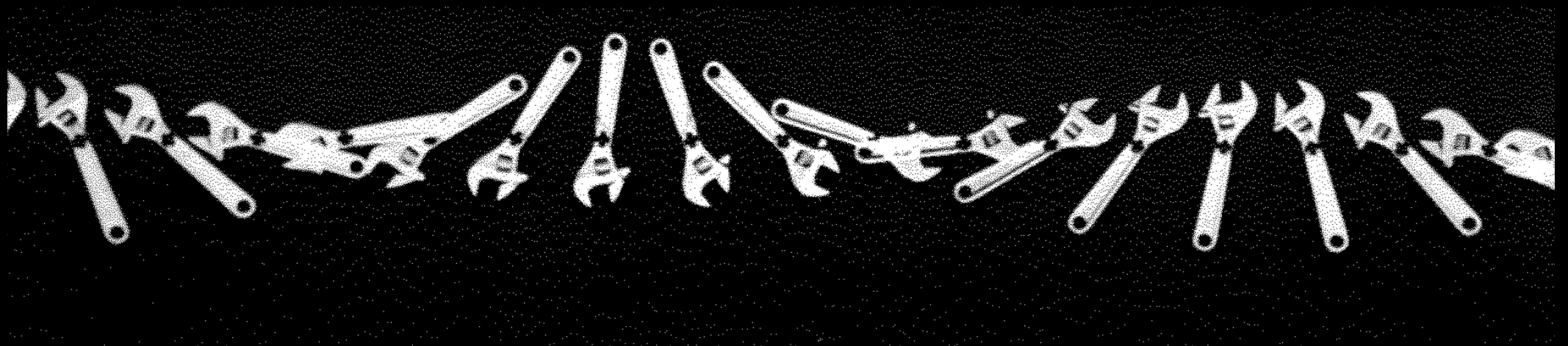
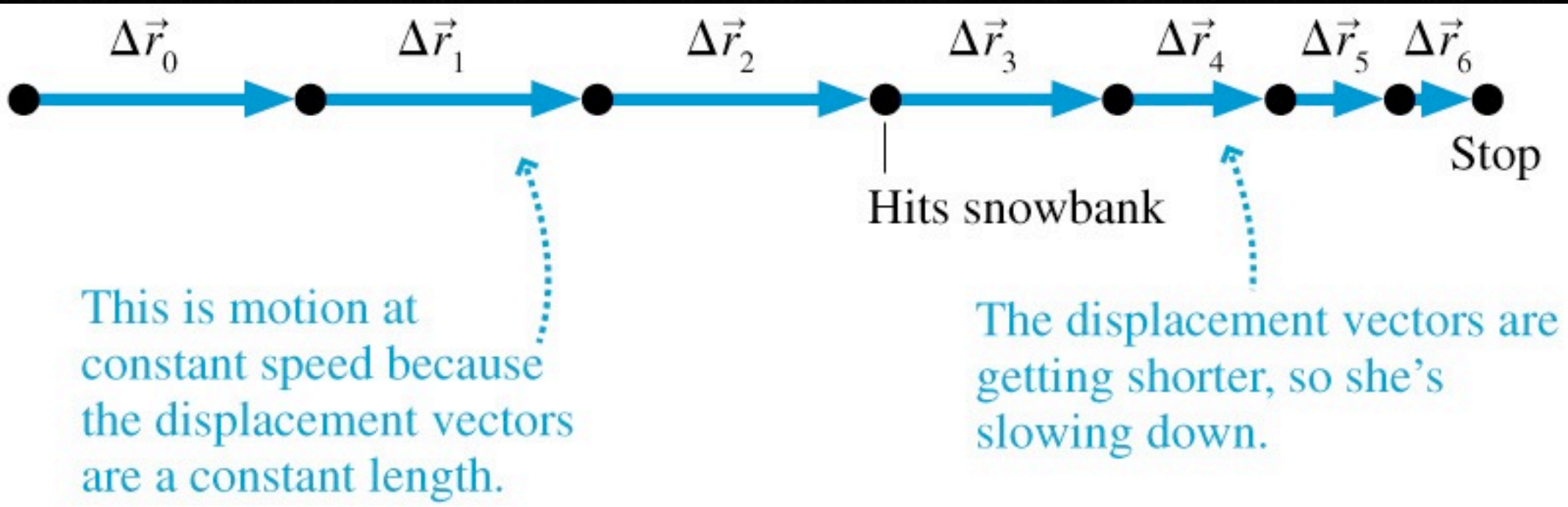
Concepts of Motion

The goal of chapter 1 is to introduce fundamental concepts of motion

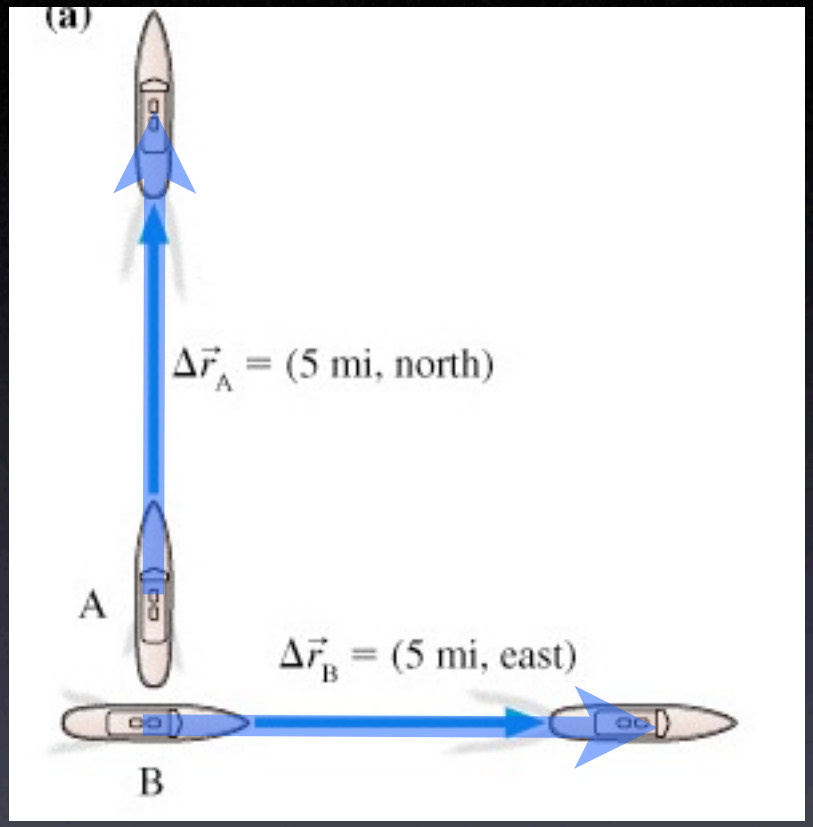
10
20
30
40
50
60
70
80
90
0
10
20
30
40
50
60
1
2
3
4
5
6
7
8
9
10
11

Berenice Abbott

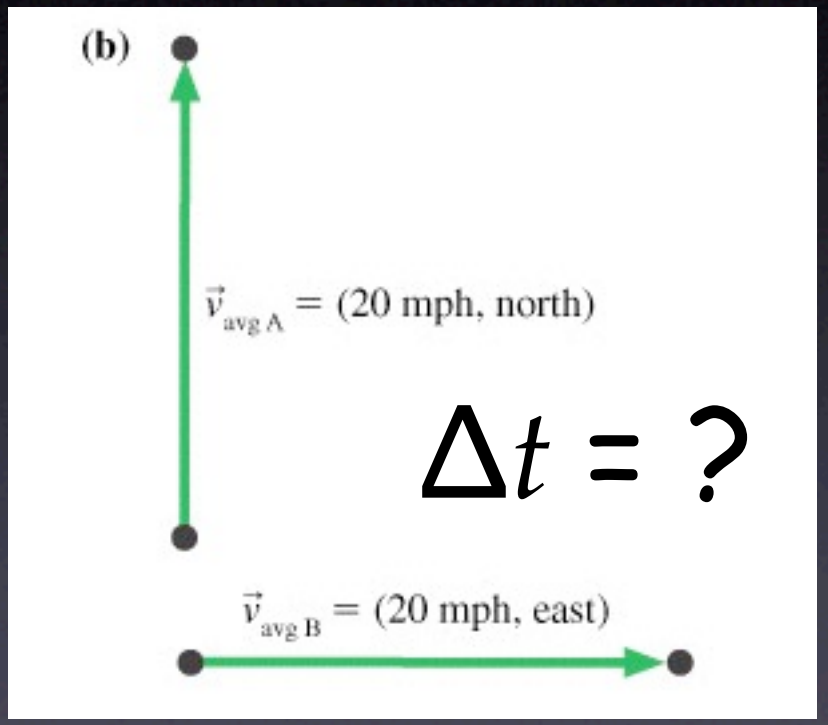




Displacement



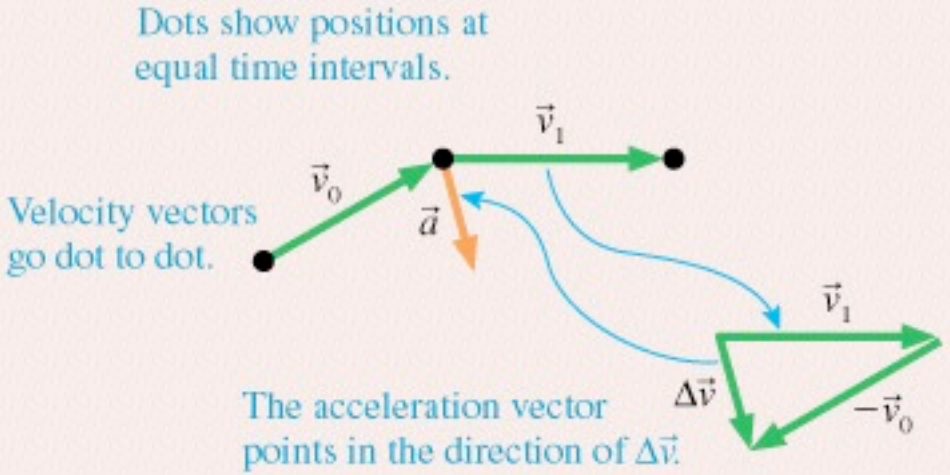
Velocity



General Strategy

Motion Diagrams

- Help visualize motion.
- Provide a tool for finding acceleration vectors.

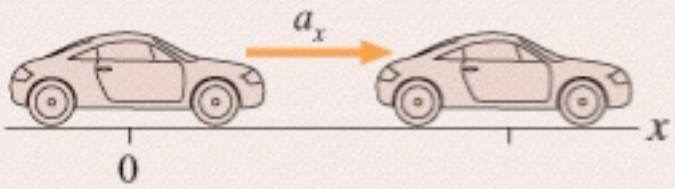


► These are the average velocity and the average acceleration vectors.

General Strategy

Pictorial Representation

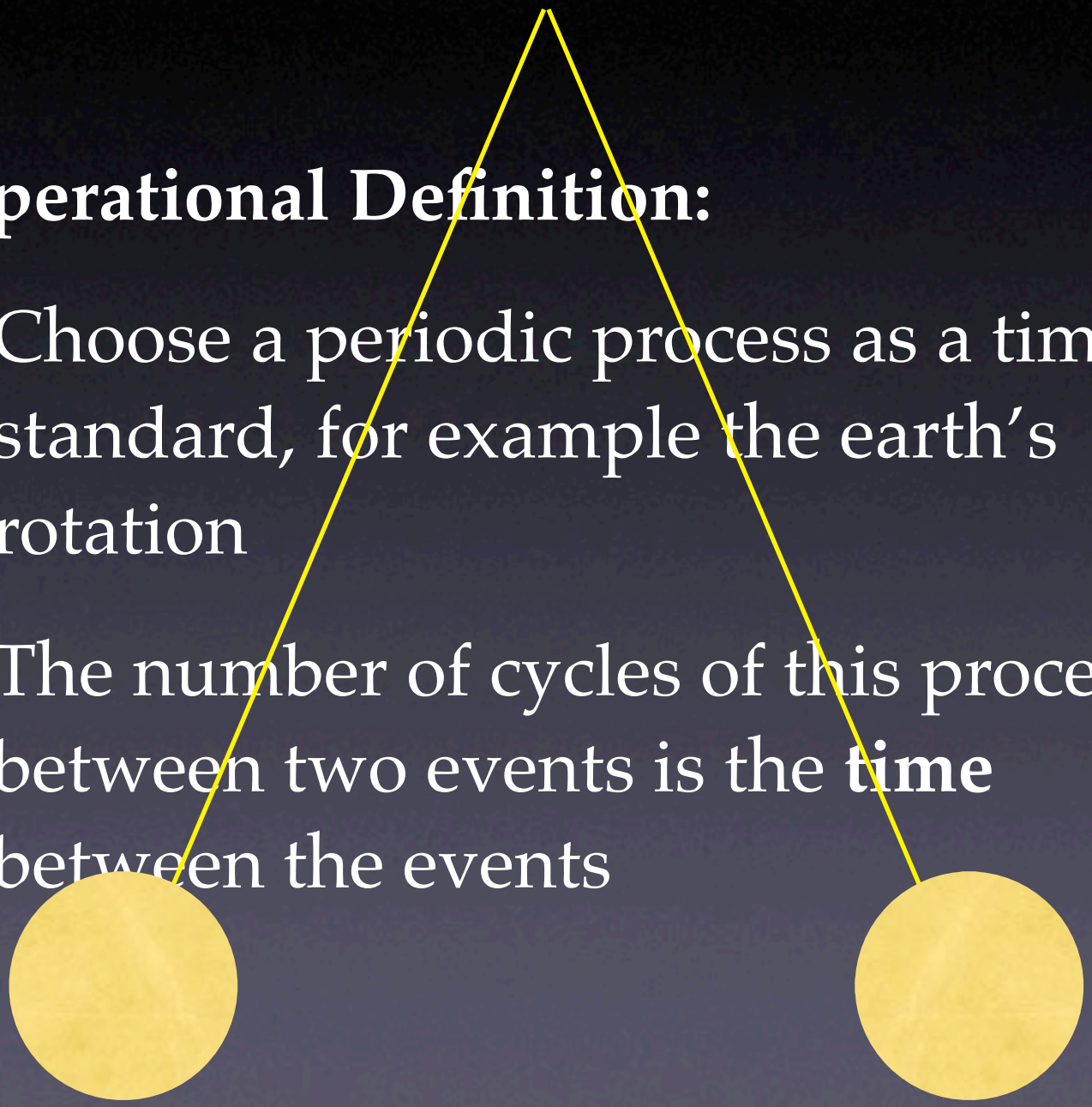
1. Sketch the situation.
2. Establish coordinates.
3. Define symbols.
4. List knowns.
5. Identify desired unknown.



Known
$x_0 = v_{0x} = t_0 = 0$
$a_x = 2\ \text{m/s}^2$ $t_1 = 2\ \text{s}$
Find
x_1

Time

- **Operational Definition:**
  - Choose a periodic process as a time standard, for example the earth's rotation
  - The number of cycles of this process between two events is the **time** between the events



Distance

- **Operational Definition:**
  - Choose a rigid object to serve a the standard of length.
  - The number of these standard lengths along a straight line between two points is the **distance** between the points.

Converting Units

- The “Power of One”
  - 2.54 cm = 1 inch
  - a) 2.54 cm / 1 inch = 1
  - b) 1 inch / 2.54 cm = 1
  - Multiply by (a) or (b) to change units without changing the actual value.

Converting Units

- 12 inches = ? cm
- 12 inches x 1 = ? cm
- 12 ~~inches~~ x (2.54 cm / 1 ~~inch~~) = 12 x 2.54 cm
- 12 inches =30.48 cm (or 30.5 cm if you're picky)