

# Lecture 5 - Gauss' Law

## Chapter 27 - Tuesday January 23rd

- Review of Thursday's class
  - The flux of a vector field
  - The flux of an electric field
- Applications of Gauss' law (examples)
- Gauss' Law and conductors
- Experimental tests of Gauss' law
- Some sophisticated vector calculus

Reading: pages 612 thru 625 (chapter 27) in HRK

Read and understand the sample problems

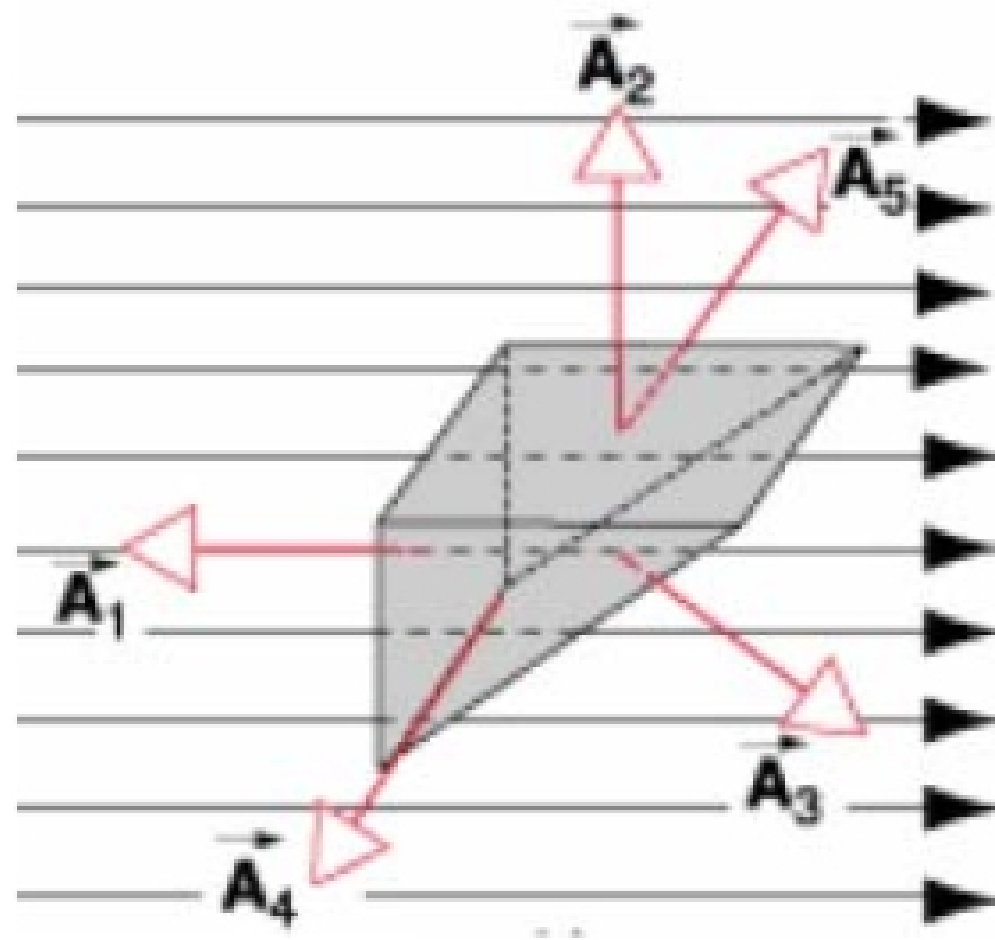
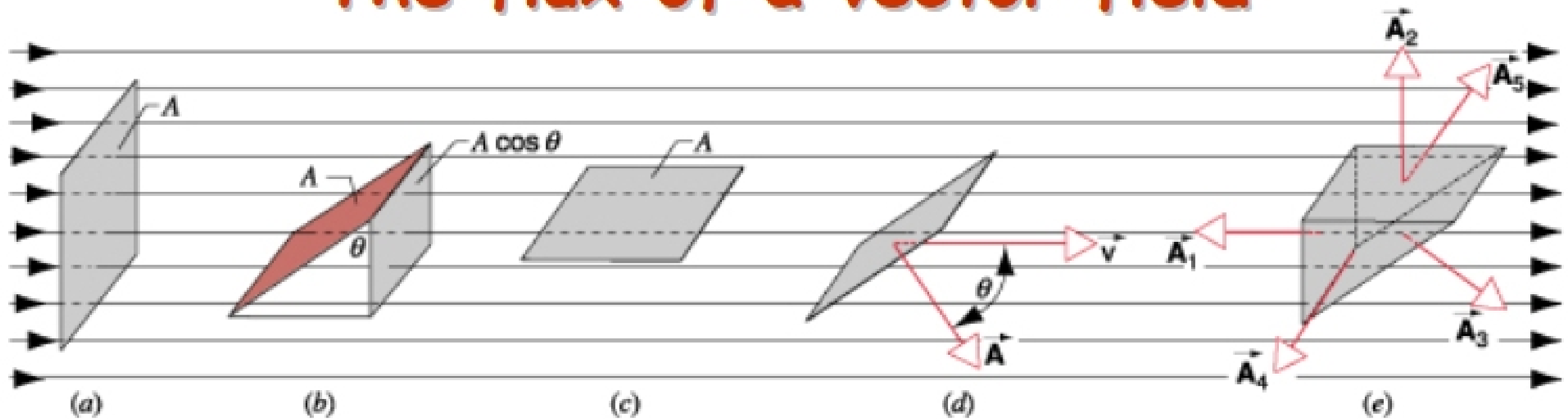
WebAssign: set 2, due Thu. 25th at 11:59pm

**Graded problems (Ch. 27) – Ex. 15, 18, 21; Prob. 2, 10, 18**

**Practice problems (Ch.27): Ex. 21, 25, 27, 29; Prob. 11, 17**

- ***Exam 1 is two weeks from today (Feb 6th).***

# The flux of a vector field



What if there are multiple surface elements to consider?

Then,

**sign now determined**

$$\Phi = \sum \vec{v} \cdot \vec{A}.$$

For a closed surface, we ALWAYS choose  $\vec{A}$  to point outwards. This is very important for Gauss' Law!!

# The flux through a closed curved surface

$$\Phi = \oint \vec{v} \cdot d\vec{A}$$

