1  □  Power and Culture
2  □  Power
   • Non-human, inanimate power a key element in Western Civilization
3  □  Power
   • Water Power
     – Horizontal water wheels
     – Vertical water wheels
       • Undershot
       • Overshot
     – Locations
       • Streams with fall
       • Tidal
4  □  Vertical water wheels
5  □  Vertical water wheels
6  □  Overshot wheel
7  □  Applications:
   • Grinding grain
   • Fulling
     – Beating cloth to soften
   • Forging
     – Iron making & working
   • Paper making
8  □  Wind Power
   • European origins
   • Location where water power unavailable
   • Valuable for pumping and drainage of low marshy areas (Netherlands, Eastern England, etc.)
9  □  Post mill
10 □  Tower mill
11 □  Dutch mill
12 □  Mechanisms
   • Crank
   • Flywheel
   • Treadle
   • Spring
13 □  New Attitudes
• Work
• Innovation
• Nature
• Individualism

14 • The Clock--”key machine of the modern age”
• determinant use of energy
• automatic action
• standardization
• accurate time-keeping
• time freed from nature

15 • Predecessors
• astronomical observation
• clepsydra (water & sand clocks)

16 • Clepsydra

17 • Invention & Spread of Clocks
• First appearance--13th century: Salisbury Cathedral clock
  • (notice--no face: rang bells to indicate hours)

18 • Escapement the key mechanism

19 • Verge and foliot

20 • DiDondi “Astrarium”--14th century

21 • Astrarium
• Faces of the DiDondi Astrarium

22 • Implications of the clock
• Clock hours replace “natural” hours
• Time consciousness spreads
• Life & work more organized

23 • Question
• Why were new attitudes about power and machinery important in the late Middle Ages?