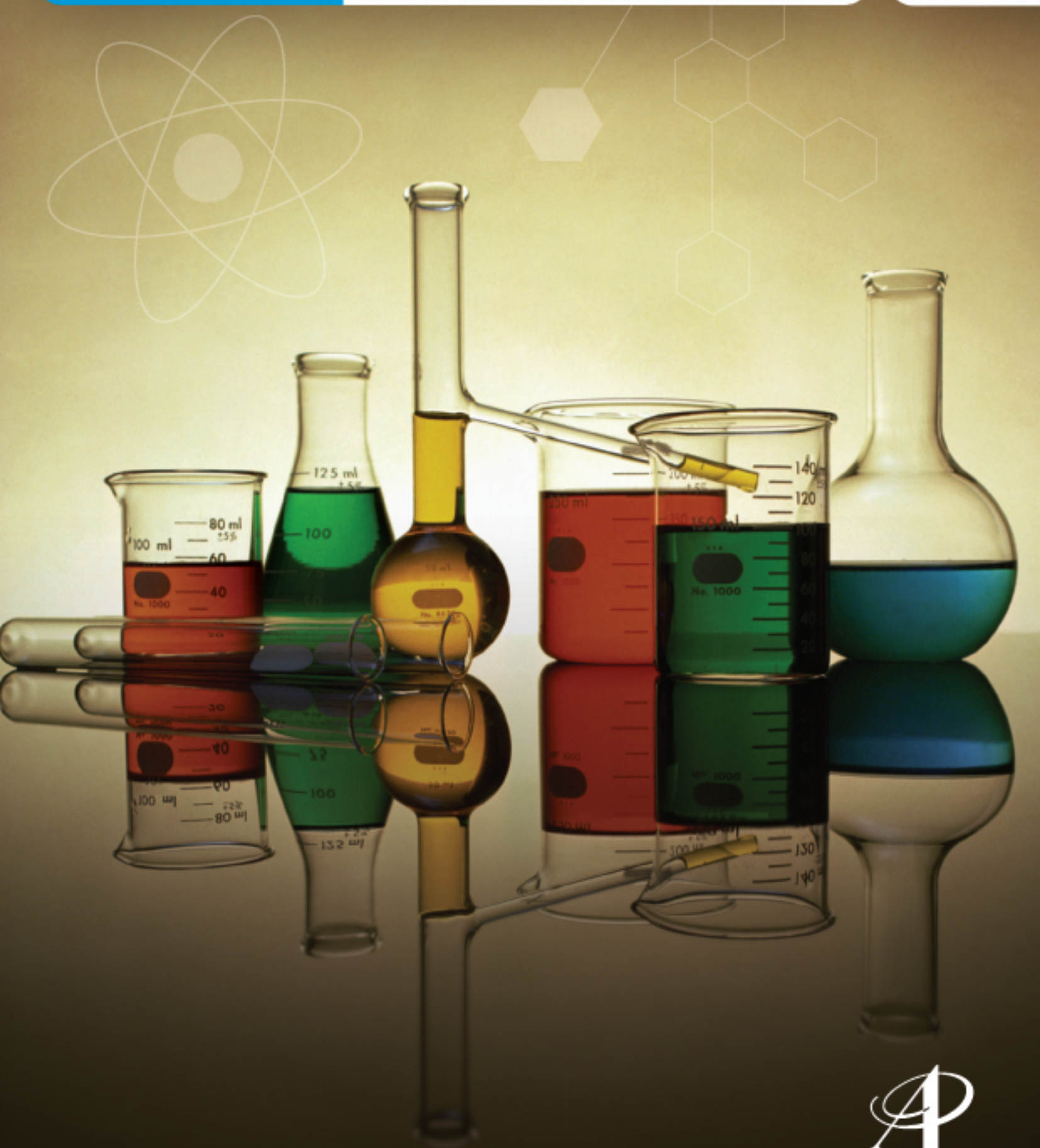
LIFEPAC®

Science



Alpha Omega Publications®

SCIENCE 404: MACHINES

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Author: **Evelyn W. Towler**

Editor-in-Chief: Richard W. Wheeler, M.A.Ed.

Editor: Martha K. Baxter, M.A.

Consulting Editor: Harold Wengert, Ed.D.

Revision Editor: Alan Christopherson, M.S.

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804 N. 2nd Ave. E., Rock Rapids, IA 51246-1759

MACHINES

King Solomon had a great Temple built many years before Jesus was born. In the Bible in the book of 1 Kings chapters 5 and 6, you can read about the Temple. The stones were cut and fitted into place. The workmen built the Temple in seven years. Buildings are constructed in a much shorter time today. Solomon's workers had no electricity or big machines to help them. They used simple machines. In this LIFEPAC® you will read about the kinds of machines they used. You will find out that you use the same type of machines today!

OBJECTIVES

Read these objectives. The objectives tell you what you should be able to do when you have successfully completed this LIFEPAC.

When you have finished this LIFEPAC, you should be able to:

1. Define *work.*
2. Tell the meaning of gravity and friction.
3. Explain about the two forms of energy.
4. Name four kinds of energy.
5. Explain why simple machines are needed to do work.
6. Name six simple machines.
7. Give an example of each simple machine.
8. Tell how each simple machine makes work easier.
9. Tell the meaning of simple and complex machines.
10. Name four complex machines.

VOCABULARY

Study these new words. Learning the meanings of these words is a good study habit and will improve your understanding of this LIFEPAC.

block and tackle (blok and tak' ul). A set of two or more pulleys (the blocks) with ropes (the tackles) used to move objects.

bulldozer (bu̇l' dō zėr). A power tractor with a wide steel blade that pushes rocks and earth.

complex (kum pleks'). Made up of a number of parts.

construction (kun struk' shun). Act of building.

crane (krān). A machine with a long, swinging arm, for lifting heavy objects.
dredge (drej). A machine with a scoop for deepening a harbor.
energy (en' ur jē). The ability to do work.
energy in action (en' ur jē in ak' shun). Energy that is being used to move something.
force (fôrs). Power, strength.
foundation (foun dā' shun). The part on which other parts rest.
friction (frik' shun). A rubbing of one thing against another.
fulcrum (ful' krum). The support on which a lever turns or is supported in moving or lifting something.
gravity (grav' u tē). The natural force that causes objects to move or tend to move toward the center of the earth.
groove (grüv). A long, narrow channel.
inclined plane (in klīnd' plān). A sloping, flat surface.
lever (lev' ur). A bar for raising or moving a weight at one end by pushing down at the other end.
load (lōd). What one is carrying.
machine (mu shēn'). A device for applying power.
mesh (mesh). To engage, as gear teeth.
pile driver (pīl drīv' vur). A machine for pushing posts down into the ground.
pitch (pich). Amount of slope.
principle (prin' su pul). Basic truth or law.
pulley (pu̇l' ē). A wheel with a grooved rim in which a rope can run, and so lift weights.
ramp (ramp). A sloping way connecting two different levels.
screw (skrü). A kind of nail which has a ridge twisted evenly around its length.
spiral (spī' rul). A winding and gradually widening coil.
stored energy (stôrd en' ur jē). Energy at rest.
streamlined (strēm līnd). A shape that offers the least resistance to air or water.
thread (thred). The sloping ridge that winds around a screw.
wedge (wej). A piece of wood or metal thick at one end and tapering to a thin edge at the other.
wheel and axle (hwēl and ak' sul). A wheel with the shaft on which it turns.
wheelbarrow (hwēl' bar' ō). A small vehicle which has one wheel and two handles.
windlass (wind' lus). A machine for pulling or lifting things.
work (wėrk). A force moving an object.

Note: All vocabulary words in this LIFEPAC appear in **boldface** print the first time they are used. If you are unsure of the meaning when you are reading, study the definitions given.

Pronunciation Key: h**a**t, **ā**ge, c**ã**re, f**ä**r; l**e**t, **ē**qual, t**ė**rm; **i**t, **ī**ce; h**o**t, **ō**pen, **ô**rder; **oi**l; **ou**t; c**u**p, p**u̇**t, r**ü**le; **ch**ild; lo**ng**; **th**in; /*TH*/ for **th**en; /*zh*/ for mea**s**ure; /*u*/ represents /*a*/ in **a**bout, /*e*/ in tak**e**n, /*o*/ in lem**o**n, and /*u*/ in circ**u**s.

I. MACHINES ARE NEEDED

In this first section of this LIFEPAC, you will learn why you need machines to help you to do work. Solomon's men did not have many **machines,** but they did have some machines to help them lift heavy rocks as they built the Temple. They had machines to help them fasten wooden boards together. They had machines to help them carry stones to the Temple. Do you use a machine to fasten two boards together? Do you use a machine to carry the family to the ballgame? Do you use only four fingers to fasten parts of a toy together? Read this section to find how machines help you to do work.

Review these objectives. When you have completed this section, you should be able to:

1. Define *work.*
2. Tell the meaning of gravity and friction.
3. Explain about the two forms of energy.
4. Name four kinds of energy.
5. Explain why simple machines are needed to do work.

Restudy these words.

energy	friction	stored energy
energy in action	gravity	streamlined
force	machine	work

WORK

Solomon's builders pushed and pulled the heavy stones toward the Temple. When they pushed or pulled, they were doing **work**. Anytime you force something to move it, you are doing work. Did you push or pull the door open to come into the classroom today? If you did, you were doing work.

Force is another name for the push or pull needed to do work. Force moves things. What was the force used when you opened the door? _____ Yes, your muscles were the force that pushed on the door.

When Solomon's men moved the big stones for the Temple, would their job have been easier if they had moved the stones uphill or downhill? _____Yes, downhill would be easier. Why? _____ _____. The reason that the stones were easier to move downhill is that **gravity** pulls things toward the center of the earth. Downhill would be toward the earth's center.

Gravity makes it safe for you to live on the earth. Everything is pulled by gravity. Roots of plants grow down. Your feet walk solidly on the ground. When you fall, you fall down instead of up. Water runs downhill. A ball tossed into the air always falls back down to the ground.

Since gravity pulls down, work is needed to move anything up, against the pull of gravity. Lifting the heavy stones for the Temple was hard work. The men used **machines** to help them.

Gravity pulled on the stones that the men would have to push uphill. The work would have been harder than pushing the stones downhill. If the men had been going downhill, gravity would have pulled on the stones, and the work would have been easier. Gravity would have helped the men.

Look up the facts!

A man named Galileo was born in Pisa, Italy, in the sixteenth century. He became the first real scientist of modern times. Read about Galileo in an encyclopedia, or find a good story of his life. Try to find the answers to these questions.

1.1 What did Galileo teach about the value of observing and experimenting? _____ _____