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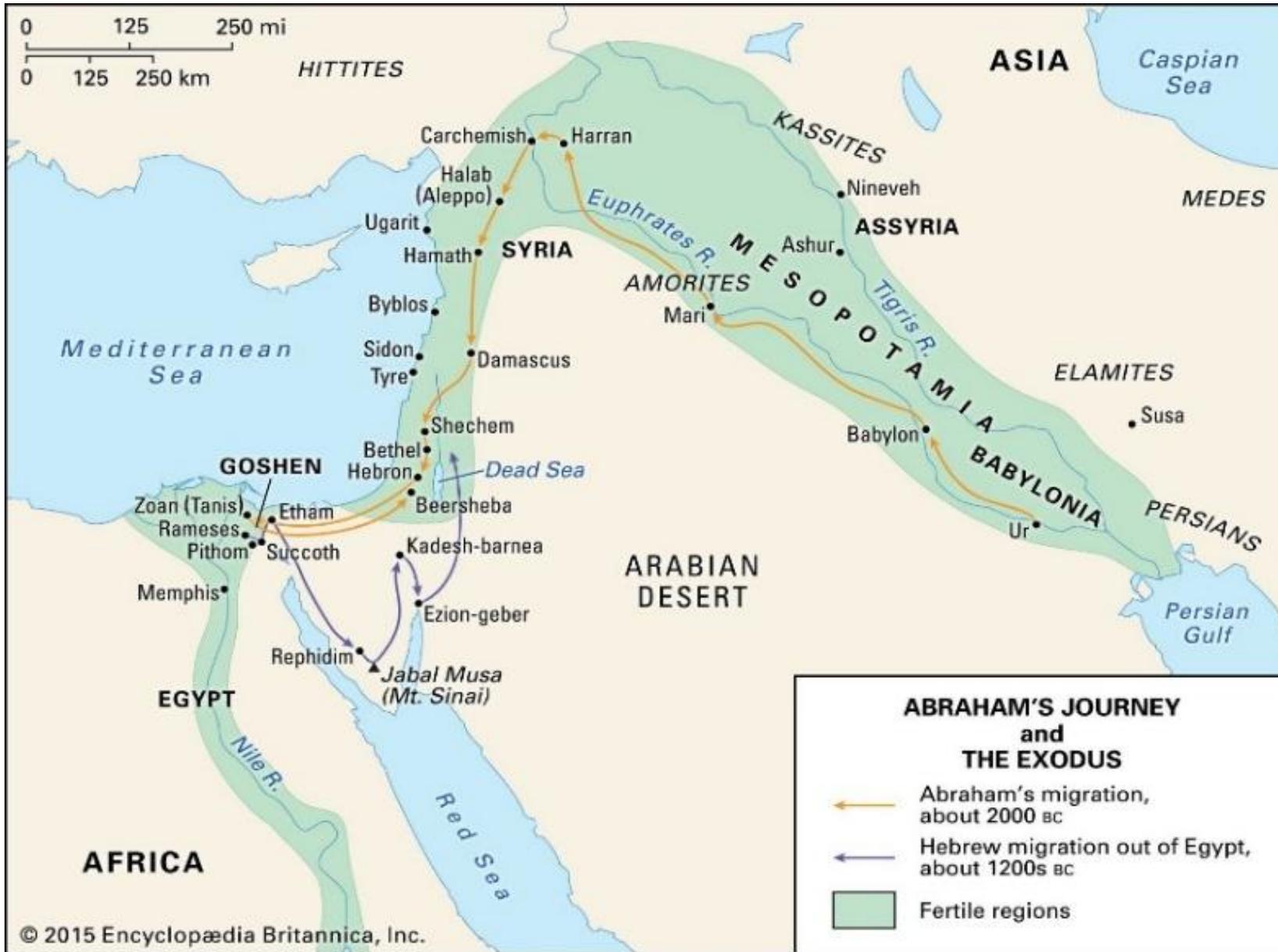
SURVIVAL SCIENCE LESSONS 5B

WHAT IF YOU...

- Were asked to give up everything!
- Knew that only God was on your side and no one else!

Would you follow GOD no matter what the “road ahead” looked like?





ISRAEL'S DESERT WANDERINGS

NOT FERTILE

SPARSE RAINFALL

SAND AND LITTLE ORGANIC SOIL

ALMOST NO VEGETATION

NO RIVERS

THE ISRAELITES WANDERED IN THE DESERT 40 YEARS?

WHY???

BECAUSE THEY...

- Didn't know the REGION would be desert?
- Didn't know how to follow RIVERS or FERTILE regions?
- Were still afraid more Egyptians would follow them?

MOST LIKELY, NONE OF THE ABOVE

**Moses knew the region of Mount Sinai where he was first called
Moses had traveled TO EGYPT from MOUNT SINAI to face PHARAOH
and because**

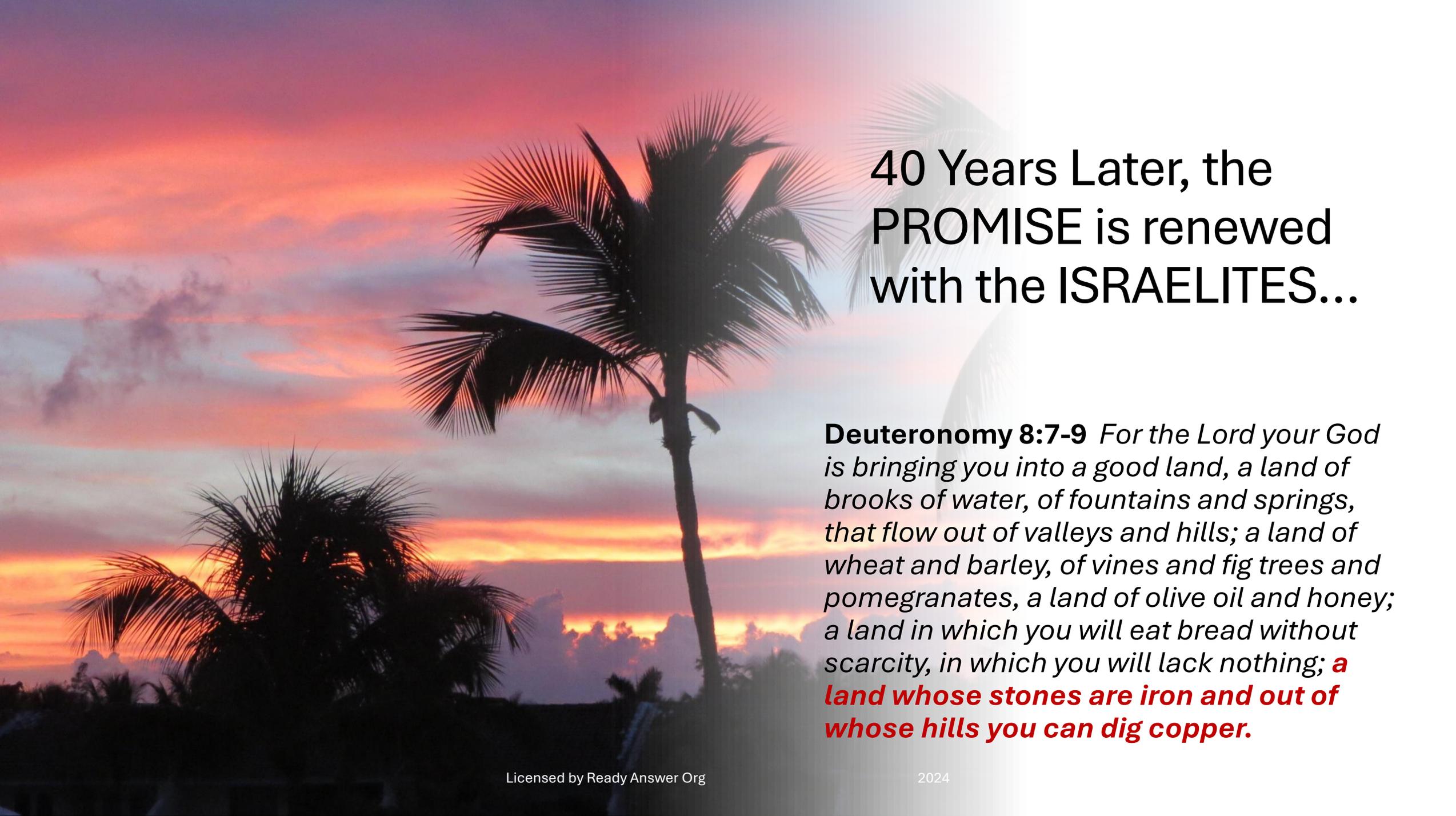
**THE PILLAR OF CLOUDS BY DAY AND THE PILLAR OF FIRE BY NIGHT LED
THE ISRAELITES – GOD'S DIVINE FIRE DID NOT REQUIRE FUEL**

THE HEBREW NATION NEEDED TO LEARN TO **TRUST AND OBEY** GOD AFTER YEARS IN EGYPT

Biblical Examples:

- [Exodus 32:9](#): "I have seen this people, and, behold, it is a stiffnecked people".
- [Deuteronomy 9:6](#): "Know therefore that the Lord thy God giveth thee not this excellent land in possession for thy justices, for thou art a very stiffnecked people".





40 Years Later, the PROMISE is renewed with the ISRAELITES...

Deuteronomy 8:7-9 *For the Lord your God is bringing you into a good land, a land of brooks of water, of fountains and springs, that flow out of valleys and hills; a land of wheat and barley, of vines and fig trees and pomegranates, a land of olive oil and honey; a land in which you will eat bread without scarcity, in which you will lack nothing; **a land whose stones are iron and out of whose hills you can dig copper.***

THE IRON AGE WAS SOON TO COME

- God's Word seems to indicate that iron would be valuable to Israel's future (Deuteronomy 7:8-9)
- At the time Moses wrote down God's Words in Deuteronomy:
 - Separating iron from rock was impossible because smelting temperature were too low!
 - Moses died just before the Iron Age began.
- Iron, and the Iron Age, would dramatically change the world.
- God knows the future!

IRON ORE ROCKS – MINERALS

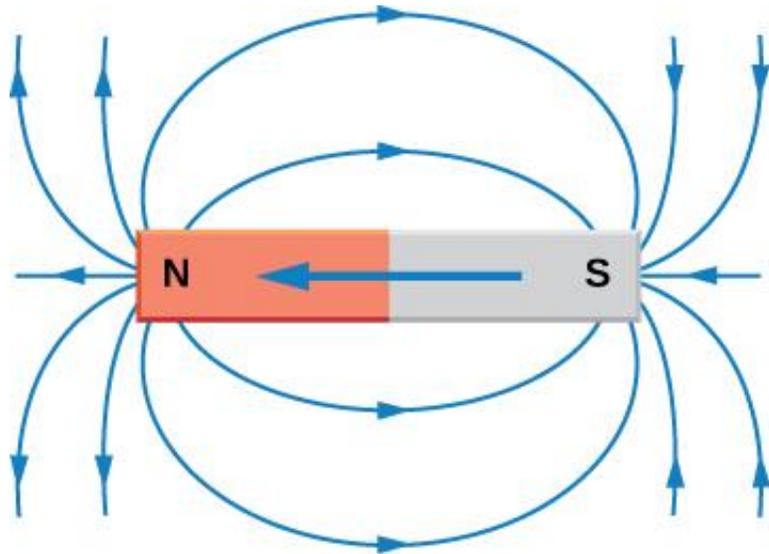
MAGNETITE (72%) aka Lodestone which is naturally magnetic, **HEMATITE (70%)**, **LIMONITE (60%)**, **SIDERITE (50%)**

Magnetite streaks are black-gray;
Hematite streaks are red-brown;
Limonite streaks are yellow-brown;
Siderite streaks yellow-white.

Only magnetite (Fe_3O_4) has enough iron to attract a magnet. Lodestone is naturally-occurring magnetic magnetite.

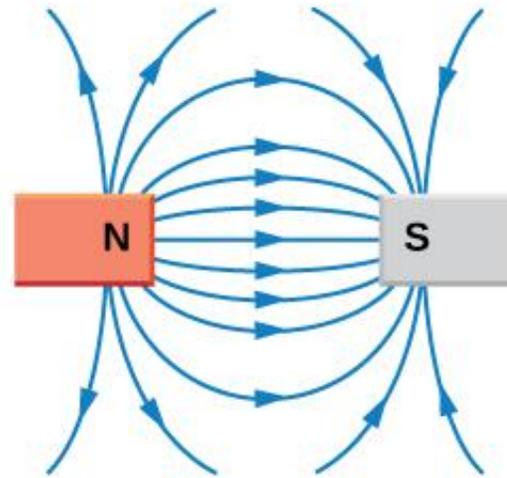


Lodestone, Magnetite, and Magnets



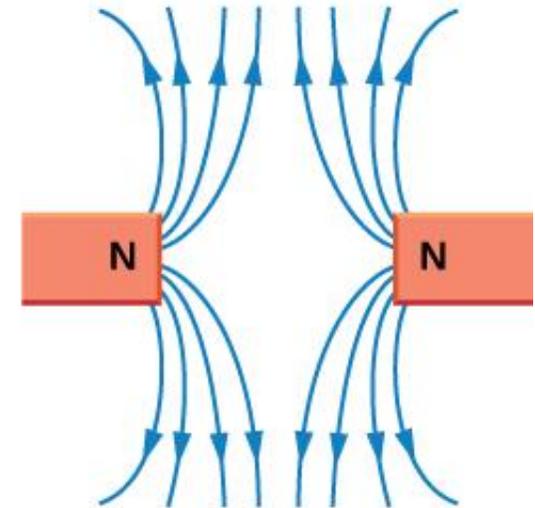
Magnetic field lines of a bar magnet

(a)



Magnetic field lines between unlike poles

(b)



Magnetic field lines between like poles

(c)

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OPPOSITES ATTRACT – SIMILAR POLES REPEL

- A Negative Charge Pole is shown as: -
- A Positive Charge Pole is shown as: +

OPPOSITES ATTRACT



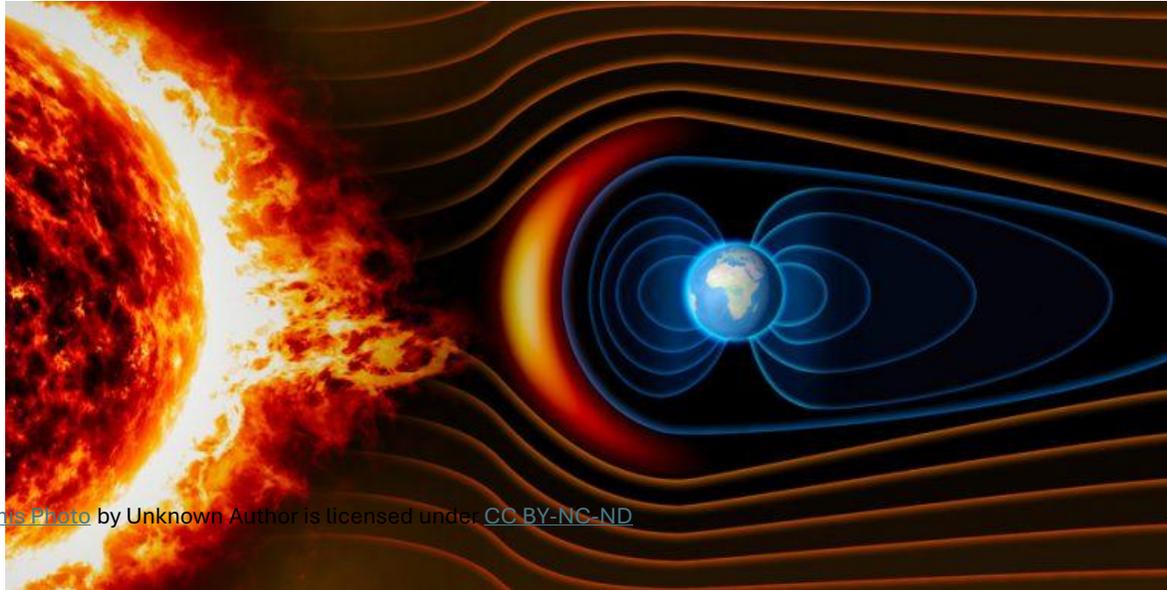
TWO NEGATIVES OR



TWO POSITIVES REPEL

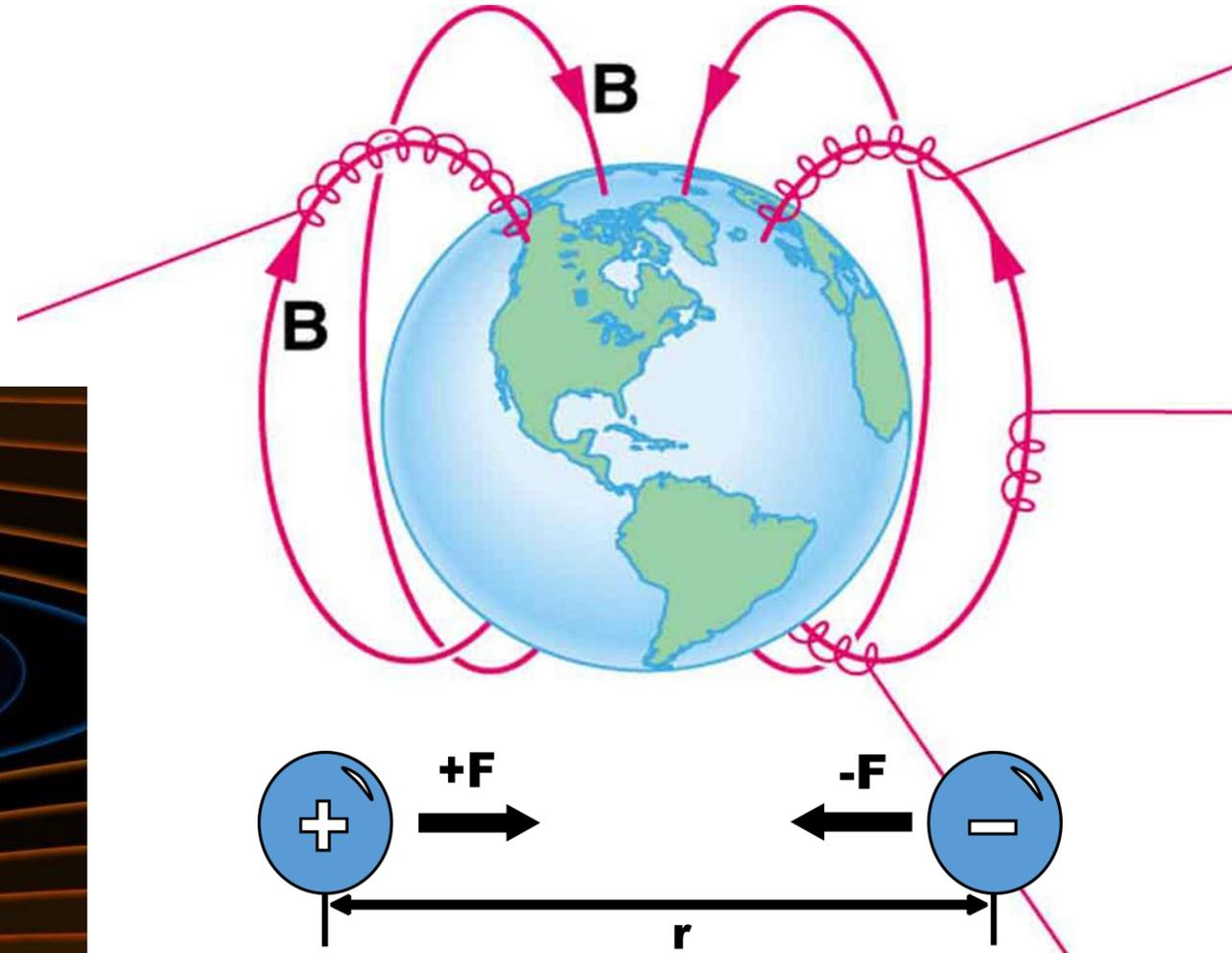


Earth's Iron Core Creates Magnetism



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HEAT/KINETIC ENERGY CHANGES MATTER

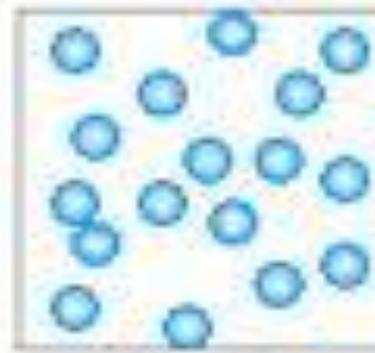
States of Matter



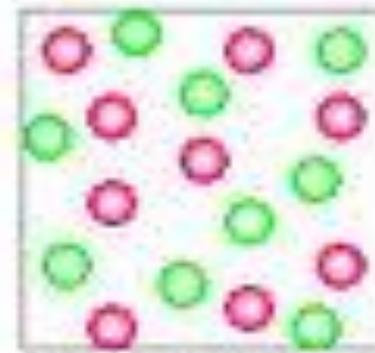
SOLID



LIQUID



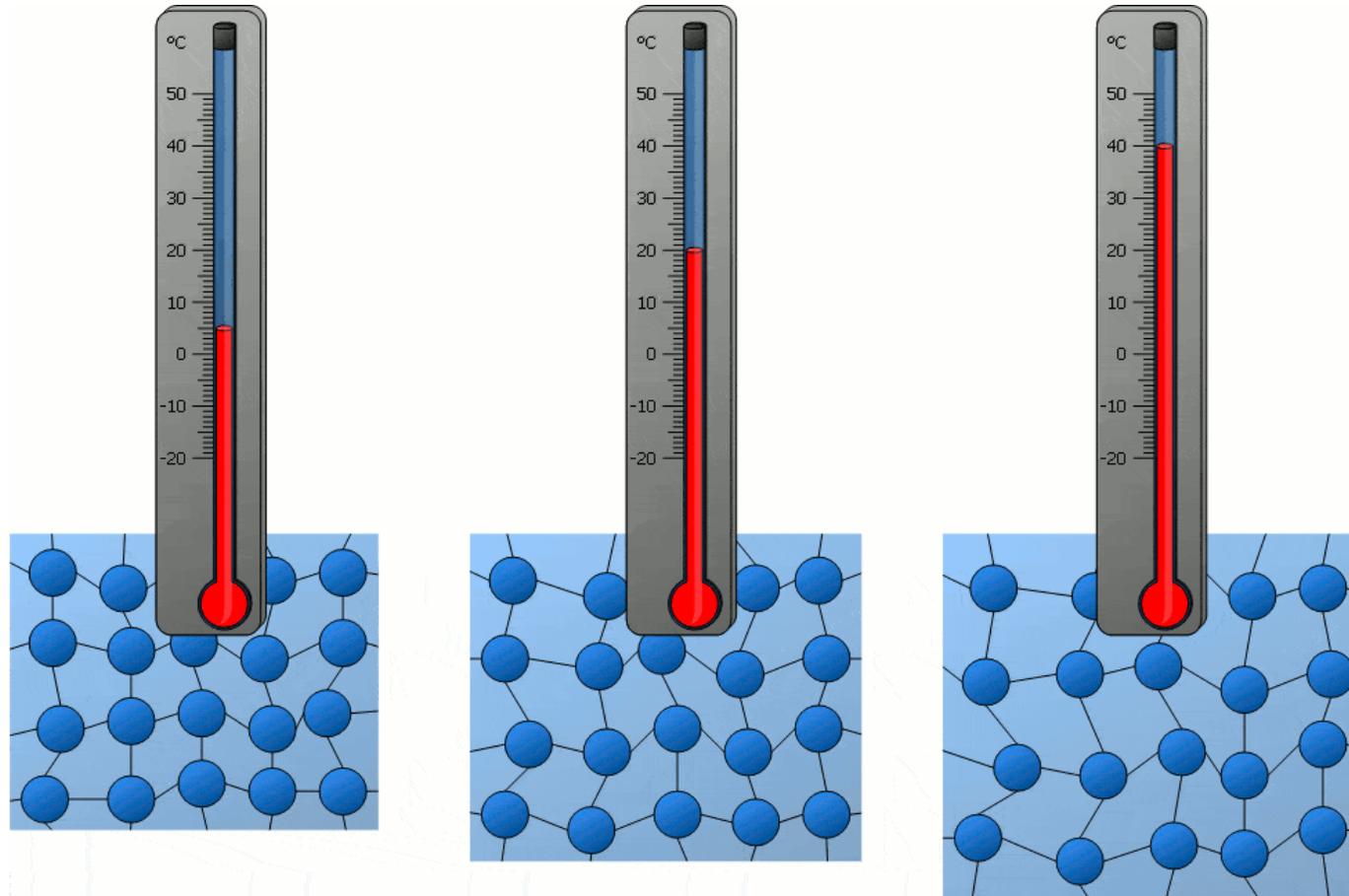
GAS



PLASMA



KINETIC ENERGY AND TEMPERATURE

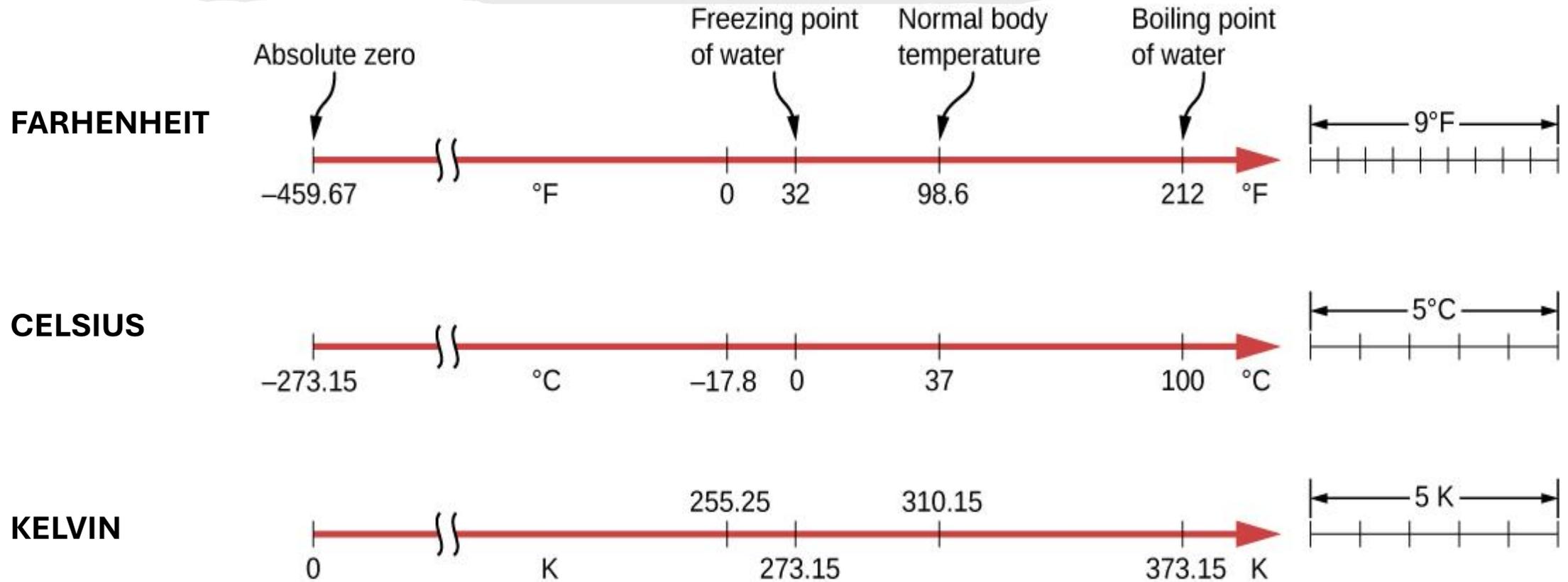


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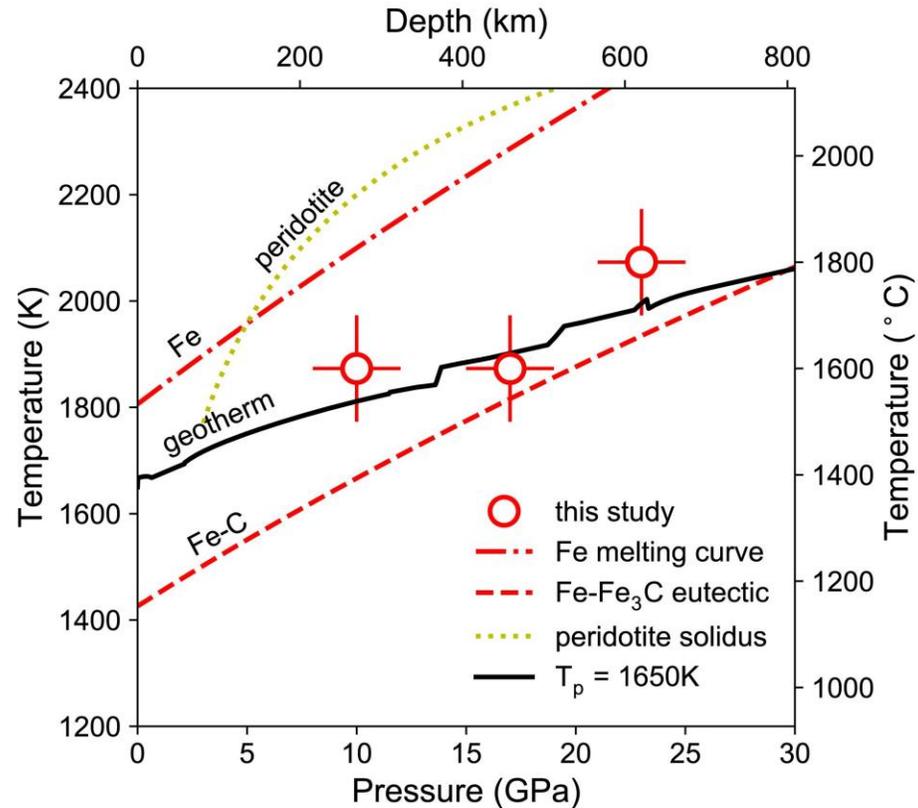
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TEMPERATURE MEASUREMENTS



IRON SMELTING REQUIRES HIGH TEMPS ~1800 K or 2800 ° F



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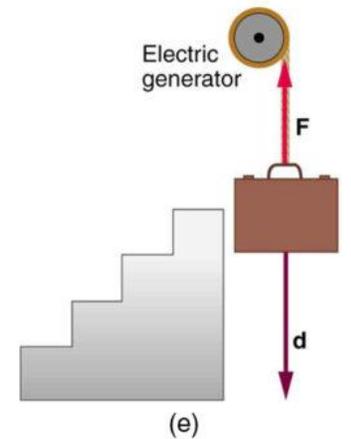
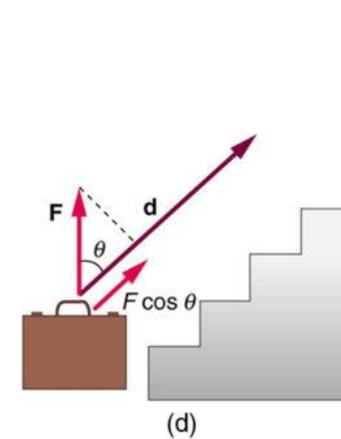
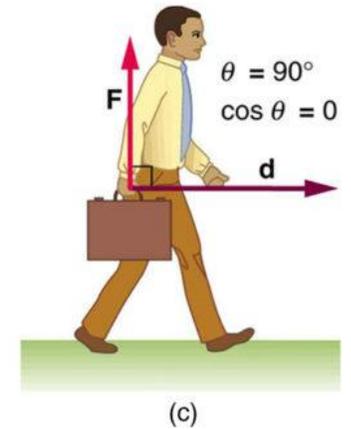
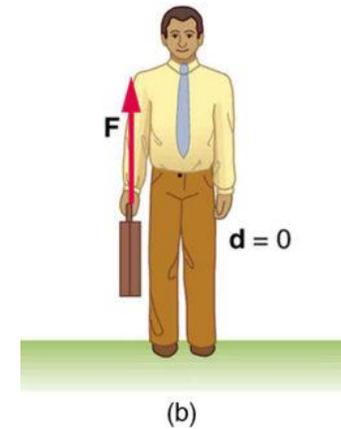
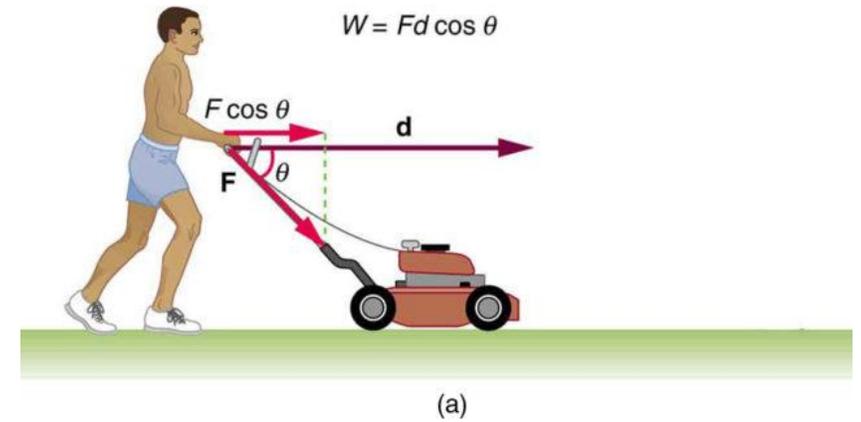


IRON IS 32% OF THE ENTIRE EARTH, BUT ONLY 5.5% OF THE EARTH'S CRUST

Work = F x distance

Energy is the Source, Action, or Fuel, needed to do work!

Unit of work: J
 $1\text{J} = 1\text{N}\cdot\text{m}$
 $= 1\text{kg}\cdot\text{m}\cdot\text{s}^{-2}\cdot\text{m}$
 $= 1\text{kg}\cdot\text{m}^2\cdot\text{s}^{-2}\cdot\text{m}$



Energy, Power and Work

Work is a form of Energy.

Work is done by a force F on mass m when the force and the displacement Δx are parallel:

Symbol: W

Formula: $W = F\Delta x$

(if Δx and F are parallel)

In general: $W = F\cos\theta\Delta x$

Work is a SCALAR.

UNITS:

Energy = Joules

Power =
Joules/sec

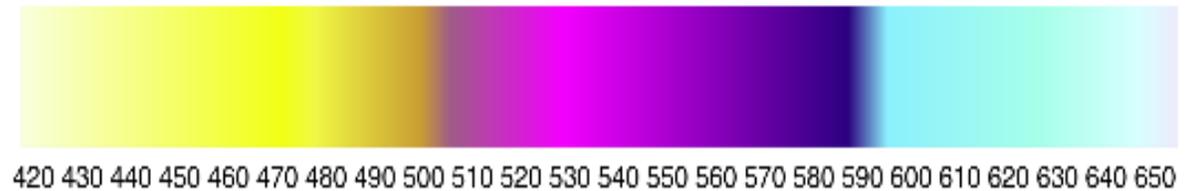
Unit of work: J
 $1\text{J} = 1\text{N}\cdot\text{m}$
 $= 1\text{kg}\cdot\text{m}\cdot\text{s}^{-2}\cdot\text{m}$
 $= 1\text{kg}\cdot\text{m}^2\cdot\text{s}^{-2}$

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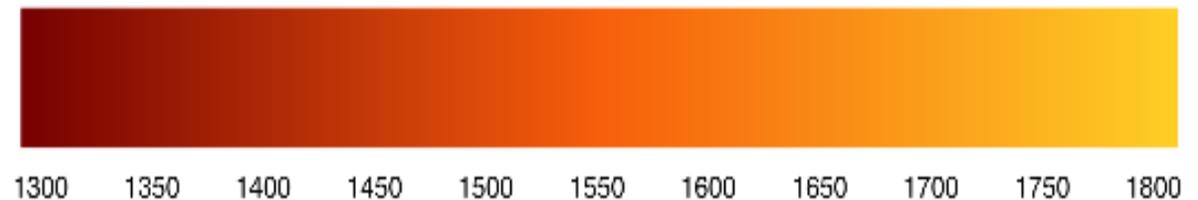
FORGING –
Heat Energy IS
doing WORK!

Unit of work: J
 $1\text{J} = 1\text{N}\cdot\text{m}$
 $= 1\text{kg}\cdot\text{m}\cdot\text{s}^{-2}\cdot\text{m}$
 $= 1\text{kg}\cdot\text{m}^2\cdot\text{s}^{-2}\cdot\text{m}$

Tempering Colors

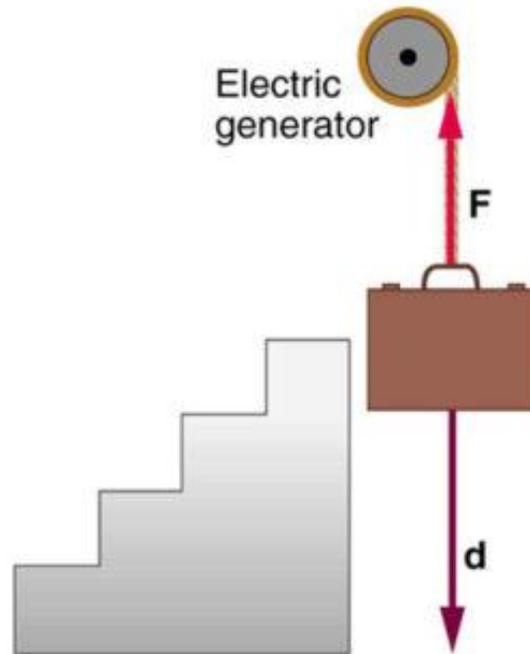
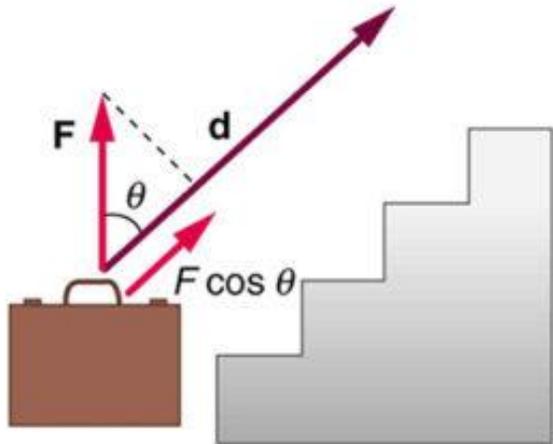


Forging Colors



(All temperatures in °F)

POWER is the **RATE** Work is Done



Power

Power is the rate at which energy is transferred or the rate at which work is done.

$$P = \frac{W}{t}$$

$$P = \frac{\Delta E}{t}$$

P = power (Watt)

W = work done (J)

ΔE = energy transferred (J)

t = time (s)

TIME IS KEY

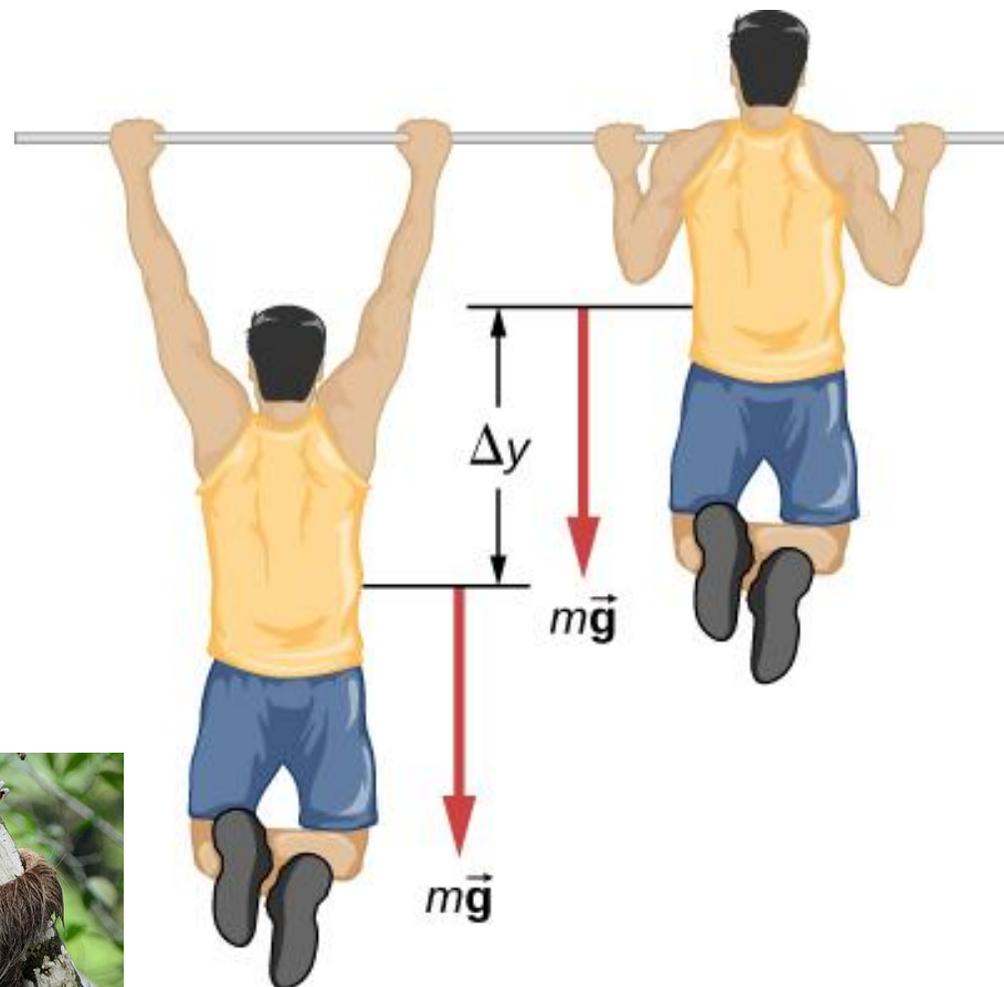
POWER SUPPLIES THE ENERGY FOR WORK



How Fast Can You Do Pull-Up's?

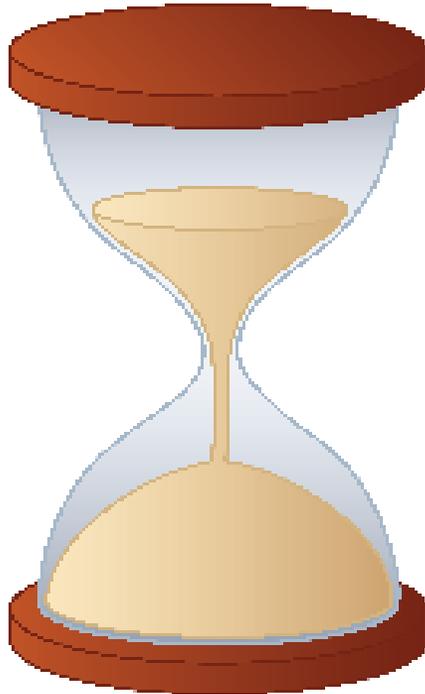
A Power Workout is one that requires:

- Using energy to do work
- Moving a distance (Δy) to give your body or muscles a workout
- A **faster rate**, no sloths allowed in a POWER WORKOUT!



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Rate indicates a UNIT of TIME

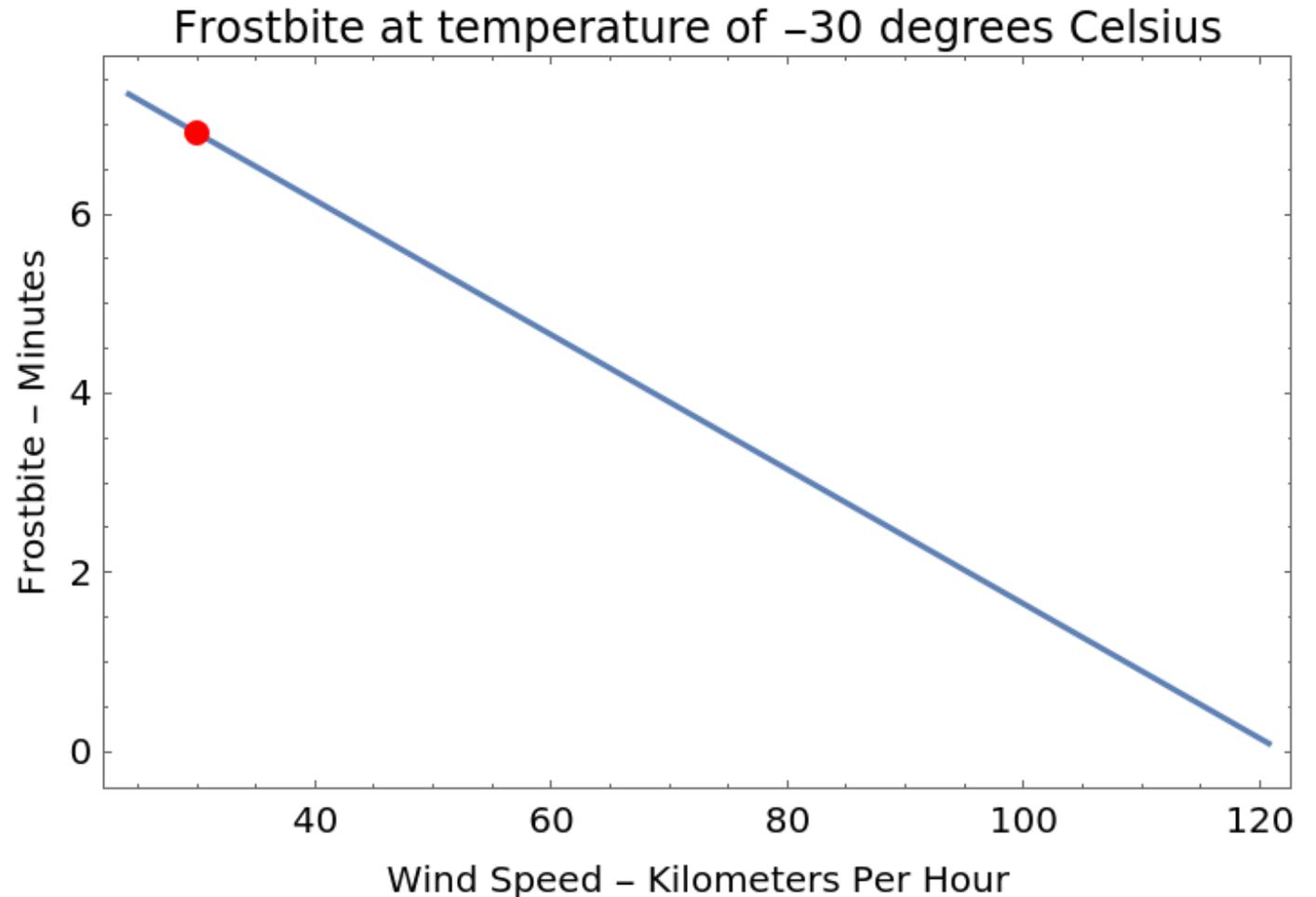


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TIME IS A KEY

Factor in avoiding Frostbite at Arctic (-30°C) Temperatures or intense wind speeds – the rate you can freeze your fingers, nose, or toes

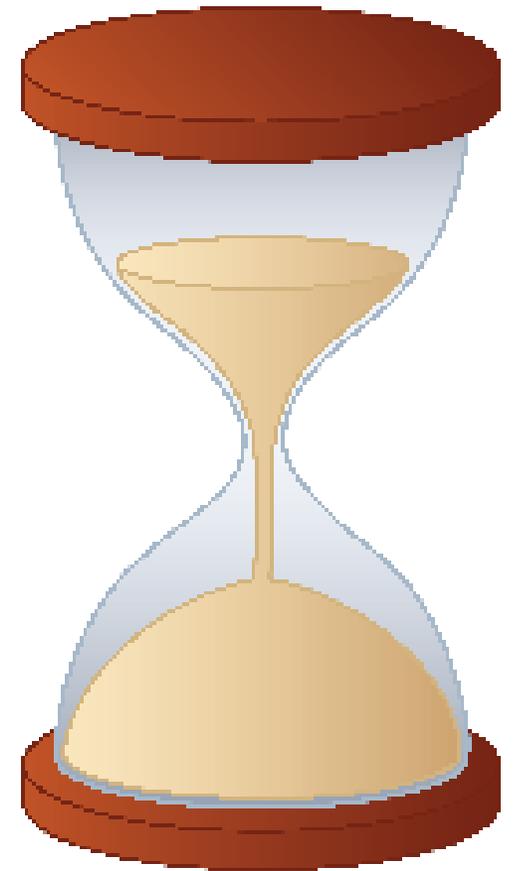


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REMEMBER THESE THINGS

Redeeming time" refers to making the most of every opportunity and using time wisely, recognizing its value and the potential for spiritual growth and service (AI). To redeem, we must do. To do, we must act/work/pray. Prayer is doing. "The prayer of the righteous is very powerful in its working." James 5:16b The quicker we act, the more powerful our testimony (in most cases). Time is irreversible

Ephesians 5:15-16 *See then that you walk circumspectly, not as fools but as wise, redeeming the time, for the days are evil.*



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