A

Photo credits, clockwise from top left: Alex Needham, EPA.gov,
http://www.free-picture.net/airplane/a-47-airplane.jpg.html, http://zoyler.com/top-10-heaviest-animal-in-the-world/,
Frank Vassen, Seighean
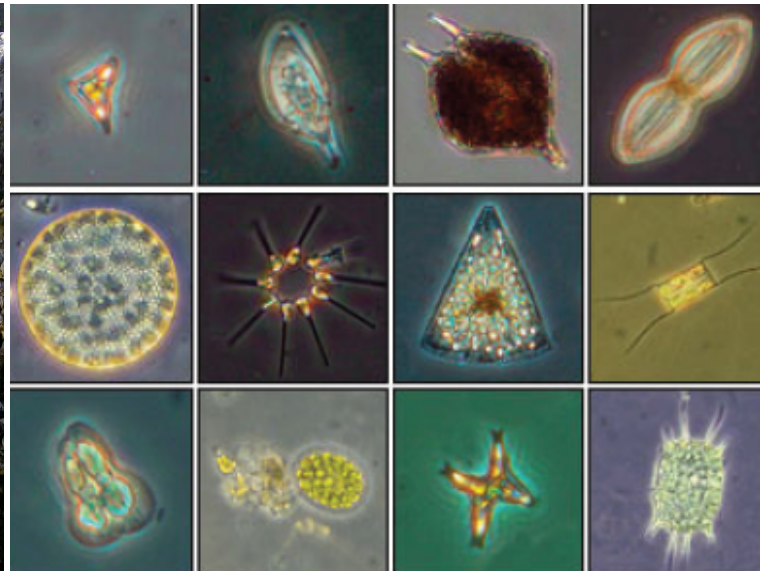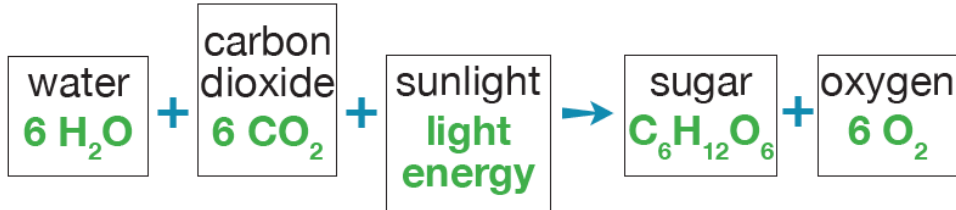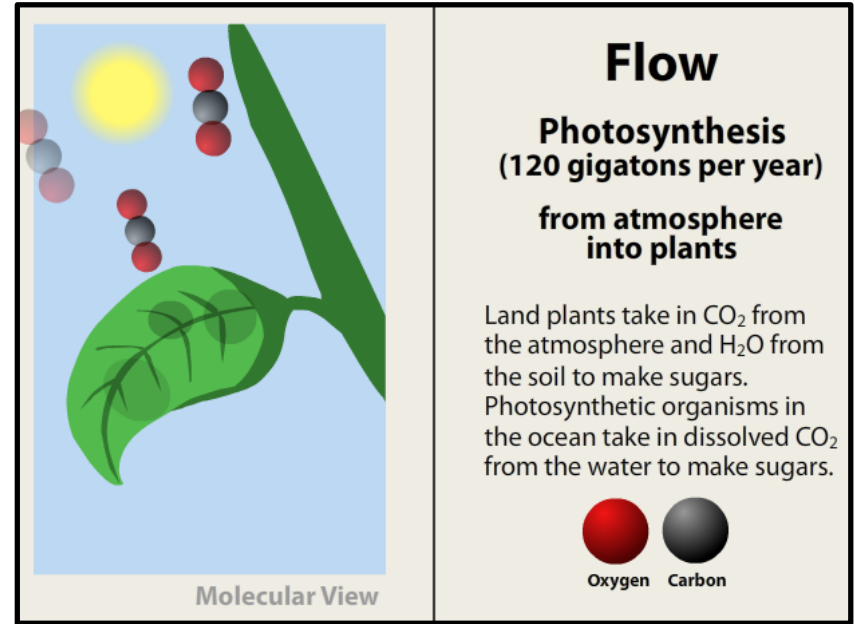
B

water
6 H$_2$O
+
carbon dioxide
6 CO$_2$
+
sunlight
light energy
→
sugar
C$_6$H$_{12}$O$_6$
+
oxygen
6 O$_2$

Flow

Photosynthesis (120 gigatons per year)

from atmosphere into plants

Land plants take in CO$_2$ from the atmosphere and H$_2$O from the soil to make sugars. Photosynthetic organisms in the ocean take in dissolved CO$_2$ from the water to make sugars.

Molecular View

Oxygen   Carbon

c

transmit

reflect

absorb

D
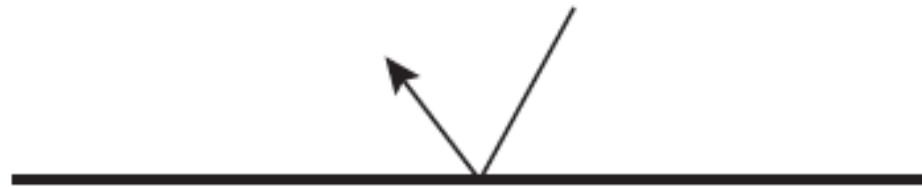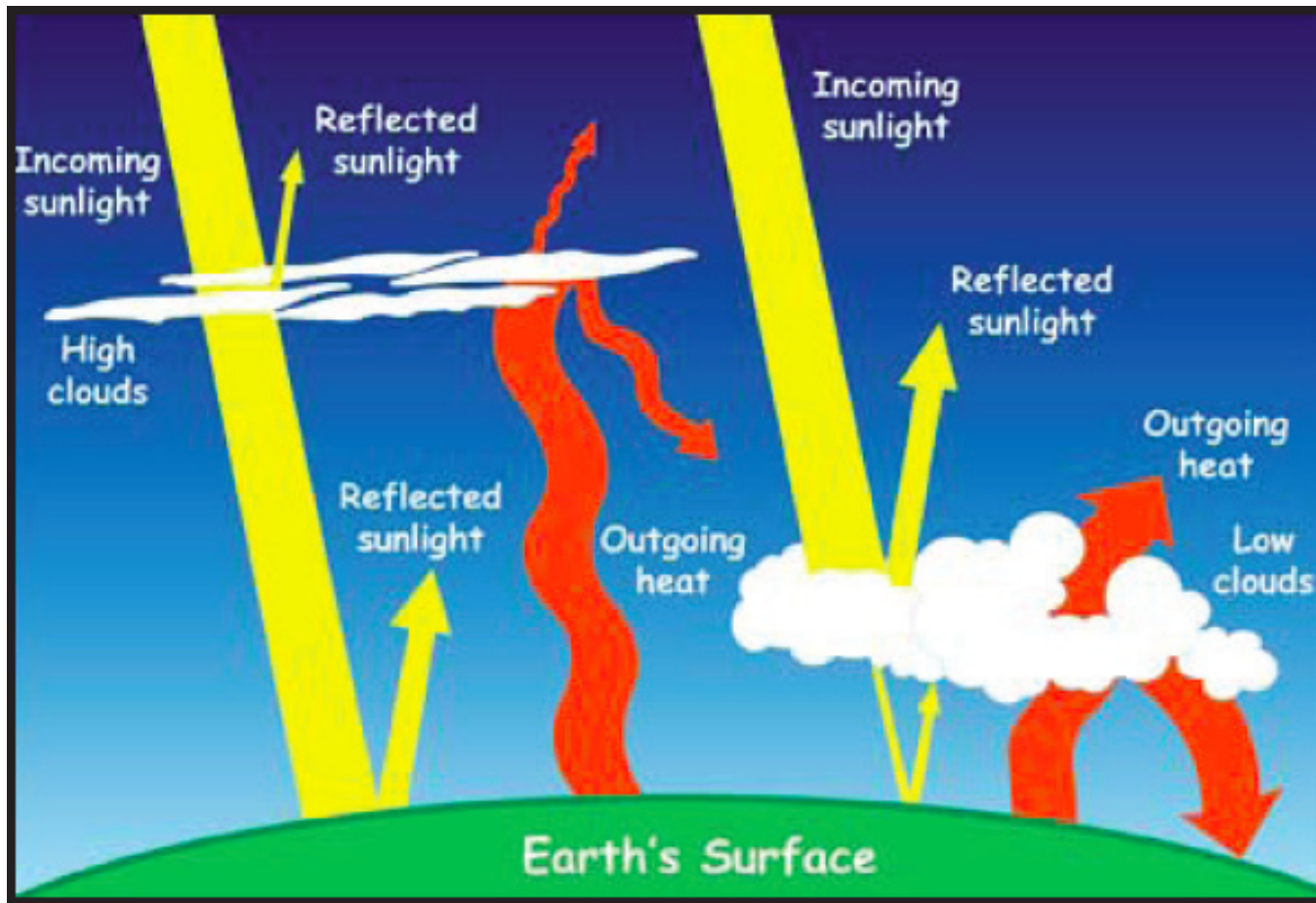
Solar Energy Absorbed		Solar Energy Reflected	
Clouds	3%	Clouds	20%
Atmosphere	16%	Atmosphere	6%
Land and ocean	51%	Land	4%
TOTAL ABSORBED	70%	TOTAL REFLECTED	30%
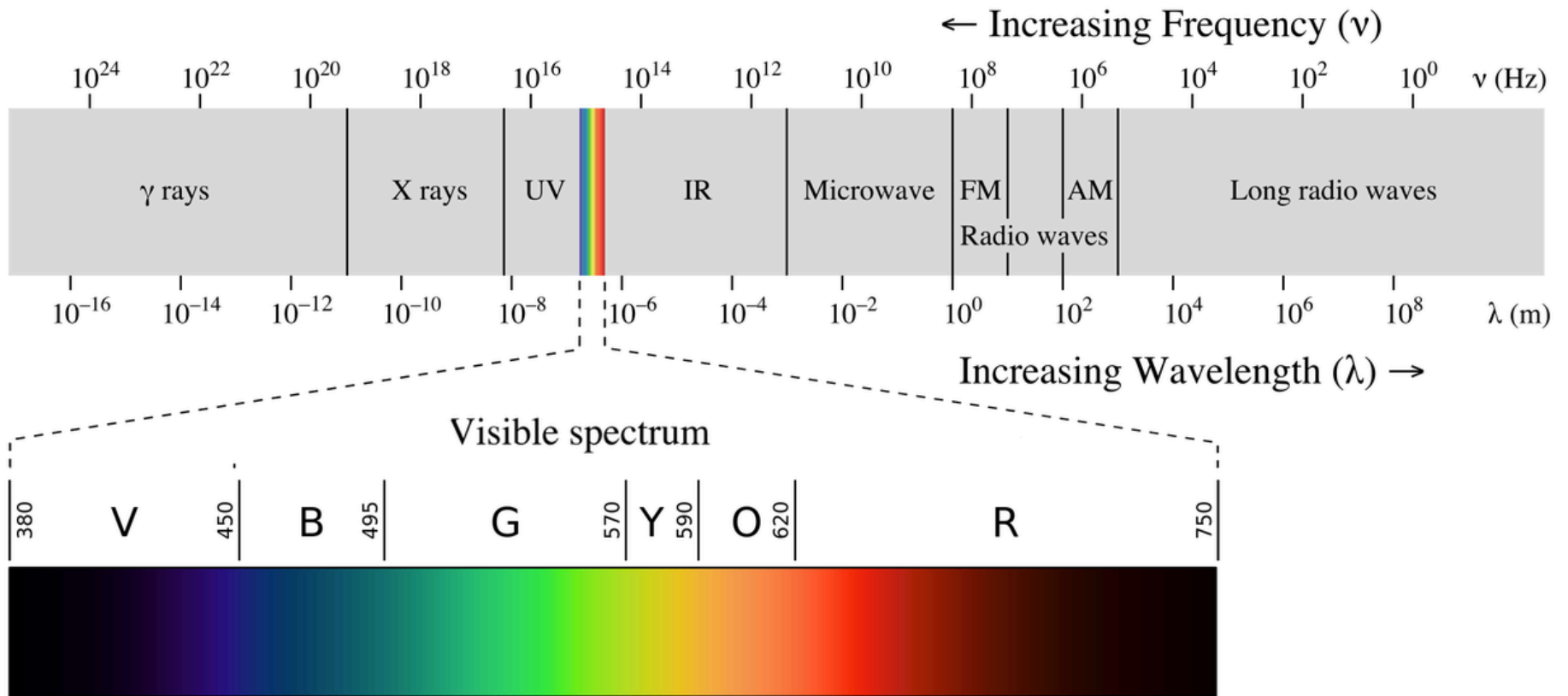
E

← Increasing Frequency (ν)

| 10^{24} | 10^{22} | 10^{20} | 10^{18} | 10^{16} | 10^{14} | 10^{12} | 10^{10} | 10^{8} | 10^{6} | 10^{4} | 10^{2} | 10^{0} | ν (Hz) |

| γ rays | X rays | UV | | IR | Microwave | FM | AM | Long radio waves |

Radio waves

| 10^{-16} | 10^{-14} | 10^{-12} | 10^{-10} | 10^{-8} | 10^{-6} | 10^{-4} | 10^{-2} | 10^{0} | 10^{2} | 10^{4} | 10^{6} | 10^{8} | λ (m) |

Increasing Wavelength (λ) →

Visible spectrum

380 V 450 B 495 G 570 Y 590 O 620 R 750

F

Keeling Curve: CO$_2$ Levels in the Atmosphere