Science Partnership
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Name KEY

The Earth's Water Budget

Examine the schematic of the water cycle and answer the following questions. Be sure to show your calculations and units.

1. What percentage of Earth's water is found in the oceans?

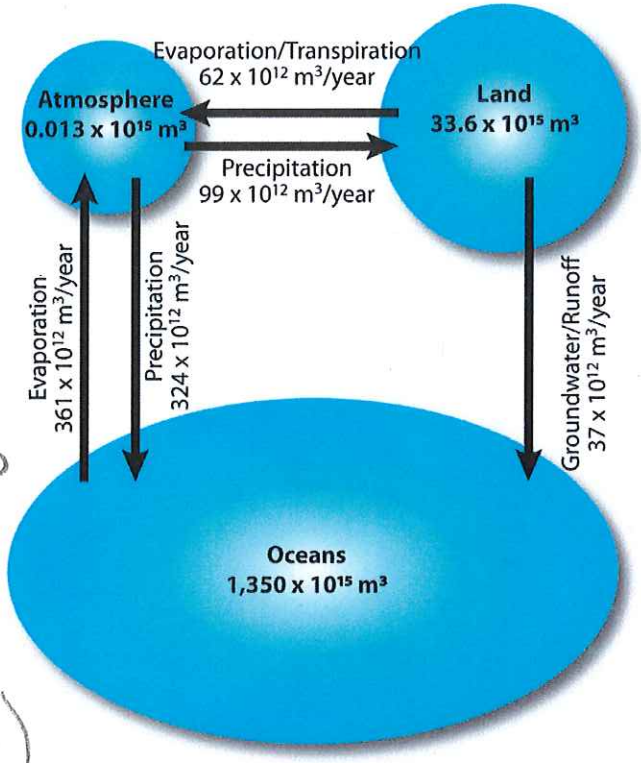
$$\left(\frac{(1350 \times 10^{15}\ m^3)}{(1350 \times 10^{15} + 0.013 \times 10^{15} + 33.6 \times 10^{15}\ m^3)}\right) \times 100$$

$= 97.6\%$

2. What percentage of Earth's water is found in the atmosphere?

$$\left(\frac{(0.013 \times 10^{15}\ m^3)}{(1350 \times 10^{15} + 0.013 \times 10^{15} + 33.6 \times 10^{15}\ m^3)}\right) \times 100$$

$= 0.0009\%$



3. What is the total amount of precipitation each year?

$(324 \times 10^{12}\ m^3/yr) + (99 \times 10^{12}\ m^3/yr)$

$= 423 \times 10^{12}\ m^3/yr$

4. What is the total amount of evaporation/transpiration each year?

$(361 \times 10^{12}\ m^3/yr) + (62 \times 10^{12}\ m^3/yr)$

$= 423 \times 10^{12}\ m^3/yr$

5. Is more water evaporated into the atmosphere from the oceans or land?

Much more evaporation from the oceans

6. What percentage of water that is evaporated (and transpired) into the atmosphere comes directly from the oceans?

$$\frac{(361 \times 10^{12}\ m^3/yr)}{(361 \times 10^{12} + 62 \times 10^{12}\ m^3/yr)} \times 100$$

$= 85\%$

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7. Compare the amount of evaporation from the oceans and precipitation into the oceans. Note that they are not equal. What is an additional source of water that is added to the oceans?

Groundwater & runoff from the continents.

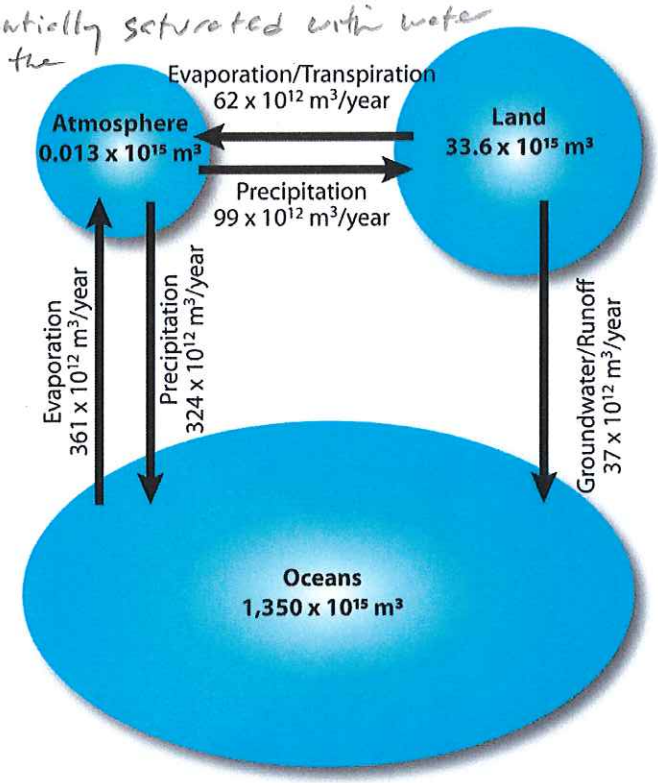
8. Compare the values in 3 and 4. Write a claim regarding the amounts of precipitation and evaporation/transpiration using data as evidence to support your claim.

1. The amount of precipitation is balanced by the amount of evaporation and transpiration
2. The Earth's atmosphere is essentially saturated with water — every drop of water added to the atmosphere results in precipitation

9. Compare your value for 3 and the total amount of water in the atmosphere. Note that the amount of precipitation is much larger than the amount of water in the atmosphere. How many times per year does all of the water in the atmosphere cycle through as precipitation?

$$\left(\frac{0.423 \times 10^{15}\ m^3/yr}{0.013 \times 10^{15}\ m^3}\right)$$ note change in exponent

$= 32.5/yr$



10. What percentage of precipitation that falls on land becomes run off and infiltration?

$$\left(\frac{37 \times 10^{12}\ m^3/yr}{99 \times 10^{12}\ m^3/yr}\right) \times 100$$

$= 37\%$

11. At high elevations and high latitudes, some of the precipitation does not immediately run off, evaporate/transpire or infiltrate. Where is the water temporarily stored?

Water can be stored on continents as glacial ice & snow.