(1) **Personal Use of Imagination**

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(and also Mathematics) is not just a collection of laws, a catalogue of unrelated facts. **It is a creation of the human mind, with its freely invented ideas and concepts...**
An insightful statement made by the 1986 Nobel Chemistry Laureate John C. Polanyi (son of Michael Polanyi):

“It is only in the popular mind that (knowledge) equates with facts. That is of course flattering, since facts are incontrovertible. But it is also demeaning, since facts are meaningless. They contain no narrative.”
KNOWLEDGE \approx FACTS + CREATIVE IDEAS + CRITICISM

Facts are objective, but inventive ideas tend to be more personal (at least for the inventor). The same fact can sometime be described by different ideas.
Have you imagined capturing an atom or molecule in the air?

This is what Steven Chu did.

He recalls, “I began talking informally with Art Ashkin, a colleague at [Bell Lab]. Art had a dream to trap atoms with light, but the management stopped the work four years ago. Over the next few months, I began to realize …. laser cooling was going to make possible all of Ashkin's dreams plus a lot more.”
Sisyphus cooling
In early 20th century, Bose (in India) wrote an article on some statistical calculations concerning light particles, photons. Editors found his idea strange and unacceptable.

With no way to go, Bose sent the manuscripts to Einstein, who had then become world famous. Einstein immediately saw the gem inside and translated and recommended them for publication.
At extremely low temperature, Einstein suggests a sudden change of the matter into a coherent state (as if dancing together)

This is known as Bose-Einstein condensation (BEC), the fourth state of matter, besides Gas, liquid and solid.
Seventy years were to pass before the Nobel Laureates, in 1995, succeeded in achieving this extreme state of matter. Cornell and Wieman then produced a pure condensate of about 2,000 rubidium atoms at 0.000 000 02 degrees above absolute zero.

Independently, Ketterle performed corresponding experiments with sodium atoms.
Evaporation cooling.

Ketterle’s first interference pattern
Einstein's Principle of Equivalence:

You can’t tell which idea is `better’ (than the other one).
While sitting in his office in Bern, Switzerland, in 1907, Einstein suddenly realized that if he were to fall freely in a gravitational field, he would be unable to feel his own weight.

Einstein later recounted that this realization was the "happiest moment in his life", for he understood that this idea was the key to extend the Special Theory of Relativity to include the effect of gravitation.
The Deflection of Starlight

As students, in your study, you are capable and encouraged to discover and rediscover insights on your own. And imagination is a big help.