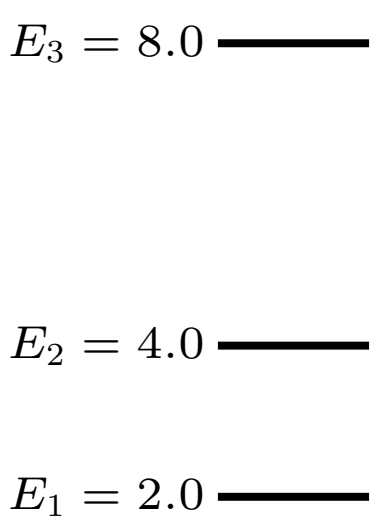
Question 1

A partial energy level diagram for a system is as illustrated. The energies are in units of $10^{-19}\,\mathrm{J}$.



Which jump results in emission of light with the lowest frequency?

1. $1 \rightarrow 2$
2. $2 \rightarrow 1$
3. $3 \rightarrow 1$
4. $1 \rightarrow 3$
5. $3 \rightarrow 2$

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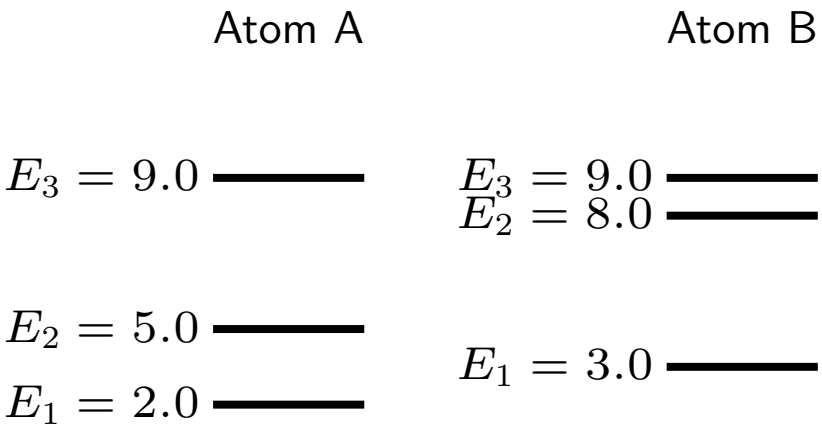
Question 2

Two atoms have the following energy levels:

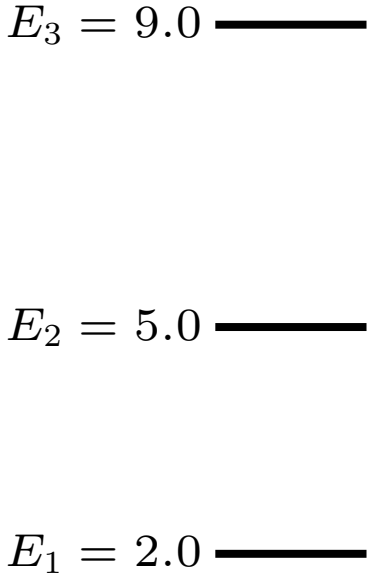


Consider the spectrum of the light emitted by the atoms. Which of the following is true?

1. The spectrum of A is the same as that of B.
2. There is one spectral line of A which is the same as a line of B.
3. There are no spectral lines of A which are the same as those of B.

Question 3

A particular type of matter has the illustrated partial energy level diagram. The energies are in units of 10^{-19} J.

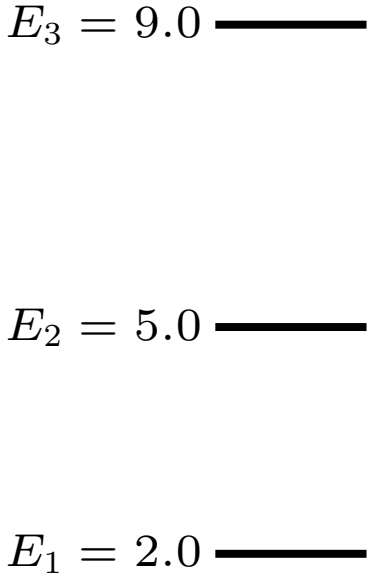


Electromagnetic radiation consisting of photons, each with energy 3.0 (in units of 10^{-19} J) is incident on the matter. Which of the following is true?

1. This radiation cannot be absorbed.
2. This radiation can be absorbed. The energy of the matter afterwards is 3.0.
3. This radiation can be absorbed. The energy of the matter afterwards is 5.0.
4. This radiation can be absorbed. The energy of the matter afterwards is 9.0.

Question 4

A particular type of matter has the illustrated partial energy level diagram. The energies are in units of 10^{-19} J.



Electromagnetic radiation consisting of photons, each with energy 2.0 (in units of 10^{-19} J) is incident on the matter. Which of the following is true?

1. This radiation cannot be absorbed.
2. This radiation can be absorbed. The energy of the matter afterwards is 2.0.
3. This radiation can be absorbed. The energy of the matter afterwards is 4.0.
4. This radiation can be absorbed. The energy of the matter afterwards is 5.0.