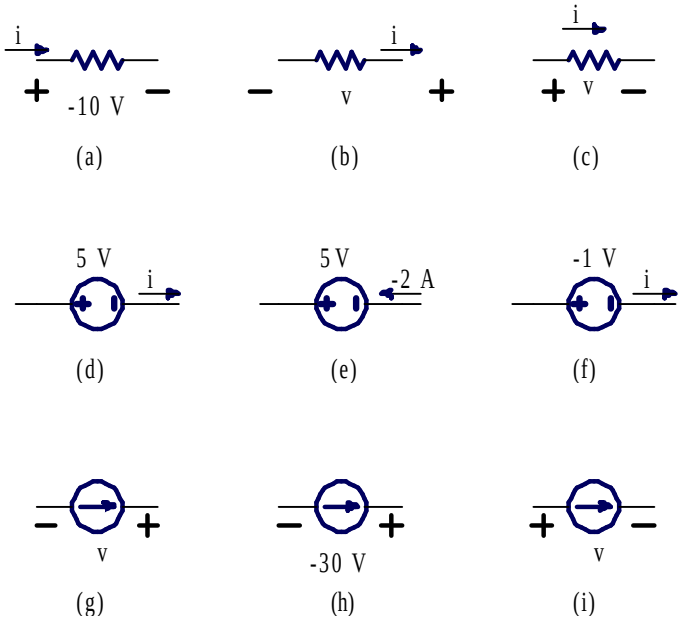
10.) Which of the nine illustrations below (a through i) show labels in agreement with the passive sign convention? Explain your answers.

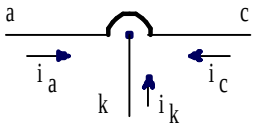


11.) Which of the following fictional and fanciful devices would be classified as a *simple circuit element* if it actually existed?

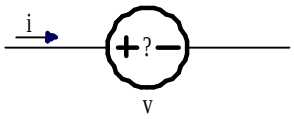
a.) A "square-law resistor" has the symbol and voltage-current relationship shown below. The value of the square-law resistor, given the symbol Γ (capital gamma), is measured in "ohms per amp." For example, if Γ = 10 Ω/A and if $i = -2$ A, then $v = -40$ V.

$$v = \Gamma i|i|$$

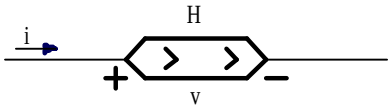
b.) A "dordtolator" has terminals marked "a," "c," and "k" as shown in the diagram below. The value of the dordtolator, symbolized by μ (lower-case mu) is dimensionless, but can be cited as "volts per volt." Under all conditions $i_a = -i_c$ $i_k = 0$, and $v_{ac} = \mu v_{kc}$. In this notation the subscripts indicate which two points are used to measure the voltage, the first subscript being the positive labeled terminal. In other words, v_{ac} is the voltage of terminal "a" with respect to terminal "c." Likewise, v_{kc} is the voltage of terminal "k" with respect to terminal "c."



c.) A "noise source" has the symbol shown below. The voltage across the noise source changes constantly with time in an unpredictable way although the average of many sample measurements taken over time will be close to zero.



d.) A "debruerator" has the symbol shown below. The voltage across the device is proportional to the second derivative of the current through the device. The value of the device is symbolized by the constant of proportionality, H, which has units of eurbs. One eurb is equal to a volt-second squared per amp squared.



$$v = H\frac{d^2 i}{dt^2}$$

12.) Approximately how many engineering students in the world are student members of the IEEE?

13.) What general types of benefits accrue to student members of a professional society? Hint: Google "IEEE student member benefits" or "ASME student member benefits", etc. (Do not enter the quotation marks in the search dialog.)