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1. What if 12 bits were used to store a signed integer. What is the biggest/smallest possible integer?

with 12 bits you can store up to 2^{12} patterns so 4096.

the biggest possible integer is:

the smallest possible integer is:

2. Think about possible values and their range, say what type of variable would be suitable for the following, and suggest a name for it too.

For example: the temperature of a room in degrees Fahrenheit. Room temperature is likely to vary between say 50 degrees F and 100 degrees F, but it can take any value in between including non-integers, e.g 71.19 F, so the type must be float or double depending on the accuracy required. A suitable variable name would be roomTemp.

(i) The number of pages in a book;

The number of pages in a book is likely to vary between say about 50 & a few thousand. It could be any value between those however it would be an integer, so the variable type would be int. A suitable variable name would be bookpagenumber

(ii) The number of atoms in a book;

the number of atoms in a book would be an incredibly large number such as several billion. since an atom is the smallest possible unit it would not be fractional and the suitable variable type would be int. A suitable variable name would be atomsinbook

(iii) The length of a side of a triangle in inches;

The length of a side of a triangle in inches is likely to vary between a fraction of an inch and any amount of inches depending on how large the triangular object is. It could be any value between those and it may be a fraction of an inch so the variable type would be float or double depending on the accuracy required. A suitable variable name would be trisidelength

(iv) Your name;

The number of characters in my name is 13 including a space. The variable type would be int since there is no potential for fractions. A suitable variable name would be myname

(v) Whether or not a nucleus has decayed;

Whether or not a nucleus has decayed would be an answer yes or no. therefore the answer is a string and the variable type would be string. A suitable variable name would be decayornot

(vi) The probability that it could have decayed.

The probability that it could have decayed is a number between 0 and 100. It could also be a fractional number so the variable type would be double or float depending on the accuracy require. A suitable variable name would be probofdecay