The HDI is scored on a scale of 0 to 1. In the pre-2011 index, the level of development was absolute – greater than 0.8 was high, 0.5 to 0.8 was medium and below 0.5 was low.

In 2011 the methodology changed – the index was measured in a new way but also the classification of development changed. Now the ranked countries have 'very high' development (0.8+), 'high' (0.7+), the third 'medium' (0.55+) and 'low'. Hence development is now relative to the performance of other countries.

The HDI still has three separate indices (education, income and health) and these are then aggregated in the manner shown below – now using the geometric rather than the arithmetic mean. This has the effect of penalising countries with very divergent indices[1].

The formulae for the separate indices are:

1. Life Expectancy Index (LEI) $= \dfrac{LE - 20}{85 - 20}$

2. Education Index (EI) First calculate the Mean years of schooling index and the expected years of schooling index:

    2.1 Mean Years of Schooling Index (MYSI) = MYS/15

    2.2 Expected Years of Schooling Index (EYSI) = EYS/18.0

Then use them in here:

    (EI) = $\dfrac{MYSI + EYSI}{2}$

3. Income Index (II) $= \dfrac{\ln(GNIpc) - \ln(100)}{\ln(107,721) - \ln(100)}$

Finally, the HDI is the geometric mean of the previous three normalized indices:

$$HDI = \sqrt[3]{LEI \cdot EI \cdot II}.$$

[1] As an example, take two data sets with an arithmetic mean of 10. One is 10,10,10. One is 2,10,18. The geometric mean of the first is the cube root of 1000, which is 10. The geometric mean of the second is the cube root of 2X10X18 which is 7.11.

LE:	Life expectancy at birth

MYS: Mean years of schooling (Years that a 25-year-old person or older has spent in schools)

EYS: Expected years of schooling (Years that a 5-year-old child will spend with his education in his whole life)

GNIpc: Gross national income at purchasing power parity per capita

So:

1. Work out the HDI for....

	LE	MYS	EYS	GNI per capita @PPP
Nigeria	52.8	5.9	9	$5341.1
China	75.8	7.5	13.1	$12547
Thailand	74.4	7.3	13.5	$13322.9
Afghanistan	60.4	3.2	9.3	$1885.3
Bulgaria	74.2	10.6	14.4	$15596
UK	80.7	13.1	16.2	$39167.2

2. Look at the data – what explains the differences in the HDIs for the countries? Look carefully at:

   Bulgaria vs China vs Thailand

   Afghanistan vs Nigeria

3. Why do you think we use the log of income in the income index?

4. What is the significance of a geometric mean?