Interpolating Coordinates

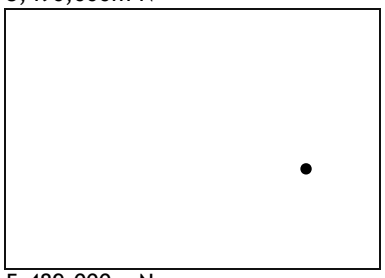
When interpolating coordinates from a map you can set it up as two equivalent ratios - the same as when we solve scale problems. Except in the case for interpolating, the values on top are the "short measures" and the values on the bottom are the "full measures".

$$\frac{\text{short measure (map units)}}{\text{full measure (map units)}} = \frac{\text{short measure (real world units)}}{\text{full measure (real world units)}}$$

UTM Example

Consider the very simple map below - it shows a single feature (wildlife tree) that is noted with a dot; the northing is labeled for both the top and bottom of the map.

5,490,000m N



5,489,000m N

Obviously the wildlife tree occurs at a northing coordinate between 5,489,000m and 5,490,000m. To calculate the northing more precisely we measure the map distance from the bottom neatline to the point (i.e. the "short measure" is 0.8cm) AND the full distance of the grid height (i.e. the "full measure" is 2.0cm). The calculation can be done one of two ways: **cross multiply & divide**, or **by proportion**.

UTM - Cross Multiply & Divide:

$$\frac{\text{Short measure}}{\text{Full grid distance}} = \frac{\text{Map}\ 0.8\text{ cm}}{2.0\text{ cm}} = \frac{\text{Real World}\ ?\text{ m}}{1000\text{ m}}$$

Now cross-multiply (0.8 cm * 1000m) and divide (by 2) and get 400 m.
The final answer is 5,489,400m N (5,489,000 + 400).

UTM - Proportion:

$$\frac{\text{short measure}}{\text{Full grid distance}} = \frac{0.8\text{ cm}}{2.0\text{ cm}} = 40\%$$

Since the "full distance" between the grid lines is 1000m, then the "short distance" is 40% * 1000m = 400m
Again, the final answer is 5,489,400m N

Lat/Long Example

The same procedure applies for latitude and longitude. Consider map measures to be:
short dist. (map) = 1.1 cm
full distance (map) = 4.4 cm
full distance (real world) = 1 minute, or 60 seconds

Lat/Long - Cross Multiply & Divide:

$$\frac{\text{Measured dist.}}{\text{Full distance}} = \frac{1.1\text{ cm}}{4.4\text{ cm}} = \frac{?\text{ sec}}{60\text{ sec}}$$

Now cross-multiply (1.1 cm * 60 sec) and divide (by 4.4) and get 66 / 4.4 = 15 (note the cm cancel out and you get seconds as the unit).

Lat/Long - Proportion:

$$\frac{\text{Measured dist.}}{\text{Full distance}} = \frac{1.1\text{ cm}}{4.4\text{ cm}} = 25\%$$

If the full distance is equivalent to 1 minute,
then the measured distance is 25% of a minute = 0.25 minutes.
Expressed in seconds it would be 0.25 * 60 seconds = 15 seconds

A worked example is provided. The link is a copy of a small portion of map 092F020. The longitude for a point on the map is calculated. Note that longitude increases towards the west (left).