QUESTION:

a mobile phone lies along the principal axis of a concave mirror .In image formation why the magnification is not uniform .Will the distortion of image depend on the location of the phone with respect to the mirror.

SOLUTION:

The magnification m of a curved mirror is defined as the height of the image h_{im} divided by the height of the object h_{ob}:

$$m = \frac{h_{im}}{h_{ob}}$$

And from the mirror equation

$$\frac{1}{d_{ob}} + \frac{1}{d_{im}} = \frac{1}{f} = \frac{2}{R}$$

we can derive

$$m = \frac{h_{im}}{h_{ob}} = \left|\frac{d_{im}}{d_{ob}}\right|$$

Where d_{im} – the image distance, and d_{ob} – object distance. As d_{im} is nonlinear function of d_{ob} the magnification is not uniform and the image distortion depends on the location of the object with the respect to the mirror