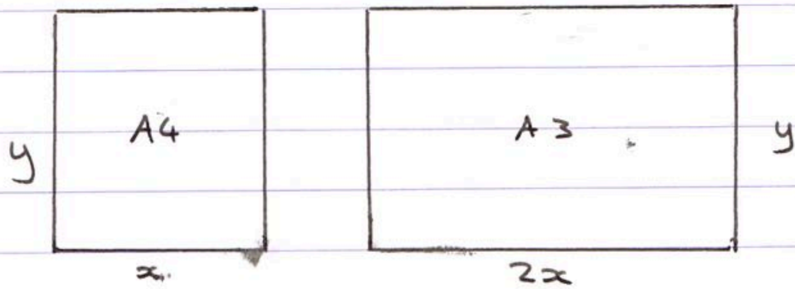
Fit for Photocopying

a)



$$\text{Ratio} = \frac{\text{short}}{\text{Long}}$$

$$\frac{x}{y} = \frac{y}{2x}$$

$$y^2 = 2x^2$$

$$\frac{x^2}{y^2} = \frac{1}{2}$$

$$\frac{x}{y} = \frac{1}{\sqrt{2}}$$

$$x : y = 1 : \sqrt{2}$$

$$\therefore \; y = \sqrt{2}x$$

b) $A0 : 2A1 \rightarrow 4A2 \rightarrow 8A3 \rightarrow 16A4$

$\therefore$ ~~x_{A4}~~ Area $A4 = \frac{1}{16} = x \times \sqrt{2}x$

$$x^2 = \frac{1}{16\sqrt{2}}$$

$\downarrow$ using calculator

$x = 0.210\,m$ (3 sig fig)

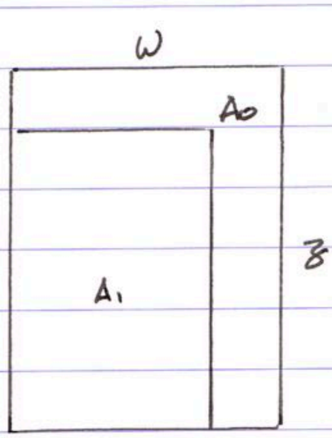
(210 mm)

$y = \sqrt{2} \cdot x = \sqrt{2} \times 0.210$

$= 0.297\,m$ (3 sig fig)

(297 mm)

c)



Not to scale

$$\left.\begin{aligned} 1 &= \omega \cdot z \\ &= \omega \cdot \sqrt{2}\,\omega \\ 1 &= \sqrt{2}\,\omega^2 \\ \omega &= 841\,mm \\ z &= 1189\,mm \end{aligned}\right\} \text{A0 size}$$

Since $\sqrt{2}x = y$, and y = short side for size up :

$$x_{A3} = \sqrt{2}\ x_{A4}$$
$$y_{A3} = \sqrt{2}\ y_{A4}$$

and A_0 is the largest size :

$$x_{An} = \frac{1}{\sqrt{2}^n} \cdot 841$$

$$y_{An} = \frac{1}{\sqrt{2}^n} \cdot 1189$$

e.g for A4 :

$$x_{A4} = \frac{1}{\sqrt{2}^4} \cdot 841$$

$$= 210\text{ mm}$$

$$y_{A4} = \frac{1}{\sqrt{2}^4} \cdot 1189$$
$$= 297\text{mm}$$

Which was proved earlier.

Thus to scale an A3 poster to A4 a $\frac{1}{\sqrt{2}}$ scale factor should be used.

d) $$An = \frac{1}{\sqrt{2}^n} \cdot 841 \text{ by } \frac{1}{\sqrt{2}^n} \cdot 1189$$

$$A(-1) = \frac{1}{\sqrt{2}^{-1}} \cdot 841 \text{ by } \frac{1}{\sqrt{2}^{-1}} \cdot 1189$$
$$= 1189\text{mm by } 1681\text{ mm}$$

$$A\left(\tfrac{1}{2}\right) = \frac{1}{\sqrt{2}^{1/2}} \cdot 841 \text{ by } \frac{1}{\sqrt{2}^{1/2}} \cdot 1189$$
$$= 707\text{ mm by } 1000\text{ mm}$$