# Sheet Sizes

International Organization for Standardization (ISO) standard

Paper sizes are based on the metric system. ISO 216 defines the **A series** of paper sizes as follows:

- The height divided by the width of all formats is $\sqrt{2}$ or 1.4142. (We take height > width)
- Format A0 has an area of one square meter.
- Format A1 is A0 cut into two equal pieces
- All smaller A series formats are defined in the same way by cutting the next larger format in the series parallel to its shorter side into two equal pieces.

$$A(n) = 2\ A(n+1)$$

- The standardized height and width of the paper formats is a rounded number in millimeters.

A(n)

$\sqrt{2}$

2

Ratio of width to height

$\sqrt{2}$: 2

= 1 : $\sqrt{2}$

1   1

A(n+1)   A(n+1)

$\sqrt{2}$
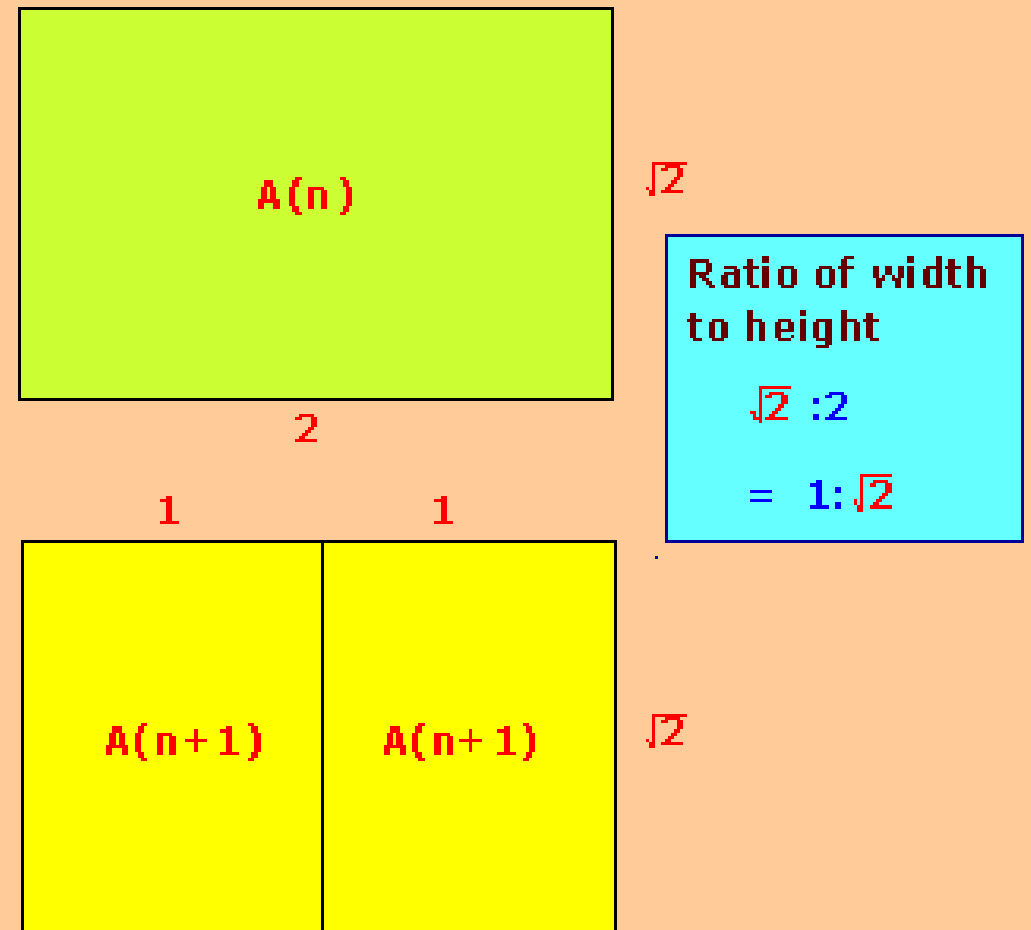
Height > width in the above diagram

What is the size of A0 paper?

Let h be the height and w be the width of the A0 paper.

Then $\quad hw = 1000 \times 1000 \quad (mm^2)$

But $\qquad h : w = \sqrt{2} : 1$

$\therefore \quad h = \sqrt{2}\, w$

$\therefore \quad hw = (\sqrt{2}\, w)w = 1000 \times 1000$

$\therefore \quad w^2 = 1000000/\sqrt{2}$

$\therefore \quad w = \dfrac{1000}{\sqrt[4]{2}}, \qquad h = 1000\sqrt[4]{2} \qquad (mm)$

What is the size of A4 paper?

Let h(n) and w(n) be the height and width of A(n) paper.
From the above, we get:

$$\therefore \; w = w(0) = \frac{1000}{\sqrt[4]{2}}, \qquad h = h(0) = 1000\sqrt[4]{2}$$

But $\quad w(1) = h/2 \;$ and $\; h(1) = w$

Therefore $\qquad$ the size of the A1 paper is $\qquad\qquad$ (h/2) x w

Similarly, $\qquad$ the size of the A2 paper is $\qquad\qquad$ (w/2) x (h/2)

$\qquad\qquad\qquad$ the size of the A3 paper is $\qquad\qquad$ (h/4) x (w/2)

$\qquad\qquad\qquad$ the size of the A4 paper is $\qquad\qquad$ (w/4) x (h/4)

$$w(4) = \frac{1}{4} \times \frac{1000}{\sqrt[4]{2}} = 210, \quad h(4) = \frac{1}{4} \times 1000\sqrt[4]{2} = 297$$

General formulas

The width and height of A(n) paper are given by:

If n is even,

$$w(n) = \frac{1}{2^{\frac{n}{2}}} \times \frac{1000}{\sqrt[4]{2}}, \quad h(n) = \frac{1}{2^{\frac{n}{2}}} \times 1000\sqrt[4]{2}$$

If n is odd,

$$w(n) = \frac{1}{2^{\frac{n+1}{2}}} \times 1000\sqrt[4]{2}, \quad h(n) = \frac{1}{2^{\frac{n-1}{2}}} \times \frac{1000}{\sqrt[4]{2}}$$

Can you verify the table on the left hand side?

A series paper	width x height (mm)
A0	841 × 1189
A1	594 × 841
A2	420 × 594
A3	297 × 420
A4	**210 × 297**
A5	148 × 210
A6	105 × 148
A7	74 × 105
A8	52 × 74
A9	37 × 52
A10	26 × 37

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Paper	Width	Height
A0	841	1189
A1	1189/2=594	841
A2	841/2=420	594
A3	594/2=297	420
A4	420/2=210	297
A5	297/2=148	210
A6	210/2=105	148
A7	148/2=74	105
A8	105/2=52	74
A9	74/2=37	52
A10	52/2=26	37

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