

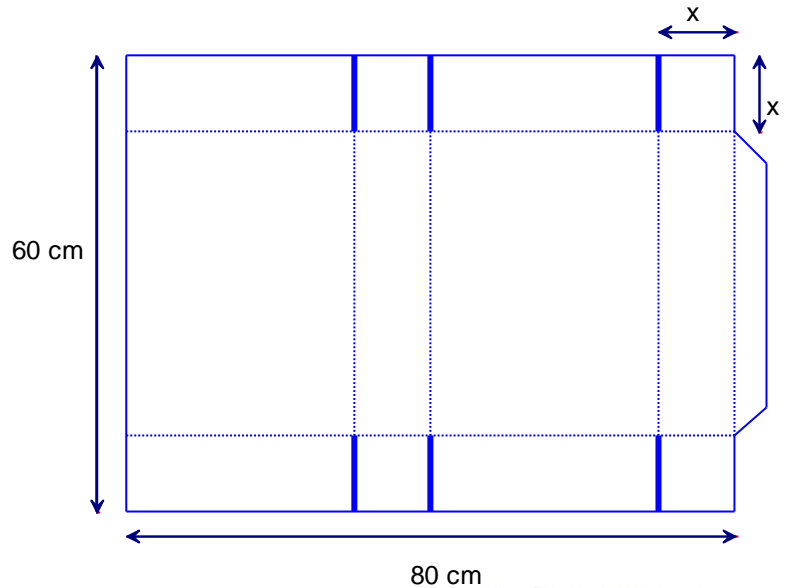


Packaging

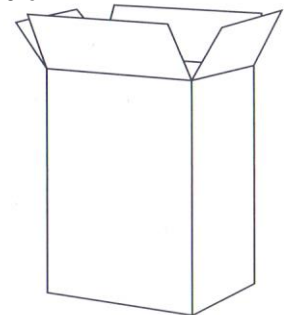
El *packaging*, anglicisme d'empaquetatge, tracta el disseny dels envasos, protegint i informant del contingut.

Els dissenys solent ser plans a fi d'ocupar el mínim espai i després amb un plegat senzill muntar la caixa o embolcall del producte.

En la següent figura tenim el desenvolupament d'una caixa (*Full Overlap Seal Ends*).



80 cm



- Si $x = 10$ quin és el volum de la caixa?
- Determineu els valors que pot tenir x .
- Ompliu la següent taula de valors.

| x | V(x) |
|----|--------|
| 5 | |
| 10 | |
| 15 | |
| 20 | |
| 25 | |
| 30 | |
| x | V(x) = |

- Representeu la gràfica de la funció volum.
- Quin tipus de funció és? Estudia les seues característiques.
- Observant la taula i la gràfica, determineu quin és el màxim volum de la caixa?
- Quant ha de mesurar x a fi que el volum de la caixa siga 20000 cm^3 ?

La caixa formada és un ortoedre de dimensions $x \times (80 - 2x) \times (60 - 2x)$.

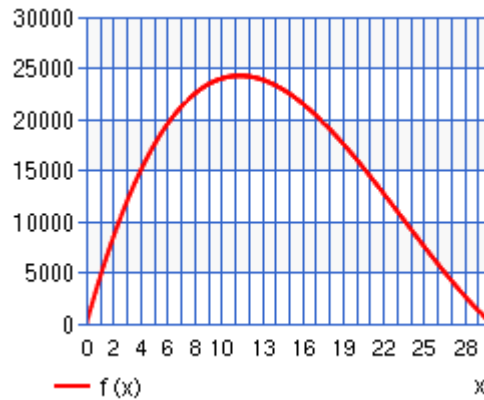
El seu volum és $V(x) = x(80 - 2x)(60 - 2x)$.

$$V(x) = 4x^3 - 280x^2 + 4800x, \quad x \in [0, 30]$$

Utilitzant El menú TAULA de la calculadora:

| $f(x) = 4x^3 - 280x^2 + 4800x$ | Rango tabla Inic.: 0 Final: 30 Paso: 1 | | | | | | | | | | | | | | | | | | | | |
|--|---|------|----|-------|----|-------|----|-------|----|-------|--|---|------|----|-------|----|-------|----|-------|----|-------|
| <table border="1"> <thead> <tr><th>x</th><th>f(x)</th></tr> </thead> <tbody> <tr><td>1</td><td>0</td></tr> <tr><td>2</td><td>4524</td></tr> <tr><td>3</td><td>8512</td></tr> <tr><td>4</td><td>11988</td></tr> </tbody> </table> | x | f(x) | 1 | 0 | 2 | 4524 | 3 | 8512 | 4 | 11988 | <table border="1"> <thead> <tr><th>x</th><th>f(x)</th></tr> </thead> <tbody> <tr><td>5</td><td>14976</td></tr> <tr><td>6</td><td>17500</td></tr> <tr><td>7</td><td>19584</td></tr> <tr><td>8</td><td>21252</td></tr> </tbody> </table> | x | f(x) | 5 | 14976 | 6 | 17500 | 7 | 19584 | 8 | 21252 |
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| 11 | 24000 | | | | | | | | | | | | | | | | | | | | |
| 12 | 24244 | | | | | | | | | | | | | | | | | | | | |
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Utilitzant el codi QR podem dibuixar la gràfica de la funció.



Per a calcular el valor x a fi que el volum de la caixa siga 20000 cm^3 , resoldrem

l'equació $4x^3 - 280x^2 + 4800x = 20000$.

$$4x^3 - 280x^2 + 4800x - 20000 = 0.$$

Utilitzarem el menú de resolució d'equacions:

| | |
|---|---|
| ax^3+bx^2+cx+d $4x^3 - 280x^2 + 4800x - 20000$ | $ax^3+bx^2+cx+d=0$ $X_1 = 46.51093409$ |
| $ax^3+bx^2+cx+d=0$ $X_2 = 17.26109445$ | $ax^3+bx^2+cx+d=0$ $X_3 = 6.22797146$ |

Les solucions són $x \approx 17.3 \text{ cm}$, $x = 6.2 \text{ cm}$.