

Answer for ^{lidless} box from A4 Sheet by Aisha (max volume)



$$V = x \times y \times z$$



$$y = 21 - 2x$$

$$z = 30 - 2x$$

sub in $y =$ and $z =$ into

$$V = x(21 - 2x)(30 - 2x)$$

$$V = x(630 - 60x - 42x + 4x^2)$$

$$= 630x - 60x^2 - 42x^2 + 4x^3$$

$$= 4x^3 - 102x^2 + 630x$$

$$V' = 12x^2 - 204x + 630 = 0$$

Use CALCULATOR
EQUA, F2 (POLY)

$$x = 12.94 \text{ and } 4.06$$

F1(2) $a=12$ $b=-204$ $c=630$

$$V = 12.94(21 - 12.94 \times 2)(30 - 12.94 \times 2)$$

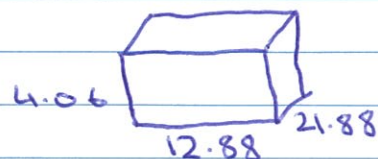
Answer becomes a negative and volume not possible. Also 12.94 is over half the size of the width of the paper so you can't cut out a square that size



minimum point (not possible)

$$V = 4.06(21 - 4.06 \times 2)(30 - 4.06 \times 2)$$

$$V = \underline{114.17 \text{ cm}^3}$$



dimensions = 4.06 cm \times 12.88 cm \times 21.88 cm

We know this is the maximum because

$$V' = 630 - 204x + 12x^2$$

$$V'' = 24x - 204 \text{ (second derivative)}$$

and when $x = 4.06$ clearly $24 \times 4.06 - 204$ is < 0 so as said this proves it is a maximum