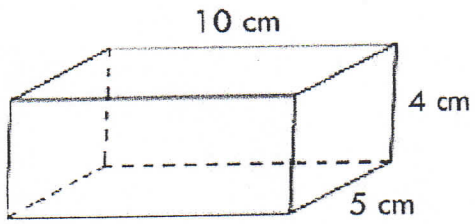
Measurement: Surface Area of Prisms & Pyramids

Date: Note

SURFACE AREA: The total area of the surface of an object. It's measured in square units.

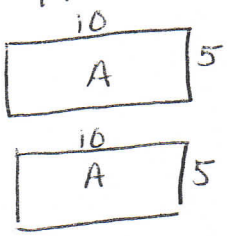
EXAMPLE 1: Surface Area of Rectangular Prism

Calculate the least amount of wrapping paper needed to wrap this box.



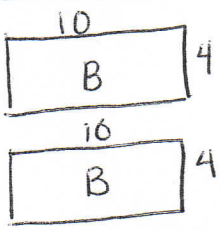
Step 1: Sketch and label all the sides of the figure.

Top/Bottom



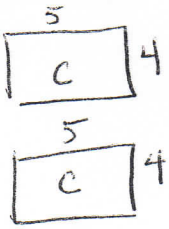
2 Faces

Front/Back



2 Faces

L/R Sides



2 Faces.

Step 2: Calculate the area of each side.

$A_A = (l \times w)(2)$
$= (5 \times 10)(2)$
$= 50(2)$
$= \boxed{100 cm^2}$

$A_B = (l \times w)(2)$
$= (10 \times 4)(2)$
$= (40)(2)$
$= \boxed{80 cm^2}$

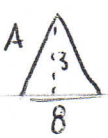
$A_C = (l \times w)(2)$
$= (5 \times 4)(2)$
$= 20(2)$
$= \boxed{40 cm^2}$

Step 3: Add up the areas of each side for the TOTAL SURFACE AREA

$A_{TOTAL} = A_A + A_B + A_C$
$= 100 + 80 + 40$
$= \boxed{220 cm^2}$

EXAMPLE 2: Surface Area of Triangular Prism

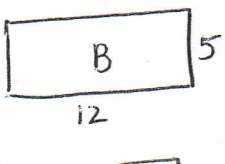
Triangle Front/Back



2 Faces

$A_A = \left(\frac{1}{2} b h\right)(2)$
$= \left(\frac{1}{2} 8 \times 3\right)(2)$
$= 12(2)$
$= \boxed{24 cm^2}$

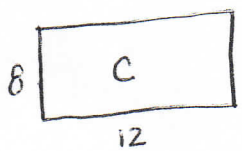
Rectangular Sides.



2 Faces.

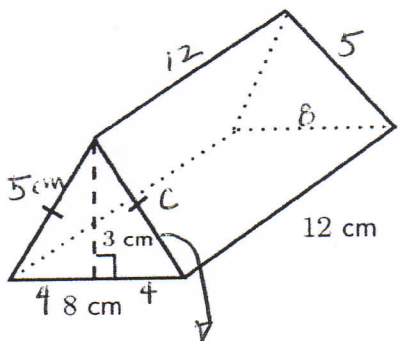
$A_B = (l \times w)(2)$
$= (5 \times 12)(2)$
$= (60)(2)$
$= \boxed{120 cm^2}$

Rectangular Bottom.



1 Face.

$A_C = l \times w$
$= 12 \times 8$
$= \boxed{96 cm^2}$



$c^2 = a^2 + b^2$
$c^2 = (4)^2 + (3)^2$
$c^2 = 16 + 9$
$\sqrt{c^2} = \sqrt{25}$
$c = 5 cm$

$A_{TOTAL} = A_A + A_B + A_C$
$= 24 + 120 + 96 = \boxed{240 cm^2}$

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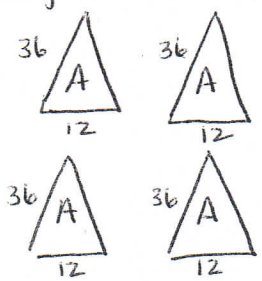
EXAMPLE 3: Surface Area of Square-Based Pyramid

Triangular Sides



4 Faces.

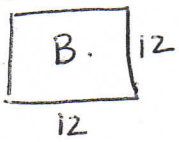
$A_A = \left(\frac{1}{2}bh\right)(4)$

$A_A = \left(\frac{1}{2}(12)(35.5)\right)(4)$

$A_A = (213)(4)$

$A_A = \boxed{852\ ft^2}$

Rectangular Bottom



1 Face.

$A_B = \ell \times w$ (1)

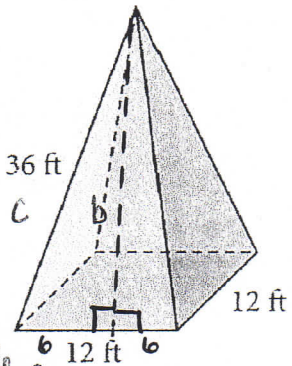
$A_B = 12 \times 12$

$A_B = \boxed{144\ ft^2}$

$A_{TOTAL} = A_A + A_B$

$= 852 + 144$

$= \boxed{996\ ft^2}$



Height of Triangle a

Pythagorean $c^2 = a^2 + b^2$

$36^2 = 6^2 + b^2$

$1296 = 36 + b^2$

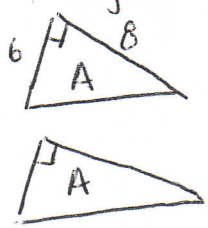
$1260 = b^2$

$\boxed{35.5 = b.}$

$\therefore$ total SA is 996 ft.^{2}

EXAMPLE 4: Surface Area of a Rectangular Pyramid

Triangle Front/Back



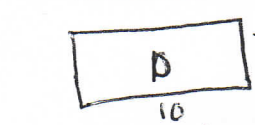
2 Faces

$A_A = \left(\frac{1}{2}bh\right)(2)$

$A_A = \left(\frac{1}{2}6 \times 8\right)(2)$

$A_A = \boxed{48\ cm^2}$

R Side



$A_B = \ell \times w$

$= 8 \times$

$= \boxed{56\ cm^2}$

L Side

$A_B = (\ell \times w)$

$A_B = (6 \times 7)$

$A_B = \boxed{42\ cm^2}$

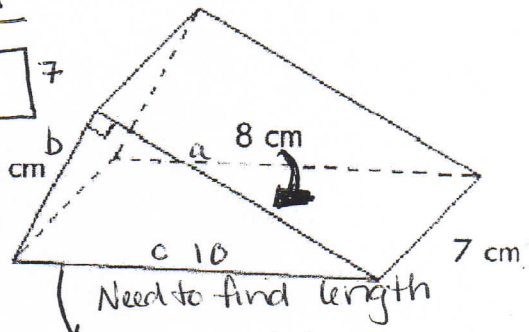
Bottom

1 Face.

$A_D = \ell \times w$

$= 7 \times 10$

$= \boxed{70\ cm^2}$



Need to find length

$c^2 = a^2 + b^2$

$c^2 = 8^2 + 6^2$

$c^2 = 64 + 36$

$\sqrt{c^2} = \sqrt{100}$

$\boxed{c = 10}$

$A_{TOTAL} = A_A + A_B + A_C + A_D$

$= 48 + 56 + 42 + 70$

$= \boxed{216\ cm^2}$

$\therefore$ total surface area is 216 cm^2.