# 1.4 SURFACE AREAS OF OTHER COMPOSITE OBJECTS

## TRIANGULAR PRISM → "TOBLERONE"

- ITS BASE IS A TRIANGLE
- ITS 3D, SO IT HAS

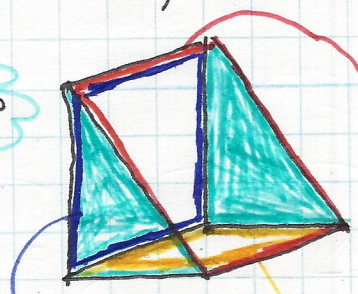
REMEMBER

AREA ⊙ $= \pi r^2$

Circumference $= d\pi$

$2r\pi$

where $\pi = 3.14$



2 identical Triangles

→ RECTANGLE #1 (on the Top)

→ RECTANGLE #2 (ON the back)

→ RECTANGLE #3 (ON the bottom)

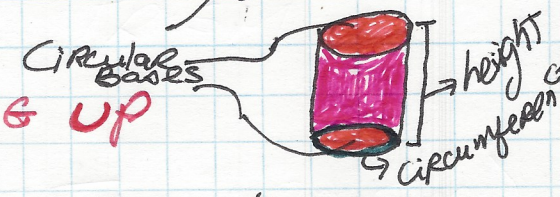
SO,

SURFACE AREA OF A TRIANGULAR PRISM = (AREA OF TRIANGLE × 2) + Area Rectangle 1 + Area Rectangle 2 + Area Rectangle 3

(Because they are identical)

Take a moment to notice that this formula, even though it contains different elements, it is based on the same concept used for Rectangular Prisms.

## RIGHT CYLINDER → STANDING UP




- MADE OF 2 CIRCULAR BASES
- MADE OF A CURVED SURFACE → THIS A "WRAPPED AROUND" RECTANGLE

$\boxed{\text{SO}}$

SURFACE AREA OF A CYLINDER = AREA OF 2 CIRCULAR BASES + AREA OF CURVED AREA

$= 2 \times$ Area of 1 Base $+$ (Circumference of base) $\times$ height of cylinder

$= (2 \times \pi r^2) + (2\pi r \times \text{height})$

SO → • FIGURE OUT S.A. OF FIRST "SHAPE"
• FIGURE OUT S.A. OF SECOND OR MORE "SHAPES"
• FIGURE OUT OVERLAP, ×2
• ADD ALL AREAS, SUBTRACT THE OVERLAP

LET'S DO EXAMPLE # 1 ON PAGE 34

- FIRST TRY TO BREAK DOWN THE FIGURE INTO SEPARATE FIGURES.

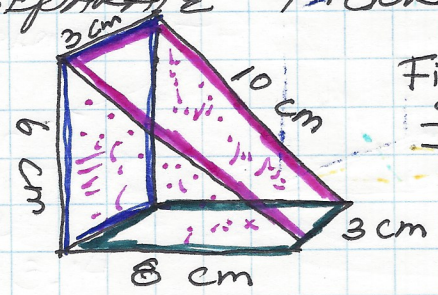



Figure 1 is the top figure.
It is a TRIANGULAR PRISM

2 Triangles (equal)

3 different RECTANGLES

SURFACE AREA OF T.P. = (2 × Area of Triangle) + (Area Rectangle 1) + (Area of Rectangle 2) + (Area of Rectangle 3)

$$= \left(2 \times \frac{(8 \times 6)\ cm^2}{2}\right) + (6 \times 3\ cm^2) + (8 \times 3\ cm^2) + (10 \times 3\ cm^2)$$

$$= 2 \times \left(\frac{48}{2}\right) cm^2 + 18\ cm^2 + 24\ cm^2 + 30\ cm^2$$

$$= (2 \times 24)\ cm^2 + 18\ cm^2 + 24\ cm^2 + 30\ cm^2$$

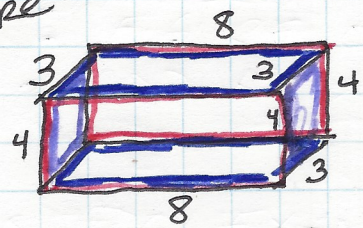
$$= 48\ cm^2 + 18\ cm^2 + 24\ cm^2 + 30\ cm^2$$

$$= 120\ cm^2$$

SO = S.A Figure 1 = 120 $cm^2$

- THE SECOND FIGURE IS ON THE BOTTOM, AND IT IS A RECTANGULAR PRISM

Figure 2




6 faces: Front, back are equal
Right, left are equal
Top, Bottom are equal

SURFACE AREA OF RECTANGULAR PRISM = (AREA Front, back) + (AREA Right, left) + (AREA Top, bottom)

$= 2 \times (8 \times 4\ cm^2) + 2 \times (4 \times 3\ cm^2) + 2 \times (8 \times 3\ cm^2)$

Remember, the 2 means the faces are equal

$= (2 \times 32)\ cm^2 + (2 \times 12\ cm^2) + (2 \times 24\ cm^2)$

$= 64\ cm^2 + 24\ cm^2 + 48\ cm^2$

SURFACE AREA FIGURE 2 = $136\ cm^2$

we have the areas of figures 1 and 2. Now, we have to determine the OVERLAP

If we put figures 1 and 2 together, we can see that the ~~lower~~ Bottom face of Fig. 1 and the Top face of Fig. 2 overlap. Also, they are equal

So = OVERlap = 2 × Area of face that overlaps

$= 2 \times (8 \times 3\ cm^2)$

$= 2 \times (24\ cm^2) = 48\ cm^2$

NOW, WE'RE READY

TOTAL AREA = (AREA OF FIGURE 1 + AREA OF FIGURE 2) − OVERlap

$= (136\ cm^2 + 120\ cm^2) - 48\ cm^2$

$= 256\ cm^2 - 48\ cm^2 = 208\ cm^2$

TO KEEP CONSISTENCY, WE WILL TACKLE THE FOLLOWING EXAMPLE THE SAME WAY WE HAVE BEEN DOING.

NOTE: Your Textbook takes a slightly different approach, but we will get to the same results!!

Remember: S.A. cylinder $= \underbrace{2(\pi r^2)}_{\text{Area of circular base}} + (\underbrace{2r\pi}_{\text{circumference of base}} \times \text{height})$

Also $\pi = 3.1415$ and diameter $= 2 \times$ radius

Example 2 on page 36 LET'S TRY IT:

- A cake made of two cylinders. We need to find the area of the figure, which will equal how much frosting we need to cover it up. (minus the bottom face)

- Get Area of Figure 1 (Top cake): $d = 14$ cm, so $r = 7$ cm, $h = 5$ cm

S.A Figure 1 $= 2\pi(7)^2 \text{cm} + (2\pi(7)\text{cm} \times 5 \text{ cm})$
$= (49 \times 2 \times \pi)\text{ cm}^2 + (14\pi \text{ cm} \times 5 \text{ cm})$
$= 98\pi \text{ cm}^2 + 70\pi \text{ cm}^2$
$= 168\pi \text{ cm}^2 = 527.79 \text{ cm}^2$

- Get Area of Figure 2

S.A Figure 2 $= 2\pi(13)^2\text{cm}^2 + (2\pi(13)\text{ cm} \times 5 \text{ cm})$
$= 338\pi \text{ cm}^2 + 130\pi \text{ cm}^2$
$= 468\pi \text{ cm}^2$
$468 \times (3.14) \text{ cm}^2 = 1470.26 \text{ cm}^2$

lower cake
$h = 5$ cm
$d = 26$ cm, so $r = 13$ cm

- Figure out the overlap. We can see that it is the lower circular base of Figure 1. So

Overlap $= 2 \times$ Area of base $= 2 \times (\pi r^2)$ Be careful! there is only one base
(always multiply by 2)

Overlap $(2) \times \pi r^2 = 2\pi(7)^2 = 98\pi \text{ cm}^2$
$\approx 307.88 \text{ cm}^2$

Now,

We can calculate the area of the total figure:

$$\left(\text{Area of Figure 1} + \text{Area of Figure 2}\right) - \text{Overlap}$$

$$S.A = (527.79\ cm^2 + 1470.26\ cm^2) - 307.88\ cm^2$$

$$= (1{,}998.05 - 307.88)\ cm^2$$

then

$$S.A = 1690.17\ cm^2$$

But... What about the Frosting?

As you can probably predict, it would be a waste of frosting if we include the base the figure sits on. So...

To find the bottom area not to be frosted

$$\text{Area of bottom base} = \pi r^2 = \pi(169)\ cm^2 = 530.93\ cm^3$$

So, subtract this area from the total area, and we'll be able to determine the amount of frosting:

$$\text{Total area to be frosted} - \text{area of lower cake base}$$

$$\text{Frosted Area} = 1690.17\ cm^2 - 530.93\ cm^2$$

$$= 1159.24\ cm^2$$

See? We got the same number!!