

Unit 11: Equivalent Figures (2D)
Equivalent Solids (3D)

Equivalent Figures 2D

the formula depends on which shape you have.

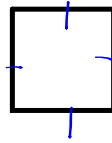
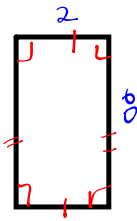
$$A_1 = A_2$$

↳ Shapes/Figures that have same area.
 (their areas are equal)

$$A_{\text{Rect}} = l \cdot w$$

$$= 8 \cdot 2$$

$$= 16 \text{ unit}^2$$



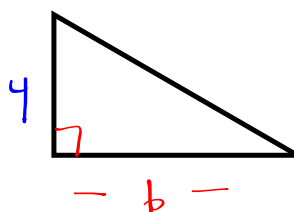
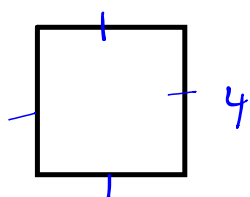
$$A_{\text{square}} = l \cdot w$$

$$= 4 \cdot 4$$

$$= 16 \text{ unit}^2$$

Note: Their Perimeters are not equal!

Hey, the two shapes are equivalent.
What's the base of the triangle?



$$A_1 = A_2$$

$$A_{\text{square}} = A_{\text{tri}}$$

$$l \cdot w = \frac{b \cdot h}{2}$$

1) Sub in
the dimension
you know \rightarrow

$$4 \cdot 4 = \frac{b \cdot 4}{2} \quad \frac{4b}{2}$$

2) Solve for b
by simplifying
and then isolating

$$\frac{16}{2} = \frac{\cancel{2}b}{\cancel{2}}$$

by performing
the opposite
operation to both
sides.

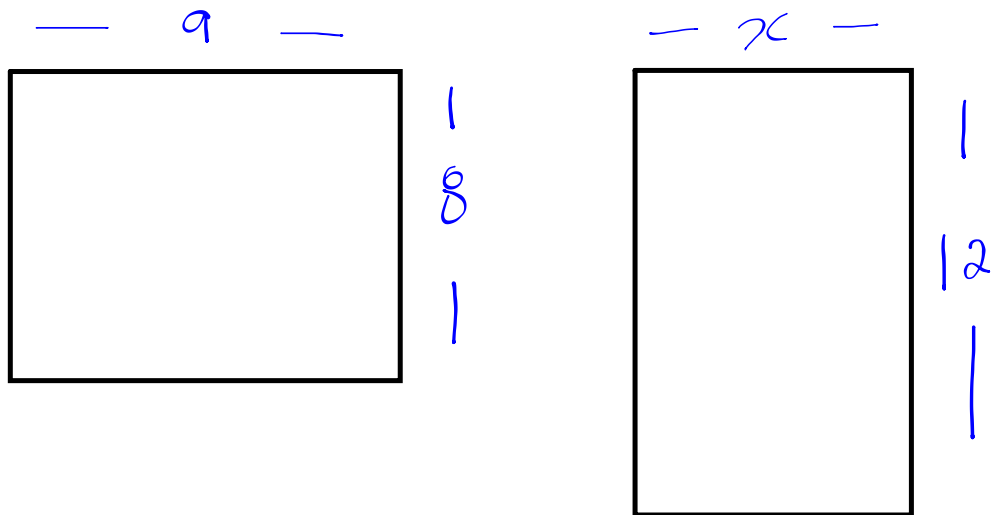
$$b = 8$$

$$\frac{x}{2} = \frac{4}{6}$$

Recall what Area represents:
the inside surface of a 2D
figure. ex. Area represents the grass
of yard whereas Perimeter represents
the fence.

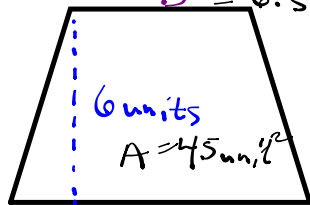
the units of Area \rightarrow unit²
cm²
m

The two shapes are equivalent. Find x



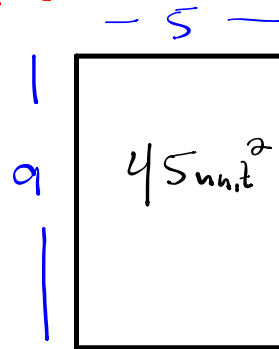
The two shapes (trapezoid + rectangle) are equivalent. The big base of trapezoid is 2 units more than the small base. (Write your unknowns in terms of one)

$$B = 2 + b$$



$$b + 2 = 8.5$$

Find the dimensions of the trapezoid.



$$A_1 = A_2$$

$$A_{\text{trap}} = A_{\text{rect}}$$

$$\frac{(b+2)h}{2} = l \cdot w$$

$$\frac{(b+2 + b)6}{2} = 9 \cdot 5$$

isolate the b bracket

$$\frac{(2b+2)6}{2} = 45 \cdot 2$$

$$(2b+2)6 = 90$$

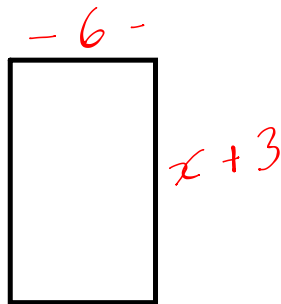
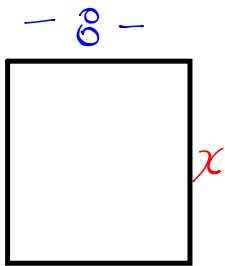
$$2b+2 = 15$$

$$\frac{2b}{2} = \frac{13}{2}$$

$$b = 6.5$$



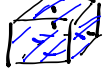
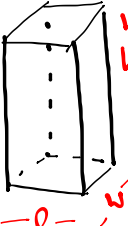

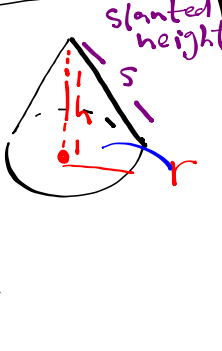
Shamon made a rectangular sand box. Its width is 8 meters. Then she decides to redo the sandbox keeping the same amount of sand. She reduces the width by 2 meters and increasing the length by 3 meters. What are the dimensions of each sandbox.

Your indication that they're equivalent



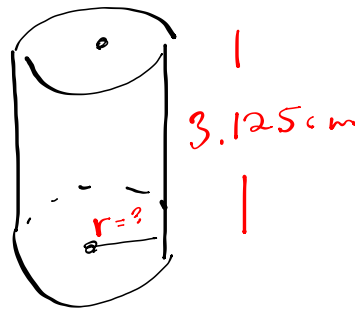
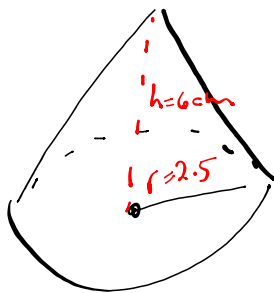
$$A_1 = A_2$$
$$l \cdot w = l \cdot w$$

Equivalent Solids (3D) have the same volumes $V_1 = V_2$
 The units for ³ Volume is units

Recall	Lateral Area (surface area except base(s))	Total Area (the area of all the surfaces)	Volume (the space contained in a solid)
Cube: 	 square enclosure	 cube	$V = s^3$ $V = \text{area of base} \times \text{height}$
Right Prism (Rectangular Prism) 	a part of gun cardboard around an eraser	cabinet container dry box	
Cylinder 	toilet paper roll pipe	Pringles can	chalk
Cone 	party hat ice cream cone	teepee tipi	

ex The height of a cone is 6 cm and its radius is 2.5 cm. Find the radius of an equivalent cylinder 3.125 cm high.

$$V_1 = V_2$$



$$V_1 = V_2$$

$$\frac{1}{3} \pi r^2 h = \pi r^2 h$$

$$\frac{1}{3} \pi (2.5)^2 \cdot 6 = \pi r^2 \cdot 3.125$$

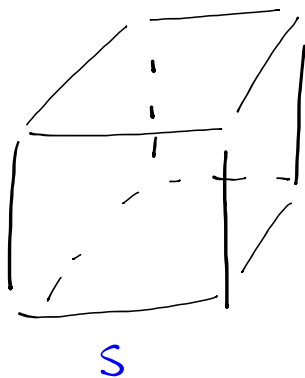
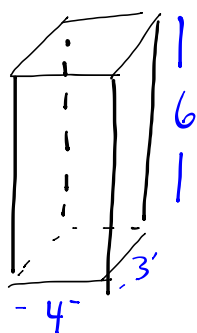
$$\cancel{\pi} \cdot 3.125 = \cancel{\pi} \cdot 3.125$$

$$\sqrt{\left(\frac{\left(\frac{1}{3} \right) (2.5)^2 \cdot 6}{3.125} \right)} = \sqrt{r^2}$$

$$r = 2 \text{ cm}$$

Solve for r
by isolating

The two solids are equivalent



Find S.

$$V_1 = V_2$$

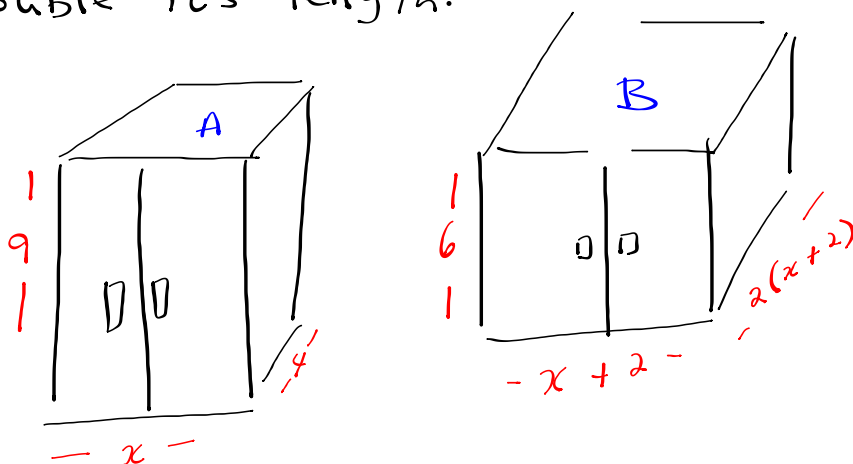
$$l \cdot w \cdot h = S^3$$

$$6 \cdot 3 \cdot 4 = S^3$$

$$\sqrt[3]{72} = \sqrt[3]{S^3}$$

$$S = 4.16 \text{ cm}$$

The cabinets are equivalent. The height of cabinet A is 9 m and it's 4 m deep. The height of cabinet B has been reduced by 3 m. The length of CB is 2 m more than the length of CA. The depth of CB is double its length.



$$V = V_2$$

$$l \cdot w \cdot h = l \cdot w \cdot h$$

$$x \cdot 4 \cdot 9 = (x+2) \cdot 2(x+2) \cdot 6$$

$$36x = (2x+4)(6x+12)$$

$$36x = 12x^2 + 24x + 24x + 48$$

$$0 = 12x^2 + 12x + 48$$

★
Your
equation
2nd degree.
- solve, you
can't simply
isolate. Use the
quad. formula,
sticker!

Herci is buying a birthday hat with a height of 10 cm. However, her head is too big so the hat maker has to increase the radius by 2 cm. The resulting cone is 1.5 cm shorter. How much materials (cm^2) is needed to make the final hat?



Nasrin wants to redo her backyard with a fence. Currently it's a rectangle with length of 4m and a width of 3m. Her new yard will be in the shape of right triangle with a base of 2m. What's the perimeter of the triangle fence?