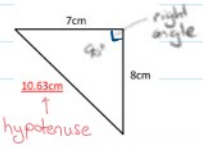
2/15

Tuesday, February 15, 2022 1:43 PM

Recap:

Squaring, Square Roots & Pythagoras' Theorem

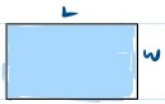


$10.63 = \sqrt{(7)^2 + (8)^2}$

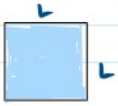
$7^2 = 49$, $8^2 = 64$ $\quad 7^2+8^2 = 113$, $\sqrt{113} = 10.63$

Area:

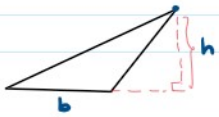
Formula:



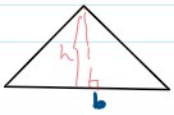
Rectangle
$L \times w$

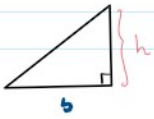


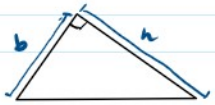
Square
L^2

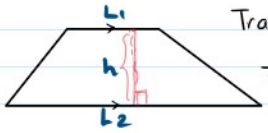


Triangle
$\frac{1}{2} \times b \times h$

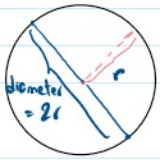








Trapezoid
$\frac{1}{2}(L_1+L_2) \times h$

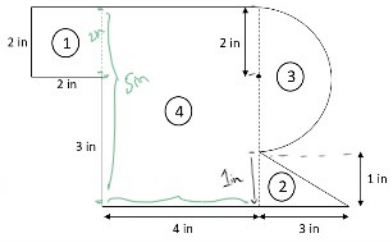


Circle
$\pi \times r^2$

$\pi = 3.1416$

Examples (Area of irregular shape)

1. Find the area of the following shape:



Area of ①: $2in \times 2in = 4in^2 = 4$ sq in

② $\frac{1}{2} \times 1in \times 3in = 1.5in^2$

③ $\frac{1}{2} \times \pi \times (2in)^2 = \frac{3.1416 \times 4in^2}{2}$

$= \frac{12.5664in^2}{2} = 6.28\ in^2$

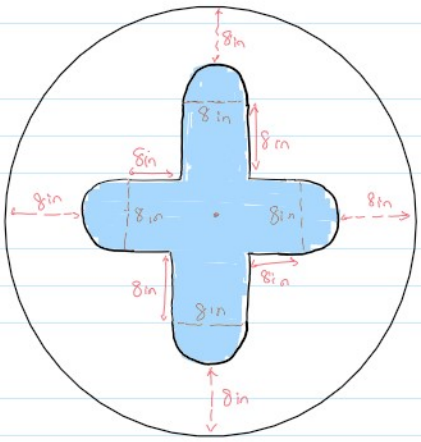
④ $5in \times 4in$

$= 20\ in^2$

Total Area $= 4in^2 + 1.5in^2 + 6.28in^2 + 20in^2$

$= 31.78\ in^2$

2. The council of Jedi Knights are planning to order a council meeting table in the following shape (the middle is hollowed out to install a holographic projector). What is the total area of this table?



TODAY:

1.

2.

Volume

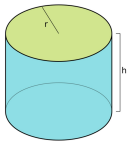
- Volume is a 3 dimensional measurement of an object. We measure the objects length, width and depth.
- Volume is expressed in cubic units (m^3, ft^3), also as millilitres, Litres, ounces, pint, quart and gallon.
- Typically liquids are measured in millilitres, litres, ounces, pint, quart and gallon. Solid objects are measured in cubic centimetres, cubic metres, cubic yards, cubic feet, and cubic inches etc. cm^3 = cu.cm m^3 cu ft
- Volume is generally used to calculate volume of cabinets for shipping.

3.

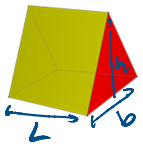
Volume – cube, cylinder & prisms

Cuboid

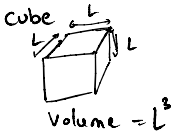
Volume = L x W x D



$Volume = \pi r^2 \times h$



Volume = $\frac{bxh}{2} \times L$



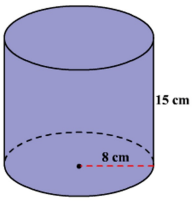
Volume = L^3

Examples:

Volume = 10in x 14in x 5in

= (10x14x5) in^3

= 700 in^3 = 700 cu. in.

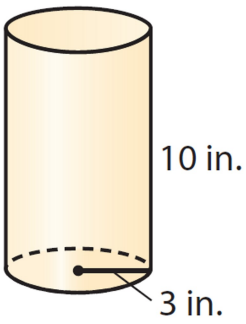


Volume = $\pi \times (8cm)^2 \times 15cm$

= $3.1416 \times 8^2 \times 15$ cm^3

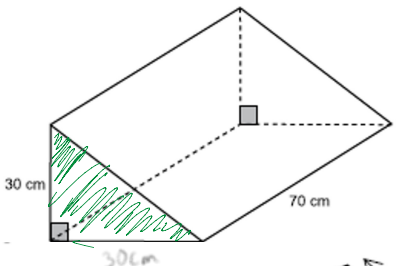
= 3015.936 cm^3 = 3020 cm^3

(nearest tens)



Find volume (nearest tenths):

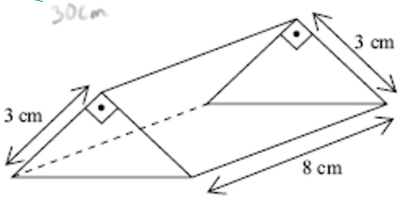
= 282.7 in^3 = 282.7 cu. in.



Volume = $\frac{1}{2} \times 30cm \times 30cm \times 70cm$

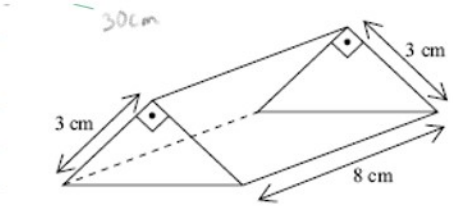
= 31500 cm^3 = 32000 cm^3

(nearest thousands)



Volume = $\frac{1}{2} \times 3cm \times 3cm \times 8cm = \frac{1}{2} \times 72$ cm^3

= 36 cu. cm



Volume = $\frac{1}{2} \times 3cm \times 3cm \times 8cm = \frac{1}{2} \times 72\ cm^3$

$= 36$ cu. cm

4.

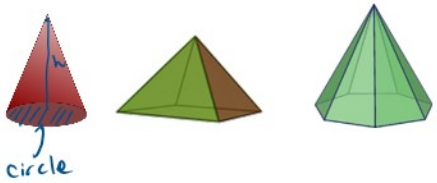
Volume - cones

Cones, square base pyramids and octagonal base pyramids

The volume of any symmetrical object that comes to a point is 1/3 the volume of an object with the same end shape and dimension.

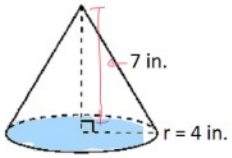
- The formula is as follows:

Volume = $\frac{\text{end area} \times \text{height}}{3}$



[redacted]

Calculate the volume of the cone.



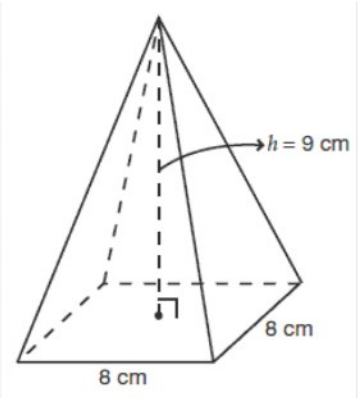
Volume = $\frac{[\pi \times (4in)^2] \times 7in}{3}$

$= \frac{(3.1416 \times 16in^2) \times 7in}{3}$

$= \frac{50.2656\ in^2 \times 7in}{3} = \frac{351.8592\ in^3}{3}$

$= 117.2864\ in^3 = 117.29\ in^3$ (2 dp)
(nearest hundredths)

Find the volume of the pyramid shown below.



Volume = 192 cm^3

5.

Chemical mixes

- Mixing glue and finishes to their correct proportions is required in order to maintain the properties of the glue or finishing materials.
- The bond, strength and cure time of glue can be affected if too much water or catalyst is added.

[redacted]

- Mixing glue and finishes to their correct proportions is required in order to maintain the properties of the glue or finishing materials.
- The bond, strength and cure time of glue can be affected if too much water or catalyst is added.
- Cure time, curing properties, durability and adhesion between coats can be affected if the finish/ catalyst ratio is not correct.
- Mixes can be in parts, weight or volume.

6.

Chemical mixes - example

Lets look at an example:

We have a recipe for an oil rubbed finish. The recipe calls for:

1/3 Boiled Linseed oil

1/3 varnish

1/3 mineral spirits

If we wanted a total of 15L of finish. How much of each item do we need?

1/3= 0.3333

0.3333 x 15 = 5L

Therefore, you would need 5L of each.

7.

Chemical mixes – example 2

You have just bought a new glue for your veneer stitcher. it requires the following mixture:

- 13 parts resin
- 3 parts catalyst
- 1 part water

recipe

If the veneer stitcher glue reserve holds 500ml. How much of each item do you need?

Answer:

13 + 3 + 1 = 17 parts total

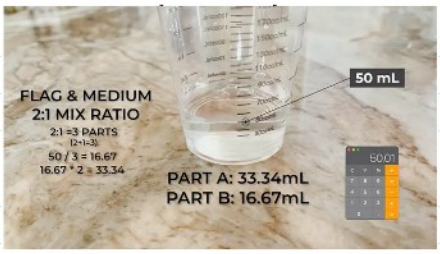
500ml ÷ 17 parts = 29.41 ml/ part

Resin – (29.41 x 13) = 382.33ml

Catalyst – (29.41 x 3) – 88.23ml

Water (29.41 x 1) – 29.41ml

Check: 382.33 + 88.23 + 29.41 = 500 mL



8.

Multiple Panel Chemical mixes

8

Multiple Panel Chemical mixes

Things to keep in mind when mixing a batch.

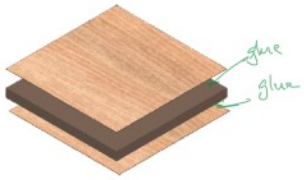
- The total amount of units or panels needed.
- Number of coats (finishing) or plies (glue calc).
- The proper mix ratio.
- Waste factor.

9.

Multiple Panel Calculations Example

- Calculate the following glue requirements:
  - 42 pcs – 3 ply panels 36" x 24"
  - Glue specs
    - 20 parts resin
    - 4 parts catalyst
    - 1 part water
    - Coverage 20 g/sqft
    - Waste 10%

recipe

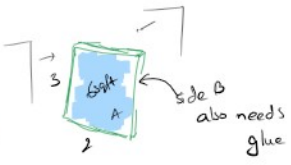


10.

Step Through

- Calculate the square foot of 1 glue line.
  - Panel size 36" x 24" (convert to feet)
  - (36/12) x (24/12) = 6 sqft. (one glue line)
- Multiply by the number of glue lines for 1 panel.
  - 6 sqft per glue line x 2 glue lines per panel (3 ply).
  - 12 sqft of glue lines per panel.
- Multiply by the number of panels needed.
  - 12 sqft of glue lines per panel x 42 panels
  - 504 sqft of glue for the whole job.

12x42



11.

Step Through cont.

- Calculate the weight of glue required.
  - 504 sqft x 20 g per sqft =
  - 10,080 g of glue required.

10,080g = 10.08kg

- Add the waste to the glue.
  - 10,080 g of glue + (10% * × 10080g)
  - (10,080 x 1.1) = 11, 088 g of glue with waste added.

need to prepare

$10.80 + (13% × $10.80)

$10.80 X 1.13

0.9 X = 10080

$X = \frac{10080}{0.9} = 11,200g$

12.

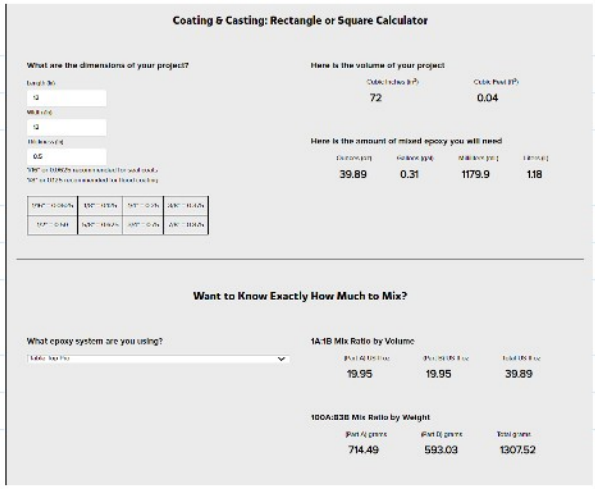
Step Through cont. – 2nd page.

- Now that we have the total amount of glue required, we need to calculate the amount of each of the parts of the glue mix.
  - Glue specs 20 parts resin, 4 parts catalyst, 1 part water.
  - A total of 25 parts.
  - 11,088 g / 25 parts = 443.52 g per part.
    - Therefore:
    - 20 parts resin x 443.52 g per part = **8,870.4 g Resin**
    - 4 part catalyst x 443.52 g per part = **1,774.08 g Catalyst**
    - 1 part water x 443.52 g per part = **443.52 g Water**

20+4+1=25

Check out:

https://masepoxies.com/resin-calculator/



Round or Circular Volume Calculator

1. You are mixing a sealer for your project. The mixture calls for 3 parts varnish to 1 parts varsol. How much of each chemical do you need if you require a total of 750ml of sealer?

Steps: - get total parts $3 + 1 = 4$
- get volume per part $750\,ml/4 = 187.5\,ml/part$
- for each chemical, find volume = volume per part x no. of parts

varnish: $187.5\,ml/part \times 3\,parts = 562.5\,ml$

varsol = $187.5\,ml/part \times 1\,part = 187.5\,ml$

3. We are pressing 50 – 3 ply panels that are 74" x 28". What is the total amount of glue by weight needed for this job?

Hot Press Glue details

Mix ratio:

Resin – 20 parts
Catalyst – 4 parts
Water – 1 part
Waste: 10% Coverage: 20g/sqft

Each panel:
- Square footage of each face (remember to convert to feet) $\frac{74}{12}\,ft \times \frac{28}{12} = 14.39\,sqft$
- 3ply panel ⇒ 2x sqft of each face $14.39 \times 2 = 28.78$

fifty panels x sqft of glue lines for each panel $29.78 \times 50 = 1439\,sqft$

Weight for completion = Coverage x Square footage $1439\,sqft \times 20g/sqft$
$= 28778\,g$

Total Weight = Weight for completion X 1.1
$= 31656\,g$
$= 31700\,g$ (nearest hundreds)