Ch 2.-Scale Drawings and Proportions

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1. Solving Proportions

$\frac{5}{9} \overset{\times 2}{=} \frac{x}{18}$ $\quad \overset{\times 2}{}$

$x = 10$

$\frac{5}{9} = \frac{x}{30}$ * Solve with cross-multiply & divide

$9x = 150$

$\frac{9x}{9} = \frac{150}{9}$

$x = 16.67$

#2. Ratios

3 : 8 $\quad$ 36 : 96 $\quad$ $\overset{\times 12}{}$

To solve ratio problems, you can write them as fractions and use X-multiplying.

$\frac{3}{8} = \frac{36}{x}$

$\frac{3x}{3} = \frac{288}{3}$

$1x = 96$

Examples:

Some can be done by inspection

$\frac{1}{4} = \frac{8}{x}$

$x = 32$

Ratios can be changed to look like fractions, and then solved using cross-multiplication.

9 : 16 _ : 48

$\frac{9}{16} = \frac{x}{48}$

$\frac{16x}{16} = \frac{432}{16}$

$x = 27$

2.1 Work with Scales.

→ A Scale is a ratio of sizes, used on any model, drawing or map to show how the model relates to the actual object.

→ If something is done "to scale" it means the drawing is the exact same shape as the original, but changed in size.

→ The easiest scale diagrams are photos. Most are properly "to scale," unless the photographer plays with the perspective (the angle used to take the picture).

→ To work with scale, you need at least one 'pair' of measurements of the same part from both the image and the original objects. This "pair' creates the scale ratio which can be used for any part of the shape.

→ Both numbers of the scale must be measured using the same units. Any difference in units must be clearly marked

- Most images are reductions of an original, so the second number is the larger one, saying how many times it has been reduced in the model.

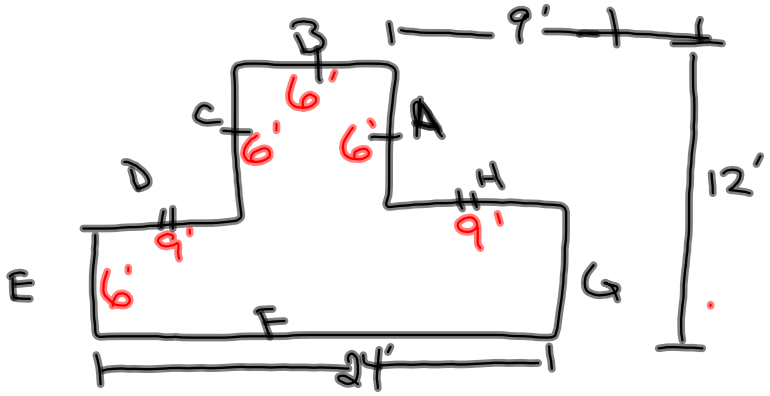
1 : 10	means that the object is 10 times larger than the image
1 : 64	the scale for most dinkies
1 : 10000	a scale used on maps. means 1 cm is 1 km in real life
1 : 600	the scale used on MMC's school floor Plan
100 : 1	Note: the image can be bigger than original also. This would be an enlargement or blow-up of the original.

image

original object

Sample problem

- find the missing dimensions of a drawing



Find D. D = H = 9'

Find A A = Total-D-H
= 24-9-9
= 6'

Find B and C B= C = A = 6'

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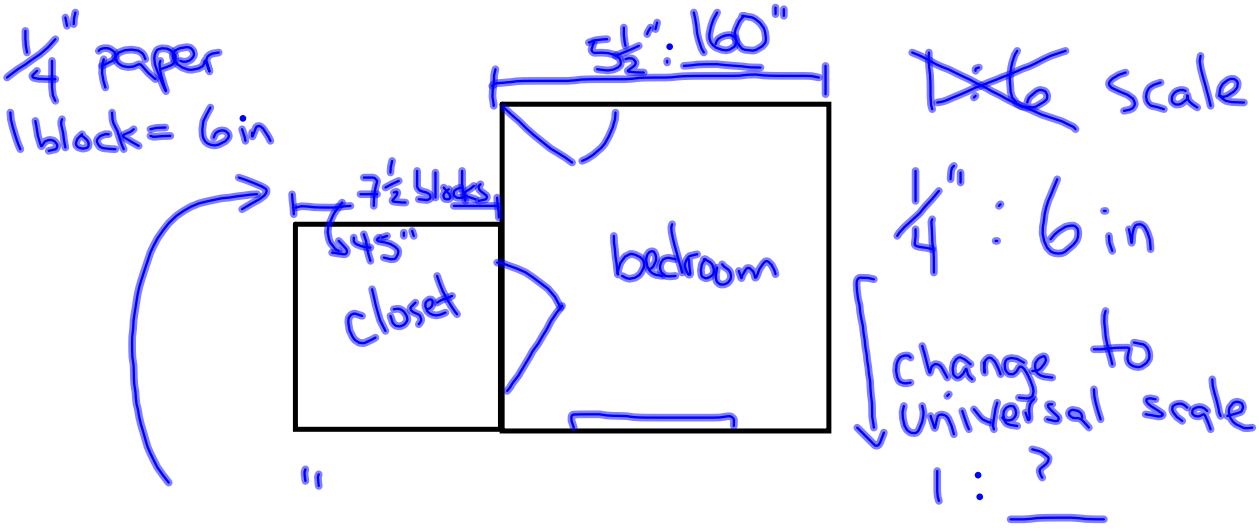
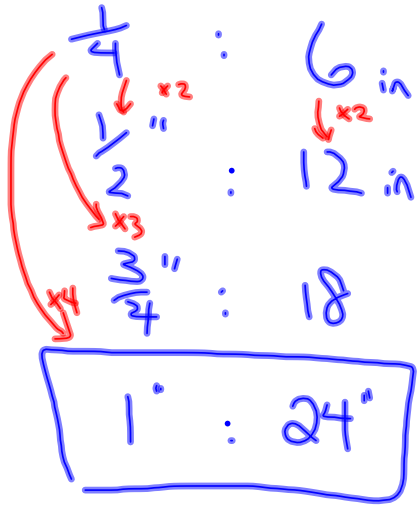
Scale Example.





using equivalent ratios, we can change the numbers by multiplying both sides by the same number

by getting a 1 :__ universal scale, units are no longer needed.

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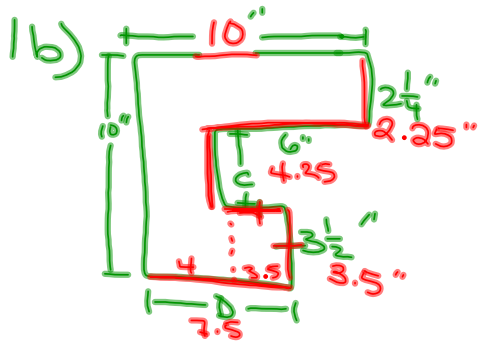
where do we use scale?

- blueprints
- maps
- land surveys (buying a house)
- house Reno's
- Model cars and airplanes
- Kids toys
- artwork
- photographs

Example of finding measures in Scale Diagrams



Hint:

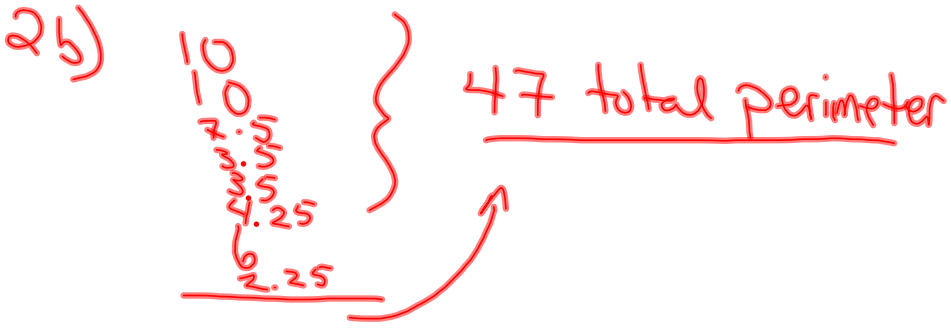
when dealing with Mixed Numbers... change them to a decimal only

C ⇒ $2.25 + 3.5 + C = 10$

$5.75 + C = 10$ -5.75

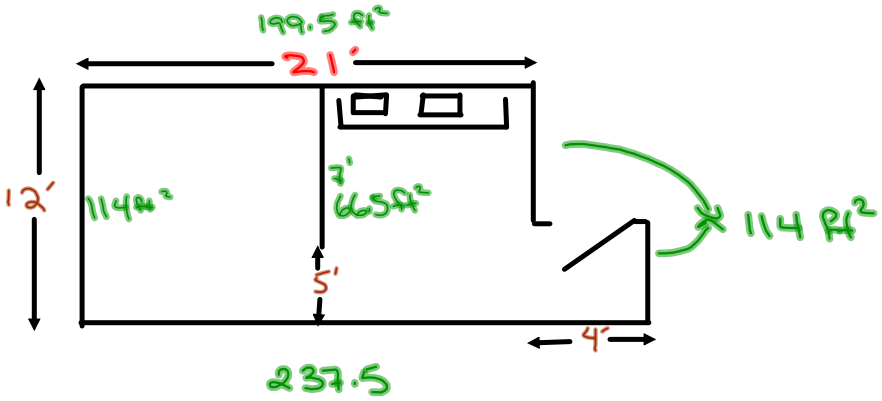
$C = 4.25$

D ⇒ $4 + 3.5 = 7.5$



7. Find the total surface area that would need to be painted in the bathroom.

1st step: all of the walls are 9' 6". Change this to a decimal form for the calculations = 9.5 feet



to find the total area to be painted, add all the wall's areas together.

114
114
199.5
237.5
+ 66.5
731.5 ft²

2.3 2D & 3D Drawings

Type 1: Orthographic Drawings.

Making 2D drawings for each face of an object

2D - Stands for Two dimensional (flat) drawings.

- It impossible to show depth of an object in 2D.

- In order to see all the details of an object you need to make multiple drawings from different angles

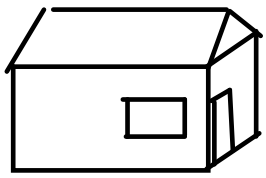
- There are a maximum of 6 orthographic drawings for any shape.

front	right side	top
back	left side	bottom

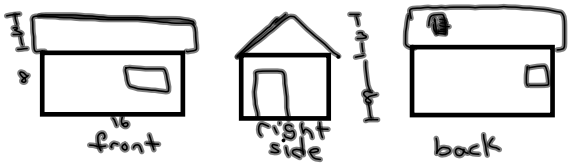
- The set of drawings done from each side are called Orthographic drawings.

Example:

Some Cabin



the 3D image of this cabin can be shown in 5 orthographic views



Note: the bottom view is not used because it would only be through the ground up.

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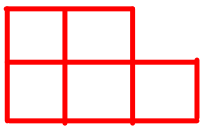
3D Drawings: type 2

→ Isometric Paper: has offset dots which help draw 3D objects on flat paper. Makes drawings taken from a chosen corner, showing 2 sides at a time.

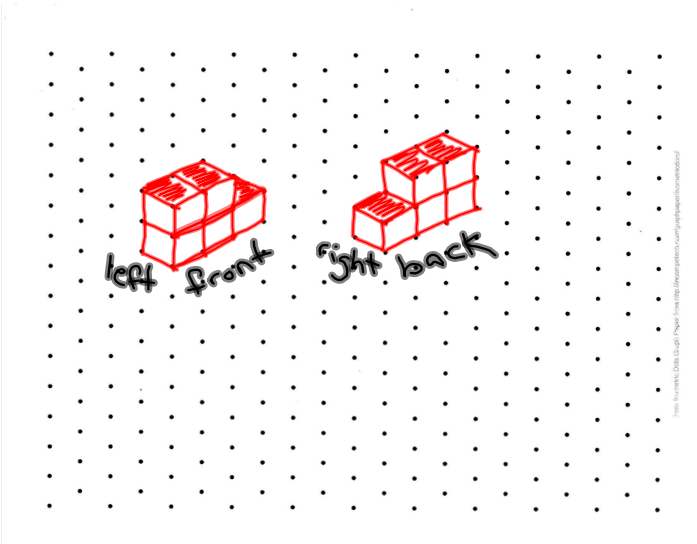
→ The objects drawn are always on a 45 degree turn, showing two faces to us at the same time, this creates the 3D look.

Example

orthographic view



make a front and a back view of this shape.



Guidelines for Isometric Cubes

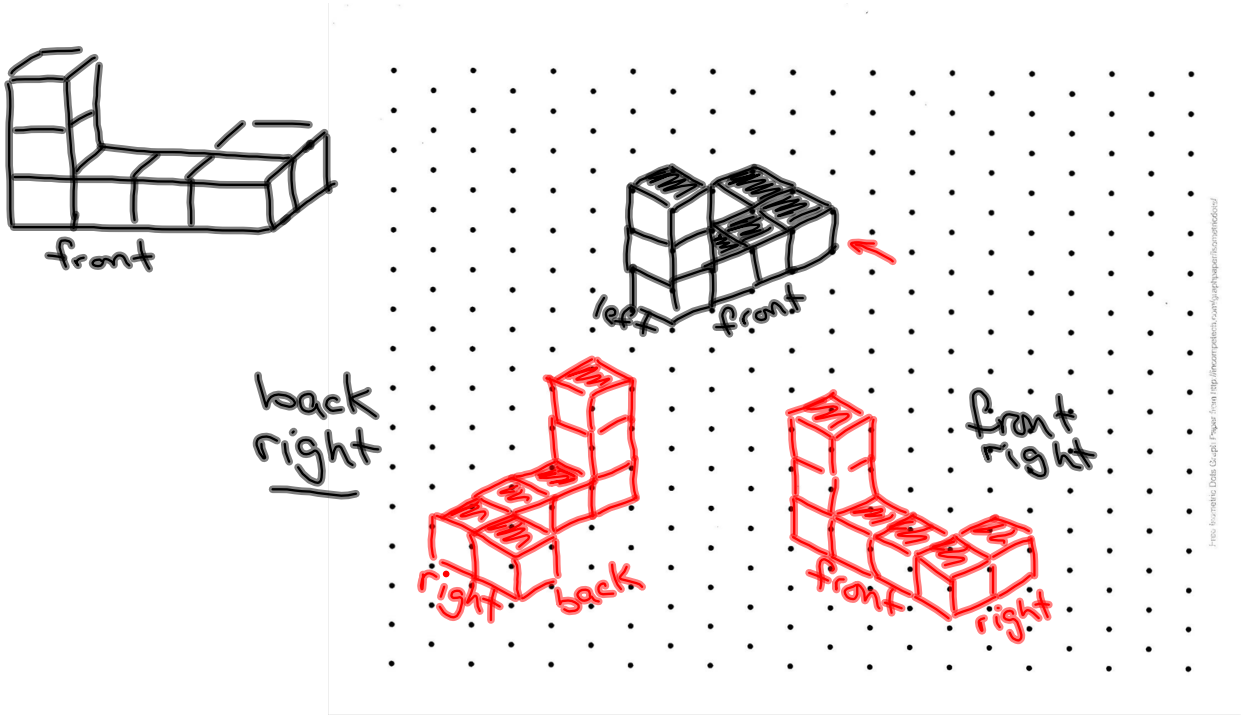
When making shapes....

- There can be no floating blocks in the construction
- There may be hidden blocks (ones that are there but not seen)

When making the drawings.....

- start your drawing at the blocks closest to you (front corner)
- never complete a full block until you know you see it all.
- always shade the tops of each cube. It helps your brain understand the shape..
- label the sides of your drawing (front, back, left and/or right)

Isometric dots



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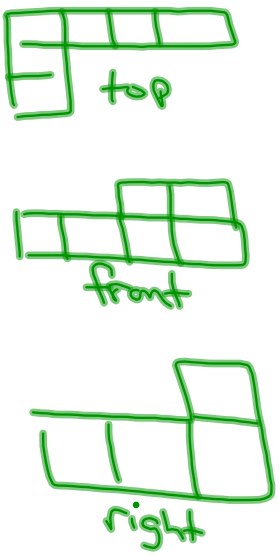
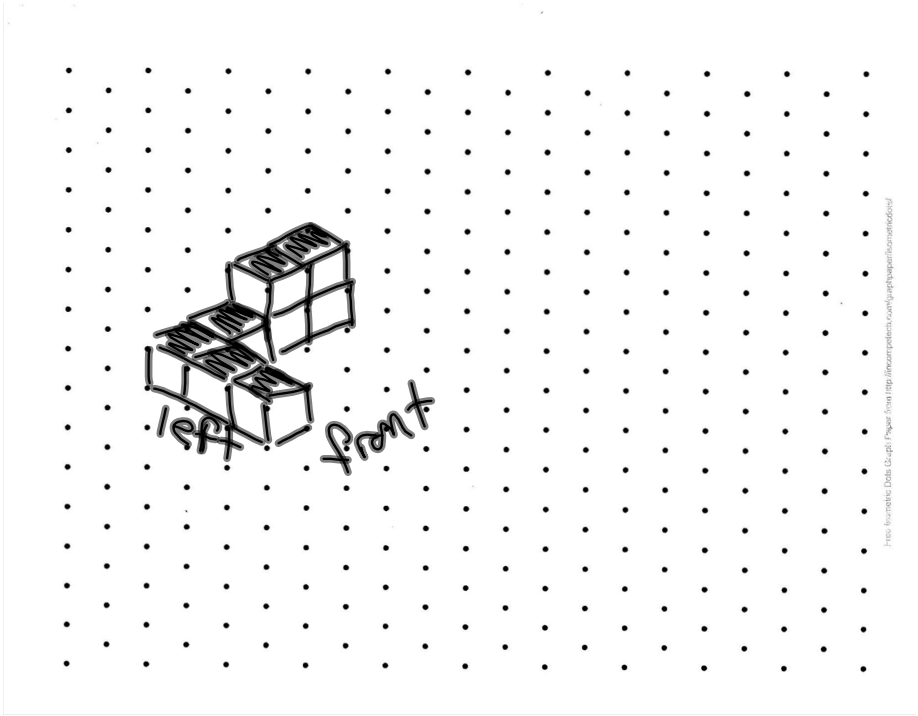
4.



Isometric dots



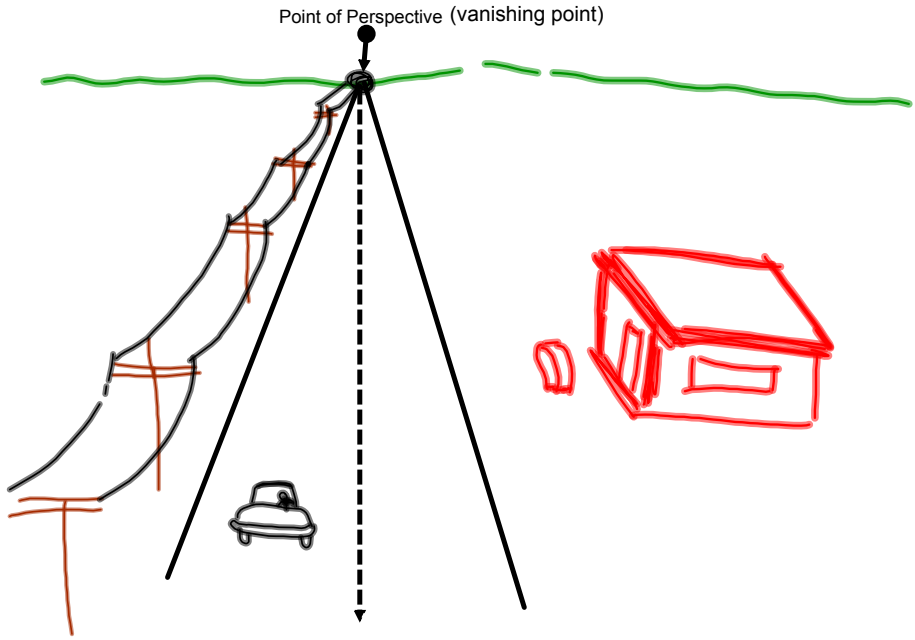
Type 3: One Point Perspective Drawings

When objects are very large or you have multiple objects at different distances from you, perspective becomes important.

To recreate a drawing of this type you have to choose a point to focus your perspective. This becomes the point where all objects will seem to shrink and disappear into the distance..... the Vanishing Point

We describe the Vanishing Point by stating in which direction the point is from the object; bottom right, top left, etc.

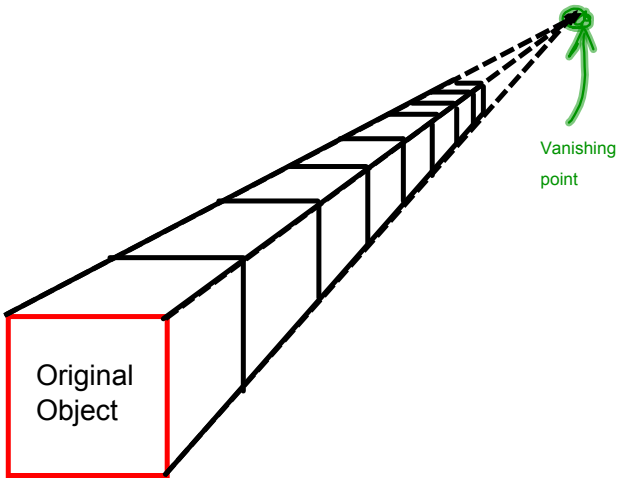
One point Perspective



One point Perspective

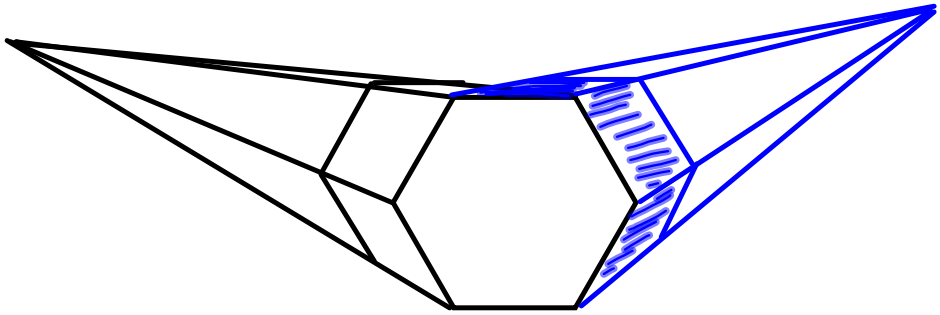
The one point perspective can creating a row drawing

Each object in the line looks a little smaller than the one before it



One point Perspective ??????

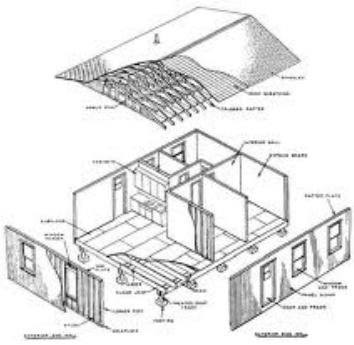
This is an attempt at using 2 vanishing points. The object will no longer be possible, showing the need for just one point of perspective.



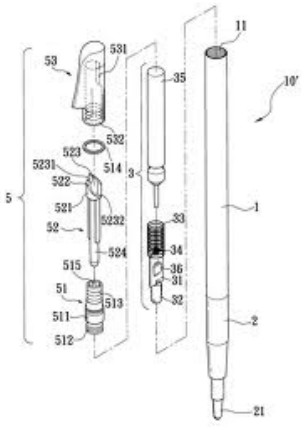
4) The Exploded View.

-This type of drawing takes an object apart and shows all of its visable and hidden pieces

- this is used in technical drawings to show all the parts included in an object.



the exploded view of a house
can be a very detailed diagram



Almost any object can be disassembled and shown as a sum of its parts using an exploded view.

4 views (types of scale diagrams)

1) Orthographic-flat faces

2) Exploded

3) Perspective Drawings 

4) Isometric