0-7+

8-14V

15-9-

10.3 Formulas in 3-D

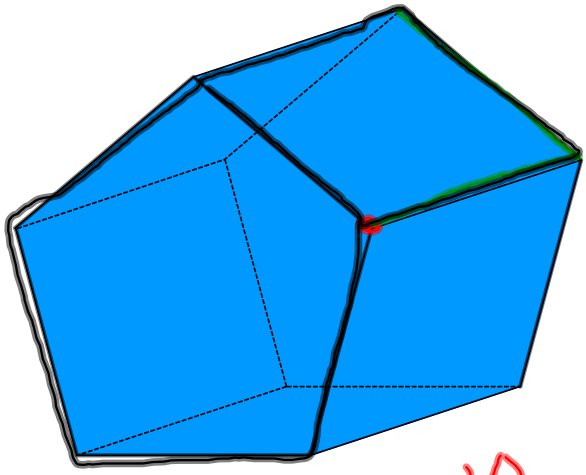
Polyhedron: formed by 4 or more polygons that intersect at their edges.

Ex: prisms & pyramids

non example: cone, cylinder

Euler's formula: for any polyhedron with V vertices, E edges, and F faces, $V - E + F = 2$

Ex:



V = 10

E = 15

F = 7

10 - 15 + 7 = 2

2 = 2 ✓

Diagonal of a rectangular prism

the length of a diagonal d of a rect. prism with length ℓ, width w, and height h is

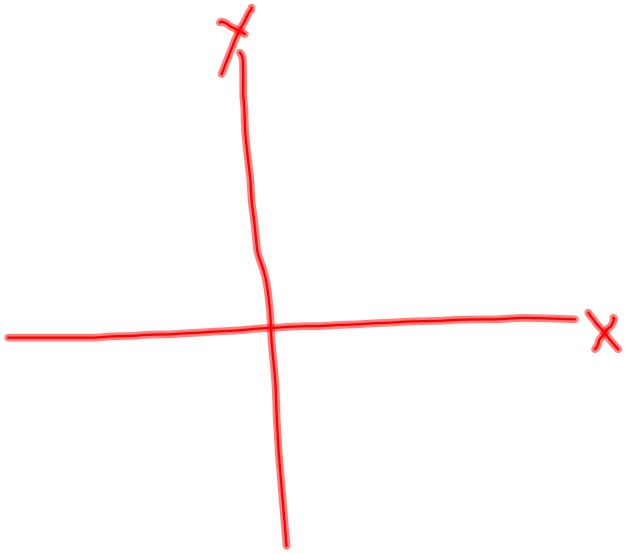
$$d^2 = \ell^2 + w^2 + h^2$$

Ex: Find the height of a rect. prism with an 8ft x 12ft. base & 18 ft. diagonal

$$d^2 = \ell^2 + w^2 + h^2$$
$$(18)^2 = (8)^2 + (12)^2 + h^2$$
$$324 = 64 + 144 + h^2$$
$$324 = 208 + h^2$$
$$-208 \quad -208$$
$$\sqrt{116} = \sqrt{h^2}$$
$$h = 10.77 \text{ ft}$$

(x, y)

(x, y, z)



Distance formula:

The distance between pts. (x_1, y_1, z_1) and (x_2, y_2, z_2) are:

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

Midpt. formula: the midpt. of segments with endpts. (x_1, y_1, z_1) and (x_2, y_2, z_2) are:

$$m = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)$$

Find the distance + midpt of $(6, 11, 3)$ and $(4, 6, 12)$

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

$$d = \sqrt{(6-4)^2 + (11-6)^2 + (3-12)^2}$$

$$d = \sqrt{4 + 25 + 81}$$

$$d = \sqrt{110}$$

$$d = 10.5$$

$$m = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)$$

$$= \left(\frac{6+4}{2}, \frac{11+6}{2}, \frac{3+12}{2} \right)$$

$$= (5, 8.5, 7.5)$$

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)$$

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2-26 even skip 8, 10, 22

odds extra credit