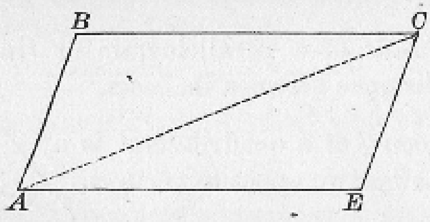
179. *In a parallelogram the opposite sides are equal, and the opposite angles are equal.*



Let the figure ABCE be a parallelogram.

To prove $BC = AE$, and $AB = EC$,

also, $\angle B = \angle E$, and $\angle BAE = \angle BCE$.

Proof. Draw AC.

$\triangle ABC = \triangle AEC$, § 178

(*the diagonal of a ▱ divides the figure into two equal* △*s*).

$\therefore BC = AE$, and $AB = CE$,

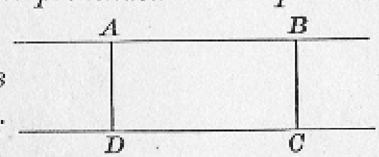
(*being homologous sides of equal* △*s*).

Also, $\angle B = \angle E$, and $\angle BAE = \angle BCE$, § 112

(*having their sides* ∥ *and extending in opposite directions from their vertices*).

Q. E. D.

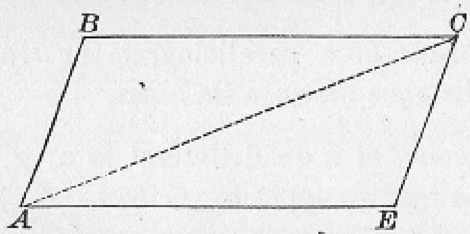
180. COR. 1. *Parallel lines comprehended between parallel lines are equal.*



181. COR. 2. *Two parallel lines are everywhere equally distant.* For if AB and DC are parallel, ⊥s dropped from *any* points in AB to DC, measure the distances of these points from DC. But these ⊥s are equal, by § 180; hence, *all* points in AB are equidistant from DC.

Proposition XXXVIII. Theorem.

179. *In a parallelogram the opposite sides are equal, and the opposite angles are equal.*



Let the figure $ABCE$ be a parallelogram.

To prove $BC = AE$, and $AB = EC$,

also, $\angle B = \angle E$, and $\angle BAE = \angle BCE$.

Proof. Draw AC.

$\triangle ABC = \triangle AEC$, § 178

(*the diagonal of a* ▱ *divides the figure into two equal* ▵*s*).

$\therefore BC = AE$, and $AB = CE$,

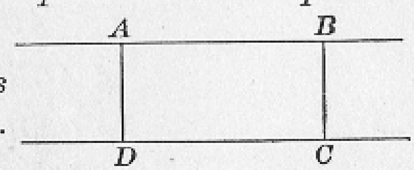
(*being homologous sides of equal* ▵*s*).

Also, $\angle B = \angle E$, and $\angle BAE = \angle BCE$, § 112

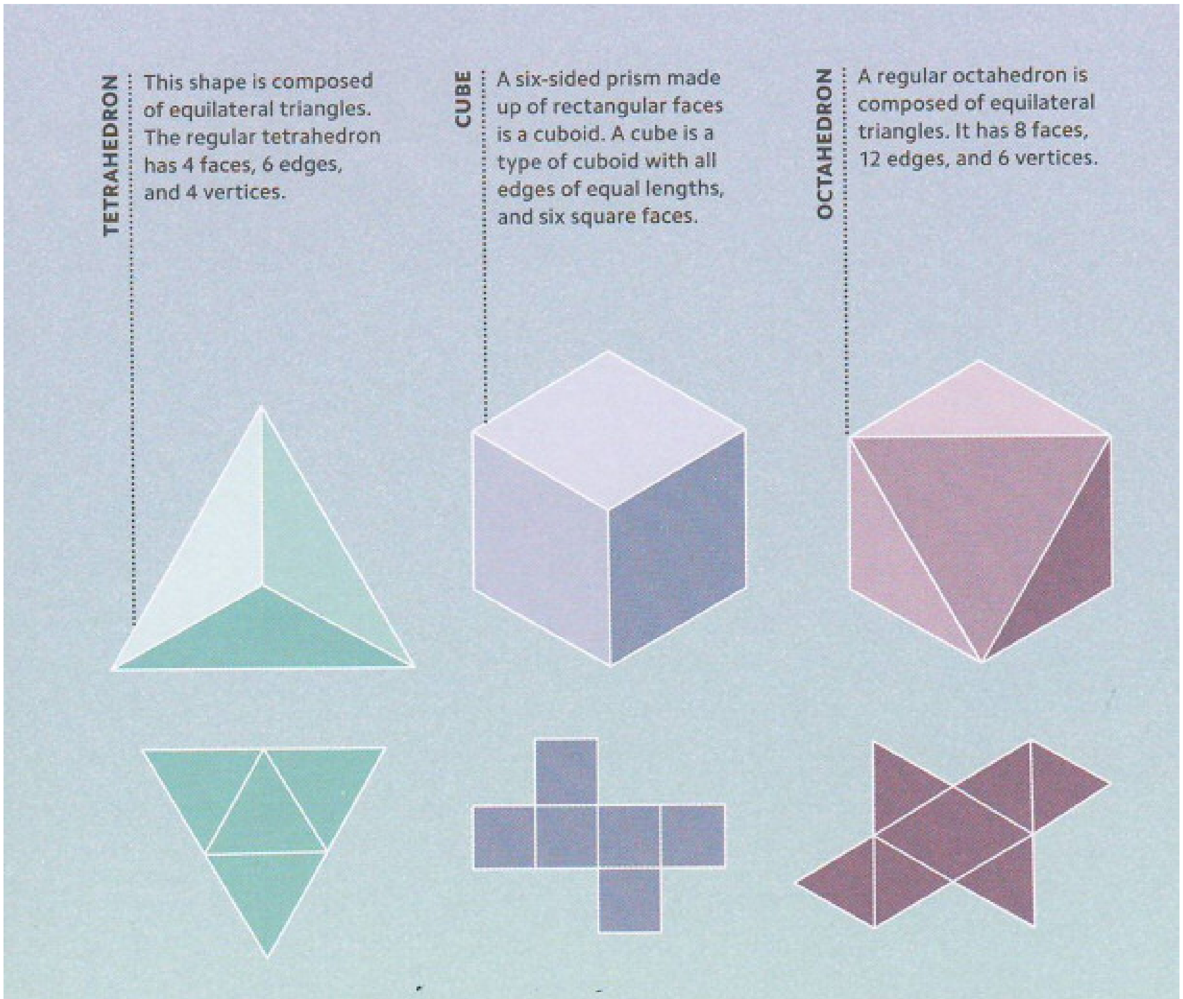
(*having their sides* ∥ *and extending in opposite directions from their vertices*).

Q. E. D.

180. Cor. 1. *Parallel lines comprehended between parallel lines are equal.*

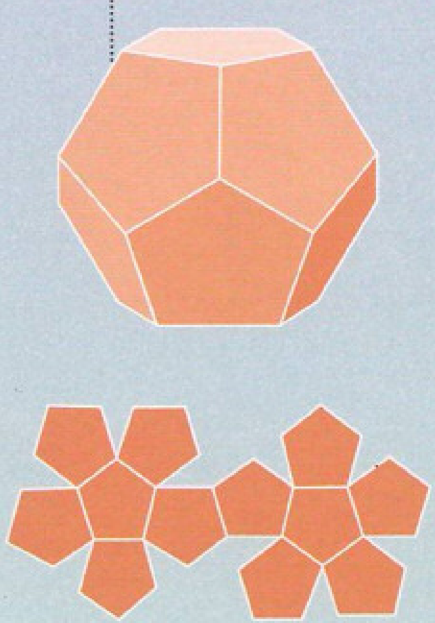


181. Cor. 2. *Two parallel lines are everywhere equally distant.* For if AB and DC are parallel, ⊥s dropped from *any* points in AB to DC, measure the distances of these points from DC. But these ⊥s are equal, by § 180; hence, *all* points in AB are equidistant from DC.


TETRAHEDRON
This shape is composed of equilateral triangles. The regular tetrahedron has 4 faces, 6 edges, and 4 vertices.
CUBE
A six-sided prism made up of rectangular faces is a cuboid. A cube is a type of cuboid with all edges of equal lengths, and six square faces.
OCTAHEDRON
A regular octahedron is composed of equilateral triangles. It has 8 faces, 12 edges, and 6 vertices.

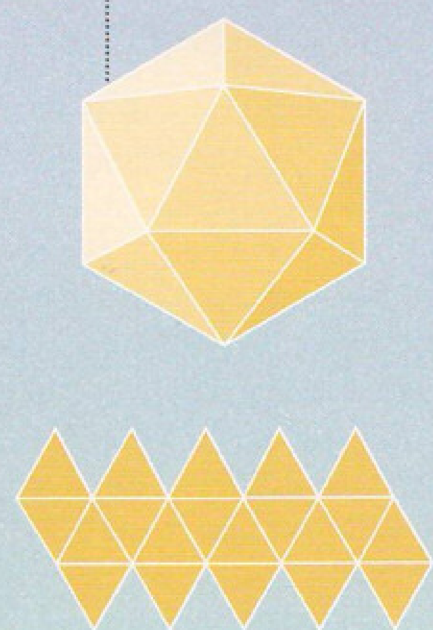
DODECAHEDRON

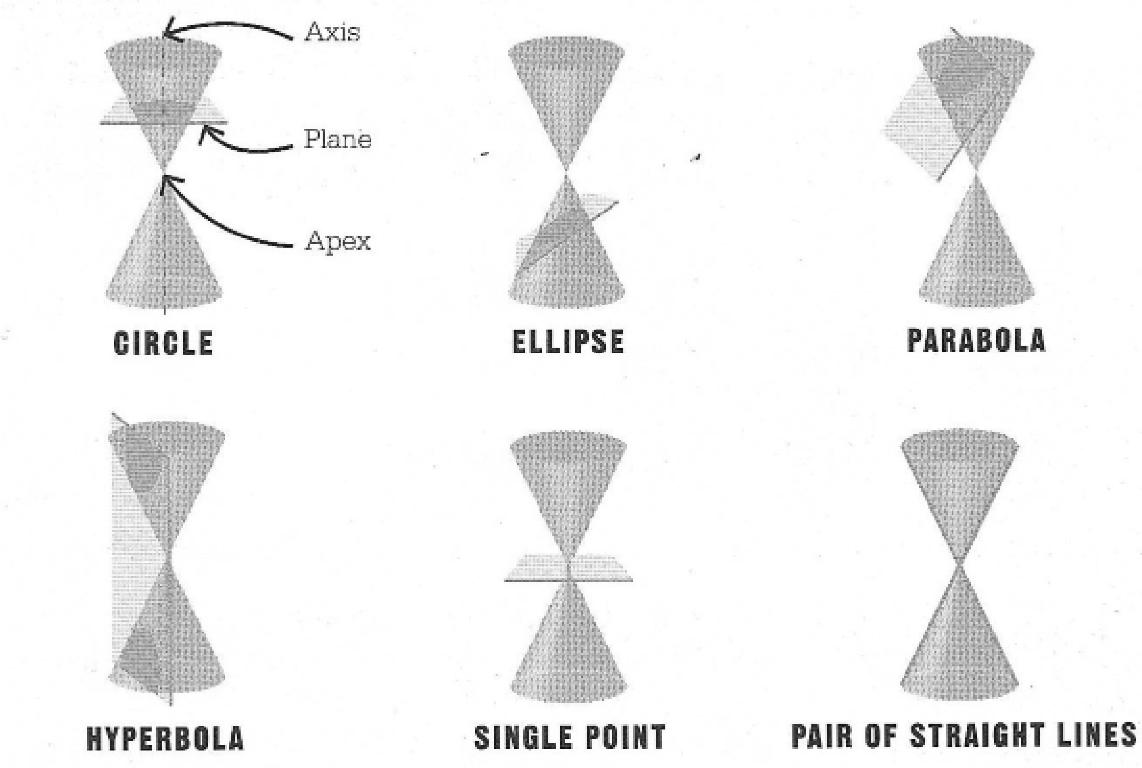
This solid is composed of regular pentagons. The regular dodecahedron has 12 faces, 30 edges, and 20 vertices.



ICOSAHEDRON

The regular icosahedron has 20 faces, 30 edges, and 12 vertices. It is composed of equilateral triangles (see pp.44–45).




Axis
Plane
Apex
CIRCLE
ELLIPSE
PARABOLA
HYPERBOLA
SINGLE POINT
PAIR OF STRAIGHT LINES

Phi and the Golden Ratio

The golden section can be described as the point on a line that will cut the line where the larger section will be in proportion to the smaller as the whole is to the larger, as shown in Figure 3-1. The proportion thus will be ϕ.

$$\frac{AB}{BC} = \frac{AC}{AB} = \phi = 1.618$$

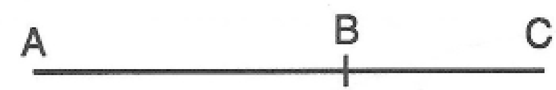


Figure 3-1

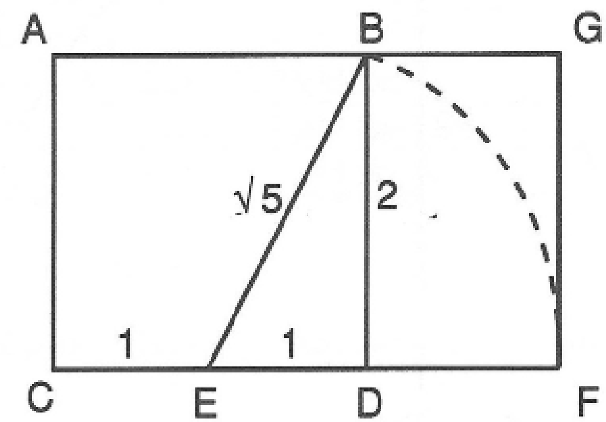
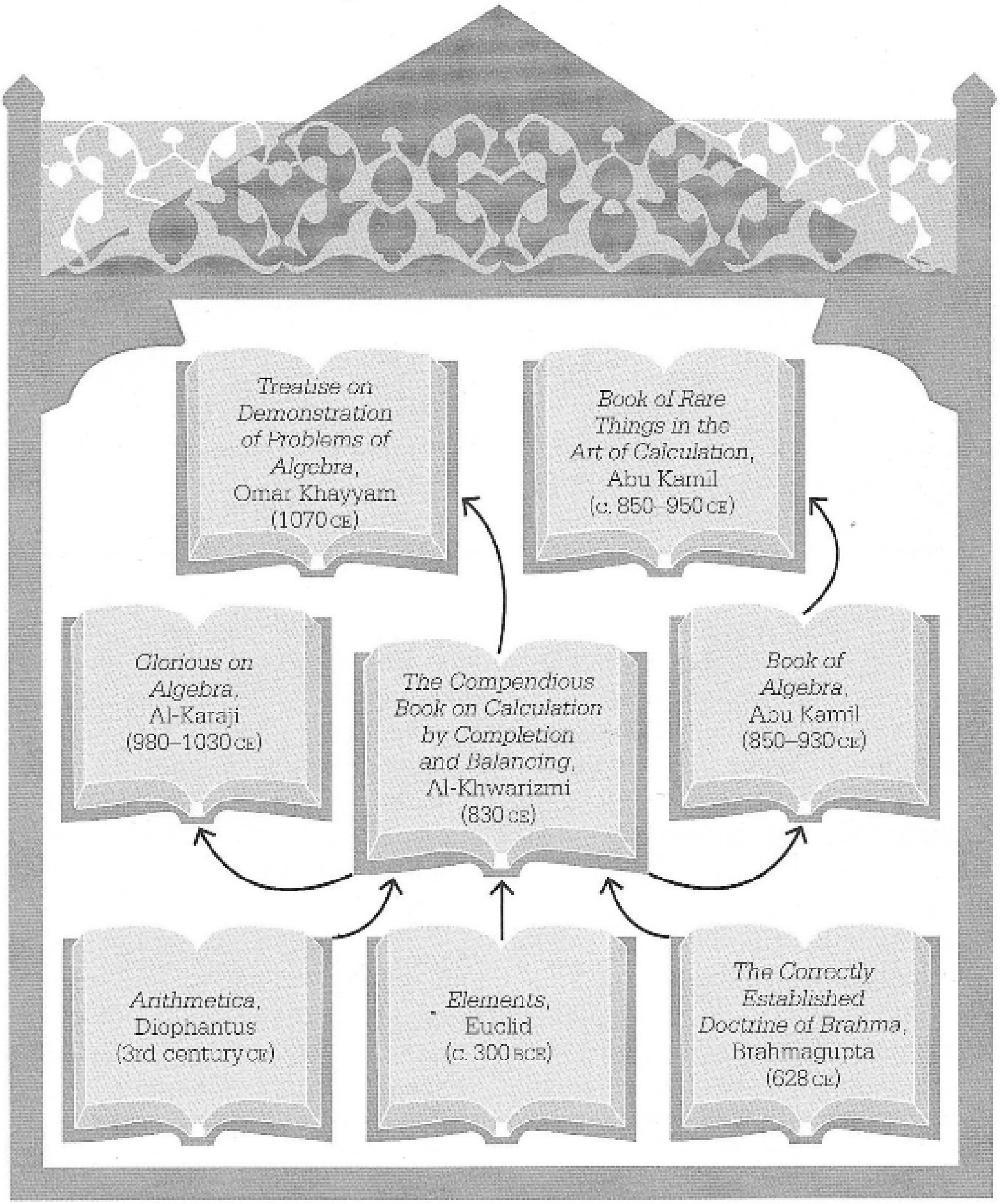
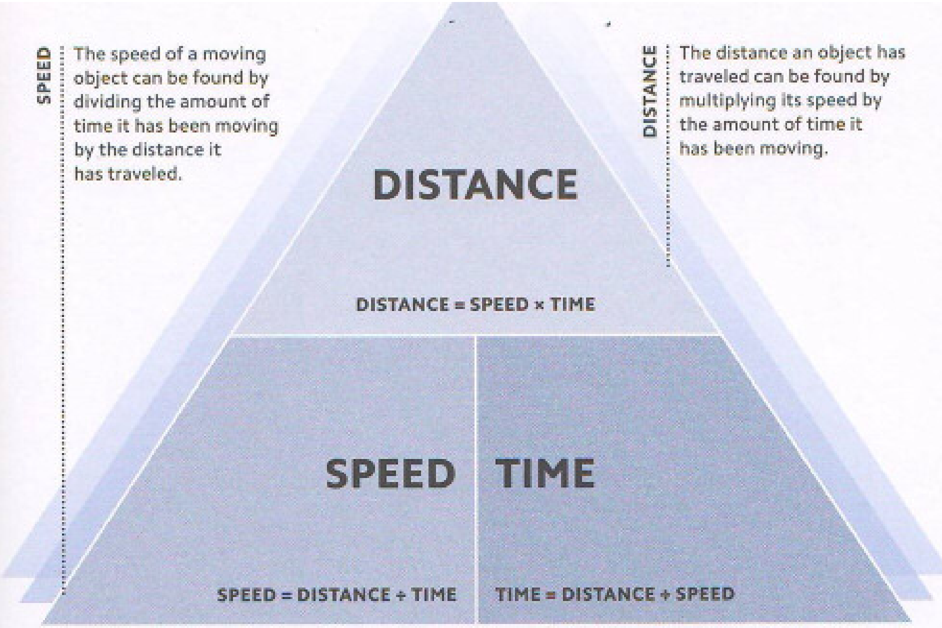


Figure 3-2

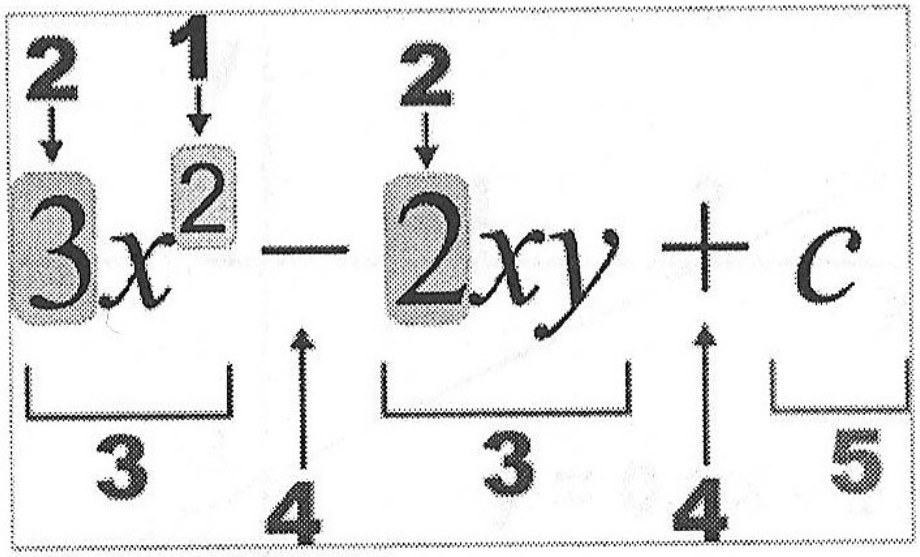
Key texts in the House of Wisdom





COMBINING UNITS

A compound measure uses two or more different units. For example, the speed of a moving object is often measured in miles per hour (mph) or kilometres per hour (kph). These compound measures account for both the amount of distance traveled and the amount of time that passes. Other compound measures include pressure, force, density, and the area and volume of objects (see pp.106–107).



Algebraic expression notation:

1 – power (exponent)

2 – coefficient

3 – term

4 – operator

5 – constant term

x y c – variables/constants

It is **possible to find** x in a linear equation.

$$5x - 8 = 2x + 1$$

Balance the equation by adding the same amount (8) to both sides.

$$5x - 8 + 8 = 2x + 1 + 8$$

becomes

$$5x = 2x + 9$$

Balance the equation again by subtracting $2x$ from both sides.

$$5x - 2x = 2x - 2x + 9$$

becomes

$$3x = 9$$

By dividing both sides by 3, x **is revealed**.

$$x = 3$$