Conors^3 Maths Grinds

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Contents

1 The Prologue **3**

2 Topics **4**

3 Prerequistes and Definitions **5**

4 Geometry **6**
4.1 Lines . . . 6
4.2 Intersecting Lines . . . 6
4.3 Line intersecting Parallel Lines . . . 6
4.4 Four-sided figures . . . 7
4.4.1 Area of a Rectangle . . . 7
4.4.2 Perimeter of a Rectangle . . . 7
4.5 Triangles . . . 8
4.5.1 Perimeter of a Triangle . . . 8
4.5.2 Area of a Triangle . . . 8
4.5.3 Angles in a Triangle . . . 8
4.6 Pythagoras Theorem . . . 9
4.6.1 Also works for the Circle on the Hypoteneuse . . . 9
4.7 Circles . . . 10
4.7.1 Area of a Circle . . . 10
4.7.2 Circumference of a Circle . . . 10
4.8 Sectors of a Circle . . . 10
4.8.1 Area of a Sector of a Circle . . . 10
4.8.2 Circumference of a Sector of a Circle . . . 10
4.9 Volume and Surface Area . . . 11
4.9.1 Rectangular Box . . . 11
4.9.2 Cylinder . . . 11
4.10 Polygons . . . 12
4.10.1 Area of a Polygon . . . 12
4.10.2 Perimeter of a Polygon . . . 12
4.10.3 Sum of angles of a polygon . . . 12
4.11 Slope of a Line . . . 13

5 Colophon **14**

1 The Prologue

I[1] am just going to outline the rules and formulae which are needed for the GMAT Mathematics test.

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2 Topics

The topics covered

- Geometry
- Algebra
- Aritmetic
- Problem Solving

3 Prerequistes and Definitions

- **Natural Number** - a number which occurs in nature, an integer, a positive whole number e.g. 1,2,3,4,511 etc.,
- **Real Number** - any number which can be plotted on a line e.g $3, 2/3, -0.2, \sqrt{3}$
- **Imaginary Number** - a number which can not be calculated e.g. $\sqrt{-5}$
- **Rational Number** - a number which can be written as a fraction e.g. $4(4/1), 2/3$
- **Irrational Number** - a number which can not be written as a fraction e.g $\sqrt{2}, \pi, 0.271271271271...$

Multiplying
$+a * +b = +ab$
$+a * -b = -ab$
$-a * +b = -ab$
$-a * -b = +ab$
Indices
$a^2 * a^3 = a^{2+3} = a^5$
$a^3/a^2 = a^{3-2} = a^1 = a$
$a^2/a^3 = a^{2-3} = a^{-1} = 1/a$
$0^x = 0$ e.g. $0^1 = 0$
$x^0 = 1$ e.g. $x^{0=1}$
Ratio - the Ratio of A to B is written as A/B *or* $A : B$ **Percentage** - to get a percentage of a fraction your multiply by 100 so $(3/4) * 100 = 75\%$

4 Geometry

- Lines
- Four-sided figures
- Triangles
- Pythagoras
- Circles
- Volume and Surface Area
- Polygons

4.1 Lines

A Line is said to be 180 degrees, so if you know the angle one makes intersecting a line you know the other side

4.2 Intersecting Lines

The opposite angles in intersecting lines are equal.

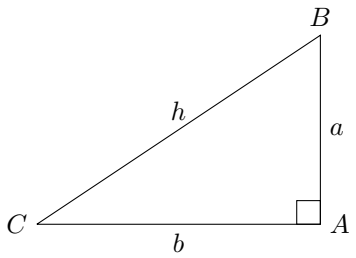
4.3 Line intersecting Parallel Lines

Parallel lines the angles are preserved, i.e. the angles made by the intersecting lines are the same

4.4 Four-sided figures

1. Rectangles
2. Squares
3. Parallelograms
4. Other foursided figures

4.4.1 Area of a Rectangle



Area of a rectangle is the length of the sides multiplied together.

$$Area_{rectangle} = width * height \tag{1}$$

4.4.2 Perimeter of a Rectangle

Is the sum of the 4 sides

$$Perimeter_{Rectangle} = or 2width + 2heigntor Perimeter_{rectangle} = 2(width + height) \tag{2}$$

4.5 Triangles

1. Perimeter of a Triangle equals sum of 3 sides
2. Area of a Triangle equals half the base by perpendicular height
3. The sum of the angles of a triangle equal 180 degrees
4. Equilateral Triangle - all the angles are 60 degrees, and all sides are the same length
5. Isoceles Triangle - 2 angles are the same and 2 sides are the same length

4.5.1 Perimeter of a Triangle

Perimeter of a triangle is the sum of the 3 sides so Perimeter = Side A + Side B + Side C

4.5.2 Area of a Triangle

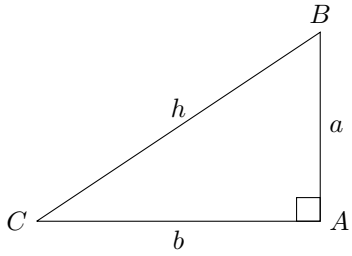
$$Area_{Triangle} = base * PerpindicularHeight/2 \tag{3}$$

4.5.3 Angles in a Triangle

The angles in a triangle equal 180 degrees So if you have two angles you always can deduct the third.

4.6 Pythagoras Theorem

The most important theorem In a Right angle triangle(one angle = 90°), the square on the hypoteneuse (longest side) is equal to the sum of the squares on the other two sides



$$h^2 = a^2 + b^2 \tag{4}$$

so $h = \sqrt{a^2 + b^2}$

4.6.1 Also works for the Circle on the Hypoteneuse

$$\pi(h/2)^2 = \pi(a/2)^2 + \pi(b/2)^2 \tag{5}$$

You will find that often the numbers used in examples are triangles with sides 5, 4 and 3, 10, 8 and 6 or 50, 40 and 30 which all neatly square etc.

4.7 Circles

4.7.1 Area of a Circle

$$Area = \pi r^2 \tag{6}$$

4.7.2 Circumference of a Circle

$$Area = 2\pi r \tag{7}$$

4.8 Sectors of a Circle

A sector of a Circle of

4.8.1 Area of a Sector of a Circle

$$Area = (angle/360)\pi r^2 \tag{8}$$

4.8.2 Circumference of a Sector of a Circle

$$Area = (angle/360)2\pi r \tag{9}$$

4.9 Volume and Surface Area

4.9.1 Rectangular Box

- Volume of a Rectangular Box - Length by Breath by Height
- Surface Area, is six rectangle, two breath by depth plus two breath by height plus two height by depth

$$Volume = width * height * depth \tag{10}$$

$$Surface_Area = 2(width * height) + 2(width * depth) + 2(height * depth) \tag{11}$$

4.9.2 Cylinder

- Volume of a Cylinder is area of the base by the height
- Surface area is 2 circles and a rectangle (from the rolled out tube of the cylinder) height by circumference of the circle

$$Volume_{Cylinder} = h\pi r^2 \tag{12}$$

$$SurfaceArea_{Cylinder} = 2\pi rh + 2(\pi r^2) \tag{13}$$

4.10 Polygons

4.10.1 Area of a Polygon

To get a polygons area, you break it up into triangles or triangles and rectangles, may need pythagoras.

4.10.2 Perimeter of a Polygon

The sum of the lengths of its sides

4.10.3 Sum of angles of a polygon

Sum of the triangles which meet the points of the polygon - i.e. multiples of 180 Or triangle is 180, rectangle 360, adding another side will always be adding another triangle so pentagon is 540, hexagon is 720 and heptagon is 900 and octagon 1060 and so on...

4.11 Slope of a Line

There are two ways which get you the slope of a line one is with the co-ordinates the other with an equation which you resolve to look like y = mx + b where m is the slope of the line

Using the Equation

$$y = mx + B \tag{14}$$

Using Co-ordinates

With co-ordinates (x_1, y_1) and (x_2, y_2)

$$m = (y_2 - y_1)/(x_2 - y_1) \tag{15}$$

5 Colophon

Wouldn't have been possible without Mr Euclid and Mr Pythagoras.

This document was written created using LaTeX.

Initially it was word-processed using text editor www.vim.org and then rendered into pdf using pdfplatex.

The amendments from the original version were made using Version 2.4 of MiKTeX(www.miktex.org) However since using the macbook a lot of late I use TeX Live (www.tug.org/texlive/).

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