# MTH 111
# MIDTERM FORMULA SHEET

## CHAPTER 1: *Numerical Computation*

Distance = Rate × Time  Amount = Rate × Base  (where rate is in decimal form)

$$\%\ change = \frac{new\ value - original\ value}{original\ value} \times 100 \qquad \%\ error = \frac{Measured\ Value - Known\ value}{Known\ value} \times 100$$

$$\%\ efficiency = \frac{output}{input} \times 100 \qquad \%\ conc.\ of\ A = \frac{Amount\ of\ A}{Total\ Amount\ of\ Mixture} \times 100$$

*Metric Prefixes:*

| $10^{12}$ | $10^{9}$ | $10^{6}$ | $10^{3}$ | 10 | 1 | $10^{-1}$ | $10^{-2}$ | $10^{-3}$ | $10^{-6}$ | $10^{-9}$ | $10^{-12}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tera | giga | mega | kilo | deca | Unit: m, gr, L | deci | centi | milli | micro | nano | pico |

## CHAPTER 6: *Geometry*

| NAME | FORMULA |
|---|---|
| Circle | Circumference = $2\pi r$ or $\pi d$ |
| | Area = $\pi r^2$ or $\frac{\pi d^2}{4}$ |
| Square | Perimeter = $4s$ |
| | Area = $s^2$ |
| Rectangle | Perimeter = $2(l + w)$ |
| | Area = $lw$ |
| Parallelogram | Perimeter = $2(a + b)$ |
| | Area = $bh$ |
| Rhombus | Perimeter = $4s$ |
| | Area = $sh$ |
| Trapezoid | Perimeter = $a + b + c + d$ |
| | Area = $\frac{(a+b)h}{2}$ |
| Triangle | Area = $\frac{bh}{2}$ |
| Hero's Formula | Area = $\sqrt{s(s-a)(s-b)(s-c)}$ where $S = \frac{a+b+c}{2}$ |

Compiled by: Humber College Math Department
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| NAME | FORMULA |
|---|---|
| Cube | Volume = $a^3$ |
| | Surface Area = $6a^2$ |
| Rectangular Parallelepiped | Volume = $lwh$ |
| | Surface Area = $2(lw + hw + lh)$ |
| Any cylinder or prism | Volume = (area of base)·(altitude) |
| Right cylinder or prism | Lateral Area = (perimeter of base) · (altitude) (not including bases) |
| Sphere | Volume = $\frac{4}{3}\ \pi r^3$ |
| | Surface area = $4\pi r^2$ |
| Any cone or pyramid | Volume = $\frac{h}{3}$ (area of base) |
| Right circular cone or regular pyramid | Lateral area = $\frac{s}{2}$ (perimeter of base) |
| Frustum | Volume = $\frac{h}{3}\ (A_1 + A_2 + \sqrt{A_1 A_2})$ |
| Frustum | Lateral area = $\frac{s}{2}$ (sum of base perimeters) $= \frac{s}{2}(P_1 + P_2)$ |

**<u>CHAPTER 7</u>:** ***Right Triangles and Vectors***

$1 \text{ rev} = 360° = 2\pi \text{ radians}$ $\quad 1 \text{ rad} \approx 57.3°$ $\quad c^2 = a^2 + b^2$

$\sin\theta = \frac{\text{opp}}{\text{hyp}}$ $\quad \cos\theta = \frac{\text{adj}}{\text{hyp}}$ $\quad \tan\theta = \frac{\text{opp}}{\text{adj}}$

$\csc\theta = \frac{1}{\sin\theta}$ $\quad \sec\theta = \frac{1}{\cos\theta}$ $\quad \cot\theta = \frac{1}{\tan\theta}$

**<u>CHAPTER 15</u>:** ***Oblique Triangles and Vectors***

$\sin\theta = \sin(180° - \theta)$ $\quad \cos\theta = \cos(360° - \theta)$ $\quad \tan\theta = \tan(180° + \theta)$

**Law of Sines:** $\quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Law of Cosines:**

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A \quad \text{or} \quad \cos A = \frac{b^2+c^2-a^2}{2bc}$$

$$b^2 = a^2 + c^2 - 2ac \cdot \cos B \quad \text{or} \quad \cos B = \frac{a^2+c^2-b^2}{2ac}$$

$$c^2 = a^2 + b^2 - 2ab \cdot \cos C \quad \text{or} \quad \cos C = \frac{a^2+b^2-c^2}{2ab}$$