

C.E.M. TUITION

Name : _____

Review of Rules & Formulae I

Algebra, Number Plane & Trigonometry

2 Unit

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ALGEBRA :**Formulae :**

[1] Expand $(a + b)^2$

[2] Expand $(a - b)^2$

[3] Expand $(a + b)(a - b)$

[4] Factorize $a^2 - b^2$

[5] Factorize $a^3 - b^3$

[6] Factorize $a^3 + b^3$

Examples :

[1] Expand $(x + 2y)^2$

[2] Expand $(2x - 3y)^2$

[3] Expand $(\sqrt{3} + 2)(\sqrt{3} - 2)$

[4] Factorize $4x^2 - 9y^2$

[5] Factorize $x^3 - 27$

[6] Factorize $2p^3 + 54q^3$

NUMBER PLANE :**Formulae :**

If P and Q are the points (x_1, y_1) and (x_2, y_2) respectively, write down the formula for :

[1] Distance $PQ =$

[2] Mid-point of $PQ =$

[3] Gradient of $PQ =$

[4] Equation of PQ is

[5] The distance between (x_1, y_1) and the line $Ax + By + C = 0$ is

Given that : $L_1 : y = m_1x + c_1$ and $L_2 : y = m_2x + c_2$, what is the relationship between m_1 and m_2 if

[6] $L_1 \parallel L_2$

[7] $L_1 \perp L_2$

Examples :

If $P(2, 1)$ and $Q(-6, 5)$, find the

[1] Distance PQ

[2] Mid-point of PQ

[3] Gradient of PQ

[4] Equation of PQ

[5] The distance between the point $(3, 4)$ and the line PQ

[6] equation of the line through $(0, -2)$ and parallel to PQ

[7] equation of the line through $(0, -2)$ and perpendicular to PQ .

[8] perpendicular distance from $(0, -2)$ to PQ .

TRIGONOMETRY :**Formulae :**

[1] Simplify $\sin\theta \times \operatorname{cosec}\theta$

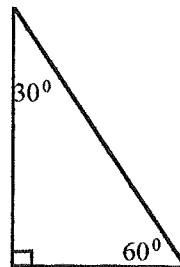
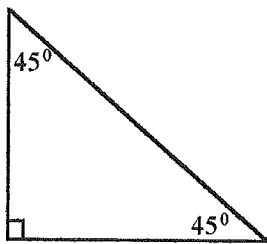
[2] Simplify $\cos\theta \times \sec\theta$

[3] Simplify $\tan\theta \times \cot\theta$

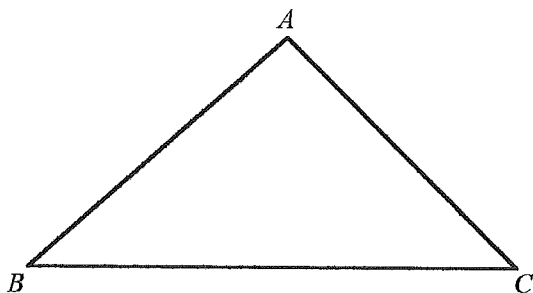
[4] $\cos^2\theta + \sin^2\theta =$

[5] $1 + \tan^2\theta =$

[6] $\cot^2\theta + 1 =$

[7] The ratios of 30° , 45° and 60° . Fill in the lengths of all the sides of these triangles.

[8] In any $\triangle ABC$, fill in the sides with lengths a , b and c units.



[a] State the Sine rule :

[b] State the Cosine rule :

[c] State the Area rule :

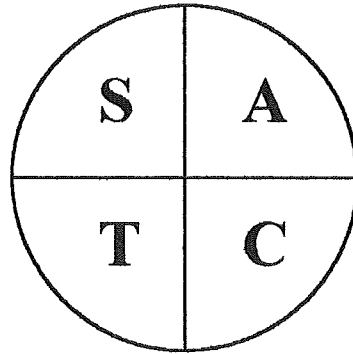
[9] Simplify : $\sin\theta \times \frac{1}{\cos(90-\theta)}$

[10] Simplify : $\sec\theta \times \frac{1}{\operatorname{cosec}(90-\theta)}$

[11] Simplify : $\tan\theta \times \frac{1}{\cot(90-\theta)}$

[12] A.S.T.C. Rule

[a] $\cos(180 - \theta) =$



[b] $\sin(180 + \theta) =$

[c] $\tan(360 - \theta) =$

[d] $\sin(90 + \theta) =$

[e] $\cos(270 - \theta) =$

Examples :

[1] Simplify $\sin 40^\circ \times \operatorname{cosec} 40^\circ$

[2] Simplify $\cos 50^\circ \times \sec 50^\circ$

[3] Simplify $\tan 70^\circ \times \cot 70^\circ$

[4] $\cos^2 80^\circ + \sin^2 80^\circ =$

[5] Simplify $\sec^2 x - \tan^2 x$

[6] Simplify $\sqrt{\cot^2 \alpha + 1}$

[7] Evaluate :

[a] $\sin 45^\circ \times \cos 45^\circ$

[b] $\tan 30^\circ \times \sin 60^\circ =$

[8] Evaluate :

[a] $\cos 135^\circ$

[b] $\tan 240^\circ$

[c] $\operatorname{cosec} 330^\circ$

[d] $\cos(-150^\circ)$

[e] $\tan 510^\circ$

[f] $\sec^2 225^\circ$

Solutions :**Page 1:**

[1] $a^2 + 2ab + b^2$ [2] $a^2 - 2ab + b^2$ [3] $a^2 - b^2$

[4] $(a+b)(a-b)$ [5] $(a-b)(a^2 + ab + b^2)$ [6] $(a+b)(a^2 - ab + b^2)$

Page 2 :

[1] $x^2 + 4xy + 4y^2$ [2] $4x^2 - 12xy + 9y^2$ [3] -1

[4] $(2x+3y)(2x-3y)$ [5] $(x-3)(x^2+3x+9)$ [6] $2(p+3q)(p^2-3pq+9q^2)$

Page 3 :

[1] $\sqrt{(x_1-x_2)^2 + (y_1-y_2)^2}$ [2] $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ [3] $\frac{y_2-y_1}{x_2-x_1}$

[4] $y-y_1 = m(x-x_1)$ where $m = \frac{y_2-y_1}{x_2-x_1}$ [5] $\frac{|Ax_1+By_1+C|}{\sqrt{A^2+B^2}}$

[6] $m_1 = m_2$ [7] $m_1 \times m_2 = -1$

Page 4 :

[1] $4\sqrt{5}$ [2] $(-2, 3)$ [3] $-\frac{1}{2}$ [4] $x+2y-4=0$ [5] $\frac{7\sqrt{5}}{5}$

Page 5 :

[6] $x+2y+4=0$ [7] $2x-y-2=0$ [8] $\frac{8\sqrt{5}}{5}$

Page 6 :

[1] 1 [2] 1 [3] 1 [4] 1 [5] $\sec^2 x$ [6] $\operatorname{cosec}^2 x$

Page 7 :

[8] [a] $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ [b] $a^2 = b^2 + c^2 - 2bc \cos A$ [c] Area = $\frac{1}{2}ab \sin C$

[9] 1 [10] 1 [11] 1

Page 8 :

[12] [a] $-\cos \theta$ [b] $-\sin \theta$ [c] $-\tan \theta$ [d] $\cos \theta$ [e] $-\sin \theta$