C.E.M. TUITION

Name :____________________________________

Review of Rules and Formulae
Quadratics, Geometry, A.P's & G.P's

Year 12 - Mathematics

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For corrections refer to pages:

QUADRATICS :

Formulae :

[1] If $ax^2 + bx + c = 0$, then using the quadratic formula

$x =$

[2] If the roots of above quadratic are α and β, then

[a] $\alpha + \beta =$

[b] $\alpha\beta =$

[3] The equation with α and β as roots is

[4] For the quadratic equation $ax^2 + bx + c = 0$,

[a] What does Δ equal ?

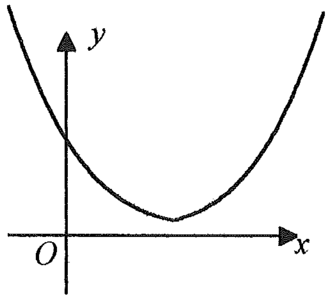
[b] If $\Delta > 0$, then the roots are

[c] If $\Delta = 0$, then the roots are

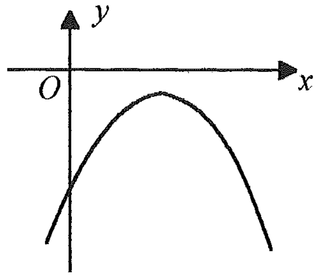
[d] If $\Delta < 0$, then the roots are

[e] The condition for (in terms of Δ):

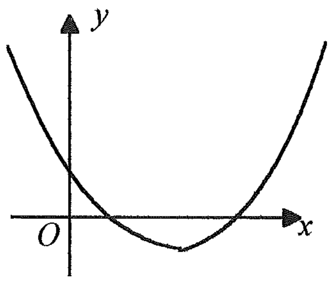
[i] Positive definite if



[ii] Negative definite if



[iii] Indefinite if



Examples :

[1] Solve $x^2 + x - 3 = 0$

[2] If α, β are the roots of $x^2 - 3x + 5 = 0$, find

[a] $\alpha + \beta$

[b] $\alpha\beta$

[3] If $\sqrt{2} - 1$ and $\sqrt{2} + 1$ are roots, find the quadratic equation.

[4] Using the discriminant, Δ, find if the roots are :
[a] real and distinct, [b] real and equal, or [c] unreal for

[i] $2x^2 - 5x - 7 = 0$

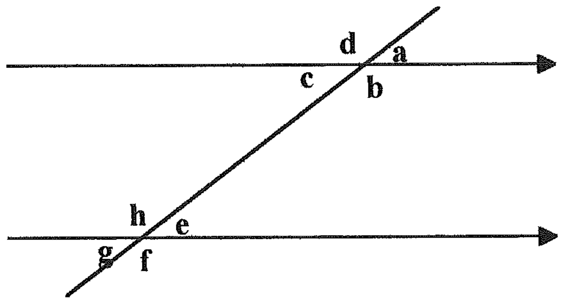
[ii] $4x^2 - 4x + 1 = 0$

[iii] $3x^2 + x + 1 = 0$

[iv] Which one of the above parabola is positive definite ?

GEOMETRY :

Rules :



In the above diagram, write down a pair of

[1] corresponding angles

[2] alternate angles

[3] cointerior angles

[4] vertically opposite angles

[5] adjacent angles

Complete the following with the words "equal" or "supplementary" :

[6] Corresponding angles are

[7] Alternate angles are

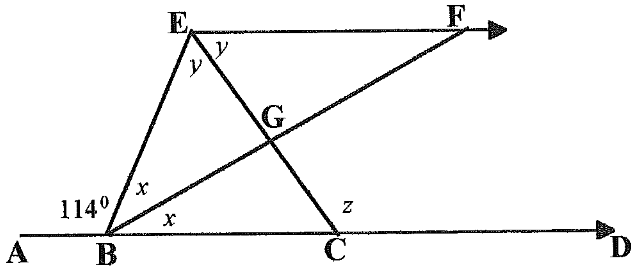
[8] Cointerior angles are

[9] Vertically opposite angles are

[10] Adjacent angles are

Examples :

Find the pronumeral in each case, giving reasons.



SEQUENCE AND SERIES :

Formulae :

[1] An arithmetic sequence is in the form $a, a+d, a+2d, \ldots$ Find :

[a] $T_n =$

[b] $S_n =$

[2] A geometric sequence is in the form $a, ar, ar^2, \ldots$ Find :

[a] $T_n =$

[b] $S_n =$

[c] Limiting sum $= S_\infty =$

Examples :

[1] For the sequence $1, 4, 7, \ldots$.

[a] Show that it is arithmetic.

[b] Find

[i] T_n

[ii] Is 61 a term of the sequence ? If so, which term is it ?

[iii] Find S_{21}

[2] For the sequence $3, 9, 27, \ldots$

[a] Show that it is geometric.

[b] Find T_n

[c] Find the first term that exceeds 1000.

[d] Find S_8

[3] For the series $0.4 + 0.04 + 0.004 + \ldots$

[a] Is there a limiting sum and why ?

[b] Find its limiting sum as a rational number.

Solutions :

Page 1:

[1] $\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ [2] [a] $-\frac{b}{a}$ [b] $\frac{c}{a}$

[3] $x^2-(\alpha+\beta)x+(\alpha\beta)$ [4] [a] b^2-4ac [b] real and distinct

[c] real and equal [d] not real.

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[e] [i] $\Delta<0, a>0$ [ii] $\Delta<0, a<0$ [iii] $\Delta>0$

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[1] $x=\frac{-1\pm\sqrt{13}}{2}$ [2] [a] 3 [b] 5 [3] $x^2-2\sqrt{2}\,x+1=0$

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[4] [i] $\Delta=81$, roots are real, distinct and rational

[ii] $\Delta=0$, roots are real and equal

[iii] $\Delta=-11$, roots are not real.

[iv] Parabola in part [iii]

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[1] $a,e;\ b,f;\ d,h;\ c,g$ [2] $c,e;\ b,h$ [3] $c,h;\ b,e$

[4] $a,c;\ b,d;\ e,g;\ h,f$ [5] $d,a;\ c,b;\ e,f;\ f,g$ [

[6] equal [7] equal [8] supplementary

[9] equal [10] supplementary

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$2x+114=180$ (Straight line) $x=33$

$2y=114$ (Alternate $\angle$s, $EF||AD$); $y=57$

$z=2x+y$ (Exterior $\angle$ of ΔBEC); $z=123$

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[1] [a] $a+(n-1)d$ [b] $\frac{n}{2}[2a+(n-1)d]$

[2] [a] ar^{n-1} [b] $\frac{a(r^n-1)}{r-1}$

[c] $\frac{a}{1-r}$

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[1] [a] $d=4-1=7-4=3$ [b] [i] $3n-2$ [ii] Yes, $n=21$ [iii] 651

[2] [a] $r=\frac{9}{3}=\frac{27}{9}=3$ [b] 3^n

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[c] $n=7$ [d] 9840

[3] [a] Yes, because $-1<r<1$

[b] $\frac{4}{9}$