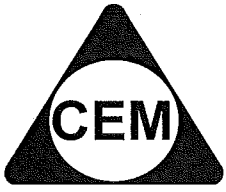NAME :

Centre of Excellence in Mathematics
S201 / 414 GARDENERS RD. ROSEBERY 2018
www.cemtuition.com.au

MOBILE 0412 880 475

PHONE 9666 3331

YEAR 12 – ADVANCED MATHS

REVIEW TOPIC (SP1)
QUADRATIC FUNCTIONS II

PAST HSC EXAM QUESTIONS:
HSC '81
(6) (i) The roots of the quadratic equation $px^2 - x + q = 0$ are $-1, 3$.
       Find p and q.

$$\boxed{p = \tfrac{1}{2}, q = -\tfrac{3}{2}}$$

HSC '80
(9) (i) (a) Given that $x = 3$ is one root of the quadratic equation

         $mx^2 - 20x + m = 0,$

       find the exact value of the other root.

$$\boxed{\dfrac{1}{3}}$$

      (b) Find all the values of k for which the quadratic equation

         $kx^2 - 8x + k = 0$

      has real roots.

$$\boxed{-4 \leq k \leq 4}$$

PAST PRELIMINARY EXAM QUESTIONS:
SBHS 05
Assessment question:

Show that $\dfrac{x^2 - mn}{2x - m - n}$ takes no real values between n and m where $m > n$.

(Hint: Use the fact that $\Delta < 0$ and that $n < k < m$)

SBHS 04

(3)

(b)   If α and β are the roots of $3x^2 - 2x + 1 = 0$
     Evaluate:

    (i) $\alpha + \beta$ **1**

$$\boxed{\dfrac{2}{3}}$$

     (ii) $\alpha\beta$ **1**

$$\boxed{\dfrac{1}{3}}$$

    (iii) $\dfrac{1}{\alpha^2\beta} + \dfrac{1}{\beta^2\alpha}$ **2**

$$\boxed{6}$$

(4)

(b)   Given $P(x) = k - 3kx - x^2$ find the values of k for which $P(x) < 0$ for all x.   **2**

$$\boxed{-\dfrac{4}{9} < k < 0}$$

(5)

(f)   If α and β are the roots of $x^2 + 5x + 7 = 0$, form the equation whose roots are

$(\alpha - \beta)^2$ and $(\alpha + \beta)^2$ ...4

$$\boxed{x^2 - 22x - 75 = 0}$$

SBHS 04 – DEC ASSESSMENT

(1) For which values of k does $x^2 - kx + 4$ have no real zero.   **2**

$$\boxed{-4 < k < 4}$$

(3)

(d)   Show that the equation $(x-p)(x-q)=r^2$ always has real solutions for real p, q **2**

and r.

(f)   The quadratic equation $x^2-5x+3-3a=0$ has roots α and β.   **3**

(i)   Find $\alpha+\beta$, and $\alpha\beta$ in terms of a.

$$\boxed{5;3(1-a)}$$

(ii)   Given that the roots differ by 11, find the value of a.

$$\boxed{a=9}$$

SBHS 03

(4)

(b) Let α and β be the roots of the equation $x^2 - 5x + 2 = 0$. Find the values of:

(i) $\alpha + \beta$ **1**

(ii) $\alpha\beta$ **1**

(iii) $(\alpha + 1)(\beta + 1)$ **1**

$$\boxed{5, 2, 8}$$

(e) The roots of the quadratic equation $px^2 - x + q = 0$ are -1 and 3.   **3**
     Find p and q.

$$\boxed{p = \frac{1}{2}, q = -\frac{3}{2}}$$

(5)

(b) For each of the quadratics below, evaluate the discriminant and state the relevance of this with regard to the roots of the equation.

   (i) $x^2 + 3x + \frac{9}{4} = y$ **2**

$$\boxed{1 \text{ real root}}$$

   (ii) $3x^2 - 2x = y + 5$ **2**

$$\boxed{2 \text{ real and rational roots}}$$

(c) Find the values of M for which the equation $4x^2 - Mx + 9 = 0$ has

   (i)   exactly one real root,   **2**

$$\boxed{M = \pm 12}$$

   (ii) real roots.   **2**

$$\boxed{M \leq -12, M \geq 12}$$