UNIT 24 *Solving Quadratic Equations* CSEC Revision Test

1. Factorise fully $3t + 6t^2$. (*2 marks*)

2. Solve the equation

$$12x^2 - 25x + 12 = 0$$ (*4 marks*)

3. (a) The expression

$$x^2 - 6x + 7$$

can be written in the form $(x + a)^2 + b$, where a and b are constants.

Determine the values of a and b and hence find the minimum value of the expression. (*4 marks*)

(b) The solutions of the equation

$$x^2 - 6x + 7 = 0$$

can be written in the form $x = p \pm q\sqrt{2}$ where p and q are rational numbers.

Determine the values of p and q. (*3 marks*)

4. Solve the equation

$$2x^2 + 3x - 2 = 0$$ *(CXC)* (*3 marks*)

5. Solve for x, given

$$3x^2 - 7x + 2 = 0$$ *(CXC)* (*4 marks*)

6. Solve the equation $x^2 = 4x + 9$, giving your answer to 3 significant figures. *(5 marks)*

7. (a) Using 1 cm to represent 1 unit on both the x and y axes, draw the graph of

$$y = x^2 - 3x + 1 \text{ for } -3 \leq x \leq 3$$ *(5 marks)*

(b) (i) Express $x^2 - 3x + 1$ in the form $(x - p)^2 + q$. *(3 marks)*

Hence determine

(ii) the minimum value of $x^2 - 3x + 1$ *(1 mark)*

(iii) the value of x for which $x^2 - 3x + 1$ takes the minimum value. *(1 mark)*
(CXC)

UNIT 24 *Solving Quadratic Equations* CSEC Revision Test

8. (a) Write $5x^2 + 2x - 7$ in the form $a(x + b)^2 + c$, where *a, b* and *c* are real numbers. *(4 marks)*

(b) Hence, or otherwise, determine

(i) the minimum value of the function $y = 5x^2 + 2x - 7$

(ii) the value of *x* at which the minimum occurs. *(3 marks)*

(c) Find the values of *x* for which $5x^2 + 2x - 7 = 0$ *(3 marks)*

(d) *Sketch* the graph of $y = 5x^2 + 2x - 7$, clearly showing

(i) the coordinates of the minimum point

(ii) the value of the *y*-intercept

(iii) the points where the graph cuts the *y*-axis. *(CXC) (5 marks)*

(50 MARKS)

UNIT 24 *Solving Quadratic Equations* — CSEC Revision Test Answers

1. $3t(1 + 2t)$ (B1 for just t or just 3 factor) B2 (*2 marks*)

2. $(4x - 3)(3x - 4) = 0$ M2

   $x = \frac{3}{4}$ or $\frac{4}{3}$ A1 A1 (*4 marks*)

3. (a) $(x - 3)^2 - 2 \Rightarrow a = -3,\ b = -2,$ minimum $= -2$ B1 B1 B2

   (b) $(x - 3)^2 = 2 \Rightarrow x - 3 = \pm\sqrt{2}$ B1

   $x = 3 + \sqrt{2}$ or $3 - \sqrt{2} \Rightarrow p = 3, q = 1$ B1 B1 (*7 marks*)

4. $(2x - 1)(x + 2) = 0$ M1

   $\Rightarrow 2x - 1 = 0$ or $x + 2 = 0$ A1

   $\Rightarrow x = \frac{1}{2}$ or $x = -2$ A1 (*3 marks*)

5. $(3x - 1)(x - 2) = 0$ M1 A1

   $\Rightarrow 3x - 1 = 0$ or $x - 2 = 0$ A1

   $\Rightarrow x = \frac{1}{3}$ or $x = 2$ A1 *(4 marks)*

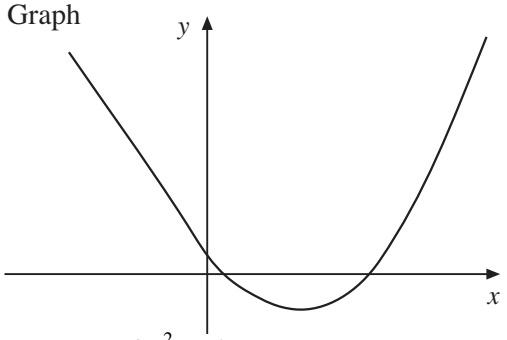
6. $x^2 - 4x - 9 = 0 \Rightarrow a = 1,\ b = -4,\ c = -9$ M1

   $x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 1 \times (-9)}}{2 \times 1}$ A1

   $x = \frac{4 \pm \sqrt{52}}{2} = 2 \pm \sqrt{13}$ A1

   $x = 5.61$ and -1.61 B1 B1 *(5 marks)*

7. (a) Graph (−1 for each error) B5



   (b) (i) $\left(x - \frac{3}{2}\right)^2 - \frac{5}{4}$ M1 A1 A1

   (ii) $-\frac{5}{4}$ B1

   (iii) $\frac{3}{2}$ B1 *(10 marks)*

UNIT 24 *Solving Quadratic Equations*

CSEC Revision Test Answers

8. (a) $5\left(x+\frac{1}{5}\right)^2-\frac{36}{5}$ M1 A1 A1 A1

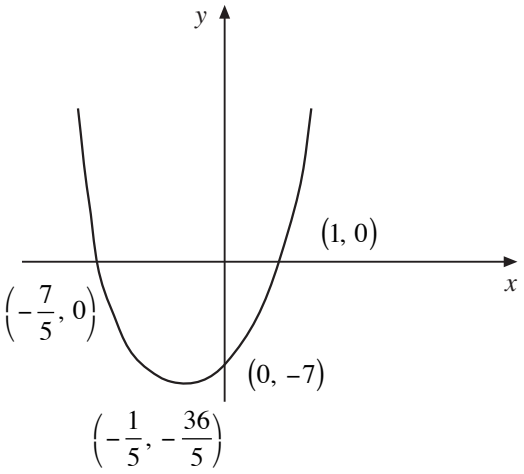
(b) (i) $-\frac{36}{5}$ M1 A1

(ii) $-\frac{1}{5}$ B1

(c) $\left(x+\frac{1}{5}\right)^2=\frac{36}{25}\Rightarrow x=-\frac{1}{5}\pm\frac{6}{5}$ M1 A1

$x=1$ or $-\frac{7}{5}$ A1

(d)



B1 for graph

B1 B1 B1 B1 for each point

(15 marks)

(TOTAL MARKS 50)