

REG-QE-2425-ASM-SET 2-MATH**Suggested solutions****Basic Questions**

$$1. x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2. x = -\frac{3}{2} \text{ or } x = 4$$

$$3. x = \frac{1}{3} \text{ or } x = -3$$

$$4. x = -1 \pm \sqrt{21}$$

$$5. x = \frac{-17 \pm \sqrt{229}}{6}$$

$$6. \Delta = b^2 - 4ac$$

$$7. \Delta = 5^2 - 4(1)(6) = 1$$

$$8. \text{Positive}$$

$$9. 2^2 - 4(1)(-c) = 0$$

$$4c + 4 = 0$$

$$c = -1$$

$$10. 4^2 - 4(a)(2) = 0$$

$$-8a + 16 = 0$$

$$a = 2$$

Conventional Questions

11. (a) $\Delta = (14k)^2 - 4(3k)(49) = 0$ 1M

$$196k^2 - 588k = 0$$

$$k = 3 \quad \text{or} \quad 0 \text{ (rejected)} \quad \text{1A}$$

(b) Put $k = 3$.

$$9x^2 + 42x + 49 = 0$$

$$x = -\frac{7}{3} \quad \text{1A}$$

The double root is $-\frac{7}{3}$.

12. (a) $\Delta = (-6k)^2 - 4(k+2)(6k+7) = 0$ 1M

$$12k^2 - 76k - 56 = 0$$

$$k = 7 \quad \text{or} \quad -\frac{2}{3} \quad \text{1A}$$

(b) Put $k = 7$.

$$9x^2 - 42x + 49 = 0$$

$$x = \frac{7}{3} \quad \text{1A}$$

Put $k = -\frac{2}{3}$.

$$\frac{4}{3}x^2 + 4x + 3 = 0$$

$$x = -\frac{3}{2} \quad \text{1A}$$

13. (a) $x^2 = \frac{4x+6}{1-k}$

$$(1-k)x^2 = 4x+6$$

$$(1-k)x^2 - 4x - 6 = 0$$

The equation has non-real roots.

$$\Delta = (-4)^2 - 4(1-k)(-6) < 0 \quad \text{1M}$$

$$-24k + 40 < 0$$

$$k > \frac{5}{3} \quad \text{1A}$$

(b) The least value of k is 2. 1A

14. $3x(x-2) = 4+h$

$$3x^2 - 6x + (-h-4) = 0$$

The equation has real roots.

$$\Delta = (-6)^2 - 4(3)(-h - 4) \geq 0 \quad 1M$$

$$12h + 84 \geq 0$$

$$h \geq -7 \quad 1A$$

The possible values of h are $-7, -6, -5, -4, -3, -2$ and -1 . 1A

15. $(x - m)(x + 6) = 1 - mx$

$$x^2 + (6 - m)x - 6m = -mx + 1$$

$$x^2 + 6x + (-6m - 1) = 0$$

The equation has real roots.

$$\Delta = (6)^2 - 4(1)(-6m - 1) \geq 0 \quad 1M$$

$$24m + 40 \geq 0$$

$$m \geq -\frac{5}{3} \quad 1A$$

Put $m = -1$.

$$x^2 + 6x + (6 - 1) = 0 \quad 1M$$

$$x = -1 \quad \text{or} \quad -5 \quad 1A$$

16. $\Delta = k^2 - 4(k + 4)(-4) \quad 1M$

$$= k^2 + 16k + 64$$

$$= (k + 8)^2 \quad 1M$$

$$\geq 0$$

The equation has real roots for all real numbers k . 1

17. The equation $5x^2 - 6x + k = 0$ has repeated real roots.

$$\Delta = (-6)^2 - 4(5)(k) = 0 \quad 1M$$

$$-20k + 36 = 0$$

$$k = \frac{9}{5} \quad 1A$$

18. The equation $-3x^2 + 5x - k = 0$ has no real roots.

$$\Delta = 5^2 - 4(-3)(-k) < 0 \quad 1M$$

$$-12k + 25 < 0$$

$$k > \frac{25}{12} \quad 1A$$

19. (a) The equation $-2x^2 + 8x + 2k + 3 = 0$ has two distinct real roots.

$$\Delta = 8^2 - 4(-2)(2k + 3) > 0$$

1M

$$16k + 88 > 0$$

$$k > -\frac{11}{2}$$

1A

- (b) Put $k = -5$ and $x = 0$.

$$y = -2(0)^2 + 8(0) + 2(-5) + 3$$

1M

$$= -7$$

The y-intercept of the graph is -7 .

1A