

Quadratic Functions Review Paper 2 KEY

1. (a) evidence of obtaining the vertex (M1)
e.g. a graph, $x = -\frac{b}{2a}$, completing the square
 $f(x) = 2(x + 1)^2 - 8$ A2 N3
- (b) $x = -1$ (equation must be seen) A1 N1
- (c) $f(x) = 2(x - 1)(x + 3)$ A1A1 N2 [6]
2. (a) $(1, -2)$ A1A1 N2 2
- (b) $g(x) = 3(x - 1)^2 - 2$ (accept $p = 1, q = -2$) A1A1 N2 2
- (c) $(1, 2)$ A1A1 N2 2 [6]
3. (a) (i) $p = 1, q = 5$ (or $p = 5, q = 1$) A1A1 N2
(ii) $x = 3$ (must be an equation) A1 N1
- (b) $y = (x - 1)(x - 5)$
 $= x^2 - 6x + 5$ (A1)
 $= (x - 3)^2 - 4$ (accept $h = 3, k = -4$) A1A1 N3 [6]
4. (a) attempt to use discriminant (M1)
correct substitution, $(k - 3)^2 - 4 \times k \times 1$ (A1)
setting **their** discriminant equal to zero M1
e.g. $(k - 3)^2 - 4 \times k \times 1 = 0, k^2 - 10k + 9 = 0$
 $k = 1, k = 9$ A1A1 N3
- (b) $k = 1, k = 9$ A2 N2 [7]

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5. (a) (i) $p = -2$ $q = 4$ (or $p = 4, q = -2$) (A1)(A1) (N1)(N1)

(ii) $y = a(x+2)(x-4)$
 $8 = a(6+2)(6-4)$ (M1)
 $8 = 16a$

$a = \frac{1}{2}$ (A1) (N1)

(iii) $y = \frac{1}{2}(x+2)(x-4)$

$y = \frac{1}{2}(x^2 - 2x - 8)$

$y = \frac{1}{2}x^2 - x - 4$

(A1) (N1) 5

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6. (a) $h = 3$ (A1)

$k = 2$ (A1) 2

(b) $f(x) = -(x-3)^2 + 2$
 $= -x^2 + 6x - 9 + 2$ (must be a correct expression) (A1)

$= -x^2 + 6x - 7$ (AG) 1

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7. (a) When $t = 0$, (M1)
 $h = 2 + 20 \times 0 - 5 \times 0^2 = 2$ $h = 2$ (A1) 2

(b) When $t = 1$, (M1)
 $h = 2 + 20 \times 1 - 5 \times 1^2$ (A1)
 $= 17$ (AG) 2

(c) (i) $h = 17 \Rightarrow 17 = 2 + 20t - 5t^2$ (M1)
(ii) $5t^2 - 20t + 15 = 0$ (M1)
 $\Leftrightarrow 5(t^2 - 4t + 3) = 0$
 $\Leftrightarrow (t - 3)(t - 1) = 0$ (M1)
Note: Award (M1) for factorizing or using the formula
 $\Leftrightarrow t = 3$ or 1 (A1) 4
Note: Award (A1) for $t = 3$

(d) (i) $20 - 10t = 0 \Leftrightarrow t = 2$ (A1)

(ii) $t = 2$ (M1)
 $\Rightarrow h = 2 + 20 \times 2 - 5 \times 2^2 = 22 \Rightarrow h = 22$ (A1) 7

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8. Correct expression for **second** side, using area = 320 (A1)

e.g. let the two sides be x , $y = \frac{320}{x}$

attempt to set up cost function using \$4 for two sides and \$10 for one side (M1)

e.g. $10x + 4(y + y)$

correct expression for cost A2

e.g. $10x + 4\left(\frac{320}{x} + \frac{320}{x}\right)$; $10x + 4(2)\left(\frac{320}{x}\right)$; $10x + \frac{2560}{x}$

sketch of cost function (M1)

identifying minimum point (A1)

e.g. marking point on graph, $x = 16$

minimum cost is 320 (dollars) A1 N4

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