Quadratic functions 2

1)

(a) (i) $m = 3$ *A2* *N2*

(ii) $p = 2$ *A2* *N2*

(b) Appropriate substitution *M1*

e.g. $0 = d(1-3)^2 + 2$, $0 = d(5-3)^2 + 2$, $2 = d(3-1)(3-5)$

$d = -\frac{1}{2}$ *A1* *N1*

2)

(a) (i) $p = 1,\ q = 5$ (or $p = 5,\ q = 1$) *A1A1* *N2*

(ii) $x = 3$ (must be an equation) *A1* *N1*

[3 marks]

(b) $y = (x-1)(x-5)$

$= x^2 - 6x + 5$ *(A1)*

$= (x-3)^2 - 4$ (accept $h = 3,\ k = -4$) *A1A1* *N3*

[3 marks]

3)

(a) $f(x) = 3(x^2 + 2x + 1) - 12$ *A1*

$= 3x^2 + 6x + 3 - 12$ *A1*

$= 3x^2 + 6x - 9$ *AG* *N0*

[2 marks]

(b) (i) vertex is (–1, –12) *A1A1* *N2*

(ii) $x = -1$ (**must** be an equation) *A1* *N1*

(iii) (0, –9) *A1* *N1*

(iv) evidence of solving $f(x) = 0$ *(M1)*

e.g. factorizing, formula,

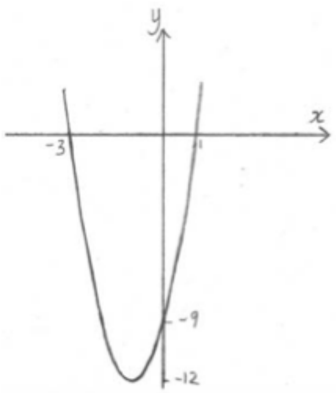
correct working *A1*

e.g. $3(x+3)(x-1) = 0$, $x = \frac{-6 \pm \sqrt{36+108}}{6}$

(–3, 0), (1, 0) *A1A1* *N1N1*

[8 marks]

(c)



A1A1 *N2*

Note:	Award ***A1*** for a parabola opening upward, ***A1*** for vertex and intercepts in approximately correct positions.

[2 marks]

Quadratic functions 2

4)	(a)	evidence of attempting to solve $f(x)=0$	*(M1)*	
		evidence of correct working	*A1*	
		e.g. $(x+1)(x-2)$, $\frac{1\pm\sqrt{9}}{2}$		
		intercepts are $(-1, 0)$ and $(2, 0)$ (accept $x=-1$, $x=2$)	*A1A1*	*N1N1*
	(b)	evidence of appropriate method	*(M1)*	
		e.g. $x_v = \frac{x_1+x_2}{2}$, $x_v = -\frac{b}{2a}$, reference to symmetry		
		$x_v = 0.5$	*A1*	*N2*
				[6 marks]
5)	(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 marks]
6)	(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 marks]
7)	(a)	evidence of setting function to zero	*(M1)*	
		e.g. $f(x)=0$, $8x=2x^2$		
		evidence of correct working	*A1*	
		e.g. $0=2x(4-x)$, $\frac{-8\pm\sqrt{64}}{-4}$		
		x-intercepts are at 4 and 0 (accept $(4, 0)$ and $(0, 0)$, or $x=4$, $x=0$)	*A1A1*	*N1N1*
	(b)	(i) $x=2$ (must be equation)	*A1*	*N1*
		(ii) substituting $x=2$ into $f(x)$	*(M1)*	
		$y=8$	*A1*	*N2*
				[7 marks]

8) (a) $q=-2, r=4$ or $q=4, r=-2$ *A1A1* *N2*

(b) $x=1$ (must be an equation) *A1* *N1*

(c) substituting $(0,-4)$ into the equation *(M1)*

e.g. $-4=p(0-(-2))(0-4), -4=p(-4)(2)$

correct working towards solution *(A1)*

e.g. $-4=-8p$

$$p=\frac{4}{8}\left(=\frac{1}{2}\right)$$ *A1* *N2*

[6 marks]