

13

$$f(x) = k(x+a)^2(x+b)(x+c)$$

$$f(x) = k(x-3)^2(x+1)(x-5)$$

$$\text{When } x=0, y=-9$$

$$\therefore -9 = k(-3)^2(1)(-5)$$

$$-9 = k(9)(-5)$$

$$-9 = -45k$$

$$k = \frac{-9}{-45} = \frac{1}{5}$$

$$f(x) = \frac{1}{5}(x-3)^2(x+1)(x-5)$$

Question			Generic scheme	Illustrative scheme	Max mark
13.			•¹ state repeated factor •² state non-repeated linear factors •³ calculate k and express in required form	•¹ $(x-3)^2(\dots)(\dots)$ •² $(\dots)^2(x+1)(x-5)$ •³ $f(x) = \frac{1}{5}(x-3)^2(x+1)(x-5)$	3
Notes:					
1. Do not penalise the omission of $f(x) =$ or the inclusion of $y =$. 2. Accept $f(x) = \frac{1}{5}(x+3)^2(x+1)(x+5)$ for • ³ .					
Commonly Observed Responses:					
Candidate A - incorrect signs $f(x) = k(x+3)^2(x-1)(x+5)$ • ¹ ✗ • ² ✓ ₁ $f(x) = \frac{1}{5}(x+3)^2(x-1)(x+5)$ • ³ ✓ ₁			Candidate B - incorrect repeated root $f(x) = k(x+1)^2(x-3)(x-5)$ • ¹ ✗ • ² ✓ ₁ $f(x) = -\frac{3}{5}(x+1)^2(x-3)(x-5)$ • ³ ✓ ₁		
Candidate C - incorrect repeated root $f(x) = k(x-5)^2(x+1)(x-3)$ • ¹ ✗ • ² ✓ ₁ $f(x) = \frac{3}{25}(x-5)^2(x+1)(x-3)$ • ³ ✓ ₁			Candidate D - incorrect signs and repeated root $f(x) = k(x+5)^2(x-1)(x+3)$ • ¹ ✗ • ² ✗ $f(x) = \frac{3}{25}(x+5)^2(x-1)(x+3)$ • ³ ✓ ₁		
Candidate E - incorrect signs and repeated root $f(x) = k(x-1)^2(x+5)(x+3)$ • ¹ ✗ • ² ✗ $f(x) = -\frac{3}{5}(x-1)^2(x+5)(x+3)$ • ³ ✓ ₁			Candidate F - use of a, b and c $a = -3$ • ¹ ✓ $b = 1, c = -5$ (or $b = -5, c = 1$) • ² ✓ $k = \frac{1}{5}$ • ³ ^		

[END OF MARKING INSTRUCTIONS]