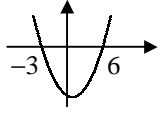
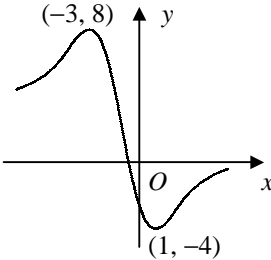
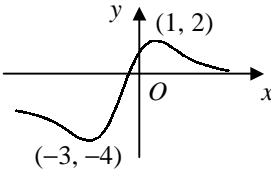
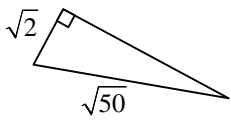


C1 Paper F – Marking Guide

1. (i) $= 8^2 - (4 \times 2 \times 8) = 0$ M1 A1
(ii) 1 real root A1 (3)
-
2. $x^2 - 3x + 2 < 20$
 $x^2 - 3x - 18 < 0$
 $(x + 3)(x - 6) < 0$ 
 $-3 < x < 6$ M1
M1
M1
A1 (4)
-
3. (i) $x = (\sqrt[3]{27})^2 = 3^2 = 9$ M1 A1
(ii) $= (\frac{9}{4})^{-\frac{1}{2}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$ M1 A1 (4)
-
4. $\frac{6x^2 - 1}{2\sqrt{x}} = 3x^{\frac{3}{2}} - \frac{1}{2}x^{-\frac{1}{2}}$ M1 A1
 $\frac{d}{dx}(3x^{\frac{3}{2}} - \frac{1}{2}x^{-\frac{1}{2}}) = \frac{9}{2}x^{\frac{1}{2}} + \frac{1}{4}x^{-\frac{3}{2}}$ M1 A2 (5)
-
5. (i)  B3
(ii)  B3
(6)
-
6. (i) $f(x) = 2[x^2 - 2x] + 1$ M1
 $= 2[(x - 1)^2 - 1] + 1$ M1
 $= 2(x - 1)^2 - 1, \quad a = 2, b = -1, c = -1$ A2
(ii) $x = 1$ B1
(iii) $2(x - 1)^2 - 1 = 3$ M1
 $(x - 1)^2 = 2$
 $x = 1 \pm \sqrt{2}$ M1 A1 (8)
-

7. (i) $\frac{dy}{dx} = 3x^2 + 2ax - 15$ M1 A1
 SP when $x = -1 \therefore 3 - 2a - 15 = 0$ M1
 $a = -6$ A1
 $y = x^3 - 6x^2 - 15x + b$
 $(-1, 12)$ on curve $\therefore 12 = -1 - 6 + 15 + b$ M1
 $b = 4$ A1
- (ii) $3x^2 - 12x - 15 = 0$ M1
 $3(x - 5)(x + 1) = 0$ M1
 $x = -1$ [at $(-1, 12)$] or $5 \therefore (5, -96)$ A1 (9)
-
8. (i) $(-6, 5) \therefore 36 + 25 - 60 - 40 + k = 0$ M1
 $k = 39$ A1
- (ii) $(x + 5)^2 - 25 + (y - 4)^2 - 16 + 39 = 0$ M1
 $(x + 5)^2 + (y - 4)^2 = 2$
 \therefore centre $(-5, 4)$, radius $= \sqrt{2}$ A2
- (iii)  dist. $(2, 3)$ to centre $= \sqrt{49 + 1} = \sqrt{50}$ B1
 $\therefore AB^2 = (\sqrt{50})^2 - (\sqrt{2})^2 = 48$ M1 A1
 $AB = \sqrt{48} = \sqrt{16 \times 3} = 4\sqrt{3}$ M1 A1 (10)
-
9. (i) $\frac{dy}{dx} = 1 - 3x^{-2}$ M1 A1
 grad $= 1 - 3(1)^{-2} = 1 - 3 = -2$ A1
- (ii) $x = 1 \therefore y = 4$
 grad $= \frac{-1}{-2} = \frac{1}{2}$ M1
 $\therefore y - 4 = \frac{1}{2}(x - 1)$ M1
 $y = \frac{1}{2}x + \frac{7}{2}$ A1
- (iii) $x + \frac{3}{x} = \frac{1}{2}x + \frac{7}{2}$
 $2x^2 + 6 = x^2 + 7x$ M1
 $x^2 - 7x + 6 = 0$
 $(x - 1)(x - 6) = 0$ M1
 $x = 1$ (at P), 6 A1
 $\therefore (6, 6\frac{1}{2})$ A1 (10)
-
10. (i) $y = 0 \therefore x = 7 \Rightarrow A(7, 0)$ M1 A1
- (ii) $l_1: y = 14 - 2x \therefore$ grad $= -2$ B1
 $l_2: y - 6 = -2(x + 6)$ M1
 $y = -2x - 6$ A1
- (iii) $y = 0 \therefore x = -3 \Rightarrow C(-3, 0)$ B1
- (iv) grad $CD = \frac{-1}{-2} = \frac{1}{2}$ M1
 eqn $CD: y - 0 = \frac{1}{2}(x + 3)$ M1 A1
 intersection with $l_1: \frac{1}{2}(x + 3) = 14 - 2x$
 $x = 5$ M1
 $y = 14 - (2 \times 5) = 4 \therefore D(5, 4)$ A1
- (v) $AC = 7 - (-3) = 10$
 area $= \frac{1}{2} \times 10 \times 4 = 20$ M1 A1 (13)
-
- Total (72)