Half Term 2A (ANSWERS)	Week 1

1

$Repeated\ root\ b^2 - 4ac = 0$

$p^2 - 4 \times (p-3) \times 3 = 0$

$p^2 - 12p + 36 = 0$

$(p-6)^2 = 0$

$p = 6$

2

$No\ real\ roots \quad b^2 - 4ac < 0$

$(2p)^2 - 4 \times p \times 3 < 0$

$4p^2 - 12p < 0$

$4p(p-3) < 0$

$0 < p < 3$

3

$2y + 4x = 7$

$y = 3.5 - 2x$ Gradient = -2

$(y - 5) = -2(x - 1)$

$y - 5 = -2x + 2$

$2x + y = 7$

4

$1 + 7(2x) + \frac{7\times6}{1\times2}(2x)^2 + \frac{7\times6\times5}{1\times2\times3}(2x)^3$

$1 + 14x + 84x^2 + 280x^3$

5

$\frac{dy}{dx} = 3x^2 - 4x + 2$

$gradient = 3 \times (-1)^2 - 4 \times (-1) + 2$

$= 9$

Half Term 2A (ANSWERS)	Week 2

1

$Repeated\ root\ b^2 - 4ac = 0$
$(k+6)^2 - 4 \times 8 \times k = 0$
$k^2 + 12k + 36 - 32k = 0$
$k^2 - 20k + 36 = 0$
$(k-2)(k-18) = 0$
$k = 2 \quad k = 18$

2

$No\ real\ roots \quad b^2 - 4ac < 0$
$(2p)^2 - 4 \times 1 \times 1 < 0$
$4p^2 - 4 < 0$
$4(p^2 - 1) < 0$
$-1 < p < 1$

3

6y + 3x = -4
y=-1.5 –0.5x Gradient = -½
(y – 4) = -½ (x + 3)
-2y + 8 = x + 3
x + 2y = 5

4

$1 + 10(-4x) + \frac{10\times9}{1\times2}(-4x)^2 + \frac{10\times9\times8}{1\times2\times3}(-4x)^3$

$1 - 40x + 720x^2 - 7680x^3$

5

$\frac{dy}{dx} = 6x^2 - 24 \quad at\ a\ stationary\ point \frac{dy}{dx} = 0$
$6x^2 - 24 = 0$
$6(x^2 - 4) = 0$
$(x+2)(x-2) = 0$
$x = 2 \quad y = -32 \quad (2, -32)$
$x = -2 \quad y = 32 \quad (-2,\ 32)$

Half Term 2A (ANSWERS)	Week 3

1

$Repeated\ root\ b^2 - 4ac = 0$

$k^2 - 4 \times 9 \times (k - 5) = 0$

$k^2 - 36k + 180 = 0$

$(k - 6)(k - 30) = 0$

$k = 6 \quad k = 30$

2

$Real\ and\ distinct\ roots\ b^2 - 4ac > 0$

$(p)^2 - 4 \times 3 \times 3 > 0$

$p^2 - 36 > 0$

$(p - 6)(p + 6) < 0$

$p < -6\ or\ p > 6$

3

Gradient = $\frac{5--3}{4-2} = 4$

Perpendicular gradient = -¼

(y + 3) = -¼ (x - 2)

-4y – 12 = x – 2

x + 4y = -10

4

$2^{10} + 10(2)^9(-3x) + \frac{10\times9}{1\times2}(2)^8(-3x)^2$

$1024 - 15360x + 103680x^2$

5

$\frac{dy}{dx} = x + \frac{1}{2}x^2 - \frac{1}{4}$

$Gradient = \frac{1}{2} + \frac{1}{2} \times \left(\frac{1}{2}\right)^2 - \frac{1}{4}$

$= \frac{3}{8}$

Half Term 2A (ANSWERS)	Week 4

1

$Repeated\ root\ b^2 - 4ac = 0$
$(p+5)^2 - 4 \times (p-1) \times 8 = 0$
$p^2 + 10p + 25\ - 32p + 32 = 0$
$p^2 - 22p + 57 = 0$
$(p-19)(p-3) = 0$
$p = 3 \quad p = 19$

2

$Real\ and\ distinct\ roots\ b^2 - 4ac > 0$
$(4)^2 - 4 \times p \times (5-p) > 0$
$16 - 20p + 4p^2 > 0$
$4(p-4)(p-1) < 0$
$p < 1\ or\ p > 4$

3

Gradient = $\frac{9--1}{-6-4} = -5$
(y - 3) = -5(x - 6)
y - 3= -5x + 30
5x + y = 33

4

$\frac{9\times8\times7}{1\times2\times3}(4^6)\left(\frac{x}{2}\right)^3$

$43008(x^3)$

5

$\frac{dy}{dx} = 3x - \frac{5}{2}x - \frac{5}{4}$
$x = -1$
$\frac{dy}{dx} = -3 + \frac{5}{2} - \frac{5}{4}$
$-1\frac{3}{4}$

Half Term 2A (ANSWERS)	Week 5

1

$Repeated\ root\ b^2 - 4ac = 0$
$(p+4)^2 - 4 \times (p-1) \times 5 = 0$
$p^2 + 8p + 16 - 20p + 20 = 0$
$p^2 - 12p + 36 = 0$
$(p-6)^2 = 0$
$p = 6$

2

$No\ real\ roots \quad b^2 - 4ac < 0$
$(3(p+1))^2 - 4 \times 1 \times (p+1) < 0$
$9p^2 + 18p + 9 - 4p - 4 < 0$
$9p^2 + 14p + 5 < 0$
$(9p+5)(p+1) < 0$
$-1 < p < -\frac{5}{9}$

3

2y = x + 5
y= ½x + 2.5
Perpendicular gradient = -2
(y – 4) = -2(x + 2)
y – 4 = -2x - 4
2x + y = 0

4

$\frac{10\times9\times8\times7}{1\times2\times3\times4}(3^6)(\frac{x}{3})^4$

$1890(x^4)$

5

$\frac{dy}{dx} = 15x^2 - 4x - 3 \qquad \frac{dy}{dx} = 0\ at\ a\ staionay\ point$
$15x^2 - 4x - 3 = 0$
$(3x+1)(5x-3) = 0$
$x = -\frac{1}{3} \quad x = \frac{3}{5}$

Half Term 2A (ANSWERS)	Week 6

1

$Repeated\ root\ b^2 - 4ac = 0$

$(k+3)^2 - 4 \times (k-3)(k+3) = 0$

$k^2 + 6k + 9 - 4k^2 + 36 = 0$

$-3k^2 + 6k + 45 = 0$

$k^2 - 2k - 15 = 0$

$(k-5)(k+3) = 0$

$k = 5 \quad k = -3$

2

$Real\ and\ disinct\ roots\ b^2 - 4ac > 0$

$(-(1+p))^2 - 4 \times 2 \times (5-p) > 0$

$1 + 2p + p^2 - 40 + 8p > 0$

$p^2 + 10p - 39 > 0$

$(p+13)(p-3) < 0$

$p < -13\ or\ p > 3$

3

$5y = 2x + 10$

$y = \frac{2}{5}x + 2$ Perpendicular gradient = $-\frac{5}{2}$

$(y - 3) = -\frac{5}{2}(x + 4)$

$2y - 6 = -5x - 20$

$5x + 2y = -14$

4

$\frac{8\times7\times6\times5}{1\times2\times3\times4}(2^4)\left(\frac{3x}{2}\right)^4$

$5670(x^4)$

5

$\frac{dy}{dx} = -10 + 3x^2$ $\quad Gradient = -10 + 3 \times (-1)^2$

$= -7$

$x = -1 \quad y = 5 - 10 \times (-1) + (-1)^3$

$Equation\ of\ tangent\ (y - 14) = -7(x+1)$

$y + 7x - 7 = 0$

Half Term 2A (ANSWERS)	Week 7

1

$Repeated\ root\ b^2 - 4ac = 0$

$(k+5)^2 - 4 \times k \times k = 0$

$k^2 + 10k + 25 - 4k^2 = 0$

$-3k^2 + 10k + 25 = 0$

$3k^2 - 10k - 25 = 0$

$(k-5)(3k+5) = 0$

$k = 5 \quad k = -\frac{5}{3}$

2

$No\ real\ roots \quad b^2 - 4ac < 0$

$(8-4p)^2 - 4 \times 4 \times (8-7p) < 0$

$64 - 64p + 16p^2 - 128 + 112p < 0$

$16p^2 + 48p - 64 < 0$

$4(p-1)(p-4) < 0$

$1 < p < 4$

3

$4y = -3x + 5$

$y = -\frac{3}{4}x + \frac{5}{4}$ Gradient $= -\frac{3}{4}$

$(y - 4) = -\frac{3}{4}(x + 4)$

$4y - 16 = -3x - 12$

$3x + 4y = 4$

4

$\frac{12\times11\times10\times9\times8}{1\times2\times3\times4\times5}\left(\frac{1}{2}\right)^7 (-2x)^5$

$-198(x^5)$

5

$\frac{dy}{dx} = 9x^2 + 12x - 2$

$y = 3x + 2 \quad Gradient = 3$

$9x^2 + 12x - 2 = 3$

$9x^2 + 12x - 5 = 0$

$(3x-1)(3x+5) = 0 \quad x = \frac{1}{3} \quad x = -\frac{5}{3}$