Half Term 3C (ANSWERS)	Week 1

1

2y + 4x = 7
y=3.5 – 2x Gradient = -2
(y – 5) = -2(x – 1)
y – 5 = -2x +2
2x + y =7

2

$cos\,3\theta = \frac{1}{3}$

$3\theta = 70.5°, 289.5°, 430.5°$

$\theta = 23.5°, 96.5°, 144°\ \ (3\ s.f.)$

3

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

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

4

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

Gradient at (-1,-6) = 3 + 4 + 2

= 9

5

($y = (x + 1)^3 + 2$

$y = x^3 + 3x^2 + 3x + 3$

Half Term 3C (ANSWERS)	Week 2

1

$6y + 3x = -4$
$y = -1.5 - 0.5x$ Gradient $= -\frac{1}{2}$
$(y - 4) = -\frac{1}{2}(x + 3)$
$-2y + 8 = x + 3$
$x + 2y = 5$

2

$2(1 - cos^2 2\theta) - cos2\theta = 1$
$2cos^2 2\theta + cos2\theta - 1 = 0$
$(2cos2\theta - 1)(cos2\theta + 1) = 0$
$cos2\theta = \frac{1}{2} \quad cos2\theta = -1$
$2\theta = 60^0, 180^0, 300^0$

$\theta = 30^0, 90^0, 150^0$

3

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

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

4

$\frac{dy}{dx} = 6x^2 - 24$
$6x^2 - 24 = 0$
$x^2 - 4 = 0$
$x = \pm 2$ $\quad x = 2 \;\; y = -32$ *(2, -32)*
$\quad x = -2 \;\; y = -32$ *(-2, 32)*

5

$y = (2x)^2 - 2(2x)$

$y = 4x^2 - 4x$

Half Term 3C (ANSWERS)	Week 3

1

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

$Perpendicular\ gradient = -¼$

$(y + 3) = -¼\ (x - 2)$

$-4y - 12 = x - 2$

$x + 4y = -10$

2

$2(1 - cos^2 3\theta) = 2 - cos3\theta$

$2cos^2 3\theta - cos3\theta = 0$

$cos3\theta(2cos3\theta - 1) = 0$

$cos3\theta = 0 \quad cos3\theta = \frac{1}{2}$

$3\theta = 60°, 90°, 270°, 300°, 420°, 450°$

$\theta = 20°, 30°, 90°, 100°, 140°, 150°$

3

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

$1024 - 15360x + 103680x^2$

4

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

$\frac{1}{2} + \frac{1}{8} - \frac{1}{4} = \frac{3}{8}$

5

$y = (-x)^3 + 2(-x)^2 - (-x) + 3$

$y = -x^3 + 2x^2 + x + 3$

Half Term 3C (ANSWERS)	Week 4

1

$Gradient = \frac{9--1}{-6-4} = -5$

$(y - 3) = -5(x - 6)$

$y - 3 = -5x + 30$

$5x + y = 33$

2

$2(1 - cos^2 2\theta) = 3cos2\theta$
$2cos^2 2\theta + 3cos2\theta - 2 = 0$
$(2cos2\theta - 1)(cos2\theta + 2) = 0$
$cos2\theta = \frac{1}{2} \quad (cos2\theta = -2)$
$2\theta = 60°, 300° \qquad \theta = 30°, 150°$

3

$\frac{9 \times 8 \times 7}{1 \times 2 \times 3}(4^6)\left(\frac{x}{2}\right)^3$

$43008(x^3)$

4

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

$-3 + \frac{5}{2} - \frac{5}{4} = -\frac{7}{4}$

5

Stretch by scale factor 2 parallel to the y axis

(-1,4)

Half Term 3C (ANSWERS)	Week 5

1

$2y = x + 5$
$y = \frac{1}{2}x + 2.5$
Perpendicular gradient = -2
$(y - 4) = -2(x + 2)$
$y - 4 = -2x - 4$
$2x + y = 0$

2

$5cos^2 2\theta = 4 - 3(1 - cos^2 2\theta)$
$5cos^2 2\theta = 4 - 3 + 3cos^2 2\theta$
$2cos^2 2\theta = 1$
$cos 2\theta = \pm\frac{1}{\sqrt{2}}$ $\quad 2\theta = 45°, 135°, 225°, 315°$
$\theta = 22.5°, 67.5°, 110, 158°$

3 s.f

3

$\frac{10 \times 9 \times 8 \times 7}{1 \times 2 \times 3 \times 4}(3^6)(\frac{x}{3})^4$

$1890(x^4)$

4

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

5

Stretch by scale factor ½ parallel to the x axis

(3,-10)

Half Term 3C (ANSWERS)	Week 6

1

$5y = 2x + 10$

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

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

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

$5x + 2y = -14$

2

$tan^2 2\theta - 3tan2\theta + 2 = 0$

$(tan2\theta - 1)(tan2\theta - 2) = 0$

$tan2\theta = 1 \quad tan2\theta = 2$

$2\theta = 45°, 63.4°, 225°, 243.4°$

$\theta = 22.5°, 31.7°, 113°, 122°$ *(3 s.f)*

3

$$\frac{8 \times 7 \times 6 \times 5}{1 \times 2 \times 3 \times 4}(2^4)\left(\frac{3x}{2}\right)^4$$

$5670(x^4)$

4

$\frac{dy}{dx} = -10 + 3x^2$ $x = -1$

gradient of the tangent = -10 + 3

= -7

$x = -1 \quad y = 14$

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

$y + 7x = 7$

5

Translation by vector $\begin{bmatrix}1\\3\end{bmatrix}$

(0, 7)

0

Half Term 3C (ANSWERS)	Week 7

1

$4y = -3x + 5$

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

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

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

$3x + 4y = 4$

2

$(1 - sin^2 3\theta) - 2 = sin^2 3\theta + 3sin3\theta$

$2sin^2 3\theta + 3sin3\theta + 1 = 0$

$(2sin3\theta + 1)(sin3\theta + 1) = 0$

$sin3\theta = -\frac{1}{2}, \ -1 \qquad 3\theta = 210°, 270°, 330°$

$\theta = 70°, 90°, 110°$

3

$\frac{12 \times 11 \times 10 \times 9 \times 8}{1 \times 2 \times 3 \times 4 \times 5}\left(\frac{1}{2}\right)^7 (-2x)^5$

$-198(x^5)$

4

$\frac{dy}{dx} = 9x^2 + 12x - 2$ $\qquad$ *Gradient of y – 3x = 2 is 3*

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

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

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

5

Translation by vector $\begin{bmatrix} -5 \\ 2 \end{bmatrix}$

(-10, 0)