Half Term 5A (ANSWERS)	Week 1

1

$9C5 \times 3^4 \times \left(\frac{1}{3}x\right)^5 = 42x^5$

The coefficient = 42

2

$\cos^2 x - 2\sin x \cos x + \sin^2 x + \cos^2 x + 2\sin x \cos x + \sin^2 x$

$= 2\cos^2 x + 2\sin^2 x$

$= 2(\cos^2 x + \sin^2 x)$

$= 2$

3

$x = 3 \quad y = 24 \qquad 9 - \frac{1}{3} \times 27 + 3a = 24 \qquad a = 8$

$\frac{dy}{dx} = 2x - x^2 + 8$

$\frac{dy}{dx} = 0 \quad 2x - x^2 + 8 = 0$

$x = -2 \quad x = 4$

4

$2\mathbf{b} - \mathbf{a} = 2i + 5j$

$|2\mathbf{b} - \mathbf{a}| = \sqrt{2^2 + 5^2}$

$= \sqrt{29}$

5

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

1

$(1+2x)^7 = \ldots\ldots + 7C3 \times 1^4 \times (2x)^3 + 7C4 \times 1^3 \times (2x)^4$

$= \ldots\ldots 280x^3 + 560x^4 \ldots$

$(x-1)(1+2x)^7 = \ldots\ldots 280x^4 - 560x^4$

$= -280x^4$

2

$1 - sin\theta cos\theta \times \frac{cos\theta}{sin\theta}$

$= 1 - cos2\theta$

$= sin2\theta$

3

$x(4-x) = 0 \quad x = 0 \quad x = 4$

$\int_0^4 4x - x^2 dx$

$= \left[2x^2 - \frac{1}{3}x^3\right]$

$= \left[2 \times 4^2 - \frac{1}{3} \times 4^3\right] - 0$

$= 10\frac{2}{3}$

4

$|q| = \sqrt{3^2 + 4^2}$

$|q| = 5$

$\begin{pmatrix} -15 \\ 20 \end{pmatrix}$

5

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

$y = 4x^2 - 4x$

Half Term 5A (ANSWERS)	Week 3

1

$10C5 \times \left(\frac{1}{3}\right)^5 \times (-3x)^5$

$= -252x^5$

2

$tan\theta sin\theta \times cos\theta = (1 - cos\theta)(1 + cos\theta)$

$tan\theta sin\theta cos\theta \quad = \quad (1 - cos\theta)(1 + cos\theta)$

$= \frac{sin\theta}{cos\theta} sin\theta cos\theta \quad = 1 - cos^2\theta$

$= sin^2\theta \quad = sin^2\theta$

3

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

$3 \times 2^2 - 10 \times 2 + k = 0$

$k = 8$

$y = x^3 - 5x^2 + 8x$

$x = 2 \quad y = 4$

4

$a = 5\,cos30° \quad b = 5\,sin30°$

$\boldsymbol{p} = \frac{5\sqrt{3}}{2} i + \frac{5}{2} j$

5

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

Half Term 5A (ANSWERS)	Week 4

1

$5C4 \times (2)^1 \times (-3x)^4 = 810x^4$

$5C2 \times (2)^3 \times (-3x)^2 = 720x^2$

Coefficient of the x^4 term = 720 - 810

= -90

2

$\frac{sin\theta}{cos\theta} + \frac{cos\theta}{sin\theta}$

$= \frac{sin^2\theta + cos^2\theta}{cos\theta sin\theta}$

$= \frac{1}{sin\theta cos\theta}$

3

$y = x^3 - 4x^2 + 3x$

$\int_0^1 x^3 - 4x^2 + 3x\, dx$ $\int_1^3 x^3 - 4x^2 + 3x\, dx$

$\left[\frac{1}{4}x^4 - \frac{4}{3}x^3 + \frac{3}{2}x^2 + c\right]$

$= \frac{5}{12}$ - $-2\frac{2}{3}$ *Total Area* $= 3\frac{1}{12}$

4

$\overrightarrow{XY} = -8i + 13j$

$\left|\overrightarrow{XY}\right| = \sqrt{8^2 + 13^2}$

$= \sqrt{233}$

5

(-1,4)

Half Term 5A (ANSWERS)	Week 5

1

$12C6 \times \left(\frac{1}{2}\right)^6 \times (2x)^6 = 924x^6$

2

$4cos\theta - 1 = 2sin\theta tan\theta$

$4cos\theta - 1 = 2\frac{sin^2\theta}{cos\theta}$

$4cos^2\theta - cos\theta = 2(1 - cos^2\theta)$

$6cos^2\theta - cos\theta - 2 = 0$

$cos\theta = \frac{2}{3}$ $cos\theta = -\frac{1}{2}$ $\theta = 48.2°,\ 120°,\ 240°\ 312$

3

$\frac{dy}{dx} = 32x^3$

x = -0.5 *Gradient of tangent = -4*

y = -2.5 *Gradient of normal = ¼*

$y + \frac{5}{2} = \frac{1}{4}(x + \frac{1}{2})$

8y + 20 = 2x + 1

8y - 2x = -19

4

$|3i - 3j| = \sqrt{3^2 + 3^2}$

$3\sqrt{2}$

$a = \sqrt{\frac{3}{2}}$ $b = -\sqrt{\frac{3}{2}}$

5

(3,-10)

Half Term 5A (ANSWERS)	Week 6

1

$6C5 \times (2)^1 \times (-2x)^5 = -382x^5$

$6C3 \times (2)^3 \times (-2x)^3 = -1280x^3$

Coefficient of the x^5 term = 768 - 1280

= -512

2

$5sin\theta = 1 + 2cos^2\theta$

$5sin\theta = 1 + 2(1 - sin^2\theta)$

$2sin^2\theta + 5sin\theta - 3 = 0$

$sin\theta = \frac{1}{2} \quad (sin\theta = -3)$

3

$\int 4x^2 + 12x + 9\, dx = \frac{4}{3}x^3 + 6x^2 + 9x + c$

0 - - 9

= 9

4

Distance between A and the midpoint $= \sqrt{(3-6)^2 + (2-8)^2}$

$= \sqrt{45}$

$= 3\sqrt{5}$

Distance between A and B $= 6\sqrt{5}$

5

(0, 7)

Half Term 5A (ANSWERS)	Week 7

1

$11C5 \times (3)^6 \times (-\frac{1}{3}x)^5 = -1386x^5$

2

$3x - 60 = 30^0, 150^0, 390^0, 510^0, 750^0, 870^0$

$3x = 90^0, 210^0, 450^0, 570^0, 810^0, 930^0$

$x = 30^0, 70^0, 150^0, 190^0, 270^0, 310^0$

3

$y = x^{\frac{5}{2}} \quad \frac{dy}{dx} = \frac{5}{2}x^{\frac{3}{2}}$

$x = 4$ *gradient of tangent* $= 20$

$y = 32$

$y - 32 = 20\,(x - 4)$

$y - 32 = 20x - 80 \qquad 20x - y = 48$

4

$|\overrightarrow{OA}| = \sqrt{4^2 + 2^2} \qquad |\overrightarrow{OB}| = \sqrt{8^2 + 0^2}$

$= 2\sqrt{5} \qquad = 8$

Angle AOB $= tan^{-1}\left(\frac{4}{2}\right)$

$= 63.4^0$

Area $= \frac{1}{2} \times 2\sqrt{5} \times 8 \times sin(63.4) \qquad Area = 16\ (units2)$

5

(-10 , 0)