Half Term 2C (ANSWERS)	Week 1

1

$\frac{6\sqrt{3}-4}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}}$

$= \frac{10+8\sqrt{3}}{1}$

$10 + 8\sqrt{3}$

2

$Repeated\ root\ b^2 - 4ac = 0$
$p^2 - 4 \times (p-3) \times 3 = 0$
$p^2 - 12p + 36 = 0$
$(p-6)^2 = 0$
$p = 6$

3

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

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

$4p^2 - 12p < 0$

$4p(p-3) < 0$

$0 < p < 3$

4

$1 - (1 - cos^2\theta) - 2cos\theta = 0$
$cos^2\theta - 2cos\theta = 0$
$cos\theta(cos\theta - 2) = 0$
$cos\theta = 0 \quad cos\theta = 2\ (no\ solutions)$
$\theta = 90°,\ 270°,\ 450°, 630°$

5

$2x^2 + x - 3$

Half Term 2C (ANSWERS)	Week 2

1

$\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} \times \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}}$

$= \frac{8+2\sqrt{15}}{2}$

$4 + \sqrt{15}$

2

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

3

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

4

$cos^2\theta\ - (1 - cos^2\theta) = -0.5$
$2cos^2\theta = 0.5$
$cos\theta = \pm\sqrt{0.25}$
$cos\theta = \pm 0.5$
$\theta = 60°,\ 120°,\ 240°,\ 300°$

5

$3x^2 - 2x - 1$

Half Term 2C (ANSWERS)	Week 3
1	$2^x \times 2^{-2} \times 2^3 = 2^7$ $x - 2 + 3 = 7$ $x + 1 = 7$ $x = 6$
2	$Repeated\ root\ b^2 - 4ac = 0$ $k^2 - 4 \times 9 \times (k - 5) = 0$ $k^2 - 36k + 180 = 0$ $(k - 6)(k - 30) = 0$ $k = 6 \quad k = 30$
3	$Real\ and\ distinct\ roots\ b^2 - 4ac > 0$ $(p)^2 - 4 \times 3 \times 3 > 0$ $p^2 - 36 > 0$ $(p - 6)(p + 6) < 0$ $p < -6\ or\ p > 6$
4	$3\frac{sin\theta sin\theta}{cos\theta} = cos\theta$ $3sin^2\theta - cos^2\theta = 0$ $3sin^2\theta - (1 - sin^2\theta) = 0$ $4sin^2\theta - 1 = 0$ $sin\theta = \pm 0.5 \qquad \theta = 30°, 150°, 210°, 330°$
5	$4x^2 - 15x + 9$

Half Term 2C (ANSWERS)	Week 4

1

$3^3 \times 3^{-2} \times 3^{-x} = 3^{-4}$

$3 - 2 - x = -4$

$x = 5$

2

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

3

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

4

$2(1 - sin^2\theta) - 3sin\theta = 0$
$2sin^2\theta + 3sin\theta - 2 = 0$
$(2sin\theta - 1)(sin\theta + 2) = 0$
$sin\theta = \ 0.5 \quad sin\theta = -2\ (no\ solutions)$
$\theta = 30°\ ,\ 150°$

5

$2x^2$ - x - 3

Half Term 2C (ANSWERS)	Week 5
1	$2\sqrt{2} - 4\sqrt{2} + 8\sqrt{2} = 6\sqrt{2}$
2	$Repeated\ root\ b^2 - 4ac = 0$ $(p+4)^2 - 4 \times (p-1) \times 5 = 0$ $p^2 + 8p + 16 - 20p + 20 = 0$ $p^2 - 12p + 36 = 0$ $(p-6)^2 = 0$ $p = 6$
3	$No\ real\ roots\ \ b^2 - 4ac < 0$ $(3(p+1))^2 - 4 \times 1 \times (p+1) < 0$ $9p^2 + 18p + 9 - 4p - 4 < 0$ $9p^2 + 14p + 5 < 0$ $(9p+5)(p+1) < 0$ $-1 < p < -\frac{5}{9}$
4	$cos^2\theta + cos\theta = 1 - cos^2\theta$ $2cos^2\theta + cos\theta - 1 = 0$ $(2cos\theta - 1)(cos\theta + 1) = 0$ $cos\theta = 0.5 \quad cos\theta = -1$ $\theta = 60°, 180°, 300°$
5	$x^2 + x + 2$

Half Term 2C (ANSWERS)	Week 6

1

$\frac{3\sqrt{3}-5}{\sqrt{3}-2} \times \frac{\sqrt{3}+2}{\sqrt{3}+2}$

$= \frac{-1+\sqrt{3}}{-1}$

$= 1 - \sqrt{3}$

2

$Repeated\ root\ b^2 - 4ac = 0$
$(k+3)^2 - 4 \times (k-3)(k+3) = 0$
$k^2 + 6k + 9 - 4k^2 + 36 = 0$
$-3k^2 + 6k + 45 = 0$
$k^2 - 2k - 15 = 0$
$(k-5)(k+3) = 0$
$k = 5 \quad k = -3$

3

$Real\ and\ disinct\ roots\ b^2 - 4ac > 0$
$(-(1+p))^2 - 4 \times 2 \times (5-p) > 0$
$1 + 2p + p^2 - 40 + 8p > 0$
$p^2 + 10p - 39 > 0$
$(p+13)(p-3) < 0$
$p < -13\ or\ p > 3$

4

$6(1 - cos^2\theta) + cos\theta = 4$
$6cos^2\theta - cos\theta - 2 = 0$
$(2cos\theta + 1)(3cos\theta - 2) = 0$
$cos\theta = -\frac{1}{2} \quad cos\theta = \frac{2}{3}$
$\theta = 48.1°,\ 120°,\ 240°,\ 312° (3\ s.f.)$

5

$x^2 - 3$

Half Term 2C (ANSWERS)	Week 7
1	$3\sqrt[3]{3} - \sqrt[3]{3} + 9\sqrt[3]{3} = 11\sqrt[3]{3}$
2	$Repeated\ root\ b^2 - 4ac = 0$ $(k+5)^2 - 4 \times k \times k = 0$ $k^2 + 10k + 25\ - 4k^2 = 0$ $-3k^2 + 10k + 25\ = 0$ $3k^2 - 10k - 25\ = 0$ $(k-5)(3k+5) = 0$ $k = 5 \quad k = -\frac{5}{3}$
3	$No\ real\ roots\ \ b^2 - 4ac < 0$ $(8-4p)^2 - 4 \times 4 \times (8-7p) < 0$ $64 - 64p + 16p^2 - 128 + 112p < 0$ $16p^2\ + 48p - 64 < 0$ $4(p-1)(p-4) < 0$ $1 < p < 4$
4	$3(1 - sin^2\theta) + 5sin\theta = 5$ $3sin^2\theta - 5sin\theta + 2 = 0$ $(sin\theta - 1\ )(3sin\theta - 2) = 0$ $sin\theta = 1 \quad sin\theta = \frac{2}{3}$ $\theta = 41.8°\ \ 90°\ \ 138°$
5	$2x^3 + x^2 - 18x - 9$