

AS SKILLS CHECKS

Half Term 2A (ANSWERS)	Week 1
<p>1</p> <p><i>Repeated root</i> $b^2 - 4ac = 0$ $p^2 - 4 \times (p - 3) \times 3 = 0$ $p^2 - 12p + 36 = 0$ $(p - 6)^2 = 0$ $p = 6$</p>	
<p>2</p> <p><i>No real roots</i> $b^2 - 4ac < 0$ $(2p)^2 - 4 \times p \times 3 < 0$ $4p^2 - 12p < 0$ $4p(p - 3) < 0$ $0 < p < 3$</p>	
<p>3</p> <p>$2y + 4x = 7$ $y = 3.5 - 2x$ Gradient = -2 $(y - 5) = -2(x - 1)$ $y - 5 = -2x + 2$ $2x + y = 7$</p>	
<p>4</p> <p>$1 + 7(2x) + \frac{7 \times 6}{1 \times 2} (2x)^2 + \frac{7 \times 6 \times 5}{1 \times 2 \times 3} (2x)^3$ $1 + 14x + 84x^2 + 280x^3$</p>	
<p>5</p> <p>$\frac{dy}{dx} = 3x^2 - 4x + 2$ <i>gradient</i> $= 3 \times (-1)^2 - 4 \times (-1) + 2$ $= 9$</p>	

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* $b^2 - 4ac < 0$
 $(2p)^2 - 4 \times 1 \times 1 < 0$
 $4p^2 - 4 < 0$
 $4(p^2 - 1) < 0$
 $-1 < p < 1$

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

4 $1 + 10(-4x) + \frac{10 \times 9}{1 \times 2}(-4x)^2 + \frac{10 \times 9 \times 8}{1 \times 2 \times 3}(-4x)^3$
 $1 - 40x + 720x^2 - 7680x^3$

5 $\frac{dy}{dx} = 6x^2 - 24$ at a stationary point $\frac{dy}{dx} = 0$
 $6x^2 - 24 = 0$
 $6(x^2 - 4) = 0$
 $(x + 2)(x - 2) = 0$
 $x = 2 \quad y = -32 \quad (2, -32)$
 $x = -2 \quad y = 32 \quad (-2, 32)$

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* $b^2 - 4ac > 0$
 $(p)^2 - 4 \times 3 \times 3 > 0$
 $p^2 - 36 > 0$
 $(p - 6)(p + 6) < 0$
 $p < -6 \text{ or } p > 6$

3 Gradient = $\frac{5 - -3}{4 - 2} = 4$
Perpendicular gradient = $-\frac{1}{4}$
 $(y + 3) = -\frac{1}{4}(x - 2)$
 $-4y - 12 = x - 2$
 $x + 4y = -10$

4 $2^{10} + 10(2)^9(-3x) + \frac{10 \times 9}{1 \times 2}(2)^8(-3x)^2$
 $1024 - 15360x + 103680x^2$

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

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

= $\frac{3}{8}$

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 $b^2 - 4ac > 0$
 $(4)^2 - 4 \times p \times (5 - p) > 0$
 $16 - 20p + 4p^2 > 0$
 $4(p - 4)(p - 1) < 0$
 $p < 1 \text{ or } p > 4$

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

4 $\frac{9 \times 8 \times 7}{1 \times 2 \times 3} (4^6) \left(\frac{x}{2}\right)^3$
 $43008(x^3)$

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

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* $b^2 - 4ac < 0$
 $(3(p + 1))^2 - 4 \times 1 \times (p + 1) < 0$
 $9p^2 + 18p + 9 - 4p - 4 < 0$
 $9p^2 + 14p + 5 < 0$
 $(9p + 5)(p + 1) < 0$
 $-1 < p < -\frac{5}{9}$

3 $2y = x + 5$
 $y = \frac{1}{2}x + 2.5$
 Perpendicular gradient = -2
 $(y - 4) = -2(x + 2)$
 $y - 4 = -2x - 4$
 $2x + y = 0$

4 $\frac{10 \times 9 \times 8 \times 7}{1 \times 2 \times 3 \times 4} (3^6) \left(\frac{x}{3}\right)^4$
 $1890(x^4)$

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

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 distinct roots* $b^2 - 4ac > 0$
 $(-(1 + p))^2 - 4 \times 2 \times (5 - p) > 0$
 $1 + 2p + p^2 - 40 + 8p > 0$
 $p^2 + 10p - 39 > 0$
 $(p + 13)(p - 3) < 0$
 $p < -13 \text{ or } p > 3$

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 $\frac{8 \times 7 \times 6 \times 5}{1 \times 2 \times 3 \times 4} (2^4) \left(\frac{3x}{2}\right)^4$
 $5670(x^4)$

5 $\frac{dy}{dx} = -10 + 3x^2$ Gradient = $-10 + 3 \times (-1)^2$
 $= -7$
 $x = -1 \quad y = 5 - 10 \times (-1) + (-1)^3$
Equation of tangent $(y - 14) = -7(x + 1)$
 $y + 7x - 7 = 0$

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 $b^2 - 4ac < 0$
 $(8 - 4p)^2 - 4 \times 4 \times (8 - 7p) < 0$
 $64 - 64p + 16p^2 - 128 + 112p < 0$
 $16p^2 + 48p - 64 < 0$
 $4(p - 1)(p + 4) < 0$
 $-4 < p < 1$

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 $\frac{12 \times 11 \times 10 \times 9 \times 8}{1 \times 2 \times 3 \times 4 \times 5} \left(\frac{1}{2}\right)^7 (-2x)^5$
 $-198(x^5)$

5 $\frac{dy}{dx} = 9x^2 + 12x - 2$
 $y = 3x + 2$ Gradient = 3
 $9x^2 + 12x - 2 = 3$
 $9x^2 + 12x - 5 = 0$
 $(3x - 1)(3x + 5) = 0 \quad x = \frac{1}{3} \quad x = -\frac{5}{3}$

