# Algebra Binomial P2 MS

0 min
0 marks

**1.** (a) 12 terms A1 N1 1

(b) evidence of binomial expansion (M1)

*e.g.* $\binom{n}{r}a^{n-r}b^{r}$, an attempt to expand, Pascal's triangle

evidence of choosing correct term (A1)

*e.g.* 10th term, $r = 9$, $\binom{11}{9}(x)^2\,(2)^9$

correct working A1

*e.g.* $\binom{11}{9}\,(x)^2\,(2)^9$, $55\times 2^9$

$28160x^2$ A1 N2 4

**[5]**

**2.** evidence of substituting into binomial expansion (M1)

*e.g.* $a^5 + \binom{5}{1}a^4b + \binom{5}{2}a^3b^2 + \ldots$

identifying correct term for $x^4$ (M1)

evidence of calculating the factors, in any order A1A1A1

*e.g.* $\binom{5}{2}$, $27x^6, \frac{4}{x^2}$; $10(3x^2)^3\left(\frac{-2}{x}\right)^2$

***Note:** Award A1 for each correct factor.*

term = $1080x^4$ A1 N2

***Note:** Award M1M1A1A1A1A0 for 1080 with working shown.*

**[6]**

**3.** (a) attempt to expand (M1)

$(x + h)^3 = x^3 + 3x^2h + 3xh^2 + h^3$ A1 N2

(b) evidence of substituting x + $h$ (M1)

correct substitution A1

*e.g.* $f'(x) = \lim_{h\to 0}\frac{(x+h)^3 - 4(x+h) + 1 - (x^3 - 4x + 1)}{h}$

simplifying A1

*e.g.* $\frac{(x^3 + 3x^2h + 3xh^2 + h^2 - 4x - 4h + 1 - x^3 + 4x - 1)}{h}$

factoring out $h$ A1

*e.g.* $\frac{h(3x^2 + 3xh + h^2 - 4)}{h}$

$f'(x) = 3x^2 - 4$ AG N0

(c) $f'(1) = -1$ (A1)

setting up an appropriate equation M1

*e.g.* $3x^2 - 4 = -1$

at Q, $x = -1$, $y = 4$ (Q is $(-1, 4)$) A1A1 N3

(d) recognizing that $f$ is decreasing when $f'(x) < 0$ R1

correct values for $p$ and $q$ (but do not accept $p = 1.15$, $q = -1.15$) A1A1 N1N1

*e.g.* $p = -1.15$, $q = 1.15$; $\pm\frac{2}{\sqrt{3}}$; an interval such as $-1.15 \leq x \leq 1.15$

(e) $f'(x) \geq -4$, $y \geq -4$, $[-4, \infty[$ A2 N2

**[15]**

**4.** evidence of using binomial expansion (M1)

*e.g.* selecting correct term, $a^8b^0 + \binom{8}{1}a^7b + \binom{8}{2}a^6b^2 + \ldots$

evidence of calculating the factors, in any order A1A1A1

*e.g.* 56, $\frac{2^3}{3^3}, -3^5, \binom{8}{5}\left(\frac{2}{3}x\right)^3(-3)^5$

$-4032x^3$ (accept $= -4030x^3$ to 3 s.f.) A1 N2

**[5]**

**5.** (a) evidence of expanding M1

*e.g.* $(x-2)^4 = x^4 + 4x^3(-2) + 6x^2(-2)^2 + 4x(-2)^3 + (-2)^4$

$(x-2)^4 = x^4 - 8x^3 + 24x^2 - 32x + 16$ A2 N2

(b) finding coefficients, $3 \times 24\ (= 72), 4 \times (-8)(= -32)$ (A1)(A1)

term is $40x^3$ A1 N3

**[6]**