

Riduci in forma normale i seguenti monomi, precisando poi qual è il grado complessivo e il coefficiente

$$1 \quad \frac{1}{2} x^4 y^2 \left(-\frac{7}{5}\right) x \frac{5}{3} y^{-2}$$

$$2 \quad a^5 \frac{1}{2} b^4 (-4 a^{-3}) \left(-\frac{1}{8} b\right) 16 a b$$

$$3 \quad a^6 (-2 a b^4) y^4 \frac{1}{2} a^{-1} b^{-3} (-10) y^2$$

Determinare il grado complessivo dei seguenti polinomi

$$4 \quad 6 a b d^3 - 4 a b^3 d - \frac{1}{6} a^3 d^5 + 15$$

$$5 \quad \frac{3}{4} x^4 z + \frac{1}{2} x^6 z^2 + \frac{1}{6} x z^8 - z^4 y^{10}$$

Ordinare i seguenti polinomi secondo le potenze decrescenti di ciascuna delle variabili

$$6 \quad -3 x^2 y^3 + 7 x - \frac{8}{5} x^3 y + \frac{4}{5} x^4 y^2$$

$$7 \quad 3 x^3 + \frac{3}{2} x^2 y + 2 x^5 y^3 - 5 x^4 y^7$$

Calcola il m. c. m. e il M. C. D. dei seguenti gruppi di monomi

$$8 \quad 21 b c^3 \quad 7 a b^2 c^3 \quad 3 a^3 b \quad [21 a^3 b^2 c^3; b]$$

$$9 \quad x^3 y \quad 5 y^4 \quad 15 x y^3 \quad [15 x^3 y^4; y]$$

$$10 \quad 3 x^4 b^3 z \quad 9 x^2 b^6 z^3 \quad 12 x^3 b^5 z^4 \quad [36 x^4 b^6 z^4; 3 x^2 b^3 z]$$

Eeguire le operazioni e ridurre i termini simili

$$1 \quad \left[(0, \bar{3} a^3 x y^2)^2 : \left(\frac{1}{9} a^4 y^4\right) - a^2 (-2 b^2 x^2)^3 (2 b^3 x^2)^{-2} \right]^3 - (2 a^2 x^2)^3 \quad [19 a^6 x^6]$$

$$2 \quad \left[\left(-\frac{5}{2} x^2 y^3\right) \left(-\frac{5}{2} x^2 y^3\right) \left(-\frac{5}{2} x^2 y^3\right) \right]^3 : \left[\left(-\frac{5}{2} x^2 y^3\right) \right]^4 \quad \left[-\frac{5}{2} x^2 y^3 \right]$$

$$3 \quad \left[\left(-\frac{5}{8} x y^2 z\right) \left(-\frac{16}{5} x^2 y z^2\right) \right]^2 + \left[\left(-\frac{8}{9} x^5 y^4 z^4\right) : \left(-\frac{2}{9} x^2 y z\right) \right]^2 \quad [20 x^6 y^6 z^6]$$

$$4 \quad \left[\left(-\frac{1}{2} x^2 y^3 z^3\right)^3 : \left(\frac{3}{4} x y^3 z\right)^2 \right]^2 : \left[\left(-\frac{2}{3} x y z\right)^2 \left(-\frac{1}{3} x z^3\right) \right]^2 \quad \left[\frac{9}{4} x^2 y^2 z^4 \right]$$

$$5 \quad \left[\left(\frac{4}{3} a + \frac{7}{6} a\right)^2 : \left(\frac{1}{3} a + \frac{3}{4} a + a\right) \right]^2 : \left(\frac{1}{2} a + \frac{2}{3} a - \frac{1}{6} a\right) \quad [9a]$$

$$6 \quad (3 a^3 - 3 a + 2) - (8 a^3 - 2 a^2 + a - 1) - (-a^2 - 2 a + 4)$$

$$7 \quad (x^4 + 7 x^3 + 3 x^2 - 4 x + 3) - (x^4 + 7 x^3 + 3 x^2 - 4 x + 3)$$

$$8 \quad -\left[-4 y^3 - [2 x + 7 x y^3 - (5 y^3 + 2 x) - 7 x y^3]\right] + 2 y^3 + 8 x y^3$$

$$9 \quad 3 a - [b - [a - (b - 2 a) + 3 b] - 2 a] - [-(-5 a)]$$

$$10 \quad 3 x^3 \cdot [4 x^4 - 7 x (9 x^3 - 11 x^2) + 59 x^3 (x - 1)] + 2 \cdot (-3 x^2)^3$$

$$11 \quad x [y (z + t) - z t] + x z (y - t) - x t (y + z) - x z (2 y - 3 t)$$

- 12 $a\{5a - [7ab - (1 + 2ab - 3a) - (ab - 5)]\} - 2a(a - 2ab - 2) - \{-[-(-a)^2]^3\}^2$
- 13 $(3a^3 + a^2 + a + 1) \cdot (a - 2)$
- 14 $(a^2 - 2a + 3) \cdot (a^4 + 2a^3 + a^2 - 4a - 11)$
- 15 $(x^3 - 4x^2 + 11x - 24) \cdot (x^2 + 4x + 5)$
- 16 $(x + y)(y + z)(z + x) - xy(x + y) - yz(y + z) - zx(z + x)$
- 17 $(a + b + c)(a + b - c) - (a + b - c)(-a + b + c)$
- 18 $(9a^2 - 4b^2)(a - 1) - (3a + 2b)(3a^2 + ab - 3a - 2b)$
- 19 $[(3a + b)(3a - 2b) + ab](a^2 - b^2) - 2ab\left(\frac{1}{2}ab - \frac{1}{2}a^2 + b^2\right)$ $[9a^4 + 2b^4 - 12a^2b^2 - a^3b^3]$
- 20 $\left[3x^2 - \frac{2}{3}x\left(3x - \frac{3}{4}y\right) - \frac{1}{3}y(x + 6y)\right](x - 3y) - (x - 6y)(x^2 - y^2)$ $\left[\frac{19}{6}x^2y - \frac{3}{2}xy^2\right]$
- 21 $\frac{1}{5}ab\left[(a - 2b^2)\left(a^2 + \frac{1}{2}b\right) - 3a\left(-\frac{1}{6}ab\right)(+4b)\right] - \frac{1}{5}a\left(a^3b + \frac{1}{2}ab^2\right)$ $\left[-\frac{1}{5}ab^4\right]$
- 22 $(2x - 3)(x + 1)(x^2 + 1) - [x^3(2x - 1) - (x + 1)(x + 3)] - 3x$ $[0]$
- 23 $(3x - 2y)\left(\frac{4}{5}x^2 + \frac{1}{4}xy - \frac{1}{4}y^2\right) - \frac{1}{5}x\left(12x^2 - \frac{25}{4}y^2\right) + \frac{1}{2}(-y)^3$ $\left[-\frac{17}{20}x^2y\right]$
- 24 $\left(\frac{2}{3}x + \frac{1}{2}y - \frac{3}{5}z\right)\left(\frac{2}{3}x + \frac{1}{2}y + \frac{3}{5}z\right) + \left(-\frac{2}{3}x - y\right)\frac{2}{3}x - \frac{1}{2}\left[\frac{1}{2}y^2 - \left(\frac{4}{5}z\right)^2\right]$ $\left[-\frac{1}{25}z^2\right]$
- 25 $\left[\left(x - \frac{1}{2}\right)\left(x^4 + \frac{1}{2}x^3 + \frac{1}{4}x^2\right)\left(x^3 + \frac{1}{8}\right)\right] \cdot \left(\frac{1}{2}x^2\right) + 2\left(\frac{1}{16} - x^3\right)\left(\frac{1}{4} + x^3\right)$ $\left[-\frac{3}{8}x^3\right]$
- 26 $\left\{\left[-3xy\left(2x - \frac{1}{3}y\right) + 6x^2y\right] + y^2\right\}(x + 2) - 3xy^2\left(\frac{1}{3}x + 1\right)$ $[2y^2]$
- 27 $(a + 2)\left\{-\left[2ax\left(\frac{1}{2}a - \frac{3}{4}x\right)\right] + a^2x\right\}^2 - 9a^2x^4\left(\frac{1}{4}a + \frac{1}{2}\right)$ $[0]$
- 28 $\{(x + y)(x^2 + y^2)[x(a^2 - 1) - (y - 2x + a^2x)] + y^4\} \cdot (-2x)$ $[-2x^5]$
- 29 $(a + 2)\left\{-\left[2ax\left(\frac{1}{2}a - \frac{3}{4}x\right)\right] + a^2x\right\}^2 - 9a^2x^4\left(\frac{1}{4}a + \frac{1}{2}\right)$ $[0]$
- 30 $-\frac{2}{3}a\left\{a^2 - \left[3b\left(a - \frac{b}{9}\right) - \frac{2}{3}a\left(b - \frac{3}{4}a\right)\right]\right\} - \frac{1}{9}a(-3a^2 + b^2 - 2ab)$ $\left[\frac{16}{9}a^2b - \frac{1}{3}ab^2\right]$
- 31 $\left[\frac{1}{3}a^2(a - b) - \frac{1}{4}a(a^2 - 2ab)\right]\left(-\frac{3}{4}ab\right) - \left(b^2 - \frac{ab}{3}\right)(a^3 - a^2b)$ $\left[\frac{13}{48}a^4b + a^2b^3 - \frac{35}{24}a^3b^2\right]$
- 32 $\left(\frac{1}{2}a - 1\right)(3 - 2a)\left[2a^2 - 3\left(a - \frac{1}{3}\right)\right] - (4a^2 - 3)(a^2 + a + 1)$
- 33 $\left(x - \frac{2}{3}y\right)\left[y^2 - \frac{1}{2}x(x - 2y)\right] - 3x\left[\left(-\frac{1}{3}y\right)(3x - 6y) + 5xy\right]$

Eseguire le seguenti divisioni applicando la regola di Ruffini:

- | | | |
|---|--|--------------------------------|
| 1 | $(3a^5 + 2a^4 - 3a^2 + 4a - 5) : \left(a + \frac{2}{3}\right)$ | $[3a^4 - 3a + 6; -9]$ |
| 2 | $(2b^3 - 5b^2 + 4b - 3) : (b - 3)$ | $[2b^2 + b + 7; 18]$ |
| 3 | $(4x + x^3 - 5 - 2x^2) : (x + 2)$ | $[x^2 - 4x + 12; -29]$ |
| 4 | $(3x^3 + 5x^2 - 7x - 4) : (x - 2)$ | $[3x^2 + 11x + 15; 26]$ |
| 5 | $(-5y^3 + 3y^4 - 25 - 24y) : (y - 3)$ | $[3y^3 + 4y^2 + 12y + 12; 11]$ |
| 6 | $(23a + 2a^3 - 3 - 13a^2) : (a - 4)$ | $[2a^2 - 5a + 3; 9]$ |
| 7 | $(3 + b + 4b^4 - 5b^2) : (1 + b)$ | $[4b^3 - 4b^2 - b + 2; 1]$ |

Eseguire le seguenti divisioni applicando la regola di Ruffini, considerando come lettera ordinatrice quella indicata nel risultato:

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|----|---|--|
| 8 | $\left(-2a^2y^4 + a^3y^3 + 3a^3y^2 - \frac{5}{2}a^4y + \frac{1}{2}a^5\right) : \left(y - \frac{1}{2}a\right)$ | $[Q(y) = -2a^2y^3 + 3a^3y - a^4; R = 0]$ |
| 9 | $(4x^3 - 5ax^2 + 3a^2x - 9a^3) : (x - 2a)$ | $[Q(x) = 4x^2 + 3ax + 9a^2; R = 9a^3]$ |
| 10 | $(3a^3 + 2x^3 - 8a^2x + 3ax^2) : (x + 3a)$ | $[Q(x) = 2x^2 - 3ax + a^2; R = 0]$ |
| 11 | $(3a^2b^3 + a^5 - 3a^4b + b^5) : (a + b)$ | $[Q(a) = a^4 - 4a^3b + 4a^2b^2 - ab^3 + b^4; R = 0]$ |
| 12 | $(-2a^2y + 5y^3 + 4a^3) : (y - 2a)$ | $[Q(y) = 5y^2 + 10ay + 18a^2; R = 40a^3]$ |

Eseguire le seguenti divisioni applicando la regola di Ruffini (...e la proprietà invariantiva):

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|----|---|-----------------------|
| 13 | $(4y^3 + 4y^2 + 21 - 29y) : (2y - 3)$ | $[2y^2 + 5y - 7; 0]$ |
| 14 | $(6x^3 - 7x^2 + 4x - 2) : (2x - 1)$ | $[3x^2 - 2x + 1; -1]$ |
| 15 | $(1 - 4y + 2y^3 + 3y^2) : (2y - 1)$ | $[y^2 + 2y - 1; 0]$ |
| 16 | $\left(-15a^4 + \frac{19}{2}a^3 + \frac{43}{15}a - \frac{2}{5}\right) : \left(\frac{5}{2}a - \frac{1}{3}\right)$ | |
| 17 | $\left(\frac{2}{5}b^3 + \frac{3}{2}b^2 + \frac{1}{3}b - \frac{10}{27}\right) : \left(\frac{1}{5}b + \frac{2}{3}\right)$ | |
| 18 | $\left(\frac{1}{3}x^3 - \frac{3}{5}x^2 + \frac{2}{5}x - \frac{1}{2}\right) : \left(\frac{2}{3}x - 1\right)$ | |

Determinare, senza eseguire l'operazione, il resto delle seguenti divisioni (teorema del resto):

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|----|--|-----------------------------|
| 19 | $\left(x^3 - 2x^2 + 4x + \frac{13}{8}\right) : (x - 1)$ | $\left[\frac{37}{8}\right]$ |
| 20 | $(2a^2 - a - 6) : (a - 2)$ | $[0]$ |
| 21 | $(15y^4 + 7y^3 - 4y^2 + 5y - 6) : (y + 1)$ | $[-7]$ |
| 22 | $\left(3x^3 - \frac{3}{2}x^2 + 2x - 1\right) : \left(x - \frac{1}{2}\right)$ | $[0]$ |
| 23 | $\left(a^4 - 3a + \frac{1}{16}\right) : \left(a + \frac{1}{2}\right)$ | $\left[\frac{13}{8}\right]$ |
| 24 | $(a^3 - 1) : (a - 1)$ | $[0]$ |
| 25 | $(a^7 + 3a^6 - 4a^5 + a^4 - a^3 + a^2 - a + 1) : (a - 2)$ | $[203]$ |