

SET 1: Basic Mathematics

Tutorial 5

- Find the value of $2xy + 3yz - xyz$, when $x = 2$, $y = -2$ and $z = 4$ [Ans. -16]
- Evaluate $3pq^2r^3$ when $p = \frac{2}{3}$, $q = -2$ and $r = -1$ [Ans. -8]
- Add together $2a + 3b + 4c$, $-5a - 2b + c$, and $4a - 5b - 6c$ [Ans. $a - 4b - c$]
- Subtract $\frac{3}{2}a - \frac{b}{3} + c$ from $\frac{b}{2} - 4a - 3c$ [Ans. $-5\frac{1}{2}a + \frac{5}{6}b - 4c$]
- Multiply $2a - 5b + c$ by $3a + b$ [Ans. $6a^2 - 13ab + 3ac - 5b^2 + bc$]
- Simplify $(x^2y^3z)(x^3yz^2)$ and evaluate when $x = \frac{1}{2}$, $y = 2$ and $z = 3$ [Ans. $x^5y^4z^3$, $13\frac{1}{2}$]
- Simplify $(a^{3/2}bc^{-3})(a^{1/2}b^{-1/2}c)$ [Ans. $a^2b^{1/2}c^{-2}$]
- Simplify $\frac{(a^3b^{1/2}c^{-1/2})(ab)^{1/3}}{(\sqrt{a^3}\sqrt{b}c)}$ [Ans. $a^{11/6}b^{1/3}c^{-3/2}$ or $\frac{\sqrt[6]{a^{11}} \times \sqrt[3]{b}}{\sqrt{c^3}}$]
- Remove the brackets and simplify $24p - [2(3(5p - q) - 2(p + 2q)) + 3q]$ [Ans. $11q - 2p$]
- Simplify $2y + 4 \div 6y + 3 \times 4 - 5y$ [Ans. $\frac{2}{3y} - 3y + 12$]
- Simplify $(x + 1)(x - 4) \div (2x + 2)$ [Ans. $\frac{1}{2}(x - 4)$]
- Simplify $\frac{1}{4}$ of $2y + 3y(2y - y)$ [Ans. $y\left(\frac{1}{2} + 3y\right)$]
- Determine whether each of the following expressions is a polynomial or not:
 - $5x^3 + 2x^2 + 4x - 3$ [Ans. polynomial]
 - $6x^4 - 3x^2 + 7$ [Ans. polynomial]
 - $4y^3 + 5y^2 + 4\sqrt{y} + 10$ [Ans. not a polynomial]
 - $2x^4y - 5x^2y + 7x - 2$ [Ans. polynomial]
 - $x^3 + 3x^2 - 7x + \frac{5}{x} - 3$ [Ans. not a polynomial]
- Determine the degree of each of the following polynomials:
 - $9x^5 + 3x^4 - 4x^3 - 3x^2 + 7x - 3$ [Ans. fifth degree]
 - $5x^6 - 9x^2 - 2x + 7$ [Ans. sixth degree]
 - 24 [Ans. zero degree]
 - $4x^3y^2 + 5x^2y^2 + 4xy^2 + xy - 12$ [Ans. fifth degree]
- Find the sum of $6z^2 - 4x^2y^2 + 6xyz - 8$ and $5x^2y^2 - 6z^2 + 8 + 2xyz$ [Ans. $x^2y^2 + 8xyz$]

16. Subtract $6z^2 - 4x^2y^2 + 6xyz - 8$ from $5x^2y^2 - 6z^2 + 8 + 2xyz$ [Ans. $9x^2y^2 - 4xyz - 12z^2 + 16$]

17. Multiply $(8m^3 + 2n^3)$ by $(3m^2n - 2n - 5m - 10)$

[Ans. $24m^5n - 16m^3n - 40m^4 - 80m^3 + 6m^2n^4 - 4n^4 - 10mn^3 - 20n^3$]

18. Divide $(9x^3 + 24x^2 + x - 2)$ by $(3x + 1)$ [Ans. $3x^2 + 7x - 2$]

19. Divide $(6x^4 + x^3 - 16x^2 - 5x + 6)$ by $(2x - 1)$ [Ans. $3x^3 + 2x^2 - 7x - 6$]

20. Determine $(8x^4 - 12x^3 + 61x - 7) \div (x - 2)$ [Ans. $8x^3 + 4x^2 + 8x + 77 + \frac{147}{x-2}$]

21. Find $\frac{(6a^3 - 13a^2b + 10ab^2 + 5b^3)}{3a + b}$ [Ans. $2a^2 - 5ab + 5b^2$]

22. Determine whether each of the following fractional expressions is a rational expressions or not. For rational expressions, determine whether they are proper or improper.

(a) $\frac{6z^6}{4 - 9z^3}$ [Ans. improper rational expression]

(b) $\frac{y^3 - 2y^2 + 3}{7y^4 + 6y^2 - 11}$ [Ans. proper rational expression]

(c) $\frac{3x^3 - 5x + 4}{x^2 + \sqrt{x}}$ [Ans. not a rational expression]

23. Simplify $\frac{4}{x-3} + \frac{2}{3x-1} - \frac{1}{5x+2}$ [Ans. $\frac{67x^2 - 12x - 23}{(x-3)(3x-1)(5x+2)}$]

24. Rationalize the denominator or numerator and simplify the following:

(a) $\frac{x}{\sqrt{x-4}}$ [Ans. $\frac{x\sqrt{x-4}}{x-4}$]

(b) $\frac{y}{\sqrt{2} + \sqrt{3}}$ [Ans. $y\sqrt{3} - y\sqrt{2}$]

(c) $\frac{2}{\sqrt{y} + \sqrt{y-2}}$ [Ans. $\sqrt{y} - \sqrt{y-2}$]