MATHS

BOOKS - CAMBRIDGE MATHS (KANNADA ENGLISH)

POLYNOMIALS

Exercise 14 1

1. Which of the following expressions are polynomials in one variable and which are not ? State reasons for your answer. (i) $4x^2 - 3x + 7$ (ii) $y^2 + \sqrt{2}$ (iii) $3\sqrt{t} + t\sqrt{2}$ (iv) $y + \dfrac{2}{y}$ (v) $x^{10} + y^3 + t^{50}$

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2. Write the coefficients of x^2 in each of the following:

(i) $2 + x^2 + x$

(ii) $2 - x^2 + x^3$

(iii) $\dfrac{\pi}{2} - x^2 + x^3$

(iv) $\sqrt{2}x - 1$

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3. Give one example each of a binomial of degree 35, and of a monomial of degree 100.

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4. Write the degree of each of the following polynomials :

(i) $5x^3 + 4x^2 + 7x$

(ii) $4 - y^2$

(iii) $5t - \sqrt{7}$

(iv) 3

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5. Classify the following as linear, quadratic and cubic polynomial:

(i) $x^2 + x$

(ii) $x - x^3$

(iii) $y + y^2 + 4$

(iv) 1 + x

(v) 3t

(vi) r^2

(vii) $7x^3$

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Exercise 14 2

1. Find the value of the polynomial at $5x - 4x^2 + 3$ at

(i) x = 0 (ii) x = - 1 (iii) x = 2

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2. Find p(0), p(1) and p(2) for each of the following polynomials :

(i) $p(y) = y^2 - y + 1$

(ii) $p(t) = 2 + t + 2t^2 + t^3$

(iii) $p(x) = x^3$

(iv) $p(x) = (x - 1)(x + 1)$

3. Verify whether the following are zeroes of the polynomial, indicated against them .

(i) $p(x) = 3x + 1, \ x = -\dfrac{1}{3}$

(ii) $p(x) = 5x - \pi, \ x = \dfrac{4}{5}$

(iii) $p(x) = x^2 - 1, \ x = 1, \ -1$

(iv) $p(x) = (x + 1)(x - 2), \ x = -1, 2$

(v) $p(x) = x^2, \ x = 0$

(vi) $p(x) = lx + m, \ x = -\dfrac{m}{l}$

(vii) $p(x) = 3x^2 - 1$, $x = -\dfrac{1}{\sqrt{3}}, \dfrac{2}{\sqrt{3}}$

(viii) $p(x) = 2x + 1$, $x = \dfrac{1}{2}$

4. Find the zero of the polynomial in each of the following cases.

(i) $p(x) = x + 5$

(ii) $p(x) = x - 5$

(iii) $p(x) = 2x + 5$

(iv) $p(x) = 3x - 2$

(v) $p(x) = 3x$

(vi) $p(x) = ax$, $a \neq 0$

(vii) $p(x) = cx + d$, $c \neq 0$, c, d are real numbers

Exercise 14 3

1. Find the remainder when $x + 3x^2 + 3x + 1$ is divided by

(i) (x+1)

(ii) $x - \dfrac{1}{2}$

(iii) x

(iv) $x + \pi$

(v) $5 + 2x$

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2. Find the remainder when $x^3 - ax^2 + 6x - a$ is divided by x -a.

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3. Check whether 7+3x is a factor of $3x^3 + 7x$

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1. Determine which of the following polynomials has (x+1) a factor.

(i) $x^3 + x^2 + x + 1$

(ii) $x^4 + x^3 + x^2 + x + 1$

(iii) $x^4 + 3x^3 + 3x^2 + x + 1$

(iv) $x^3 - x^2 - \left(2 + \sqrt{2}\right)x + \sqrt{2}$

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2. Use the Factor Theorem to determine whether g (x) is a factor of p (x) in each of the following cases:

(i) $p(x) = 2x^3 + x^2 - 2x - 1, g(x) = x + 1$

(ii) $p(x) = x^3 + 3x + 1, g(x) = x + 2$

(iii) $p(x) = x^3 - 4x^2 + x + 6, g(x) = x - 3$

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3. Find the value of k, if (x-1) is a factor of p(x) in each of the following cases:

(i) $p(x) = x^2 + x + k$

(ii) $p(x) = 2x^2 + kx + \sqrt{2}$

(iii) $p(x) = kx^2 - \sqrt{2}x + 1$

(iv) $p(x) = kx^2 - 3x + k$

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4. Factories:

(i) $12x^2 - 7x + 1$

(ii) $2x^2 + 7x + 3$

(iii) $6x^2 + 5x - 6$

(iv) $3x^2 - x - 4$

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5. Factories :

(i) $x^3 - 2x^2 - x + 2$

(ii) $x^3 - 3x^2 - 9x - 5$

(iii) $x^3 + 13x^2 + 32x + 20$

(iv) $2y^3 + y^2 - 2y - 1$

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Exercise 14 5

1. Use suitable identities to find the following products:

(i) $(x + 4)(x + 10)$

(ii) (x+8) (x-10)

(iii) (3x+4) (3x -5)

(iv) $\left(y^2 + \dfrac{3}{2} \right)\left(y^2 - \dfrac{3}{2} \right)$

(v) $(3 - 2x)(3 + 2x)$

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2. Evaluate the following products without multiplying directly

(i) 103×107

95×96

(iii) 104×96

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3. Factories the following using appropriate identities:

(i) $9x^2 + 6xy + y^2$

(ii) $4y^2 - 4y + 1$

(iii) $x^2 - \dfrac{y^2}{100}$

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4. Expand each of the following , using suitable identities :

(i) $(x + 2y + 4z)^2$

(ii) $(2x - y + z)^2$

(iii) $(-2x + 3y + 2z)^2$

(iv) $(3a - 7b - c)^2$

(v) $(-2x + 5y - 3z)^2$

(vi) $\left(\dfrac{1}{4}a - \dfrac{1}{2}b + 1\right)^2$

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5. Factorise :

(i) $4x^2 + 9y^2 + 16z^2 + 12xy - 24yz - 16xz$

(ii) $2x^2 + y^2 + 8z^2 - 2\sqrt{2}xy + 4\sqrt{2}yz - 8xz$

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6. Write the following cubes in expanded form:

(i) $(2x + 1)^3$

(ii) $(2a - 3b)^3$

(iii) $\left(\dfrac{3}{2}x + 1 \right)^3$

(iv) $\left(x - \dfrac{2}{3}y \right)^3$

7. Evaluate the following using suitable identities :

(i) $(99)^3$

(ii) $(102)^3$

(iii) $(998)^3$

8. Factorise each of the following :

(i) $8a^3 + b^3 + 12a^2b + 6ab^2$

(ii) $8a^3 - b^3 - 12a^2b + 6ab^2$

(iii) $27 - 125a^3 - 135a + 225a^2$

(iv) $64a^3 - 27b^3 - 144a^2b + 108ab^2$

(v) $27p^3 - \dfrac{1}{216} - \dfrac{9}{2}p^2 + \dfrac{1}{4}p$ s

9. Verify the following :

(i) $x^3 + y^3 = (x - y)\left(x^2 - xy + y^2\right)$

(ii) $x^3 - y^3 = (x - y)\left(x^2 + xy + y^2\right)$

10. Factorise each of the following :

(i) $27y^3 + 125z^3$

(ii) $64m^3 - 343n^3$

11. Factorise the following : $27x^3 + y^3 + z^3 - 9xyz$

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12. Verify that :

$$x^3 + y^3 + z^3 - 3xyz = \frac{1}{2}(x + y + z)\left[(x - y)^2 + (y - z)^2 + (z - x)^2\right]$$

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13. $x + y + z = 0$ Show that $x^3 + y^2 + z^3 = 3xyz$

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14. Without actually calculating the cubes, find the value of each of the following:

(i) $(-12)^3 + (7)^3 + (5)^3$

(ii) $(28)^3 + (-15)^3 + \big) - 13\big)^3$

15. Give possible expressions for the length and breadth of each of the following rectangles, in which their areas are given.

(i) Area $25^2 - 35a + 12$

(ii) Area $= 35y^2 + 13y - 12$

16. What are the possible expressions for the dimensions of the cuboids whose volumes are given below ?

(i) Volume : $3x^2 - 12x$

(ii) $12ky^2 + 8ky - 20k$