Unit 2 · Polynomial

WORKSHEET

Full marks 33

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 33

1 Key words [3]

Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

coefficient **degree** **divisor** **factor** **monomial** **quotient** **remainder** **synthetic division**

The highest power of x in a polynomial is its _____. In $f(x) = d(x) \cdot q(x) + R$, $d(x)$ is the _____ and $q(x)$ is the _____. When $f(x)$ is divided by $x - a$, the _____ is $f(a)$. If $f(a) = 0$, then $x - a$ is a _____ of $f(x)$. Dividing by $x - a$ with the coefficients alone, in three rows, is called _____.

2 Multiple choice [5]

Choose the correct option for each of the following questions.

i. What is the remainder when $x^3 - 2x^2 + 4$ is divided by $x - 2$? [1]

a. 4 **b.** -12

c. 0 **d.** 20

ii. Which of these is a factor of $x^3 - 13x + 12$? [1]

a. $x + 1$ **b.** $x + 2$

c. $x - 2$ **d.** $x - 1$

iii. A polynomial of degree 5 is divided by $x - a$. What is the degree of the quotient? [1]

a. 5 **b.** 4

c. 1 **d.** 6

iv. By the rational root theorem, which of these can **not** be a root of $2x^3 + 5x^2 - 4x + 3$? [1]

a. $\frac{3}{2}$ **b.** $\frac{1}{2}$

c. -3 **d.** $\frac{2}{3}$

v. When $f(x)$ is divided by $2x - 1$, the remainder is [1]

a. $f\left(\frac{1}{2}\right)$ **b.** $f\left(-\frac{1}{2}\right)$

c. $f(2)$ **d.** $f(1)$

3 Very short answers [3]

Write very short answers to the following questions.

a. Write the degree and the leading coefficient of $5 - 3x^4 + x^2$. [1]

b. Find the remainder when $x^4 + 3$ is divided by $x + 1$. **[1]**

c. If $x - 3$ is a factor of $x^2 + kx + 6$, find k. **[1]**

4 Short answers [8]

Write short answers to the following questions.

a. Find the mistake. Sita finds the remainder when $2x^3 + x - 5$ is divided by $x + 2$ like this: **[2]**
$f(2) = 16 + 2 - 5 = 13$, so the remainder is 13.
What has she done wrong? Find the correct remainder.

b. Divide $x^3 - 4x^2 + 5x - 6$ by $x - 3$ by synthetic division. Write the quotient and the remainder. **[2]**

c. Explain why $x - 1$ is a factor of every polynomial whose coefficients add up to 0, such as $3x^3 - 5x^2 + 4x - 2$. **[2]**

d. Show that $x + 2$ is a factor of $x^3 + 8$, and find the other factor. **[2]**

5 Long answers [12]

Solve the following problems. Show your working.

a. Factorize $2x^3 - 5x^2 - 4x + 3$ completely, and write its roots. **[4]**

Answer: _____

b. $x - 1$ is a factor of $x^3 + ax^2 + bx - 6$, and the polynomial leaves a remainder of -8 when divided by $x + 1$. **[4]**

i. Find a and b.

ii. Find the quotient when the polynomial is divided by $x - 1$.

Answer: _____

c. Squares of side x cm are cut from the corners of a card 16 cm long and 10 cm wide, and the sides are folded up into an open box. **[4]**

i. Show that the box holds 144 cm^3 when $x^3 - 13x^2 + 40x - 36 = 0$.

ii. Solve this equation and find the cut that makes the box.

Answer: _____

6 Think **[2]**

Think, then answer.

A cubic with whole-number coefficients has two rational roots. Can its third root be irrational? Explain.

_____

_____

_____

_____

7 Activity: Two ways to the same remainder (not marked)

Work with a partner on $f(x) = x^3 - 2x^2 - 5x + 6$. For each a, one of you finds $f(a)$ by putting a in, the other finds the remainder on dividing by $x - a$ by synthetic division. Compare, then write whether $x - a$ is a factor.

a	$f(a)$ by putting in	Remainder by synthetic division	Is $x - a$ a factor?
-2			
-1			
0			
1			
2			
3			