



# MATHS

## BOOKS - SELINA MATHS (ENGLISH)

### REMAINDER AND FACTOR THEOREMS

#### Questions

1. Find the remainder when  $x^2 - 8x + 4$  is divided by  $2x+1$ .



Watch Video Solution

2. Find the value of 'a' if the division of  $ax^3 + 9x^2 + 4x - 10$  by  $x+3$  leaves a remainder of 5.



[Watch Video Solution](#)

3. When the polynomial  $2x^3 - kx^2 + (5k - 3)x - 8$  is divided by  $x-2$  the remainder is 14. Find the value of 'k'.



[Watch Video Solution](#)

4. The polynomials  $3x^3 - ax^2 + 5x - 13$  and  $(a + 1)x^2 - 7x + 5$  leaves the same remainder when divided by  $x-3$ . Find the value of 'a'.



[Watch Video Solution](#)

5. When  $f(x) = x^3 + ax^2 - bx - 8$  is divided by  $x-2$ , the remainder is zero and when divided by  $x+1$ , the remainder is  $-30$ . Find the values of 'a' and 'b'.



[Watch Video Solution](#)

6. Which number should be added to  $2x^3 - 3x^2 + x$  so that when the resulting polynomial is divided by  $x-2$ , the remainder is 3?



[Watch Video Solution](#)

7. Determine whether  $x-1$  is a factor of  $x^6 - x^5 + x^4 + x^3 - x^2 - x + 1$  or not?



[Watch Video Solution](#)

8. If  $x-2$  is a factor of  $x^2 - 7x + 2a$ , find the value of  $a$ .



[Watch Video Solution](#)

9. Find the value of 'k' if  $(x-2)$  is a factor of  $x^3 + 2x^2 - kx + 10$ . Hence determine whether  $(x+5)$  is also a factor.



[Watch Video Solution](#)

10. Given that  $x+2$  and  $x-3$  are factors of  $x^3 + ax + b$ , calculate the values of  $a$  and  $b$ .



[Watch Video Solution](#)

11. Polynomial  $x^3 - ax^2 + bx - 6$  leaves remainder  $-8$  when divided by  $x-1$  and  $x-2$  is a factor of it. Find the values of ' $a$ ' and ' $b$ '.



[Watch Video Solution](#)

**12.** Using the factor theorem, show that  $(x-2)$  is a factor of  $3x^2 - 5x - 2$ . Hence factorise the given expression.



[Watch Video Solution](#)

**13.** Show that  $2x + 7$  is a factor of  $2x^3 + 5x^2 - 11x - 14$ . Hence factorise the given expression completely, using the factor theorem.



[Watch Video Solution](#)

14. Using the Remainder theorem, factorise the expression  $2x^3 + x^2 - 2x - 1$  completely.



[Watch Video Solution](#)

15. Find the values of 'a' and 'b' so that the polynomial  $x^3 + ax^2 + bx - 45$  has  $(x-1)$  and  $(x+5)$  as its factors.

For the value of 'a' and 'b', as obtained above, factorise the given polynomial completely.



[Watch Video Solution](#)



**16.** If  $(x-2)$  is a factor of  $2x^3 - x^2 - px - 2$

(i) find the value of  $p$ .

(ii) with the value of  $p$ , factorise the above expression completely.



**Watch Video Solution**

**Exercise 8 A**

1. Find, in each case, the remainder when :

(i)  $x^4 - 3x^2 + 2x + 1$  is divided by  $x - 1$ .

(ii)  $x^2 + 3x^2 - 12x + 4$  is divided by  $x - 2$ .

(iii)  $x^4 + 1$  is divided by  $x + 1$ .



[Watch Video Solution](#)

2. Show that :

(i)  $x - 2$  is a factor of  $5x^2 + 15x - 50$ .

(ii)  $3x + 2$  is a factor of  $3x^2 - x - 2$ .



[Watch Video Solution](#)

**3.** Use the Remainder Theorem to find which of the following is a factor of  $2x^3 + 3x^2 - 5x - 6$ .

(i)  $x+1$  (ii)  $2x-1$

(iii)  $x+2$



**Watch Video Solution**

**4.** (i) If  $2x + 1$  is a factor of  $2x^2 + ax - 3$ , find the value of  $a$ .

(ii) Find the value of  $k$ , if  $3x - 4$  is a factor of expression  $3x^2 + 2x - k$ .



[Watch Video Solution](#)

5. Find the values of constants  $a$  and  $b$  when  $x - 2$  and  $x + 3$  both are the factors of expression  $x^3 + ax^2 + bx - 12$ .



[Watch Video Solution](#)

6. Find the value of  $k$ , if  $2x + 1$  is a factor of  $(3k + 2)x^3 + (k - 1)$ .



[Watch Video Solution](#)

7. Find the value of  $a$ , if  $x - 2$  is a factor of  $2x^5 - 6x^4 - 2ax^3 + 6ax^2 + 4ax + 8$ .



[Watch Video Solution](#)

8. Find the values of  $m$  and  $n$  so that  $x-1$  and  $x+2$  both are factors of  $x^3 + (3m + 1)x^2 + nx - 18$ .



[Watch Video Solution](#)

9. When  $x^3 + 2x^2 - kx + 4$  is divided by  $x - 2$ , the remainder is  $k$ . Find the value of constant  $k$ .



[Watch Video Solution](#)

**10.** Find the value of  $a$ , if the division of  $ax^3 + 9x^2 + 4x - 10$  by  $x + 3$  leaves a remainder 5.



**Watch Video Solution**

**11.** If  $x^3 + ax^2 + bx + 6$  has  $x - 2$  as a factor and leaves a remainder 3 when divided by  $x - 3$ , find the values of  $a$  and  $b$ .



**Watch Video Solution**

12. The expression  $2x^3 + ax^2 + bx - 2$  leaves remainder 7 and 0 when divided by  $2x - 3$  and  $x + 2$  respectively. Calculate the values of  $a$  and  $b$ .



[Watch Video Solution](#)

13. What number should be added to  $3x^3 - 5x^2 + 6x$  so that when resulting polynomial is divided by  $x - 3$ , the remainder is 8?



[Watch Video Solution](#)



**14.** What number should be subtracted from  $x^3 + 3x^2 - 8x + 14$  so that on dividing it by  $x - 2$ , the remainder is 10?



[Watch Video Solution](#)

**15.** The polynomials  $2x^3 - 7x^2 + ax - 6$  and  $x^3 - 8x^2 + (2a + 1)x - 16$  leave the same remainder when divided by  $x - 2$ . Find the value of  $a$ .



[Watch Video Solution](#)

**16.** If  $x-2$  is a factor of the expression  $2x^3 + ax^2 + bx - 14$  and when the expression is divided by  $(x - 3)$ , it leaves a remainder 52, find the values of  $a$  and  $b$ .



**Watch Video Solution**

**17.** Find 'a' if the two polynomials  $ax^3 + 3x^2 - 9$  and  $2x^3 + 4x + a$ , leaves the same remainder when divided by  $x + 3$ .



Watch Video Solution

## Exercise 8 B

1. Using the Factor theorem, show that

(i)  $(x-2)$  is a factor of  $x^3 - 2x^2 - 9x + 18$ .

Hence factorise the expression

$x^3 - 2x^2 - 9x + 18$  completely.

(ii)  $(x+5)$  is a factor of  $2x^3 + 5x^2 - 28x - 15$ .

Hence factorise the expression

$2x^3 + 5x^2 - 28x - 15$  completely.

(iii)  $(3x+2)$  is a factor of  $3x^3 + 2x^2 - 3x - 2$ .

Hence factorise the expression

$3x^3 + 2x^2 - 3x - 2$  completely.



[Watch Video Solution](#)

2. Using the Remainder Theorem, factorise each of the following completely:

(i)  $3x^3 + 2x^2 - 19x + 6$

(ii)  $2x^3 + x^2 - 13x + 6$

(iii)  $3x^3 + 2x^2 - 23x - 30$

(iv)  $4x^3 + 7x^2 - 36x - 63$

(v)  $x^3 + x^2 - 4x - 4$



Watch Video Solution

3. Using the Remainder Theorem, factorise the expression  $3x^3 + 10x^2 + x - 6$ . Hence, solve the equation  $3x^3 + 10x^2 + x - 6 = 0$ .



Watch Video Solution

4. Factorise the expression

$$f(x) = 2x^3 - 7x^2 - 3x + 18,$$

Hence, find all possible values of  $x$  for which  $f(x)=0$ .



Watch Video Solution

5. Given that  $x - 2$  and  $x + 1$  are factors of  $f(x) = x^3 + 3x^2 + ax + b$ , calculate the values of  $a$  and  $b$ . Hence, find all the factors of  $f(x)$ .



Watch Video Solution

6. The expression  $4x^3 - bx^2 + x - c$  leaves remainders 0 and 30 when divided by  $x+1$  and

$2x-3$  respectively. Calculate the values of  $b$  and  $c$ . Hence factorise the expression completely.



[Watch Video Solution](#)

7. If  $x+a$  is a common factor of expression

$$f(x) = x^2 + px + q \text{ and } g(x) = x^2 + mx + n$$

, show that  $a = \frac{n - q}{m - p}$ .



[Watch Video Solution](#)

8. The polynomials  $ax^3 + 3x^2 - 3$  and  $2x^3 - 5x + a$ , when divided by  $x - 4$ , leave the same remainder in each case. Find the value of  $a$ .



[Watch Video Solution](#)

9. Find the value of 'a', if  $(x - a)$  is a factor of  $x^3 - ax^2 + x + 2$ .



[Watch Video Solution](#)



**10.** Find the number that must be subtracted from the polynomial  $3y^3 + y^2 - 22y + 15$ , so that the resulting polynomial is completely divisible by  $y + 3$ .



**Watch Video Solution**

## Exercise 8 C

**1.** Show that  $(x - 1)$  is a factor of  $x^3 - 7x^2 + 14x - 8$

Hence, completely factorise the given expression.



[Watch Video Solution](#)

2. Using Remainder Theorem, factorise :

$x^3 + 10x^2 - 37x + 26$  completely.



[Watch Video Solution](#)

3. When  $x^3 + 3x^2 - mx + 4$  is divided by  $x - 2$ ,

the remainder is  $m + 3$ . Find the value of  $m$ .



[Watch Video Solution](#)

4. What should be subtracted from  $3x^3 - 8x^2 + 4x - 3$ , so that the resulting expression has  $(x+2)$  as a factor



[Watch Video Solution](#)

5. If  $(x + 1)$  and  $(x - 2)$  are factors of  $x^3 + (a + 1)x^2 - (b - 2)x - 6$ , find the

values of  $a$  and  $b$ . And then, factorise the given expression completely.



[Watch Video Solution](#)

6. If  $x = 2$  is a factor of  $x^2 + ax + b$  and  $a + b = 1$ .

find the values of  $a$  and  $b$ .



[Watch Video Solution](#)

7. Factorise  $x^3 + 6x^2 + 11x + 6$  completely

using factor theorem.



Watch Video Solution

8. Find the value of 'm'. If  $mx^3 + 2x^2 - 3$  and  $x^2 - mx + 4$  leave the same remainder when each is divided by  $x - 2$ .



Watch Video Solution

9. The polynomial  $px^3 + 4x^2 - 3x + q$  completely divisible by  $x^2 - 1$ : find the values

of  $p$  and  $q$ . Also for these values of  $p$  and  $q$  factorize the given polynomial completely.



[Watch Video Solution](#)

**10.** Find the number which should be added to  $x^2 + x + 3$  so that the resulting polynomial is completely divisible by  $(x + 3)$ .



[Watch Video Solution](#)

**11.** When the polynomial  $x^3 + 2x^2 - 5ax - 7$  is divided by  $(x - 1)$ , the remainder is A and when the polynomial.  $x^3 + ax^2 - 12x + 16$  is divided by  $(x + 2)$ , the remainder is B. Find the value of 'a' if  $2A + B = 0$ .



**Watch Video Solution**

**12.**  $(3x + 5)$  is a factor of the polynomial  $(a - 1)x^3 + (a + 1)x^2 - (2a + 1)x - 15$ .

Find the value of 'a'. For this value of 'a'.

Factorise the given polynomial completely



[Watch Video Solution](#)

**13.** When divided by  $x - 3$  the polynomials

$$x^3 - px^2 + x + 6 \text{ and } 2x^3 - x^2 - (p + 3)x - 6$$

leave the same remainder. Find the value of 'p'.



[Watch Video Solution](#)



**14.** Use the Remainder Theorem to factorise the following expression  $2x^3 + x^2 - 13x + 6$ .



**Watch Video Solution**

**15.** Using remainder theorem, find the value of  $k$  if on dividing  $2x^3 + 3x^2 - kx + 5$  by  $x-2$  leaves a remainder 7



**Watch Video Solution**

**16.** What must be subtracted from  $16x^3 - 8x^2 + 4x + 7$  so that the resulting expression has  $2x+1$  is a factor?



**Watch Video Solution**