

Mathematics S2

Unit 1: Indices and surds

1. Find the numerical value of:

a) $256^{0.5} + 27^{-\frac{1}{3}}$

b) $(x-1)^{\frac{2}{3}} + (x+6)^{\frac{4}{3}} + 5x^0$ when $x=10$

2. Solve the equations

a) $8(2^{2x-1}) = 16(2^{x-1})$

b) $16^{(3+n)} \times 2^{(1+n)} = \left(\frac{1}{2}\right)^{(1-n)}$

3. Simplify

a) $\sqrt{\frac{20}{21}} \times \sqrt{\frac{24}{15}}$

b) $0.42^2 - 0.58^2$ without using a calculator

4. Rationalise the denominator

a) $\frac{\sqrt{27}}{\sqrt{21} + \sqrt{33}}$

b) $\sqrt{\frac{3}{5}} - \sqrt{\frac{5}{3}}$

5) Use factor method to find the square root of

a) 1296

b) 784

Unit 2: Polynomials

1. Remove the brackets and simplify

a) $(x-3y)9y + 2(y^2 - 3xy)$

b) $xy(x-yn) - x(2y-x^2)$

2. Expand and simplify

a) ~~$(x-y-z)$~~ $(2x+3-y)$

b) $(x+y)^2 + (y+3)^2 + (3+2)^2 - (x+y+3)^2$

3) Divide the given polynomials and in each case state the quotient and the remainder

a) $(3a^3 - 1) \div (a - 1)$

b) $(x+2 - 3x^2 - 2x^3) \div (1+2x)$

- 4) Given that $2x^2 - 9x - 15 = a(x+3) + b(x+3)^2 + c(x^2+1)$, find the values of a , b and c .
- 5) Factorise the following expressions
 a) $6x^2 + 23x + 15$ b) $50 - 2x^2$
 c) $p^2qx + pq^2y + p^2xy + qxy^2$ d) $9x^2 - 36xy + 4y^2$
- 6) Find the zeros of the polynomials
 a) $x^3 - 2x^2 - 5x + 6$ b) $x^4 - 2x^3 + 3x^2 - 2x - 8$ c) $15 - x^2 - 2x$

Unit 3: linear simultaneous equations

1. Solve the following pairs of simultaneous equations

a) $\begin{cases} 2x = 3 + y \\ 7x + 2y = 16 \end{cases}$ b) $\frac{1}{v} + \frac{1}{4} = \frac{1}{5}$ c) $\begin{cases} 5x + 3y = 12 \\ 2y + 7x = 19 \end{cases}$
 $\frac{1}{v} - \frac{1}{4} = \frac{2}{5}$

2) Two lines are given by $2x + y = 5$ and $4x - y = 1$. Find the coordinates of the point of intersection, hence state the solutions of the simultaneous equations $2x + y = 5$ and $4x - y = 1$.

3) Write down the integral values of x which satisfy the inequality $-3 < 2x + 4 \leq -3x + 9$

4. Solve the inequalities

a) $\frac{x+1}{2-x} < 1$ b) $(3-x)(x+2) > 0$ c) $\frac{(x^2-1)(x+1)}{x+2} \geq 0$ d) $\frac{x+1}{x-1} \leq 5$

5. The sum of the digits in a three digit number is nine. The tens digit is half the sum of the other two and the hundreds digit is half the units digit. Find the number.

6) A man is 22 years older than his son and their total age is 48 years. Form a pair of equations and solve them to find the ages of the man and his son.