

PURE MATHEMATICS (P425/1)

1. Solve the equation: $\sqrt{4x+13} - \sqrt{x+1} = \sqrt{12+x}$
2. Solve the simultaneous equations below using the echelon form:

$$2x + 3y - 4z = 9$$

$$3x + 2y + z = 4$$

$$5x + y + 3z = 3$$

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3. Solve for x : $9^{3x} - 6(9^{2x}) + 11(9^x) - 6 = 0$

4. Solve for x given: $0.7 = (1.2)^{2x-1}$

5. Solve the equations: $\log_2 x^2 + \log_2 y^3 = 1$

$$\log_2 x - \log_2 y^2 = 4$$

6. The roots of the quadratic equation $x^2 + (7 + p)x + p = 0$ are α and β . Given that α and β differ by 5, find the possible values of p
7. When the quadratic expression $px^2 + qx + r$ is divided by $x - 1$, $x - 2$ and $x + 1$, the remainders are 1, 1 and 25 respectively. Determine the values of p , q and r and then factorise the expression completely.
8. When a polynomial $P(x)$ is divided by $x - 2$, the remainder is 4 and when $P(x)$ is divided by $x - 3$, the remainder is 7. Find the remainder when $P(x)$ is divided by $(x - 2)(x - 3)$
9. Using the substitution $u = 3^x$, solve the equation $3^x + 3^{2x} = 3^{3x}$; giving your answer correct to 3S.Fs
10. Find the value of x in the following equations;
 - (a) $\log_{10}(x + 9) = 2 + \log_{10}x$
 - (b) $1/9^x = 3^{x-2}$

11. Prove that : $\tan(45^\circ + \vartheta) - \tan(45^\circ - \vartheta) = 2 \tan 2\vartheta$

12. Solve for x given $7 \cos x + 24 \sin x = 10$ and $0 \leq x \leq 360^\circ$.

13. a) Solve the simultaneous equations : $\cos x + 4 \sin y = 1$
 $\sec x - 3 \operatorname{cosec} y = 5$ for $0^\circ \leq x, y \leq 360^\circ$

- (b) Determine the solution of the equation $\tan 2x + 2 \sin x = 0$ for $0 \leq x \leq 90^\circ$.

14. Prove the following identities

- (a) $2 \operatorname{cosec} 2\vartheta = \operatorname{cosec} \vartheta \sec \vartheta$

(b) $\frac{1+\tan^2 \theta}{2-\tan^2 \theta} = \sec 2\theta$

c) $\tan 5\theta = \frac{5 \tan \theta - \tan^3 \theta + \tan^5 \theta}{1 - 10 \tan^2 \theta + \tan^4 \theta}$

