



1 Find the centre and radius for the circle
 $x^2 + y^2 - 14x - 2y - 31 = 0$.

2 The line through (2, -1) and (4, x) has a gradient of 4. What is the value of x?

3 Find the equation of the tangent to the curve $y = x^3 + 3x^2$ where $x = -2$.

4 Find the limit of the recurrence relation
 $u_{n+1} = \frac{1}{3}u_n - 6$.

5 What are the values of a, b and c?
 $y = a \sin bx + c$

6 Show that E(-1, 0, 1), F(2, 6, 7) and G(6, 14, 15) are collinear and find the ratio in which F divides EG.

7 Show that (x + 5) is a factor of $x^3 + 13x^2 + 31x - 45$ and hence factorise it fully.

8 Calculate the inverse function, $f^{-1}(x)$, for:
 $f(x) = 6x - 1$.

9 Write $y = 2x^2 - 8x + 7$ in the form $y = a(x + b)^2 + c$.

10 Solve the equation $\sin 2x = \sqrt{3} \sin x$ for $\pi \leq x \leq 2\pi$

11 Express $\cos x^\circ + \sin x^\circ$ in the form $k \sin(x + a)^\circ$ where $k > 0$ and $0 < a < 360$.

12 Differentiate the following:
 $\sin^4 x$

13 Simplify the following logarithmic expression;
 $4 \log_9 3 - 2 \log_9 3$

14 If A is an acute angle with $\tan A = \frac{2}{3}$ find the exact value of $\sin 2A$.

15 Find the point of intersection between the lines $y = 5 - 3x$ and $y = 1 - x$

16 A curve for which $\frac{dy}{dx} = 3x^2 + 1$ passes through the point (-1, 4). Express y in terms of x.

17 Show that the line $y = 3 - 2y$ is a tangent to the circle $x^2 + y^2 + 8x - 2y + 12 = 0$ and find the coordinates of the point of contact.

18 Calculate the coordinates of the stationary points on the curve $y = 3x^3 - 9x^2 + 15$ & determine nature.

19 A recurrence relation is defined as $u_{n+1} = 3u_n - 2$. If $u_2 = 19$, calculate u_0 .

20 State the equation of the graph of the inverse function for $y = \log_7 x$.

21 Differentiate with respect to $f(x) = \frac{x^2 + 2}{\sqrt{x}}$.

22 Calculate the size of the angle that the line $y = 4 - x$ makes with the positive direction of the x-axis.

23 For the equation $y = k(x + a)(x + b)$, what are the values of a, b and k?

24 State any restrictions on the domain for the function:
 $h(x) = \frac{x + 8}{x^2 - x - 12}$

25 Triangle ABC has vertices A(-4, -3), B(-2, 7) and C(6, -1). Calculate the equation of the median from B.

26 The quadratic equation $2x^2 - 3x + k = 0$ has real roots. What are the range values of k?

27 Find the shaded area

28 Calculate the size of the angle between the vectors $\underline{c} = \begin{pmatrix} 3 \\ 4 \\ -1 \end{pmatrix}$ and $\underline{d} = \begin{pmatrix} 5 \\ 1 \\ 0 \end{pmatrix}$