Further Maths Revision (Non-Calculator)

Using the digits 5, 6, 7 and 8 once each, how many possible numbers can be made that are multiples of 5?	Given that $\frac{a+\sqrt{12}}{2-\sqrt{3}} = b + 10\sqrt{3}$ find the values of a and b.	A sequence starts $\frac{2}{3}, \frac{3}{5}, \frac{4}{7}, \frac{5}{9}, \ldots$ Find the nth term for this sequence and the limiting value as $n \to \infty$.
Factorise $(4x^2 - 1) - (2x - 1)(x + 1)$	A circle has centre $(5, 10)$. The point $(2, 14)$ lies on the circumference of the circle. Find the equation of the circle.	Expand and simplify $(x^2 + 2)^4$
Show that $(x - 2)$ is a factor of $x^3 + x^2 - 4x - 4$.	Solve the simultaneous equations: $x + y + 2z = 12$ $5x - 2y + z = 22$ $x - y + z = 9$	Solve $2x^3 + x^2 - 18x - 9 = 0$
A line segment joins point A (5, 2) with point B. Point C with coordinates (4, 4) divides the line segment in the ratio AC : CB = 1 : 3. Find the coordinates of B.	Prove that $(2\sin x - \cos x)^2 + (\sin x + 2\cos x)^2 \equiv 5$	Find the equation of the tangent to the curve $y = x^2 + \frac{1}{x}$ at the point where $x = 1$.

Answers

6	a = 6, b = 18	$\frac{n+1}{2n+1} \to \frac{1}{2}$
$x(2x-1)$	$(x-5)^2+(y-10)^2=25$	$x^8+8x^6+24x^4+32x^2+16$
$f(2)=0$ hence $(x-2)$ is a factor	$x=3, y=-1, z=5$	$x=3, x=\frac{-1}{2}, x=-3$
$(1,10)$	(proof)	$\frac{dy}{dx}=2x-\frac{1}{x^2}$ $y=x+1$

Further Maths Revision (Calculator)

Solve in the interval $0 \leq x \leq 360$

$$x = 3$$

Find the coordinates of the stationary points of this curve. Establish whether these points are minimums or maximums.

$$y = 2x^3 - 3x^2 - 12x + 5$$

Matrix **P** = $\begin{pmatrix} 2 & 3 \\ a & b \end{pmatrix}$

Matrix **Q** = $\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$

You are given that **PQ** = **QP**. Work out the values of a and b.

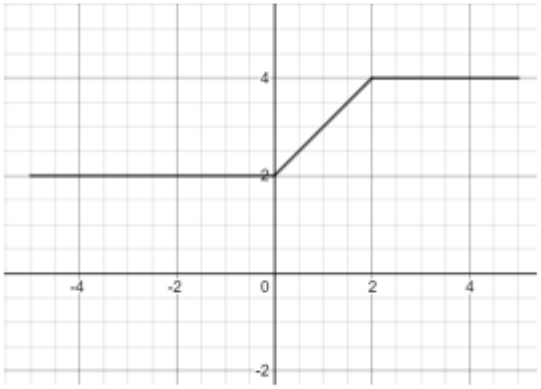
Solve

$$\sqrt[3]{\left(42 - 3\sqrt{x}\right)} = 3$$

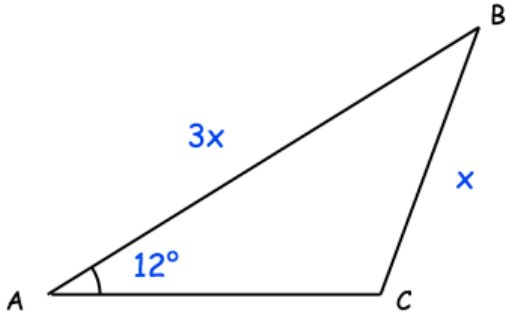
Solve in the interval $0 \leq x \leq 360$

$$2x - 5cosx = 2$$

(a) Given the graph of $y = f(x)$, define the function, stating the domain of each part clearly.



(b) Evaluate $f(1)$



$\angle ACB$ is an obtuse angle.

Find the size of $\angle ACB$

Find the centre and radius of the circle with equation:

$$x^2 + y^2 - 2x + 8y - 8 = 0$$

	$(x+2)$ and $(x-3)$ are both factors of the cubic $x^3+ax^2+bx+18$. Find the values of a and b.	Point $(-1,4)$ is transformed by the matrix $\begin{pmatrix}3 & -1\\ -2 & 2\end{pmatrix}$ followed by a further transformation by the matrix $\begin{pmatrix}1 & 0\\ 3 & -2\end{pmatrix}$. (i) Work out the matrix for the combined transformation. (ii) Work out the co-ordinates of the image point of W.

Answers

60° 240° 120° 300°	(-1, 12) MAXIMUM (2, -15) MINIMUM	$\begin{pmatrix}2 & 3\\ a & b\end{pmatrix}\begin{pmatrix}1 & 1\\ 0 & 1\end{pmatrix} = \begin{pmatrix}1 & 1\\ 0 & 1\end{pmatrix}\begin{pmatrix}2 & 3\\ a & b\end{pmatrix}$ $\begin{pmatrix}2 & 5\\ a & a+b\end{pmatrix} = \begin{pmatrix}2+a & 3+b\\ a & b\end{pmatrix}$ $a=0 \quad b=2$
25	90, 270	$f(x)=2 \quad -5\leq x<0$ $f(x)=x+2 \quad 0\leq x<2$ $f(x)=4 \quad 2\leq x<5$ f(1) = 3
141.4	(a) $(x-1)^2+(y+4)^2=25$ centre (1, -4) radius 5	

	$a=-4\ ,\ b=-3$	(i) $\begin{pmatrix} 0 & 2 \\ 4 & -4 \end{pmatrix}$ (ii) $(8,-20)$