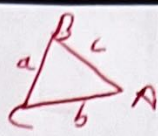


A - Level Maths 15 Minute Boost 2

State the sine rule:	$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ 
State a property of the tangent to a circle.	the tangent is \perp to the radius
$\frac{d}{dx}(e^{kx}) =$	ke^{kx}
What is the formula for the binomial expansion of $(a+b)^n$, $n \in \mathbb{N}$?	$a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \dots + \binom{n}{n}a^0b^n$
$\int \sin(ax+b) dx =$	$-\frac{\cos(ax+b)}{a} + C$

1) Express $\frac{12x^2 + 21x + 7}{(x-1)(x+1)(2x+3)}$ in partial fractions.

Consider $\frac{12x^2 + 21x + 7}{(x-1)(x+1)(2x+3)} = \frac{A}{x-1} + \frac{B}{x+1} + \frac{C}{2x+3}$

So
$$\frac{12x^2 + 21x + 7}{(x-1)(x+1)(2x+3)} = \frac{A(x+1)(2x+3) + B(x-1)(2x+3) + C(x-1)(x+1)}{(x-1)(x+1)(2x+3)}$$

When $x = -1$, $-2 = -2B \Rightarrow B = 1$

When $x = \frac{-3}{2}$, $\frac{2}{2} = \frac{4C}{4} \Rightarrow C = 2$

$x = 1$, $40 = 10A \Rightarrow A = 4$

Hence in partial fractions we have

$$\frac{12x^2 + 21x + 7}{(x-1)(x+1)(2x+3)} = \frac{4}{x-1} + \frac{1}{x+1} + \frac{2}{2x+3}$$



2 Find the equation of the circle passing through the points $A(7,5)$, $B(6,6)$ and $C(-1, -1)$.

$$\perp \text{ bisector of } AB : y = x - 1$$

$$\perp \text{ bisector of } BC : y = -x + 5$$

\therefore Centre of circle is the intersection of these two bisectors

$$\text{Centre} : (3, 2)$$

$$\begin{aligned} \text{So radius} &= \sqrt{(7-3)^2 + (5-2)^2} \\ &= 5 \end{aligned}$$

So equation of circle is

$$(x-3)^2 + (y-2)^2 = 25$$

