

**2nd February**Factorise $3x^2 - 17x + 10$

$$(3x - 2)(x - 5)$$

AB is a diameter of a circle C.

Q is the centre of the circle

A has coordinates $(-4, 1)$ and B has coordinates $(6, 9)$.

$$Q(1, 5)$$

$$QB = \sqrt{5^2 + 4^2} = \sqrt{41}$$

Find the equation of C

$$(x - 1)^2 + (y - 5)^2 = 41$$

Given that

$$(x + a)^2(x - 2) \equiv x^3 + bx^2 + 12x - 72$$

$$(x^2 + 2ax + a^2)(x - 2)$$

Find the values of a and b

$$x^3 - 2x^2 + 2ax^2 - 4ax + a^2x - 2a^2$$

$$x^3 + (2a - 2)x^2 + (a^2 - 4a)x - 2a^2$$

$$\boxed{x^2} \quad b = 2a - 2 \quad \boxed{x} \quad a^2 - 4a = 12$$

$$a^2 - 4a - 12 = 0$$

Constants

$$(a - 6)(a + 2) = 0$$

$$-2a^2 = -72$$

$$a^2 = 36$$

$$a = \pm 6$$

$$a = 6 \text{ or } a = -2$$

$$\therefore a = 6$$

$$b = 10$$

Work out the equation of the normal to

the curve $y = (x + 1)(x + 7)$ at the point where $x = -5$

$$y = x^2 + 8x + 7$$

$$\frac{dy}{dx} = 2x + 8$$

$$\frac{dy}{dx} = -2 \quad y = -8$$

gradient of normal is $\frac{1}{2}$

$$y = \frac{1}{2}x + c$$

$$-8 = -\frac{5}{2} + c$$

$$c = -\frac{11}{2}$$

$$y = \frac{1}{2}x - \frac{11}{2}$$