Higher Homework 10

1) Write down the coordinates of the centre of each circle and state its radius.

a) $x^2 + y^2 - 4x + 6y + 11 = 0$ b) $x^2 + y^2 + 10x - 7y - 3 = 0$

c) $2x^2 + 2y^2 - 6x - 9y - 8 = 0$

2) The point P (2,3) lies on the circle $(x + 1)^2 + (y - 1)^2 = 13$.
Find the equation of the tangent at P.

3) $(x - 2)$ is a factor of $3x^3 - kx^2 + 4$.

a) Find the value of k.

b) Find the other factors of $3x^3 - kx^2 + 4$ for this value of k.

4) A triangle LMN has vertices L (-1,-2), M (5,2) and N (1,8) .
Find the equation of the altitude through L.

5) A circle has centre (-2,3) amd passes through P (1,6).

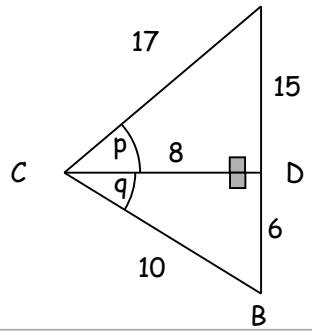
a) Find the equation of this circle.

b) The line PQ is a diameter of the circle. Find the equation of the tangent to the circle at Q.

6) a) Express $2x^2 + 4x - 3$ in the form a $(x + b)^2 + c$.

b) Write down the coordinates of the turning point on the parabola with equation $y = 2x^2 + 4x - 3$.

7) Triangles ACD and BCD are right-angled at D with angles p and q and lengths as shown in the diagram.



a) Show that the exact value of sin (p + q) is $\frac{84}{85}$.

b) Calculate the exact values of :

i) cos (p + q) ii) tan (p + q)

8) $f(x) = x^3 - x^2 - 5x - 3$

a) i) Show that $(x + 1)$ is a factor of $f(x)$.

ii) Hence or otherwise factorise $f(x)$ fully.

b) One of the turning points of the graph of $y = f(x)$ lies on the x-axis. Write down the coordinates of this turning point.

9) Find the coordinates of the point(s) where the straight line $y = x + 1$ meets the parabola $y = x^2 + 3x + 2$.