

Mathematics Department – Langholm Academy

**HIGHER HOMEWORK**

**UNIT 2**

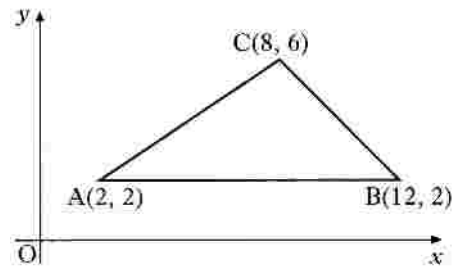
**CHAPTER 4**

**Circles 2**

**Higher - Unit 2**  
**Circles 2**

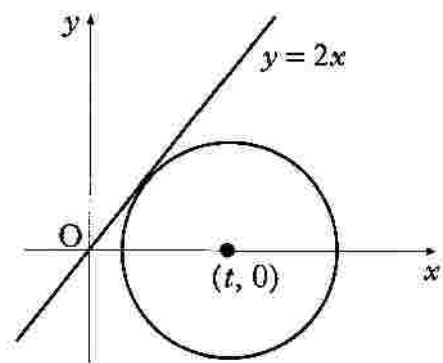
1. Find the equation of the tangent to the circle at the given point
  - a.  $(1,2)$ ,  $(x-1)^2 + (y-5)^2 = 9$
  - b.  $(4,-1)$ ,  $x^2 + y^2 + 6x - 4y - 45 = 0$
  - c.  $(-1,2)$ ,  $3x^2 + 3y^2 - 6x - 9y - 3 = 0$
  
2. Show that the line  $y = x - 1$  is a tangent to the circle (carry out a test)  $x^2 + y^2 + 2x - 1 = 0$  and find the point of contact.
  
3. A circle has centre  $A(4,3)$  and passes through the origin.
  - a. Find the equation of the circle.
  - b. A chord of the circle  $PQ$  has midpoint  $M(2,2)$ , find the coordinates of  $P$  and  $Q$ .
  
4. For what range of values of  $k$  does  $x^2 + y^2 + 2kx - 8y + 25 = 0$  represent a circle?

5. Triangle  $ABC$  has vertices as shown
  - a. Find the perpendicular bisectors of  $AB$  and  $AC$
  - b. Hence, find the equation of the circle passing through  $A$ ,  $B$  and  $C$



6.
  - a. Find the equation of the tangent to the curve  $y = x^3 + 2x^2 - 3x + 2$  at the point where  $x = 1$ .
  - b. Show that this line is also a tangent to the circle with equation  $x^2 + y^2 - 12x - 10y + 44 = 0$

7. A circle has centre  $(t,0)$ ,  $t \neq 0$ , and radius 2 units.
  - a. Write down the equation of the circle.
  - b. Find the exact value of  $t$ , such that the line  $y = 2x$  is tangent to the circle.



8. The line  $y = -2x + c$  is a tangent to the circle  $x^2 + y^2 - 2x - 4y - 15 = 0$ . Find all the possible values of  $c$ .