1. Triangle ABC has vertices A(-1,6), B(-3,-2) and C(5.2).
2. Find the equation of the median from C in this triangle
3. Find the equation of the perpendicular bisector of BC

(c) Find the point of intersection of these two lines

2. Show that the following two circles touch externally at a single point :

 

3. A circle has as its equation 

 (a) Verify that the point (4,0) lies on the circle.

 (b) Find the equation of the tangent at this point.

 (c) Find the equation of the parallel tangent.

4. (a) Find the value of *k* which results in the equation 

 Having **equal** roots, given that  ?

 (b) A quadratic equation is given as .

 For what values of *p* will the above equation have i) equal roots ;

 ii) no real roots.

 (c) Show that the roots of the equation  are real for

 all values of  *t* .

5. Find q given that $x^{2}+\left(q-3\right)x+q$ = 0 has non real roots.

6. The brake fluid reservoir in a car is leaky. Each day it loses 3% of its contents. To compensate for this daily loss the driver “tops up” once per **week** with 50ml of fluid. For safety reasons the level of fluid in the reservoir should always be between 230 and 265ml.

 Initially the fluid level is 255ml.

1. Find a recurrence relation to describe the above
2. Is the process effective in the long run?

7. Over a period of time the effectiveness of a standard spark plug slowly



 decreases. It has been found that, in general, a spark plug will loose

 8% of its burn efficiency every  **two months** while in average use.

 (a) A new spark plug is allocated a *Burn Efficiency Rating (BER)*

 of 120 units.

What would the *BER* be for this plug after a year of average use ?

 Give your answer correct to one decimal place.

 (b) After exhaustive research, a new fuel additive was developed.

 This additive , when used at the end of every **four month** period,immediately

 allows the *BER* to increase by 8 units.

 A plug which falls below a *BER* of 80 units should immediately be replaced.

What should be the maximum recommended lifespan for a plug, in months, when using this additive?