**THREE INVESTIGATIONS.**

1(a) Find the coordinates of the points where the line ***y = ½x*** crosses the

circle given by ***(x – 4)2 + y2 = 8***

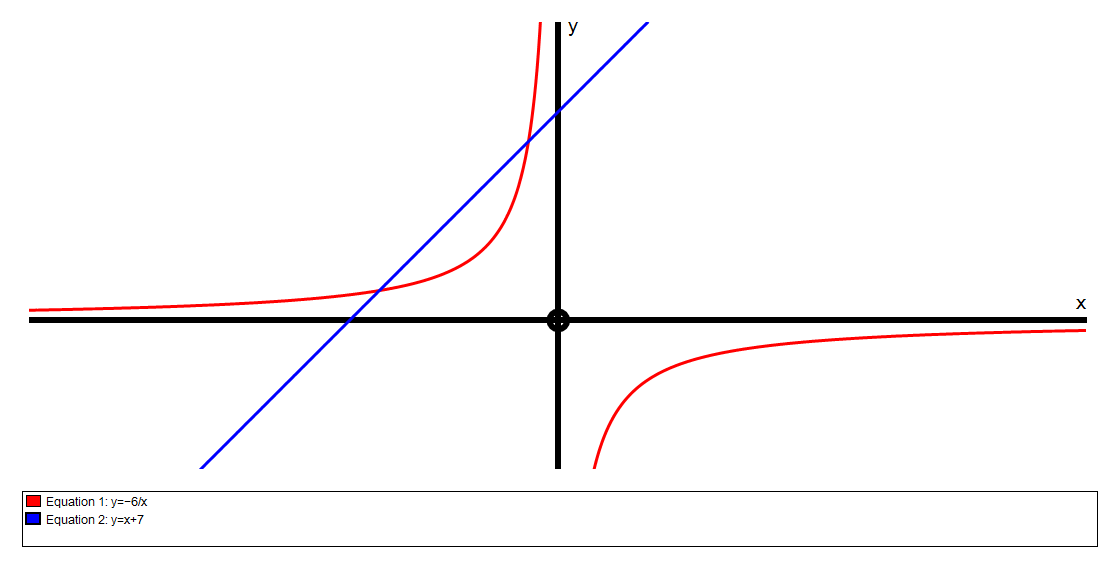
(b)

A line of the form ***y = mx*** can cross the circle ***(x – 4)2 + y2 = 8***

once or twice or not at all.

Find the value of ***m*** so that the line is a tangent.

2(a)



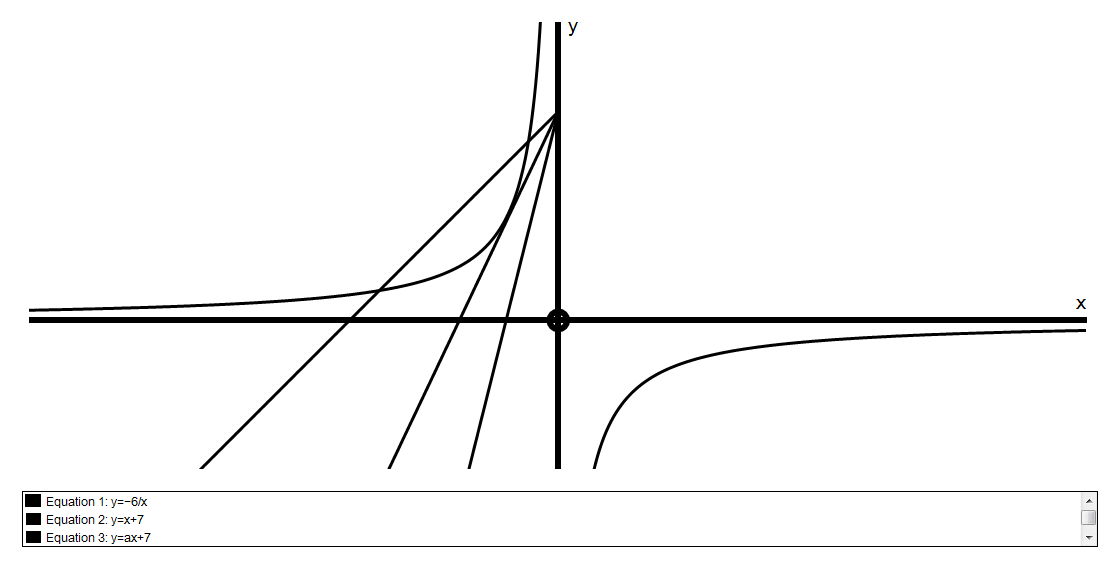
The graphs above show the intersection points of ***y = – 6 and y= x + 5***

***x***

Find the coordinates of the intersection points algebraically.

(b) Consider the line ***y = mx + 5*** which has a fixed ***y*** intercept at P but a

variable gradient ***m***.



P

A B C

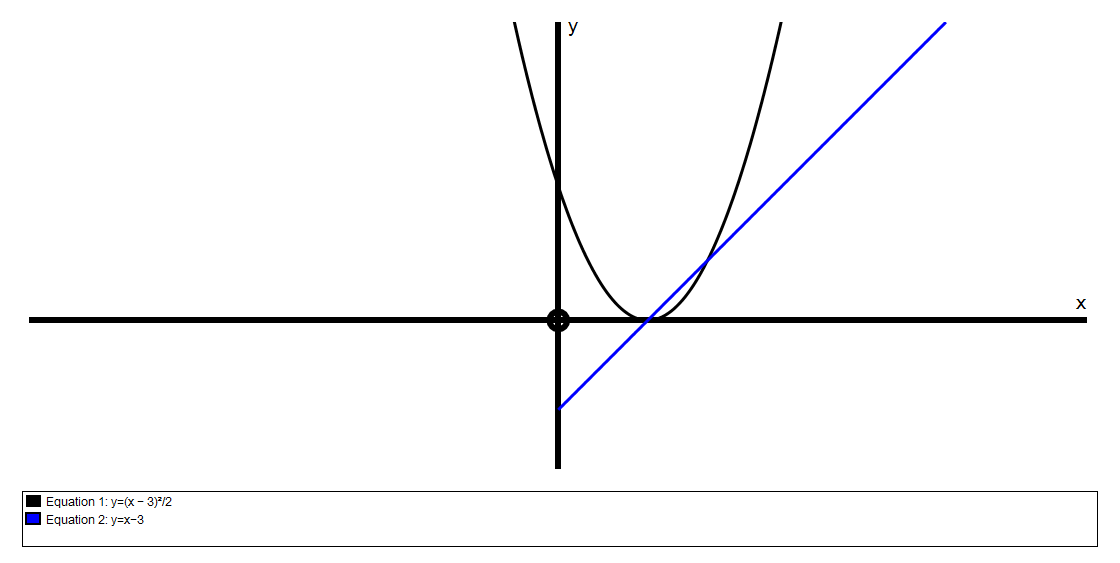
Line A crosses the hyperbola twice, Line B is a tangent and Line C does not cross.

Find the value of ***m*** so that ***y = mx + 5*** is a tangent.

(c) Write down the range of values for m so that there will be 2 intersections.

(d) Write down the range of values for m so that there will be no intersections.

3(a) The graphs below show ***y = (x – 3)2 and y = x – 3***



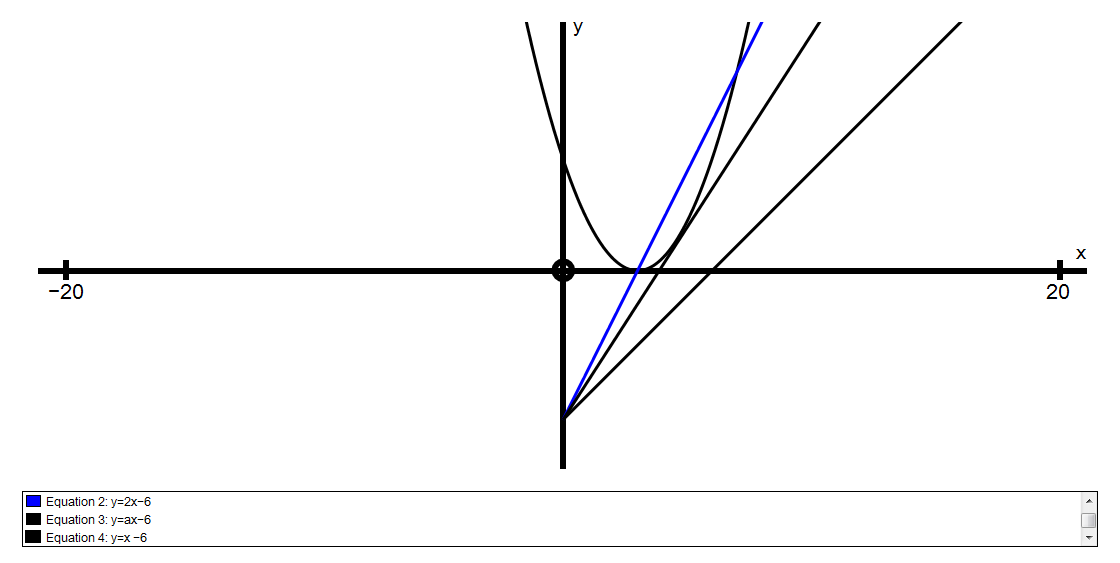
Calculate algebraically the intersection points.

(b) Consider the line ***y = mx – 7*** which has a fixed ***y*** intercept but a variable

gradient ***m***.

Find the value of ***m*** so that

***y = mx – 7*** is a tangent to the parabola ***y = (x – 3)2***



P

(c) If ***y = mx – k*** is to be a tangent to ***y = (x – k)2*** show that ***m2 + 4km – 4k = 0***