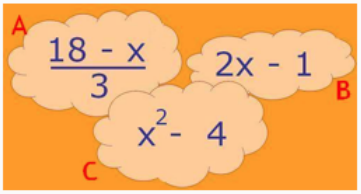
Grades 11 to 12 Almost Total Inequality?

When x is zero, A is greater than both B and C

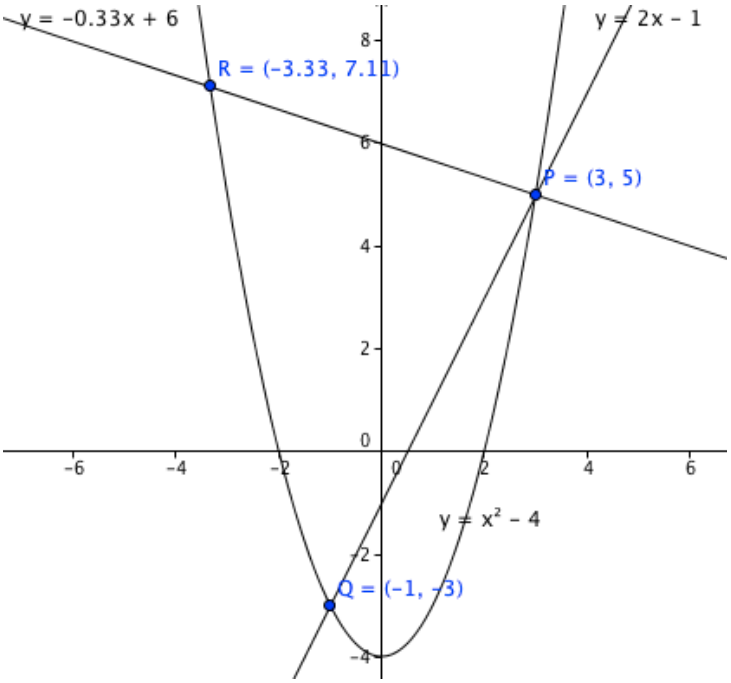


For what other values of x is A the greatest?

For what values of x is B the greatest ?

For what values of x is C the greatest?

Is there a value of x when neither A nor B nor C is greater than the other two?
See http://nrich.maths.org/5966



From the graph:
A is the greatest between R and P
B is never the greatest
C is greatest to the left of R and to the right of P.
At point P the three expressions are equal so neither A not B nor C is greater than the other two.

Algebraically:
A=B when (18-x)/3 = 2x-1. Solving this equation gives x=3 and the expressions have the value y=5.

B=C when
x^2-4 = 2x-1 that is x^2 -2x -3 = 0 and solving this equation gives x = 3 or -1.
Hence A=B=C at P(3,5)
and B=C at Q(-1,-3)

A=C when $(x^2 - 4)=(18-x)/3$ which simplifies to the quadratic equation $3x^2+x-30=0$. This equation has solutions x=3 and x=-10/5. So the graphs of A and C intersect at R(-10/3, 64/9).
A is greater than B and C for $-10/3 < x < 3$
B is greater than C (but less than A) for $-1 < x < 3$
C is greater than A and B for $x < -10/3$ and $x > 3$.

Key Questions
1. What would you do with two of the expressions to find out when one is greater than the other?
2. Now you have found an inequality involving two of the expressions how are you going to compare them with the third expression.
3. What shape would the graphs be for these expressions?

Why do this problem?
The problem is non-routine involving complex procedures and problem solving so it will help learners to develop higher order cognitive skills.

Possible approach
Give your learners the opportunity to decide for themselves how to tackle this problem. Encourage learners to share their ideas. You might use the one-two-four-more strategy (work individually,

compare results then work with a partner, later compare results and work with another pair as a group of four, later share ideas in a whole class discussion). To understand the concepts fully learners should be encouraged to reflect on both graphical and algebraic methods. You could ask learners who have used one method to present their method to the class then do the same with the other method.