Solving Quadratic & Higher Degree Inequalities by Factoring

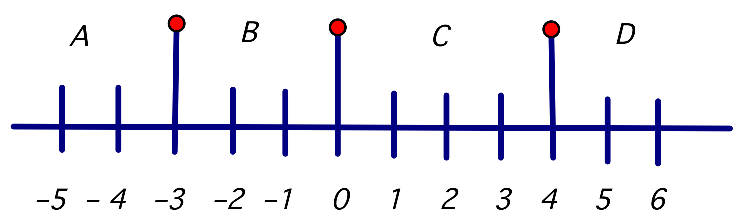
Strategy

1. **Place everything on one side, zero on the other side**
2. **Factor completely**
3. **Find the critical points**
4. **Plot those on a number line to identify intervals**
5. **Check convenient points in those intervals to determine which interval(s) make the inequality true**

Example **Solve the inequality** $x^3 - x^2 \geq 12x$

```

1. $x^3 - x^2 - 12x \geq 0$
2. $x(x^2 - x - 12) \geq 0$
   $x(x - 4)(x + 3) \geq 0$
3. $x = 0$, $x = 4$ and $x = -3$




5. **Intervals A, B, C and D**

**A Interval A, –5 does not work. Interval B, – 1 works**
**Interval C, 2 does not work. Interval D, 10 works.**

**Therefore the solution is** $-x \leq x \leq 0 \cup x \geq 4$

Find the solution set for the following inequalities.

1. $(x + 3)(x - 5) < 0$
2. $x(x - 10)(x + 1) > 0$
3. $x^2 + x > 0$
4. $x^2 - 7x < -12$
```

5. $x(x - 5)(x + 5) > 0$

6. $x^2 + 15 < 8x$

7. $x^2 - 3 > 2x$

8. $(x - 2)^2 < 0$

9. $2x^3 - 5x^2 + 6x - 15 > 0$

10. $x^4 + 3x^3 - 8x - 24 < 0$