Simplify the following:

4 x (x-2 y)-(x-3 y)^2

Distribute 4 x over x-2 y.

4 x (x-2 y) = 4 x^2-8 x y.

To simplify 4 x^2-8 x y-(x-3 y)^2 first

expand (x-3 y)^2 :

(x-3 y) (x-3 y) = (x) (x) + (x) (-3 y) + (-3 y) (x) + (-3 y) (-3 y) = x^2-3 x y-3 x y+9 y^2 = x^2-6 x y+9 y^2.

Then multiply -1 by x^2-6 x y+9 y^2 :

-(x^2-6 x y+9 y^2) = -x^2+6 x y-9 y^2.

So, 4 x^2-8 x y-x^2+6 x y-9 y^2.

Consider 4 x^2-8 x y-x^2+6 x y-9 y^2.

Group like terms in this expression:

4 x^2-8 x y-x^2+6 x y-9 y^2 = -9 y^2+(6 x y-8 x y)+(4 x^2-x^2).

In -9 y^2+(6 x y-8 x y)+(4 x^2-x^2) combine like terms :

in case (6 x y-8 x y) we have 6 (x y)-8 (x y) = -2 (x y);

in case (4 x^2-x^2) we have 4 x^2-x^2 = 3 x^2.

So,

-9 y^2-2 x y+3 x^2 .

Answer:

-9 y^2-2 x y+3 x^2