Simplify the following expression:

$$(2 + 3i)\left[(2 - 3i) + \frac{1}{2 - 3i}\right]$$

Solution   It is easiest to solve this problem in two pieces (rather than putting the two terms over a common denominator).

$$(2 + 3i)(2 - 3i) = 4 \cancel{-6i} + \cancel{6i} - 9(i)^2$$
$$= 13$$

$$\frac{2 + 3i}{2 - 3i} = \left(\frac{2 + 3i}{2 - 3i}\right)\left(\frac{2 + 3i}{2 + 3i}\right)$$
$$= \left(\frac{4 + 6i + 6i - 9}{13}\right)$$
$$= \left(\frac{-5 + 12i}{13}\right)$$

Don't stop simplifying until you have the complex number in rectangular form, i.e.

$$(\text{real number}) + i(\text{real number})$$