M10 - 5.6 - Factoring Substitution Let x = m+1 Notes

Substitution Factoring

$(m+1)^2+5(m+1)+6$

x^2+5x+6
$(x+2)(x+3)$
$\big((m+1)+2\big)\big((m+1)+3\big)$

$(m+3)(m+4)$

$Let\ x=m+1$

$Put\ "x"\ in\ for\ "m+1"$
Factor
$Put\ "m+1"\ back\ in\ for\ "x"$
Substitute with Brackets

OR

FOIL then Factor
$(m+1)^2+5(m+1)+6$
$(m+1)(m+1)\ldots$
$m^2+2m+1+5m+5+6$
$m^2+7m+12$
$(m+3)(m+4)$

$4x^2-(x+2)^2$
$(2x)^2-(x+2)^2$

a^2-b^2

$let\ a=2x$
$let\ b=(x+2)$

$Put\ "a"\ in\ for\ "2x"$
$Put\ "b"\ in\ for\ "x+2"$

Figure Out what is being Squared
Change of base
Do this in your Head

$4x^2=(2x)^2$

$(a+b)(a-b)$

$(2x+(x+2))(2x-(x+2))$

$(3x+2)(x-2)$

Factor

$Put\ "2x"\ back\ in\ for\ "a"$
$Put\ "x+2"\ back\ in\ for\ "b"$
Substitute with Brackets

Distribute
Combine Like Terms

OR

FOIL then Factor
$4x^2-(x+2)^2$
$4x^2-(x+2)(x+2)$
$4x^2-(x^2+4x+4)$
$4x^2-x^2-4x-4$
$3x^2-4x-4$
…
$(3x+2)(x-2)$

$9(x+2)^2-16(x-1)^2$

$9a^2-16b^2$
$(3a+4b)(3a-4b)$

Let $a=x+2$
Let $b=x-1$

$\big(3(x+2)+4(x-1)\big)\big(3(x+2)-4(x-1)\big)$
$(3x+6+4x-4)(3x+6-4x+4)$
$(7x+2)(-x+10)$

$-(7x+2)(x-10)$

$x^2-6x+9-y^2$
$(x^2-6x+9)-y^2$
$(x-3)^2-y^2$
…
$(x-3+y)(x-3-y)$

Group First/Last 3 Terms
Factor
Differences of Squares
…

$9x^4-9x^2+6xy-y^2$
$9x^4-(9x^2-6xy+y^2)$
$9x^4-(3x-1)^2$
$(3x^2)^2-(3x-1)^2$
$\big(3x^2+(3x-1)\big)\big(3x^2-(3x-1)\big)$

$(3x^2+3x-1)(3x^2-3x+1)$