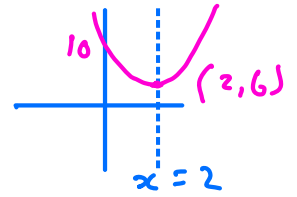


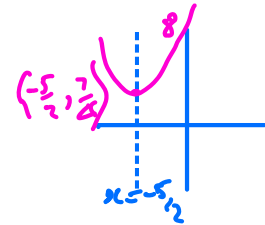
## Completing the Square 2

Exercise Complete the square, identify min point and line of symmetry. Draw a sketch

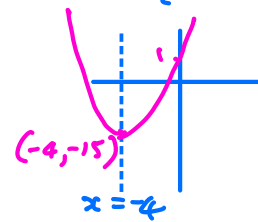
$$1) \quad x^2 - 4x + 10 \\ = (x-2)^2 + 10 - 4 = (x-2)^2 + 6$$



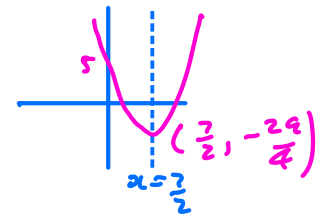
$$2) \quad x^2 + 5x + 8 \\ = (x + \frac{5}{2})^2 + 8 - \frac{25}{4} = (x + \frac{5}{2})^2 + \frac{7}{4}$$



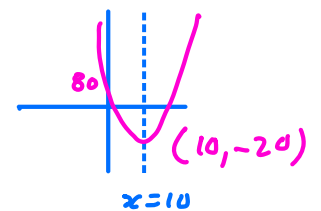
$$3) \quad x^2 + 8x + 1 \\ = (x+4)^2 + 1 - 16 = (x+4)^2 - 15$$



$$4) \quad x^2 - 7x + 5 \\ = (x - \frac{7}{2})^2 + 5 - \frac{49}{4} = (x - \frac{7}{2})^2 - \frac{29}{4}$$



$$5) \quad x^2 - 20x + 80 \\ = (x-10)^2 + 80 - 100 = (x-10)^2 - 20$$



Multiple  $x^2$  Term

Completing the Square

$$\text{Ex1} \quad 2x^2 + 6x - 5 \\ = 2 \left[ x^2 + 3x - \frac{5}{2} \right] \\ = 2 \left[ \left( x + \frac{3}{2} \right)^2 - \frac{5}{2} - \frac{9}{4} \right] \\ = 2 \left( x + \frac{3}{2} \right)^2 - 5 - \frac{9}{2}$$

$$= 2\left(x + \frac{3}{2}\right)^2 - \frac{10}{2} - \frac{9}{2}$$

$$= 2\left(x + \frac{3}{2}\right)^2 - \frac{19}{2}$$

Min point

$$\left(-\frac{3}{2}, -\frac{19}{2}\right)$$

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Ex 2

$$3x^2 - 12x + 7$$

$$= 3\left[x^2 - 4x + \frac{7}{3}\right]$$

$$= 3\left[(x-2)^2 + \frac{7}{3} - 4\right]$$

$$= 3(x-2)^2 + 7 - 12$$

$$= 3(x-2)^2 - 5$$

Min point

$$(2, -5)$$

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Ex 3

$$-x^2 + 6x - 4$$

$$= -1\left[x^2 - 6x + 4\right]$$

$$= -1\left[(x-3)^2 + 4 - 9\right]$$

$$= -1\left[(x-3)^2 - 5\right]$$

$$= -(x-3)^2 + 5$$

Max pt

$$(3, 5)$$

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# Exercise Complete the Square

1)

$$2x^2 + 10x + 7$$

$$= 2 \left[ x^2 + 5x + \frac{7}{2} \right]$$

$$= 2 \left[ \left( x + \frac{5}{2} \right)^2 + \frac{7}{2} - \frac{25}{4} \right]$$

$$= 2 \left( x + \frac{5}{2} \right)^2 + 7 - \frac{25}{2}$$

$$= 2 \left( x + \frac{5}{2} \right)^2 - \frac{11}{2}$$

Min point

$$\left( -\frac{5}{2}, -\frac{11}{2} \right)$$

2)

$$-x^2 - 4x + 8$$

$$= -1 \left[ x^2 + 4x - 8 \right]$$

$$= -1 \left[ (x+2)^2 - 8 - 4 \right]$$

$$= -1 \left[ (x+2)^2 - 12 \right]$$

$$= -(x+2)^2 + 12$$

Max point

$$(-2, 12)$$