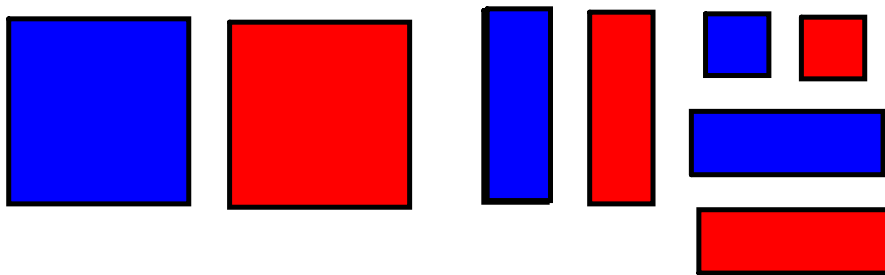


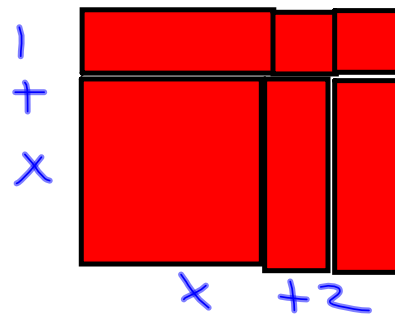
Completing the Square with Alge-tiles



FACTOR

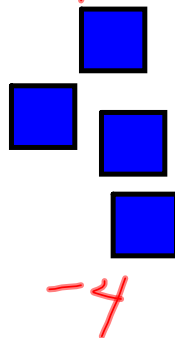
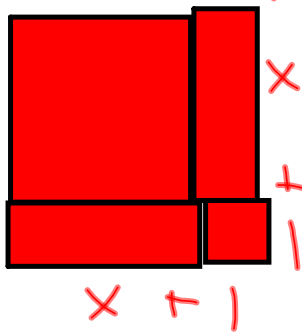
$$x^2 + 3x + 2$$

$$= (x+1)(x+2)$$



Complete the square

$$x^2 + 2x - 3 = (x+1)^2 - 4$$



$$x^2 - 2x - 1$$

D. Make each statement true :

a) $4 + (-4) = 0$

b) $-4 + 4 = 0$

c) $x + 4 - 4 = x$

E. Putting all of it together :

i) Complete the square ii) find the vertex and if the parabola is opening up or down

a) $y = x^2 - 10x + 3$

$a > 0$
 $= x^2 - 10x + (5)^2 - (5)^2 + 3$
 $= (x^2 - 10x + 25) - 25 + 3$
 $= (x - 5)^2 - 22$

Vertex (5, -22)

$\therefore a > 0$
 \therefore opens up

b) $y = x^2 + 6x - 16$

$= x^2 + 6x + 9 - 9 - 16$
 $= (x + 3)^2 - 25$
 V(-3, -25)
 opens up.

c) $y = 20x - x^2 + 3$

$= -x^2 + 20x + 3$
 $= -(x^2 - 20x) + 3$ ← factor out "a" → -1
 $= -(x^2 - 20x + 100 - 100) + 3$ ← to first two terms.
 $= -(x^2 - 20x + 100) + 100 + 3$
 $= -(x - 10)^2 + 103$

d) $y = 3x^2 + 12x$

$= 3(x^2 + 4x + 4 - 4)$
 $= 3(x^2 + 4x + 4) - 12$
 $= 3(x + 2)^2 - 12$

V(-2, -12) opens up

e) $y = -4.9x^2 + 29.4x + 7$

$= -4.9(x^2 - 6x) + 7$
 $= -4.9(x^2 - 6x + 9 - 9) + 7$
 $= -4.9(x - 3)^2 + 44.1 + 7$
 $= -4.9(x - 3)^2 + 51.1$

V(3, 51.1) opens down

f) $y = \frac{1}{4}x^2 + 5x + 2$

$= \frac{1}{4}(x^2 + 20x) + 2$
 $= \frac{1}{4}(x^2 + 20x + 100 - 100) + 2$
 $= \frac{1}{4}(x^2 + 20x + 100) - 25 + 2$
 $= \frac{1}{4}(x + 10)^2 - 23$

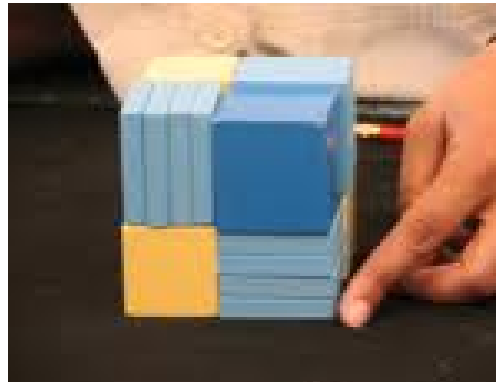
V(-10, -23) opens up

g) $y = -3x^2 + 5x + 1$

$= -3(x^2 - \frac{5}{3}x) + 1$
 $= -3(x^2 - \frac{5}{3}x + \frac{25}{36} - \frac{25}{36}) + 1$
 $= -3(x - \frac{5}{6})^2 + \frac{25}{12} + 1$
 $= -3(x - \frac{5}{6})^2 + \frac{37}{12}$
 $\therefore V(\frac{5}{6}, \frac{37}{12})$
 opens down

Handwritten notes:
 $5 \div (-3) = 5 \cdot (-\frac{1}{3}) = -\frac{5}{3}$
 $-\frac{25}{36} \cdot (-2) = \frac{25}{18}$
 $\frac{25}{18} + 12 = \frac{25}{18} + \frac{12 \cdot 18}{18} = \frac{25 + 216}{18} = \frac{241}{18}$

Homework



p. 116 #1abkl, 2 & 3 eoo.