Shifting paraboras.

1. Orginal function $y = x^2$.

The ~~graph~~ ~~has~~ parabora has been shifted upwards by 2 units.

Therefore ~~the~~ it' equation (Red) is:

$$y = x^2 + 2.$$

2. Original function: $y = x^2$.

The parabola has shifted downwards (on the y axis) by 1 unit.

Therefore the equation of the shifted graph is:

$$y = x^2 - 1$$

3. Original function: $y = x^2$

The parabola has shifted on the ~~righ~~ x-axis towards the right by 3 units.

Therefore the equation of the shifted graph is:

$$\cancel{y = (x+3)} \quad y = (x-3)^2.$$

Simplifying, we get $\cancel{y}$ $\underline{y = x^2 - 6x + 9}$

4. Original function: $y = x^2$.

The parabola has shifted along the x-axis towards the left by 4 units.

Therefore the equation of the shifted graph is:

$$y = (x+4)^2.$$

Simplifying,

$$y = x^2 + 8x + 16.$$

5- Original function: $y = x^2$:

~~The parabola~~ ~~ha~~

The parabola has shifted right by 2 units, and shifted 7 unit upward so,

Right shift the equation becomes: ~~$y=(x-3)^2$~~

$$y = (x-2)^2$$

Upward shift the eqn becomes:

$$y = (x-2)^2 + 7$$

Simplifying,

$$y = x^2 - 4x + 4 + 7$$

$$y = x^2 - 4x + 11.$$

6. Original equation: $y = x^2$:

Left shift by 5 units the equation becomes

$$y = (x+5)^2$$

Downward shift by 2 units, the equation becomes:

$$y = (x+5)^2 - 2.$$

Simplifying,

$$y = x^2 + 10x + 25 - 2$$

$$y = x^2 + 10x + 23.$$

Parabola vertices.

1. $y = x^2 - 3x + \frac{1}{4}$.

step 1

$$y = x^2 - 3x + \frac{1}{4}$$

$$\boxed{y - \frac{1}{4}} = x^2 - 3x$$

step 2.

$$y - \frac{1}{4} = x^2 - 3x \qquad \left(\frac{b}{2}\right)^2 = \left(-\frac{3}{2}\right)^2 \text{ or } \frac{9}{4}$$

step 3.

$$y - \frac{1}{4} + \frac{9}{4} = \left(x - \frac{3}{2}\right)^2.$$

$$\left(y + \frac{8}{4}\right) = \left(x - \frac{3}{2}\right)^2.$$

step 4

$$y = \left(x - \frac{3}{2}\right)^2 - \frac{8}{4}$$

$$y = \left(x - \frac{3}{2}\right)^2 - 2.$$

step 5.

$$y = (x - h)^2 + k$$

$$h = \frac{3}{2}, \quad k = -2.$$

The vertex is $(h, k) = \left(\frac{3}{2}, -2\right)$

Distance formula.

$A = (4, -3)$, $B(3, -6)$ $C:(1, -2)$

✓ length of $\overrightarrow{AB}$

$(4, -3)$
$(3, -6)$

$= \sqrt{(4-3)^2 + (-3+6)^2}$

$= \sqrt{1 + 9}$

$= \sqrt{10}$.

✓ length of $\overrightarrow{BC}$ $(3, -6)$
$(1 \; -2)$

$= \sqrt{(3-1)^2 + (-6+2)^2}$

$= \sqrt{4 + 16}$

$= \sqrt{20}$.

✓ Length $\overrightarrow{AC}$ $(4, -3)$
$(1, -2)$

$\sqrt{(4-1)^2 + (-3+2)^2}$

$\sqrt{3^2 + (-1)^2}$

$= \sqrt{9+1}$

$= \sqrt{10}$

✓ Which side should be our candidate for the hypotenuse.

$\sqrt{20}$ should be the hypotenuse since it's the largest.

Ans $\boxed{BC}$

✓ So do these three sides satisfy the pythagorean theorem?

For pythagorean theorem to be satisfied,

$$a^2 + b^2 = c^2$$

$\therefore$

$$(\sqrt{10})^2 + (\sqrt{10})^2 = (\sqrt{20})^2.$$

$$10 + 10 = 20$$

$$20 = 20$$

Hence they satisfy the pythagorean theorem.

Ans $\boxed{\text{yes}}$