FMPC 12 1.4(a) TRANSFORMATIONS – Practice Exercises

1. x has been replaced with **x+3**

therefore, the graph is translated **3 units LEFT**

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2. 2 units left means, "replace **x** with **x+2**"
4 units down means, "replace **y** with **y+4**"

The equation then becomes $y+4 = |x + 2|$

- isolate y and get $y = |x + 2| - 4$

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3. x has been replaced with **x-3**
y has been replaced with **y-6**
The graph has been translated **3 units RIGHT and 6 units UP**

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4. The x-coordinate has changed from 0 to -4 which means the graph is horizontally translated 4 units LEFT → Replace x with **x+4**

The y coordinate has changed from 0 to 2 which means the graph is also vertically translated 2 units UP → Replace y with **y-2**

$$(x+4)^2 + (y-2)^2 - 25 = 0$$

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5. x has been replaced with **x-5**,

therefore, the graph has been translated **5 units RIGHT**

6. 2 units to the right means, "replace **x** with **x-2**"
5 units up means, "replace **y** with **y-5**"

So we get $\mathbf{y-5 = \frac{1}{x-2}}$ → $\mathbf{y = \frac{1}{x-2} + 5}$

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7. y has been replaced with **y+4** which means…**4 units DOWN**

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8. x has been replaced with **x-5** which means the x-coordinates have been translated 5 units RIGHT. The x-intercept are affected as such…

(3+5, 0) and (-3+5, 0) which gives us new x-intercepts of **(8,0) and (2,0)**

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9. x has been replaced with **x-4**
y has been replaced with **y-3**
The graph has been translated **4 units RIGHT and 3 units UP**

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10. The vertical asymptote is the y-axis. This really means it is the vertical line x=0.
A vertical asymptote of x=4 means we would translate the graph 4 units RIGHT.
So, **replace x with x-4**

$$\mathbf{y = \frac{1}{x-4}}$$

11. The corner has been horizontally translated 3-(-4) or 7 units LEFT. So,

replace x with x+7.

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12. The vertices have been translated 2 units UP (0,4) → (0,6) and (0,-4) → (0,-2)

Therefore, replace **y with y-2** and get, $\frac{(y-2)^2}{16} - \frac{x^2}{4} = 1$

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13. B. x has been replaced with x+2. This means, "subtract 2 from the x-coordinate"

(a, b) → (a-2, b)

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14. B. Because, in order to move the graph 4 units LEFT, we must **replace x with x+4.**
For a translation 2 units UP, we must **replace y with y-2.**

The equation then becomes **y-2 = *f*(x+4) → y = *f*(x+4) +2** compare this to **y = *f*(x-a) +b** and we can see **a= -4 and b=2**

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15. C. For **$y = (x+2)^2 + 3$** replace **y** with **y+2** and get **$y+2 = (x+2)^2 + 3$**

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

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

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16. For **$y = (x-2)^2$** replace x with x-5 and get **$y = ((x-5)-2)^2$**

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

$y = (x-7)^2$ **The value of *h* is 7.**

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17. **$y-5 = (x-3)^2 - 2$ → $y = (x-3)^2 - 2+5$ → $y = (x-3)^2 + 3$**

This is a parabola that opens up and has been translated 3 units UP. The vertex is now at (3,3) instead of (0,0). **The range is $y \geq 3$**