**MPM 2D**

**GRAPHING QUADRATICS IN VERTEX FORM** $y = a(x-h)^2 + v$

## ① DESCRIBING THE TRANSFORMATION OF $y = x^2$

$$\boldsymbol{y = a(x-h)^2 + v}$$

| | |
|---|---|
| Where $a =$ | Vertical expansion/compression<br>Vertical Reflection |
| $h =$ | horizontal shift left or right |
| $v =$ | vertical shift up or down |

**EXAMPLES:** Describe the transformations that would be applied to $y = x^2$ to create the graph of each relation. List in the appropriate order.

1. $y = (x-3)^2 - 4$

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

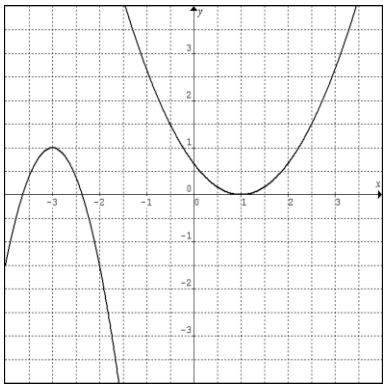
3. $y = \frac{5}{2}x^2 - 5$

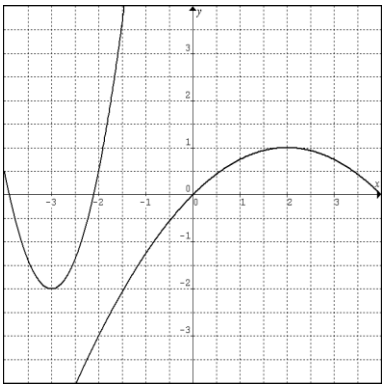
4. $y = -\frac{1}{2}(x-1)^2$

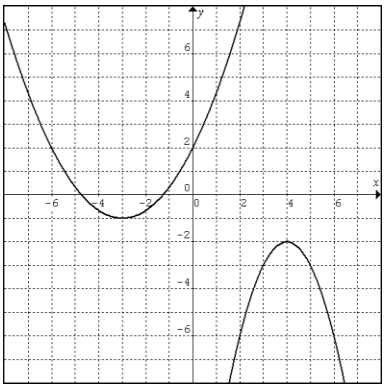
5. $y = -3(x-3)^2 + 3$

6. $y = 0.21(x+4.6)^2 - 2.95$

## ② MATCH ONE EQUATION WITH THE CORRECT PARABOLA.







A) $y = -5(x+6)^2 + 2$

B) $y = \frac{2}{3}(x-1)^2$

C) $y = -(x-4)^2 - 2$

D) $y = -\frac{1}{8}(x-4)^2 + 2$

E) $y = \frac{3}{2}(x+3)^2 - 2$

F) $y = \frac{1}{3}(x+3)^2 - 1$

G) $y = -2.5(x+3)^2 + 1$

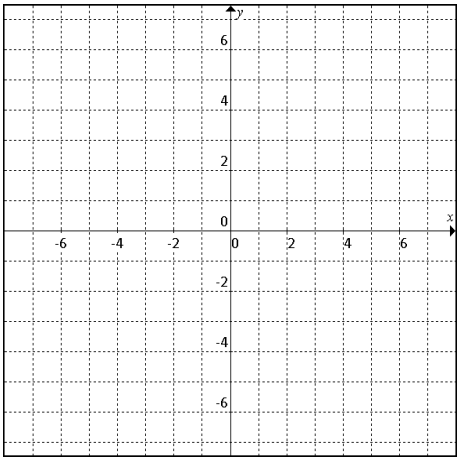
H) $y = -\frac{1}{4}(x-2)^2 + 1$

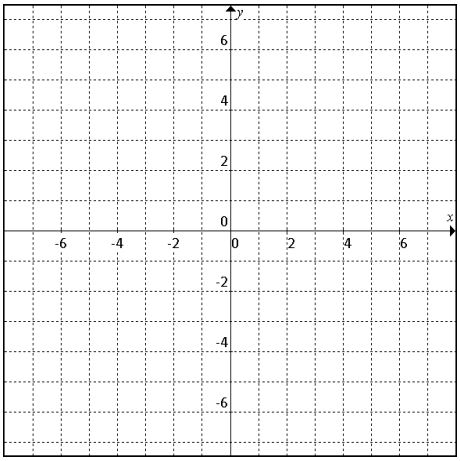
## ③ COMPLETE THE TABLE

| EQUATION | stretch/ compression factor | vertical reflection | horizontal/ vertical translation | vertex | axis of symmetry |
|---|---|---|---|---|---|
| $y = -3(x-4)^2$ | | | | | |
| $y = 0.95x^2 + 3$ | | | | | |
| | 2.4 | yes | left 5, up 1 | | |

## ④ DESCRIBING THE TRANSFORMATIONS & SKETCHING

A) $y = -2(x-3)^2 + 4$ B) $y = \frac{1}{2}(x+1)^2 - 2$




## ⑤ APPLICATIONS

The path of a baseball is parabolic and can be modeled by the equation $h = -5(t-3)^2 + 46.2$, where $t$ =time in seconds and $h$ =height in metres.

A) At what height was the ball hit?
B) What was the maximum height reached by the baseball?
C) When did the baseball reach its maximum height?
D) Sketch the graph that represents the height of the baseball over time.
E) Approximately when did the ball hit the ground?