4.7 - Transformations of Polynomial Functions

Obj: Describe and write transformations of polynomial functions so that we can graph them.
\[ | -2|^2 + | -5| - 3 = ? \]

A. 0
B. 6
C. 8
D. 10
E. 13

In the figure below, triangles PQR, PSQ, and QSR are right triangles. If the measure of angle P is 55°, what is the measure of angle R?

F. 35°
G. 45°
H. 55°
J. 65°
I. 75°
## Name the Transformation

<table>
<thead>
<tr>
<th>Transformation</th>
<th>$f(x)$ Notation</th>
<th>$f(x) = x^4$ Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Horizontal Translation</strong></td>
<td>$f(x-h)$ / oppo</td>
<td>$g(x) = (x - 5)^4$ right 5 units left 2 units</td>
</tr>
<tr>
<td><strong>Vertical Translation</strong></td>
<td>$f(x) + k$ as is</td>
<td>$g(x) = x^4 + 1$ up 1 unit, $g(x) = x^4 - 4$ down 4 units</td>
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<tr>
<td><strong>Horizontal Reflection</strong></td>
<td>$f(-x)$</td>
<td>$g(x) = (-x)^4 = x^4$ reflects over y-axis</td>
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<tr>
<td><strong>Vertical Reflection</strong></td>
<td>$-f(x)$</td>
<td>$g(x) = -x^4$ reflects over x-axis</td>
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<td><strong>Horizontal Stretch/Shrink</strong></td>
<td>$f(ax)$ for $</td>
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Ex 1: Describe the transformations to the function $f(x) = x^3 + 1$ (the red line) as shown by the lines in blue and green.

**Blue:**
- Vertical translation down 5 units
- \( g(x) = x^3 - 4 \)

**Green:**
- Horizontal translation right 6 units
- \( g(x) = (x - 6)^3 + 1 \)
Ex 2: Describe the transformation of \( f \) represented by \( g \). Then graph the functions.

a. \( f(x) = x^3, \ g(x) = (x + 5)^3 + 2 \)
   - horizontal translation left 5 units
   - vertical translation up 2 units

b. \( f(x) = x^4, \ g(x) = \frac{1}{4} x^4 \)
   - vertical shrink by factor of \( \frac{1}{4} \)
   - reflection over x-axis (across x-axis)