Algebra 1 STAAR EOC Review #9
Reporting Category 5: Quadratic and Other Nonlinear Functions
A.9bcd

RC9 A.09B

1. Which shows the functions correctly listed in order from widest to narrowest graph?

    A.
    $$y = -7x^2, y = -\frac{1}{7}x^2, y = \frac{3}{4}x^2, y = 5x^2$$

    B.
    $$y = -\frac{1}{7}x^2, y = \frac{3}{4}x^2, y = 5x^2, y = -7x^2$$

    C.
    $$y = \frac{3}{4}x^2, y = -\frac{1}{7}x^2, y = 5x^2, y = -7x^2$$

    D.
    $$y = -7x^2, y = 5x^2, y = -\frac{1}{7}x^2, y = \frac{3}{4}x^2$$

2. How is the graph of $y = 2x^2$ different from the graph of $y = -3x^2$?

    F. The graph of $y = 2x^2$ opens downward and is wider than the graph of $y = -3x^2$.
    G. The graph of $y = 2x^2$ opens downward and is narrower than the graph of $y = -3x^2$.
    H. The graph of $y = 2x^2$ opens upward and is wider than the graph of $y = -3x^2$.

3. Which equation will produce the widest parabola when graphed?

    A. $y = 2x^2$
    B. $y = -6x^2$
    C. $y = -0.6x^2$
    D. $y = 0.2x^2$

4. Barbara graphs a family of equations of the form $y = ax^2 + 1$. How does each new graph compare to the previous graph as Barbara increases the value of a from $\frac{1}{2}$ to 1 to $1\frac{1}{2}$ and finally to 2?

    A. Each new graph is above the previous graph.
    B. Each new graph is wider than the previous graph.
    C. Each new graph is narrower than the previous graph.

5. Which lists the functions of the form $y = ax^2$ in order from the widest to the narrowest graph?
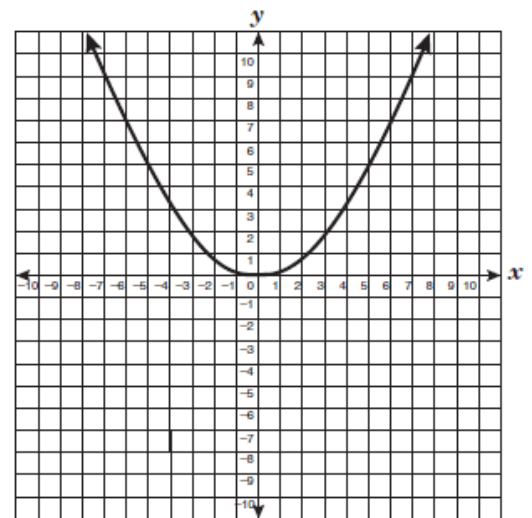
    F.
    $$y = \frac{7}{3}x^2, y = \frac{2}{3}x^2, y = \frac{1}{2}x^2, y = 2x^2$$

    G.
    $$y = \frac{1}{2}x^2, y = \frac{2}{3}x^2, y = 2x^2, y = \frac{7}{3}x^2$$

    H.
    $$y = \frac{7}{3}x^2, y = 2x^2, y = \frac{1}{2}x^2, y = \frac{2}{3}x^2$$

    J.
    $$y = 2x^2, y = \frac{7}{3}x^2, y = \frac{1}{2}x^2, y = \frac{2}{3}x^2$$

6. The graph of $y = 0.2x^2$ is shown below.

    Which of the following equations represents a graph that is wider than the graph of $y = 0.2x^2$?

    F. $y = 0.3x^2$
    G. $y = 0.2x^2 + 1$
    H. $y = 0.1x^2$
    J. $y = 0.2x^2 - 1$

7. In the graph of the function $y = x^2 + 5$, which describes the shift in the vertex of the parabola if, in the function, 5 is changed to -2?

    A.   3 units up
    B.   7 units up
    C.   3 units down
    D.   7 units down

8. What is the effect on the graph of the equation $y = x^2 + 1$ when it is changed to $y = x^2 + 5$?

    F.   The slope of the graph changes.
    G.   The curve translates in the positive x direction.
    H.   The graph is congruent, and the vertex of the graph moves up the y-axis.
    J.   The graph narrows.

9. How does the graph of $y = x^2$ differ from the graph of $y = x^2 - 4$?

    A.   The graph of $y = x^2 - 4$ is wider than the graph of $y = x^2$.
    B.   The graph of $y = x^2 - 4$ is shifted to the left of the graph of $y = x^2$.
    C.   The graph of $y = x^2 - 4$ is shifted down from the graph of $y = x^2$.
    D.   The graph of $y = x^2 - 4$ is narrower than the graph of $y = x^2$.

10. The graph of $y = 11x^2 + c$ is a parabola with a vertex at the origin. Which of the following is true about the value of c?
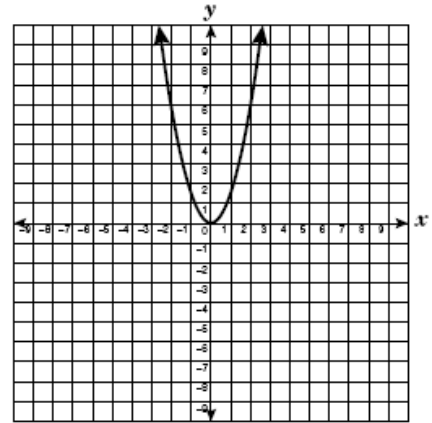
    F. $c > 0$
    G. $c < 0$
    H. $c = 0$
    J. $c = 11$

11. If the graph of $y = 19x^2 + 31$ is translated up 15 units, which of the following equations will best describe the resulting graph?
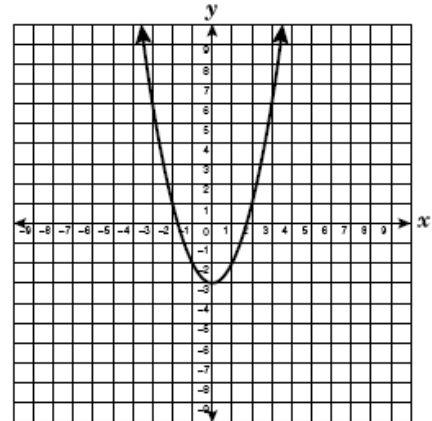
    A. $y = 34x^2 + 31$
    B. $y = 34x^2 + 46$
    C. $y = 19x^2 + 46$
    D. $y = 19x^2 + 16$
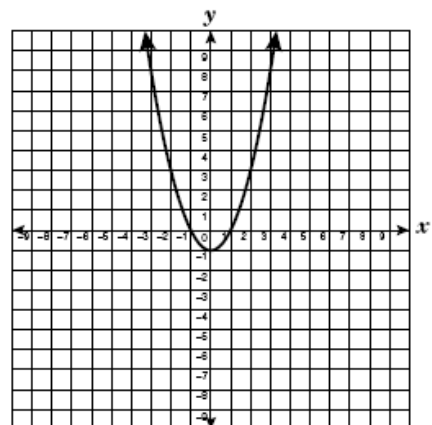
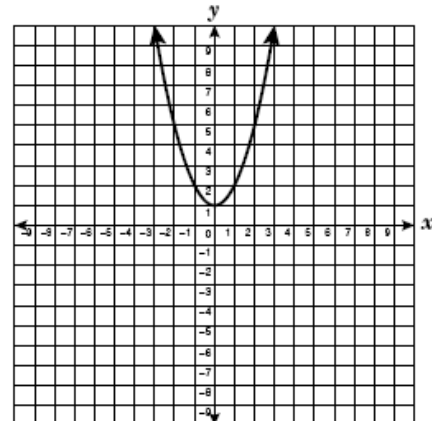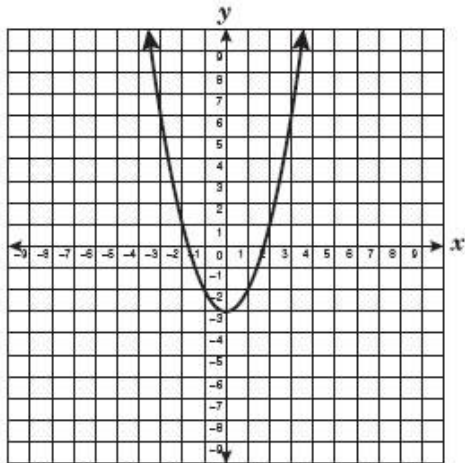12. Which graph shows a function $y = x^2 + c$ when $c < -1$?
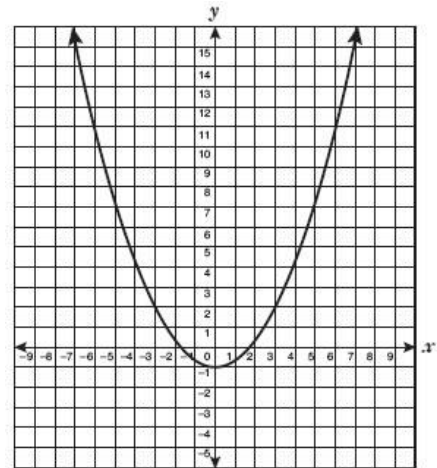
F.

G.

H.

J.

13. The graph of the function $y = x^2 - 3$ is shown below.

If the graph of the original function is shifted 5 units up, which of the following equations best represents the translation of each point on the curve?

A. $y = x^2 + 5$
B. $y = x^2 + 2$
C. $y = x^2 - 2$
D. $y = x^2 - 8$

14. What is the effect on the graph of the equation $y = x^2 - 2.5$ when the equation is changed to $y = x^2 + 2.5$?

F. The graph of $y = x^2 + 2.5$ is a reflection of $y = x^2 - 2.5$ across the x-axis.
G. The graph of $y = x^2 + 2.5$ is a translation of the graph of $y = x^2 - 2.5$.
H. The graph of $y = x^2 + 2.5$ is a reflection of $y = x^2 - 2.5$ across the y-axis.
J. The graph of $y = x^2 + 2.5$ is a dilation of the graph of $y = x^2 - 2.5$.

15. How does the graph of $y = 3x^2 - 5$ compare with the graph of $y = 3x^2 + 8$?

A. The graph of $y = 3x^2 - 5$ is 3 units above the graph of $y = 3x^2 + 8$.
B. The graph of $y = 3x^2 - 5$ is 13 units below the graph of $y = 3x^2 + 8$.
C. The graph of $y = 3x^2 - 5$ is 3 units to the right of the graph of $y = 3x^2 + 8$.
D. The graph of $y = 3x^2 - 5$ is 13 units to the left of the graph of $y = 3x^2 + 8$.

16. The graph of the form $y = ax^2 + c$ is shown below.

If the graph is translated only up or down to include the ordered pair $(6, 7)$, which of the following equations best represents the resulting graph?

F. $y = -\dfrac{1}{3}x^2 + 3$

G. $y = \dfrac{1}{3}x^2 + 1$

H. $y = -\dfrac{1}{3}x^2 - 10$

J. $y = \dfrac{1}{3}x^2 - 5$

17. The function $y = 5x^2 - 2$ represents a function of the form $y = ax^2 + c$. If the value of c is multiplied by 4, how does the graph of the new function compare to the graph of the original function?

A. The graph of the new function is a reflection of the graph of the original function across the x-axis.
B. The graph of the new function is a translation down of the graph of the original function.
C. The graph of the new function is the same as the graph of the original function.

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18. The graph below shows h, the height in meters of a model rocket, versus t, the time in seconds after the rocket is launched. From the graph, what conclusion can be made about the flight of the rocket?

Height (meters)

Time (seconds)
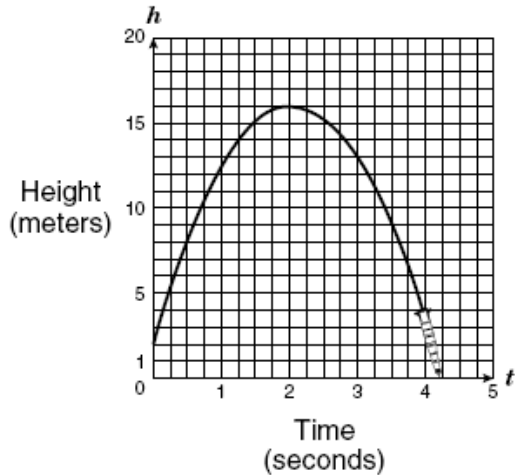
F. The rocket reached its maximum height after 2.5 seconds.
G. At 0 seconds the rocket was 2 meters off the ground.
H. The height of the rocket was 0 meters when it was launched.
J. The rocket was in flight for 5 seconds.

19. Look at the equation shown below.

$$y = \frac{4}{5}x^2 + 3, \quad y = \frac{4}{5}x^2,$$

$$y = \frac{4}{5}x^2 - 5, \quad y = \frac{4}{5}x^2 + \frac{3}{5}$$

Which of the following statements is true for the graphs of all the equations given?

A. The graphs are congruent and open downward.
B. The graphs open upward and are symmetrical about the y-axis.
C. The graphs are congruent and are listed from narrowest to widest.
D. The graphs open downward and are symmetrical about the y-axis.

20. Which of the following is the vertex of the graph of the equation $y = -x^2 + 2x + 3$?
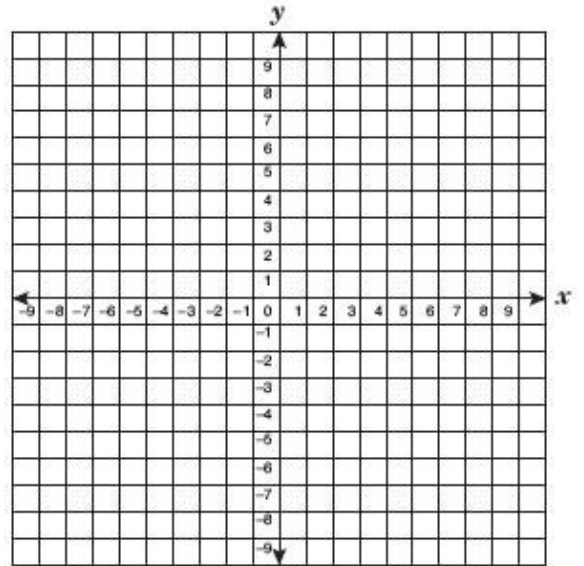

F. (0, 3)
G. (−1, 0)
H. (1, 4)
J. (3, 0)

21. The graph below represents the relationship between the density of water and the temperature of water.

Density of Water vs. Temperature

Density of Water (kg/m³)
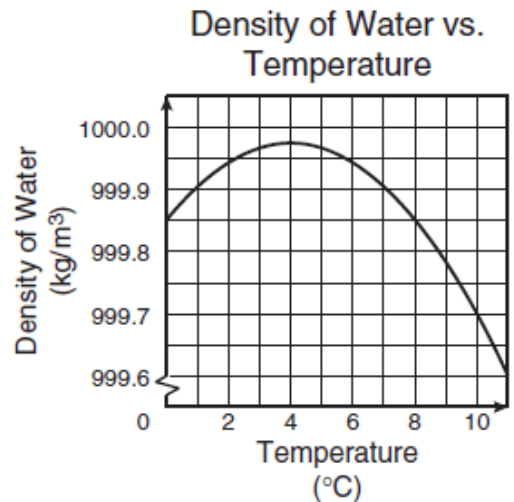
Temperature (°C)

According to the graph, which of the following intervals best represents the temperature at which the density of water is greater than 999.9 kilograms per cubic meter?

A. Less than 1°C
B. Between 0°C and 4°C
C. Between 4°C and 8°C
D. Between 1°C and 7°C

22. The graph of a quadratic function is shown below.
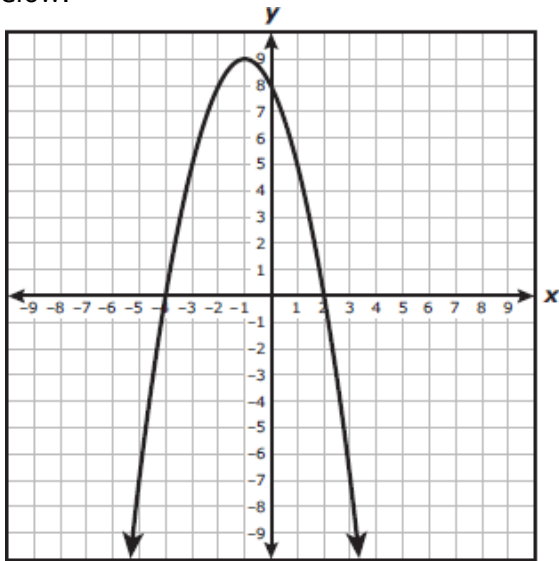
A. The graph has a y-intercept at $(0, 8)$.
B. The graph has a maximum point at $(-1, 9)$.
C. The graph has an x-intercept at $(2, 0)$.
D. The graph has the y-axis as a line of symmetry.

23. Which statement best describes the sales of this CD?

The sales record for a recent hit CD at Tony's Music Store is shown on the graph below.
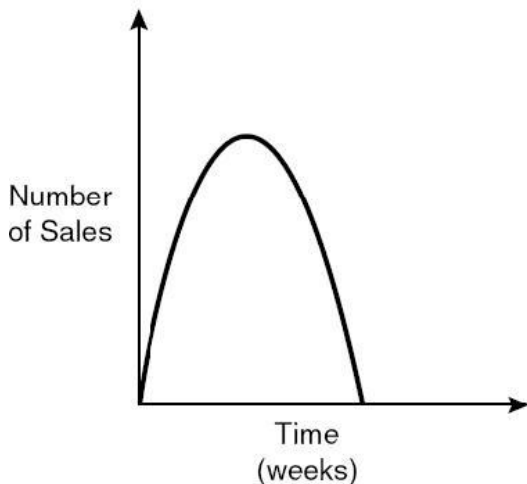
F. Sales rapidly increased, reached a peak, and then gradually decreased.
G. Sales gradually increased, reached a peak, and then leveled off.
H. Sales rapidly increased, reached a peak, and then rapidly decreased.
J. Sales remained constant throughout the time period.

24. If the graph of a function of the form $y = ax^2 + c$ has a vertex located above the origin and opens downward, which of the following must be true about the values of a and c ?

F. $a < 0$ and $c > 0$
G. $a > 0$ and $c > 0$
H. $a < 0$ and $c < 0$
J. $a > 0$ and $c < 0$

25. An object was dropped from a height of 250 meters and fell to the ground. The graph below shows the change in h, the object's height in meters, with respect to t, the time in seconds.
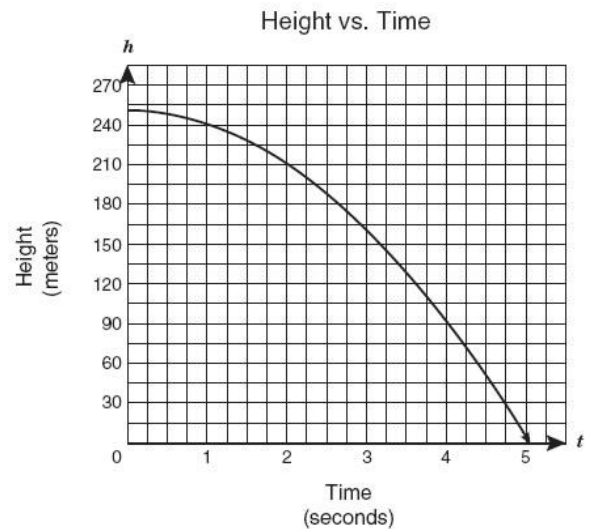
According to the graph, which time interval best represents when the object was at 140 meters above the ground?

A. Between 3 seconds and 3.25 seconds
B. Between 3.75 seconds and 4 seconds
C. Between 3.5 seconds and 3.75 seconds
D. Between 3.25 seconds and 3.5 seconds