Interpreting Non-Linear Expressions

1. $S(q) = 4q + 230\sqrt{q} + 3{,}000$

   A company manufactures paper plates. The function above gives the cost $S(q)$, in dollars, of producing q plates. How many dollars is the fixed cost of production before any paper plates are produced? *(calculator)*
   A) 3,000
   B) 3,230
   C) 3,234
   D) 0

2. The following equation shows the height, h, in meters above the ground above of a baseball t after a particular hit.
   $$h = 4 + 6.5t - 4.9t^2$$
   What was the height of the baseball at the moment of the hit? *(calculator)*
   A) 0
   B) 4
   C) 4.9
   D) 6.5

3. $P = \$175\left(\dfrac{1 - \left(\dfrac{1}{1.04}\right)^8}{0.04}\right)$

   The equation above gives the present value, P, of an investment that pays the investor $175 per year for 8 years. The present value is the dollar amount that is equal to the series of future payments. If the payments are changed from $175 to $350, what is the effect on the present value P? *(no calculator)*
   A) The present value stays the same.
   B) The present value increases by $175.
   C) The present value doubles.
   D) The present value increases by 100%.

4. $P(q) = -0.05(q - 300)(q - 40)$

   The equation above gives the profit, $P(q)$, in dollars, earned by a music business when q records are sold. What is the best interpretation of the number 40 in this context? *(no calculator)*
   A) 40 is the number of records for which the profit is equal to $0.
   B) 40 is the number of records that corresponds to the maximum profit.
   C) 40 is the number of records that corresponds to the minimum profit.
   D) 40 is the maximum profit, in dollars.

5. $h(x) = -3(x + 6)^2 + 10$

   At a soda company's headquarters there is a soda fountain. The height, h, of the stream of soda, in feet above the surface, in a fountain at the horizontal distance of x feet from the nozzle, is given by the function shown above. What is the best interpretation of the number 10 in the function? *(no calculator)*
   A) The stream of soda begins at an initial height of 10 feet above the surface.
   B) The stream of soda will reach a maximum height of 10 feet above the surface.
   C) The stream of soda will touch the surface at a distance of 10 feet horizontally from the nozzle.
   D) The stream of soda will reach a maximum height at a distance of 10 feet horizontally from the nozzle.

6. $F = \dfrac{1}{4\pi\varepsilon_0}\dfrac{q_1 q_2}{r^2}$

   Coulomb's law describes the force of attraction/repulsion between two charges. Two-point charges with respective charges q_1 and q_2 are placed r meters apart and the force emitted on one another is analyzed and recorded. If the distance between the two-point charges is halved, what is the effect on the force of attraction/repulsion? *(no calculator)*
   A) The force is doubled.
   B) The force is quadrupled.
   C) The force increases, but it does not double.
   D) The force is halved.

7. Jimmy conducted an experiment to determine the relationship between the number of hours, t, spent playing video games and number of questions, q, answered correctly on tests. He used the following equation to model his results.

   $$q = -5(t - 1)^2 + 52$$

   What is the best interpretation of the number "1" in Jimmy's model? *(no calculator)*

   A) In this experiment, a student who did not play video games would answer 1 question correctly.
   B) In this experiment, a student answers 1 more question correctly for every subsequent hour of study.
   C) In this experiment, a student who played video games for 1 hour would answer the most questions correctly.
   D) In this experiment, the first hour of video games did not influence the number of questions the student answered correctly.
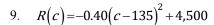
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8. $E(v) = 2,500(1.506)^t$

The expected value, $E(v)$, of an investment after t years

is given by the function defined above. What is the initial value of the investment? *(no calculator)*

A) 2,500
B) 3,765
C) 1,660
D) 1,506

9. $R(c) = -0.40(c - 135)^2 + 4,500$

A bottle manufacturer determines that its monthly

revenue, $R(c)$, in dollars, is given by the function

defined above, where c is the number of bottles sold each month. What is the maximum value of the company's monthly revenue in dollars? *(calculator)*

A) $54
B) $135
C) $4,500
D) $18,225