ANSWERS
1. A 2. B 3. C 4. A 5. B 6. B 7. C 8. C 9. A 10. C

Answer Explanations
1. A. In this problem, we are given the function $S(q) = 4q + 230\sqrt{q} + 3{,}000$ and asked to find the fixed production cost. Since q represents the number of plates produced, we plug in $q = 0$ into $S(q)$ to find the total cost of producing 0 plates. $S(0) = 4(0) + 230\sqrt{0} + 3000 = 3000$, which corresponds to answer choice **A**.

2. B. In this problem, we are given the function $h = 4 + 6.5t - 4.9t^2$ and asked to find the height of the baseball at the moment of the hit. Given the information that the function represents the height of the baseball *after* the hit, we know that no time has elapsed at the moment of the hit allowing us to plug in $t = 0$.

$$h = 4 + 6.5 - 4.9t^2 \rightarrow h(0) = 4 + 6.5(0) - 4.9(0)^2 \rightarrow h(0) = 4$$

3. C. In this problem, we are given the function $P = \$175\left(\frac{1-\left(\frac{1}{1.04}\right)^8}{0.04}\right)$ and asked to find the effect of the present value, P, if the payments are increased from \$175 to \$350. By rewriting our function, we can determine that the present value doubles.

$$P = 350\left(\frac{1-\left(\frac{1}{1.04}\right)^8}{0.04}\right) \rightarrow P = 2(175)\left(\frac{1-\left(\frac{1}{1.04}\right)^8}{0.04}\right)$$

4. A. In this problem, we are given the function $P(q) = -0.05(q - 300)(q - 40)$ and asked to find the best interpretation of the number 40. Given that our function $P(q)$ is already in factored form, we can set our function equal to zero.

$$0 = -0.05(q - 300)(q - 40)$$
$$0 = (q - 300)(q - 40)$$

Therefore, we know that when our function is equal to zero q either equals 40 or 300. Thus, the best interpretation of 40 is the number of records sold for which the profit is equal to \$0.

5. B. In this problem, we are given the function $h(x) = -3(x + 6)^2 + 10$ and asked to find the best interpretation for the number 10 in the function. Note that our function is given in vertex form: $a(t - h)^2 + k$, which indicates a maximum or minimum value of k when $t = h$. Given that our a-value is negative, we know that the parabolic shape is inverted. Therefore, our k value of 10 in the equation represents the maximum height of soda attainable.

6. B. In this problem, we are given the equation $F = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^2}$ and asked to find the effect on the force of attraction/repulsion if the distance between the two point charges is halved.

$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^2} \rightarrow F = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{(\frac{1}{2}r)^2} \rightarrow F = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{\left(\frac{1}{4}\right)r^2} \rightarrow F = \frac{1}{4\pi\varepsilon_0}\frac{4q_1q_2}{r^2}$$

From our equation, we can see that by halving the distance we quadruple the force of attraction/repulsion on the two point charges.

7. C. In this problem, we are given the function $q = -5(t - 1)^2 + 52$ and asked to find the best interpretation of the number 1. Note that our function is given in vertex form: $a(t - h)^2 + k$, which indicates a maximum or minimum value when $t = h$ and the value will align with the value of k. Given that our a-value is negative, we know that the parabolic shape is inverted. Therefore, our (h, k) of (1,52) indicates that 1 hour of playing video games would render 52 questions answered correctly.

8. A. In this problem, we are given the function $E(v) = 2{,}500(1.506)^t$ and asked to find the initial value of the investment. Here we can set $t = 0$ to determine when no time has elapsed; in other words, the initial value.

$$E(v) = 2{,}500(1.506)^t \rightarrow E(0) = 2{,}500(1.506)^0 \rightarrow E(0) = 2{,}500(1) \rightarrow E(0) = 2{,}500$$

9. C. In this problem, we are given the function $R(c) = -0.40(q - 135)^2 + 4{,}500$ and asked to find the maximum value of the company's monthly revenue. Note that our function is given in vertex form: $a(t - h)^2 + k$, which indicates a maximum or minimum value when $t = h$ and the value will align with the value of k. Given that our value for a is negative, we know that our parabola is inverted. Therefore, our maximum value is $4,500 at 135 bottles.