PSSA Open Ended Prep - Systems

Situation #1: There are 16 questions on a test. Each question is worth either 5 points or 10 points. The total is 100 points. The following equations can be written.

\[
\begin{align*}
    x + y &= 16 \\
    5x + 10y &= 100
\end{align*}
\]

(where \( x \) = number of 5-point questions, \( y \) = number of 10-point questions)

Part A) Solve the equations as a system in order to determine how many of each question is on the test.

![Graph showing the solution to the system of equations]

Part B) Mr. Scidel creates a 30 question final exam that is worth 100 points. Each question is worth either 3 points or 5 points. Create two equations that could be used to determine exactly how many of each question is on the test.

\[
\begin{align*}
    \text{Equation } #1: & \quad x + y = 30 \\
    \text{Equation } #2: & \quad 3x + 5y = 100
\end{align*}
\]
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Situation #2: James contacts two moving companies about relocating to a new house. Each company provides him with estimates that can be modeled by the following equations.

\[
\begin{align*}
  y &= 25x + 100 \\ 
  y &= 20x + 150
\end{align*}
\]

(\text{where } x = \text{number of man-hours, and } y = \text{total cost, and the constant represents the cost of the moving truck})

Part A) Solve the equations as a system in order to determine at what point the cost would be the same regardless of the company.

\[
\begin{align*}
  350 &= 25 \times 10 + 100 \\ 
  350 &= 250 + 100 \\ 
  \text{Check: } y &= 25x + 100 \\
  350 &= 20 \times 10 + 150 \\ 
  350 &= 200 + 150 \\ 
  \text{Check: } y &= 20x + 150 \\
  350 &= 350
\end{align*}
\]

Part B) Suppose that James’ move took a total of 25 man-hours. How much money will he have saved if he chose the “right” moving company? Show all work.

\[
\begin{align*}
  y &= 25x + 100 \\
  y &= 25 \times 25 + 100 \\
  y &= 625 + 100 \\
  y &= 725 \\
  y &= 20x + 150 \\
  y &= 20 \times 25 + 150 \\
  y &= 500 + 150 \\
  y &= 650
\end{align*}
\]

\[\text{Savings } \$75\]