**Y11 Context Graphs Practice #2**

1. Bentley and family have a 400 km drive, and expect to average 80 km per hour.
   
   a. Sketch a relationship between distance and time if they travel at exactly 80 km/hr.
   
   b. Write an equation for that line.
   
   c. If they spend X hours stopped for a break in the middle, write a new equation for the line representing the second part of their trip.

2. Ebola is has spread in a country before authorities start a quarantine and treatment campaign to stop it. The number of cases can be modelled with a parabola.

   There are 450 cases at the start, and two months later the disease peaks at 600 cases.

   a. Write an equation to give the number of cases of Ebola, \( E \), relative to time, \( t \).
   
   b. Use your equation to show when the disease will be stopped.

3. The height of a served volleyball is given by

   \[
   h = \frac{(8-x)(x+13)}{30}
   \]

   where

   - \( h \) is height above the ground, in metres,
   - \( x \) is the distance from the net, in metres

   a. A volleyball court is 9 metres long either side of the net. Will the ball land inside the court?
   
   b. Will the ball go over the 2.43 m high net?
   
   c. What is the maximum height the ball reaches?
Answers: Y11 Context Graphs Practice #2

1.  
   a. The solid line shown (must stop at axes).
   b. \( d = -80t + 400 \), or equivalent.
   c. Each hour spent stopped loses 80 km, so
      pushes the initial starting point 80 \( X \) higher.
      The gradient stays the same.
      \[ d = -80t + 400 + 80X \]

2. Intercept method, uses symmetry to know that \((0, 450)\)
   means \((4, 450)\) is also a point. Use these as if
   intercepts, then raise the line by 450
   \[ E = -37.5x (x - 4) + 450 \]
   Turning point method, uses turning point at \((2, 600)\)
   and fits the point \((0, 450)\) to give the multiplier
   \[ E = 600 - 37.5 (x - 2)^2 \]
   b. Solving \( 0 = -37.5x (x - 4) + 450 \)
      \[ 0 = -37.5x^2 + 150x + 450 \]
      \[ 0 = x^2 - 4x - 12 \quad \text{(all divided by -37.5)} \]
      \[ 0 = (x + 2)(x - 6) \]
      gives \( x = -2 \) or 6. So after 6 months.

3. \( h = \frac{(8-x)(x+13)}{30} \)
   a. \( x \) intercepts are \( x = 8 \) and \(-13\). The \(-13\) is the server’s side.
      So it lands inside at 8 m from the net.
   b. Putting in \( x = 0 \), gives \( h = \frac{(8-0)(0+13)}{30} = 3.47 \text{ m} \)
      So it goes over a 2.43 m net easily.
   c. Maximum halfway between intercepts of \(-13\) and 8 is at \( x = -2.5 \)
      \( h = \frac{(8-2.5)(-2.5+13)}{30} = 3.675 \text{ m} \) is the maximum height