Sec. 8.3 HW Trig Models Answers

 1. a) $y=300\cos(\left(\frac{2π}{3}\left(x\right)\right))+500$ in weeks OR $ y=300\cos(\left(\frac{2π}{21}\left(x\right)\right))+500$

 b) Red cell count = 609.602 If in weeks plug in 17/7. If in days plug in 17
 Since the red cell count is less than 700 she did not start feeling good at this time.

 c) Find intersections of graph and the line y = 700 around 9 weeks or 63 days.
 She feels “good” between 8.598 and 9.402 weeks or 60.189 and 65.811 days so the “good” feeling lasts 6 days.

2. b) lowest distance = min = -2 ft. Yes this makes sense because the point is below the water’s surface.

 c) $d=9\cos(\left(\frac{π}{5}\left(t-4\right)\right))+7$

 d) d = 4.219 ft. above the water’s surface at t = 17

 e) t = 0.0817 s. The first positive time when d = 0
 The wheel is coming out of the water because the function is increasing at that time.

3. b) $d=10\cos(\left(\frac{2π}{3}\left(t-0.3\right)\right))+50$

 c) d = 43.409 cm above the floor at t =17.2

 d) d = 58.090 cm from the floor at t= 0

 e) t = 0.0847 s The first positive time when d = 59

4. b) $h=2.5\cos(\left(π\left(t-1\right)\right))+6.5$ OR $h=-2.5\cos(\left(πt\right))+6.5$

 c) d = 7.969 ft above the ground at t =19.3 s

 d) d = 4 ft. above the ground at t= 6.4 mins = 384 seconds

 e) t = 0.564 s The first positive time when h = 7
 It remains above 7 ft. from t = 0.564 s to r = 1.436 s

5. a) period = (1948-1750)/18 cycles = 11 years

 b) $y=50\cos(\left(\frac{2π}{11}\left(t-1948\right)\right))+60$

 c) y = 12.025 sunspots in 2020
 y = 110 sunspots in 2014 (this year)

 d) t = 2021.333 when y =35 for first time after 2020

 e) t = 2025 is first max y =110 after 2020

 f) t = year 2018 first year y is below 50 after this year exact (2017.1025 – round to next year to be below 50)

6. a) $y=100\cos(\left(\frac{π}{600}\left(x-400\right)\right))+50$

 b) Plug in x = 0 and solve by hand to see if you get y = 0:
 $y=100\cos(\left(\frac{π}{600}\left(0-400\right)\right))+50=100\cos(\left(\frac{-2π}{3}\right))+50$ = 100 (-1/2) + 50 =0

 c) Horizontal tunnel – need to find x value when y = 40 and subtract from 130. x = 80.869 m so
 horizontal tunnel = 130-80.869 = 49.131 m
 Vertical tunnel – need to find y value when x = 130 and subtract 40. Y = 65.643 m so
 vertical tunnel = 65.643 – 40 = 25.643 m.

 Therefore, it would be shorter to dig the vertical tunnel to the treasure.

7. a) y Max = Axis + Amp = 30 ft. which is at x = 1050 ft. from the y-axis.

 b) y Min = Axis – Amp = -170 ft. which is at x = 450 ft. from the y-axis.

 c) Silt is between x = 91.808 ft. and 808.192 ft. (Intersection with the line y = -40)

 d) 55.882 ft. of silt (y = -95.8819 ft at x = 700ft so subtract this from y =-40)

 e) Plug in x = 0 and solve by hand to see if you get y = 0:
 $y=-70+100\cos(\left(\frac{π}{600}\left(0+150\right)\right))=-70+100\cos(\left(\frac{π}{4}\right))$ = -70 + 100 ($\sqrt{2}$/2) = 0.711 ≠0
 So it does not go through the origin

 f) Between x = 898.090 ft. and x = 1201.91 ft. (find x when y = 0 for the island at water level)

 Width of island = 1201.91 – 898.090 = 303.820 ft.