

1 Population Practice

For Country X the following data is true for 2020:	
Net migration rate	+ .3%
CDR	4
CBR	16
Size	4,000 sq miles
Population	18 million
Uninhabitable land	40% water and desert
IMR	24
Population 35 years ago	9 million

- 1.1 What would the change in population for this country be in the year 2021 based solely on immigration and emigration?

$$C = 1.8 * 10^7 * 0.3\% \quad (1)$$

$$C = 54000 \quad (2)$$

$$(3)$$

- 1.2 What is the 2020 population growth rate in terms of percent for this country?

$$Gr = \frac{change}{init} + k \quad (4)$$

$$change = \left(\frac{1.8 * 10^7 \text{ people}}{1} \right) \left(\frac{16 \text{ births} - 4 \text{ deaths}}{1000 \text{ people}} \right) = 2.16 * 10^5 \text{ people} \quad (5)$$

$$init = 1.8 * 10^7 \text{ people} \quad (6)$$

$$Gr = \frac{2.16 * 10^5}{1.8 * 10^7} + 0.3\% \quad (7)$$

$$Gr = 1.5\% \quad (8)$$

- 1.3 What was the population growth rate over the past 35 years for this country?

$$Gr = \frac{change}{init} \quad (9)$$

$$change = 1.8 * 10^7 - 9 * 10^6 = 9 * 10^6 \text{ people} \quad (10)$$

$$Gr = \frac{9 * 10^6}{9 * 10^6} \quad (11)$$

$$Gr = 100\% \quad (12)$$

- 1.4 What is the population density of the country considering only land that can be lived on by people?

$$D_p = \frac{N}{A} \quad (13)$$

$$D_p = \frac{1.8 * 10^7 \text{ people}}{0.6 * 4000 \text{ mi}^2} \quad (14)$$

$$D_p = 7500 \frac{\text{people}}{\text{mi}^2} \quad (15)$$

- 1.5 Based on the population growth rate you calculated for 2020, how many years would it take to reach 72 million people?

$$P = P_0 * e^{rt} \quad (16)$$

$$7.2 * 10^7 = 1.8 * 10^7 * e^{0.012 * t} \quad (17)$$

$$0.012 * t = \ln \left(\frac{7.2 * 10^7}{1.8 * 10^7} \right) \quad (18)$$

$$t = 115.53 \text{ years} \quad (19)$$

- 1.6 How many births were there in 2020?

$$\text{births} = 1.8 * 10^7 \text{ people} * \left(\frac{16 \text{ births}}{1000 \text{ people}} \right) \quad (20)$$

$$2.88 * 10^5 \text{ births} \quad (21)$$

- 1.7 How many infants died in 2020?

$$\text{deaths} = 2.88 * 10^5 \text{ infants} * \left(\frac{24 \text{ deaths}}{1000 \text{ infants}} \right) \quad (22)$$

$$6912 \text{ infant deaths} \quad (23)$$

- 1.8 How many people were added in 2020 to the countries

$$1.88 * 10^5 \text{ births} - 6912 \text{ deaths} = 1.86 * 10^5 \text{ new people} \quad (24)$$

- 1.9 IF this population was 15 million 10 years ago, what was the percent change from 2010 to 2020?

$$C = \frac{change}{init} \quad (25)$$

$$change = 1.8 * 10^7 - 1.5 * 10^7 = 3 * 10^6 \quad (26)$$

$$C = \frac{3 * 10^6}{1.5 * 10^7} \quad (27)$$

$$C = 20\% \quad (28)$$