Exponential Growth and Decay

1. A cup of hot water is left out to cool. The water is currently 13°C above room temperature. If the heat difference decreases by 5% every minute, what will the difference be in 14 minutes?
   If necessary, round your answer to the nearest tenth.

2. A colony of 10 bacteria doubles in size every 8 hours. What will the population be 16 hours from now?

3. There is a population of 15,000 bacteria in a colony. If the number of bacteria doubles every 220 hours, what will the population be 440 hours from now?

4. Wayne takes 730 milligrams of an antibiotic. Every hour, his body breaks down 20% of the drug. How much will be left after 4 hours?
   If necessary, round your answer to the nearest tenth.

5. In 1995, there were 85 rabbits in Central Park. The population increased by 12% each year. How many rabbits were in Central Park in 2005?

6. An adult takes 400 mg of ibuprofen. Each hour, the amount of ibuprofen in the person's system decreases by about 29%. How much ibuprofen is left after 6 hours?

7. The population of Winnemucca, Nevada, can be modeled by $P=6191(1.04)^t$ where t is the number of years since 1990. What was the population in 1990? By what percent did the population increase by each year? What will the population be in 2020?

8. You have inherited land that was purchased for $30,000 in 1960. The value of the land increased by approximately 5% per year. What is the approximate value of the land in the year 2011?

9. Bacteria can multiply at an alarming rate when each bacteria splits into two new cells, thus doubling. If we start with only one bacteria which can double every hour, how many bacteria will we have by the end of one day?

10. Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated. How many players remain after 5 rounds?

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1. A cup of hot water is left out to cool. The water is currently 13°C above room temperature. If the heat difference decreases by 5% every minute, what will the difference be in 14 minutes?
   If necessary, round your answer to the nearest tenth.

Answer: 6.3⁰C

2. A colony of 10 bacteria doubles in size every 8 hours. What will the population be 16 hours from now?

Answer: 40 bacteria

3. There is a population of 15,000 bacteria in a colony. If the number of bacteria doubles every 220 hours, what will the population be 440 hours from now?

Answer: 60,000 bacteria

4. Wayne takes 730 milligrams of an antibiotic. Every hour, his body breaks down 20% of the drug. How much will be left after 4 hours?
   If necessary, round your answer to the nearest tenth.

Answer: 299.0 milligrams

5. In 1995, there were 85 rabbits in Central Park. The population increased by 12% each year. How many rabbits were in Central Park in 2005?

Answer: 263 rabbits

6. An adult takes 400 mg of ibuprofen. Each hour, the amount of ibuprofen in the person's system decreases by about 29%. How much ibuprofen is left after 6 hours?

Answer: 51.24 mg

7. The population of Winnemucca, Nevada, can be modeled by $P=6191(1.04)^t$ where t is the number of years since 1990. What was the population in 1990? By what percent did the population increase by each year? What will the population be in 2020?

Answer: population in 1990 = 6191   percent of increase = 4%   population in 2020 = 20,080 people

8. You have inherited land that was purchased for $30,000 in 1960. The value of the land increased by approximately 5% per year. What is the approximate value of the land in the year 2011?

Answer: $361,223.09

9. Bacteria can multiply at an alarming rate when each bacteria splits into two new cells, thus doubling. If we start with only one bacteria which can double every hour, how many bacteria will we have by the end of one day?

10. Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated. How many players remain after 5 rounds?