1. For the scenario below, find the variation constant k of the model (if possible).

   In an alternative galaxy, the quartic of the time, T (Earth years), required for a planet to orbit Sun χ increases as the quartic of the distance, d (AUs), that the planet is from Sun χ increases. For example, when Ea's average distance from Sun χ is 5, it takes 93 Earth days to complete an orbit.

   A. $k = 4.028$

   B. $k = 46753250625.000$

   C. $k = 2.077$

   D. $k = 119688.322$

   E. Unable to compute the constant based on the information given.

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2. For the scenario below, find the variation constant k of the model (if possible).

   In an alternative galaxy, the quartic of the time, T (Earth years), required for a planet to orbit Sun χ increases as the quartic of the distance, d (AUs), that the planet is from Sun χ increases. For example, when Ea's average distance from Sun χ is 6, it takes 78 Earth days to complete an orbit.

   A. $k = 4.028$

   B. $k = 1.899$

   C. $k = 28561.000$

   D. $k = 47971512576.000$

   E. Unable to compute the constant based on the information given.

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3. Choose the model type that would best describe the scenario below.

   Social distancing is a common tactic to counter potential epidemics. This is due to the exponential increase in number of people infected as

the density of people living in an area increases.

A. Direct variation

B. Indirect variation

C. Joint variation

D. None of the above

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4. A town has an initial population of 50000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop.	50000	50034	50054	50069	50080	50089	50097	50103	50109

A. Logarithmic

B. Linear

C. Exponential

D. Non-Linear Power

E. None of the above

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5. A town has an initial population of 100000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop.	100000	99979	99967	99958	99951	99946	99941	99937	99934

A. Non-Linear Power

B. Logarithmic

C. Linear

D. Exponential

E. None of the above

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6. Choose the model type that would best describe the scenario below.

   Social distancing is a common tactic to counter potential epidemics. This is due to the exponential increase in number of people infected as the density of people living in an area increases.

   A. Direct variation

   B. Joint variation

   C. Indirect variation

   D. None of the above

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7. For the scenario below, model the rate of vibration (cm/s) of the string in terms of the length of the string. Then determine the variation constant k of the model (if possible). The constant should be in terms of cm and s.

   The rate of vibration of a string under constant tension varies based on the type of string and the length of the string. The rate of vibration of string ω increases as the quartic length of the string decreases. For example, when string ω is 3 mm long, the rate of vibration is 36 cm/s.

   A. $k = 2916.00$

   B. $k = 0.29$

   C. $k = 4444.44$

   D. $k = 0.44$

   E. None of the above.

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8. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$ to find the coefficient for the model of the new volume $V_{extnew} = kr^2 h$.

   Pepsi wants to increase the volume of soda in their cans. They've decided to decrease the radius by 20 percent and decrease the height by 17 percent. They want to model the new volume based on the radius and height of the original cans.

A. $k = 0.53120$

B. $k = 0.00680$

C. $k = 1.66881$

D. $k = 0.02136$

E. None of the above.

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9. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$ to find the coefficient for the model of the new volume $V_{extnew} = kr^2 h$.

Pepsi wants to increase the volume of soda in their cans. They've decided to decrease the radius by 20 percent and decrease the height by 16 percent. They want to model the new volume based on the radius and height of the original cans.

A. $k = 0.00640$

B. $k = 0.53760$

C. $k = 0.02011$

D. $k = 1.68892$

E. None of the above.

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10. For the scenario below, model the rate of vibration (cm/s) of the string in terms of the length of the string. Then determine the variation constant k of the model (if possible). The constant should be in terms of cm and s.

The rate of vibration of a string under constant tension varies based on the type of string and the length of the string. The rate of vibration of string ω increases as the quartic length of the string decreases. For example, when string ω is 5 mm long, the rate of vibration is 35 cm/s.

A. $k = 21875.00$

B. $k = 560.00$

C. $k = 0.06$

D. $k = 2.19$

E. None of the above.
