WGU Applied Algebra FXO2 PFXP C957

WGU Applied-Algebra

Version Demo

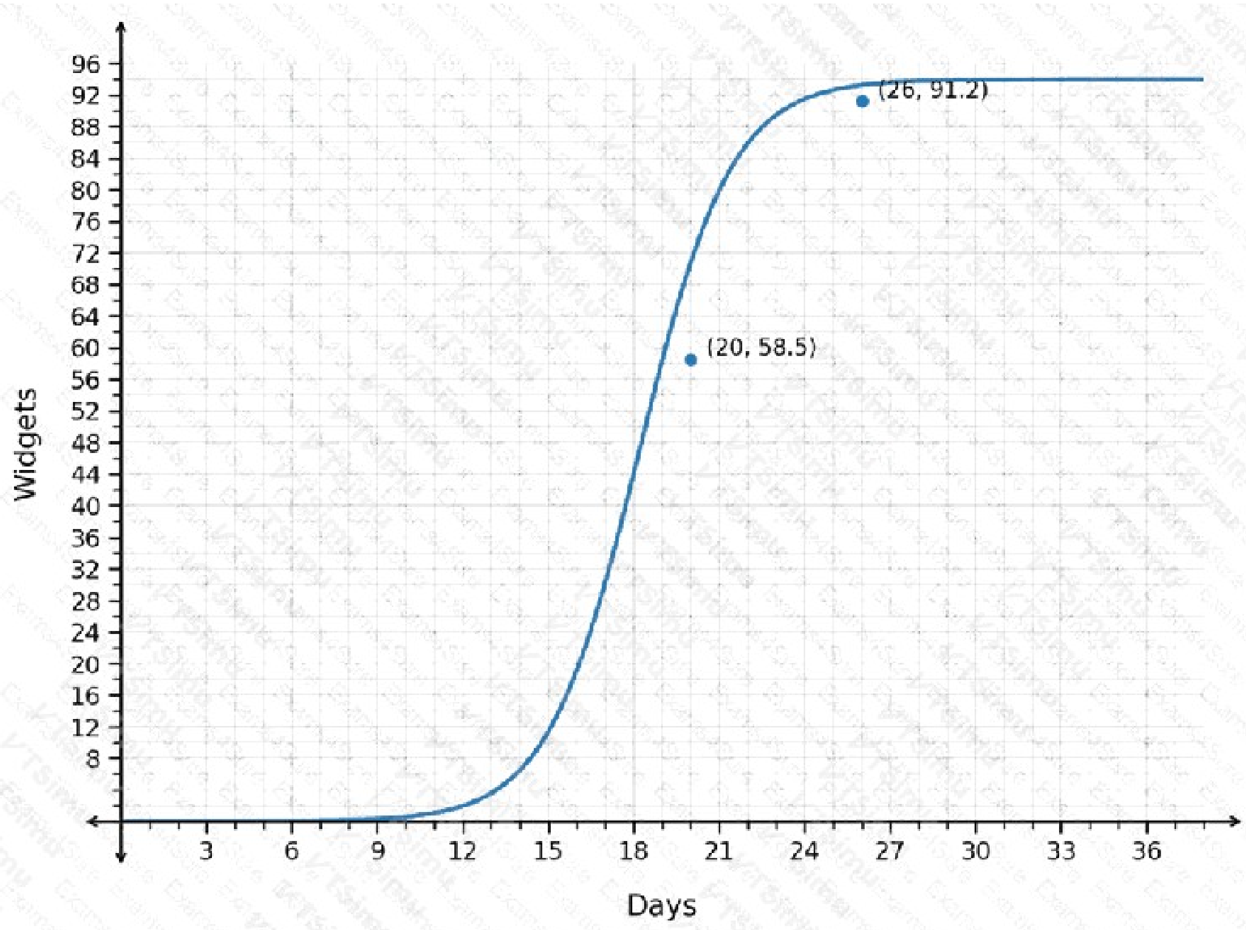
Total Demo Questions: 17

Total Premium Questions: 170

Buy Premium PDF

QUESTION NO: 1

The graph shows the progress of a manufacturing team, modeling the number of widgets the team is able to produce each day since the team was formed.



How should the average rate of change from day 20 to day 26 be interpreted?

A. The team increased production by an average of approximately 5.5 widgets each day.

B. The team increased production by an average of approximately 2.7 widgets each day.

C. Over the 6-day period, the team approximately produced an additional 5.5 widgets in total.

D. Over the 6-day period, the team approximately produced an additional 2.7 widgets in total.

ANSWER: A

Explanation:

The team increased production by an average of approximately 5.5 widgets each day. Average rate of change measures how much the output value changes, on average, for each one-unit increase in the input value over a specified interval. Here, the input is time in days, and the output is the number of widgets the team can produce each day. Using the two graph values at day 20 and day 26, the change in daily widget production is divided by the change in time, which is 26 − 20, or 6 days. The resulting rate is approximately 5.5 widgets per day. Because the graph models production capability *each day*, this means the team's daily production amount was rising at an average pace of about 5.5 widgets for every day between those two dates. It does not describe a total number of widgets accumulated across the interval; it describes the slope of the graph over that interval and therefore requires units of widgets per day. This interpretation follows the standard average-rate-of-change formula, (change in output)/(change in input), as described in OpenStax College Algebra: Rates of Change and Behavior of Graphs and Khan Academy's average rate of change review.

QUESTION NO: 2

The number of trees in a managed forest is modeled by the function

$T(t)=4,800(0.92)^t$

where t is the number of years since the study began and T(t) is the number of trees.

Which statement correctly interprets the factor 0.92?

A. The number of trees decreases by 0.92 trees each year.

B. The number of trees decreases by 8% each year.

C. The number of trees increases by 8% each year.

D. The number of trees decreases by 92% each year.

ANSWER: B

Explanation:

The number of trees decreases by **8% each year**. In an exponential model of the form $a(b)^t$, the factor b gives the portion of the previous amount that remains after each time period. Since 0.92 is equal to 92%, the model retains 92% of the previous year's tree count each year.

The missing 8%, calculated as 100% − 92%, represents the yearly decrease. The value 4,800 is the initial number of trees when t=0; it is not the annual change. A factor greater than 1 would indicate growth, but 0.92 is less than 1, so the model represents exponential decay.

QUESTION NO: 3

The values, in dollars, of two accounts over time are modeled by

A_1 (t)=6,500× 〖1.05〗^t

and

A_2 (t)=3,000× 〖0.96〗^t

The variable tis measured in years.

What is the difference between the accounts after 3 years?

A. The value of Account 1 is about $4,870less than the value of Account 2.

B. The value of Account 1 is about $2,654less than the value of Account 2.

C. The value of Account 1 is about $4,870greater than the value of Account 2.

D. The value of Account 1 is about $2,654greater than the value of Account 2.

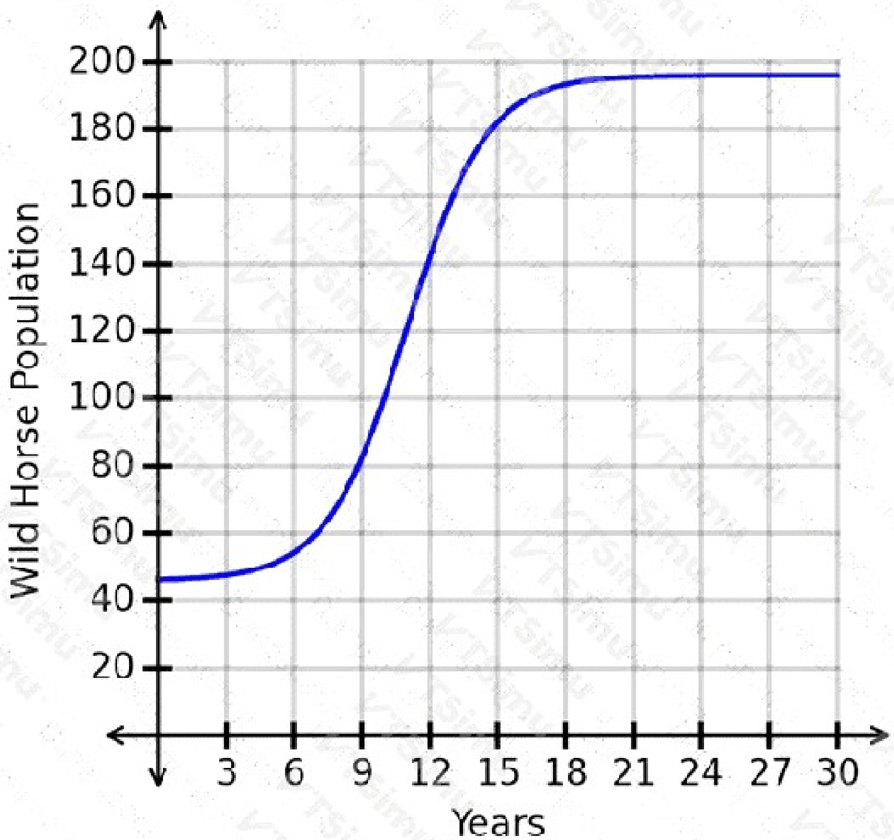
ANSWER: C

Explanation:

The value of Account 1 is about $4,870greater than the value of Account 2. To compare the accounts after three years, substitute *t* = 3 into each exponential model. Account 1 has value $6,500(1.05)^3$ = 6,500(1.157625) = $7,524.56, rounded to the nearest cent. Account 2 has value $3,000(0.96)^3$ = 3,000(0.884736) = $2,654.21, rounded to the nearest cent. The requested difference is found by subtracting the second account value from the first: $7,524.56 − $2,654.21 = $4,870.35. Since the first account's value is larger, the appropriate comparison is that Account 1 is about $4,870 greater after three years. This uses the standard exponential-model form, in which the initial amount is multiplied by the growth or decay factor once for each elapsed time period. A factor of 1.05 represents five percent growth per year, while 0.96 represents four percent decay per year. See [OpenStax College Algebra: Exponential Functions] and [Khan Academy: Exponential growth and decay].

QUESTION NO: 4

The number of wild horses in a federal park is represented by the logistic function f(x), whose graph is shown, where xrepresents the number of years since the park was established and f(x)represents the wild horse population in a given year.



How does the number of wild horses change as time progresses from year 1 to year 9?

A. The number of wild horses increases faster and faster.

B. The number of wild horses decreases slower and slower.

C. The number of wild horses decreases faster and faster.

D. The number of wild horses increases slower and slower.

ANSWER: A

Explanation:

The number of wild horses increases faster and faster. Between year 1 and year 9, the displayed logistic curve rises, so the population is increasing throughout this interval. In addition, the curve becomes progressively steeper over those years. On a graph of population versus time, slope represents the rate at which the population changes. A steeper positive slope means more horses are being added per year than before. Because the slope is positive and increasing from year 1 through year 9, the population is not merely growing; its growth rate is accelerating.

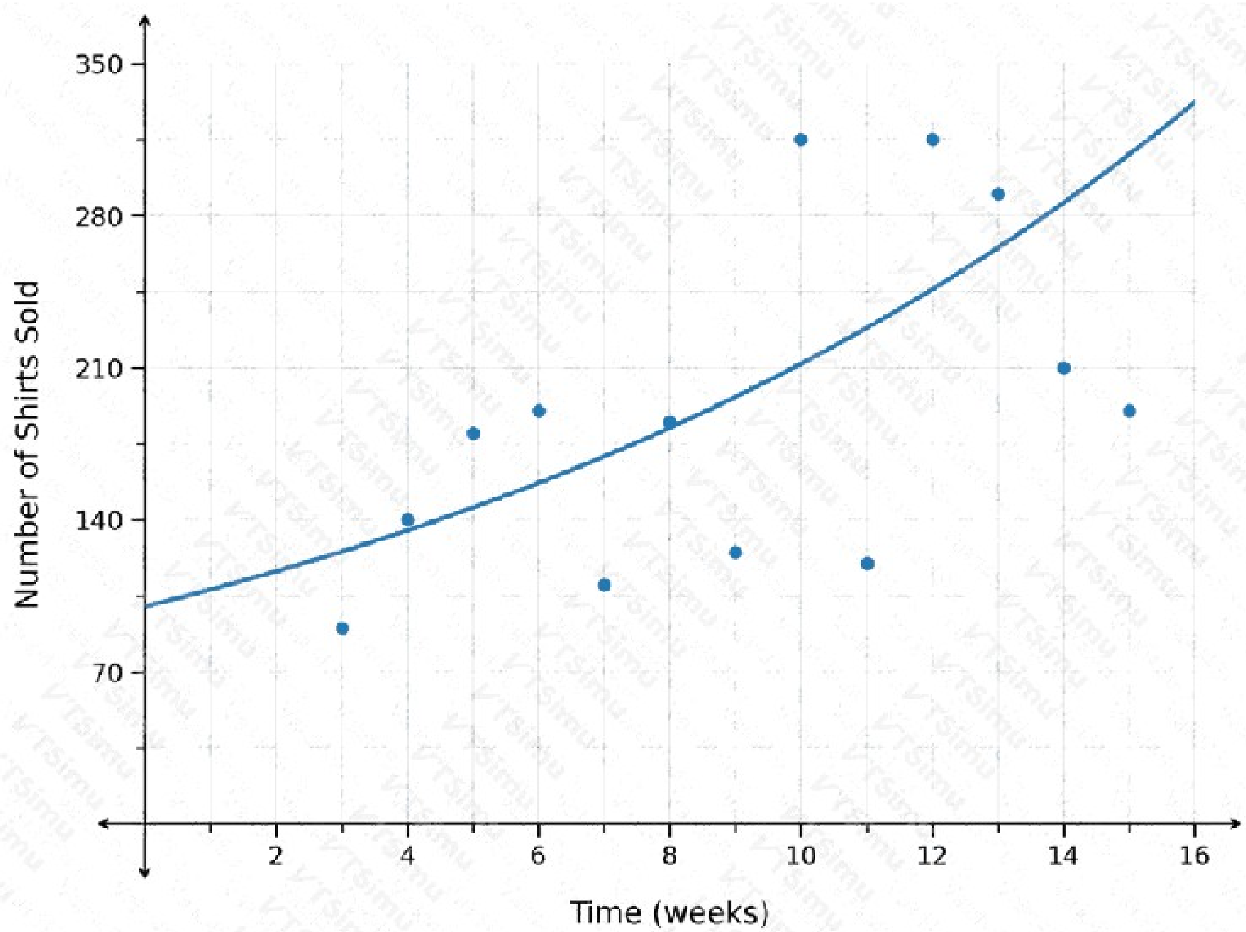
This behavior matches the early-to-middle portion of a logistic growth model. Logistic growth commonly starts with relatively slow growth, then enters a phase in which the population rises more rapidly as conditions support reproduction and the population becomes established. Eventually, a logistic curve reaches an inflection point and begins to level toward a carrying capacity, but the graph's year 1 to year 9 interval is on the upward, steepening portion before that leveling behavior. This interpretation uses the graph's direction and changing steepness, rather than just the population values at the endpoints. See OpenStax College Algebra: Logistic Growth and Encyclopaedia Britannica: Logistic Function.

QUESTION NO: 5

The scatterplot shows data on the number of shirts sold at a gift shop per week over time. The graphed regression function has an r

2

value of 0.09.



Which range of x-values is appropriate for extrapolation?

A. x=0 to x=18

B. x=â ̂'3 to x=21

C. Extrapolation is not appropriate because r2< 0.3.

D. Extrapolation is not appropriate because r2< 0.7.

ANSWER: C

Explanation:

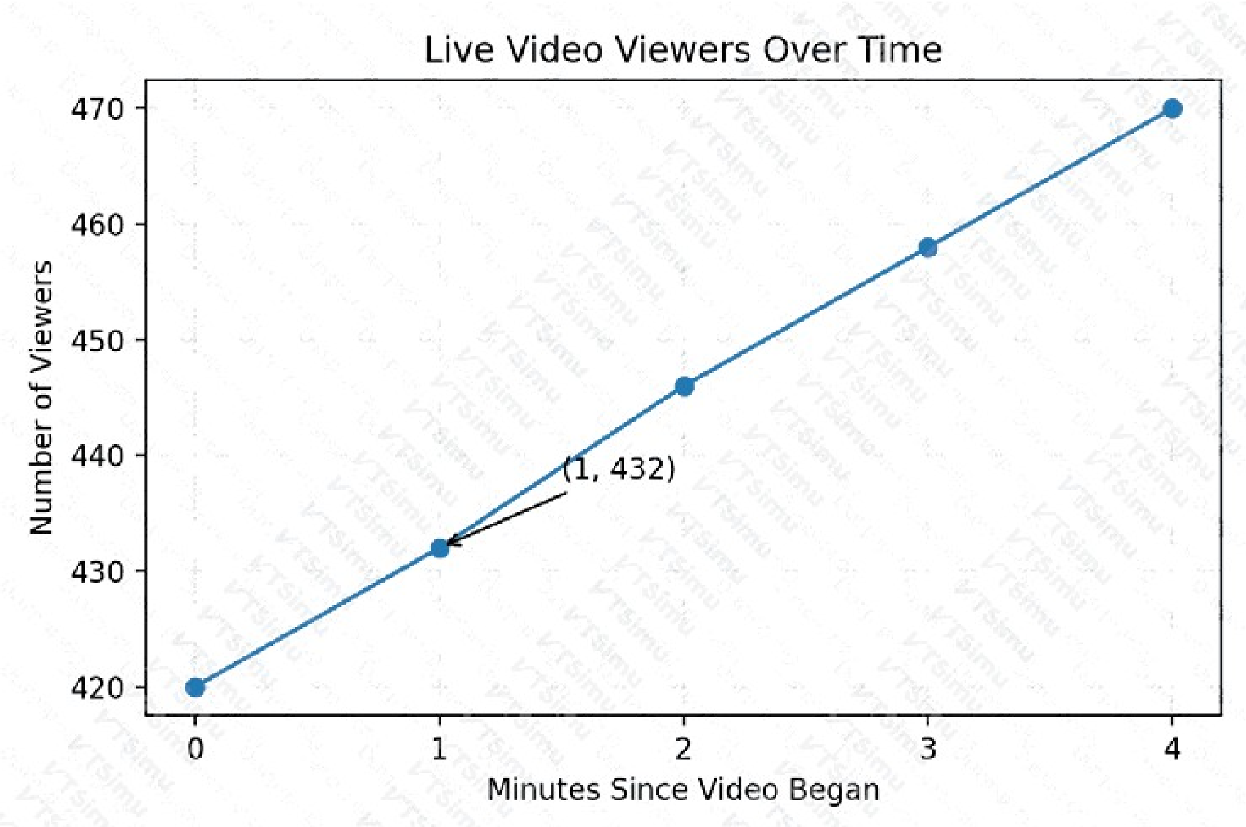
Extrapolation is not appropriate because r^2< 0.3. The coefficient of determination, r^2, measures the proportion of the variation in the response variable that is explained by the regression model. An r^2 value of 0.09 means that the line explains only 9% of the observed variation in weekly shirt sales. Thus, the plotted linear relationship is very weak and does not provide a dependable basis for forecasting sales patterns.

Extrapolation uses a regression equation to predict values beyond the observed x-values. Because it extends the pattern outside the available evidence, it requires a model with a sufficiently strong fit to the data. Here, the very low r^2 value is below 0.3, so there is not enough linear explanatory power to support predictions beyond the data range. The appropriate conclusion is therefore to avoid extrapolation rather than identify a future or past interval for it. The meaning and interpretation of r^2 in regression are described by the NIST Engineering Statistics Handbook and OpenStax Introductory Statistics.

QUESTION NO: 6

The graph shows the number of people watching a live video. The number of minutes since the video began is on the horizontal axis, and the number of viewers is on the vertical axis. When were there 432 viewers?

Exhibit:



A. Minute 0

B. Minute 1

C. Minute 2

D. Minute 4

ANSWER: B

Explanation:

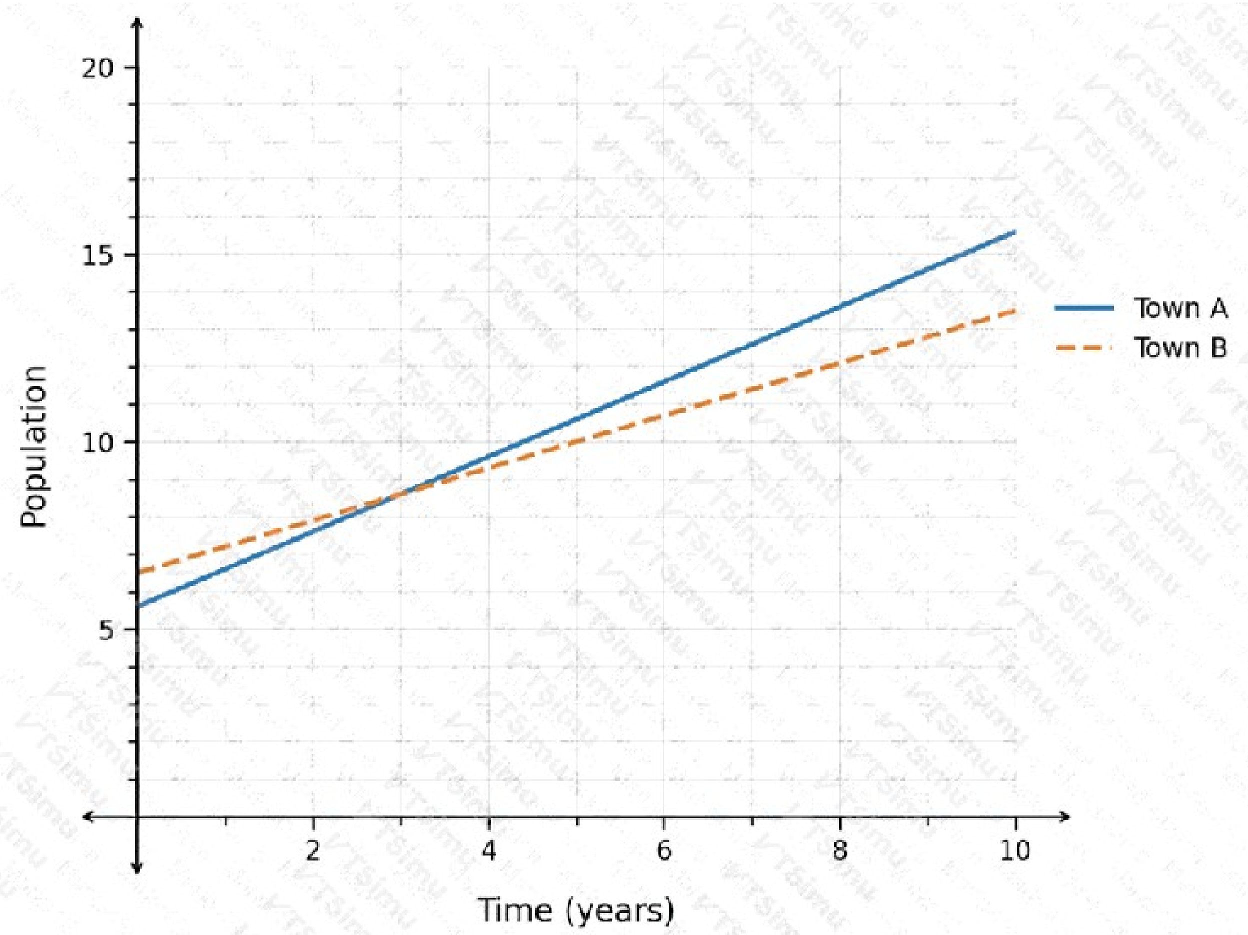
Minute 1 is correct because the graph represents a relationship between elapsed time and the number of live-video viewers. Time, measured in minutes, is the input and is read from the horizontal axis. Viewer count is the output and is read from the vertical axis. To find when there were 432 viewers, first locate 432 on the vertical scale. From that value, trace horizontally until reaching the plotted graph. The corresponding point aligns with 1 on the horizontal time scale. Thus, the graph contains the ordered pair approximately (1, 432): after 1 minute, the video had 432 viewers.

This is an application of interpreting a graph as a function or relation: coordinates are read in the order (horizontal value, vertical value), so the requested time must come from the horizontal coordinate of the point whose vertical coordinate is 432.

Reading graph coordinates accurately is essential when a real-world context assigns units to each axis. For additional guidance on coordinate-plane conventions, see Khan Academy's coordinate-plane review and OpenStax's discussion of functions and graph inputs and outputs.

QUESTION NO: 7

The populations, in thousands, of two towns are shown in the graph, where the horizontal axis measures the time in years.



Which town's population is growing at a faster rate?

A. Town A, because 6.5 > 5.5

B. Town B, because 1.0 > 0.7

C. Town B, because 6.5 > 5.5

D. Town A, because 1.0 > 0.7

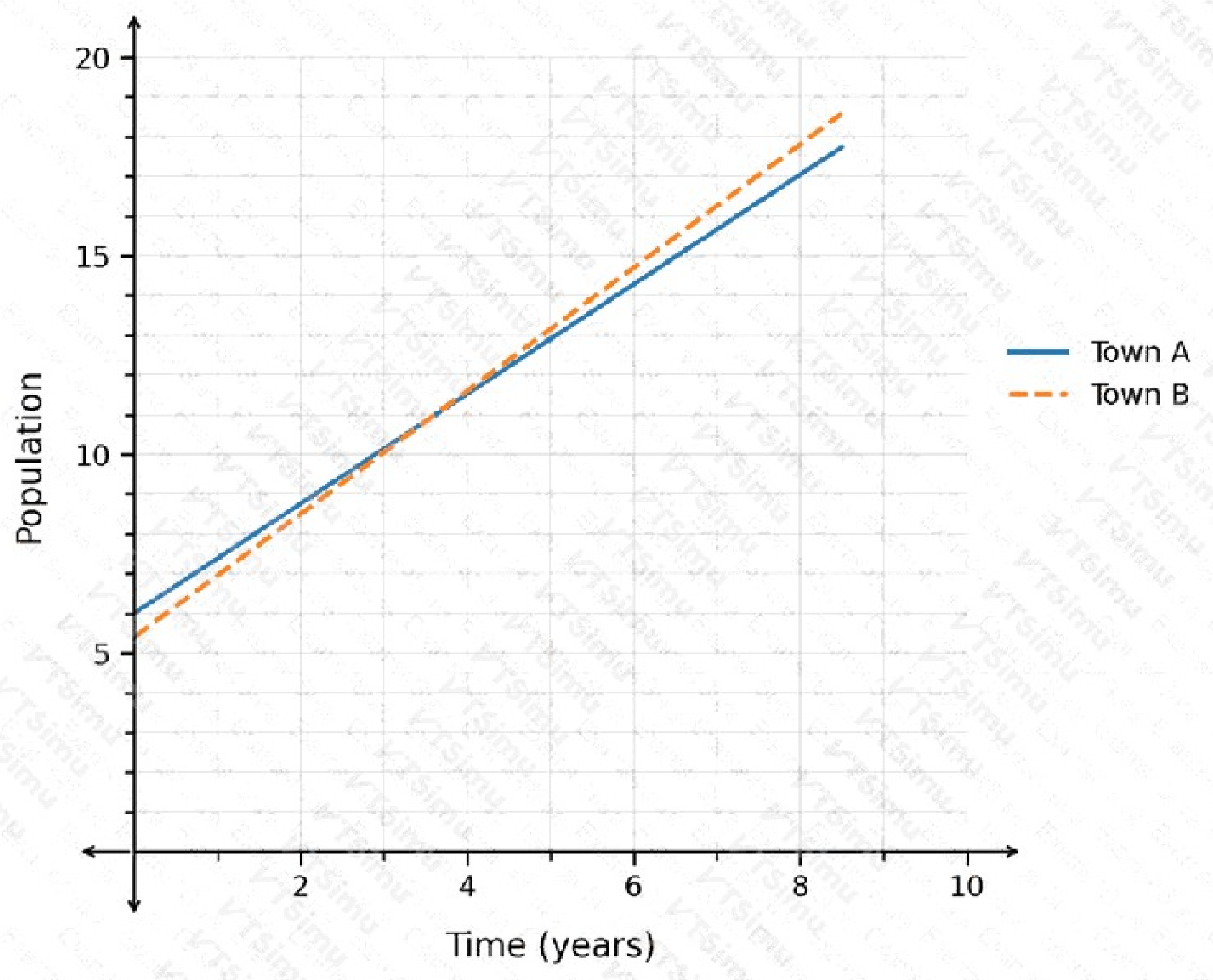
ANSWER: D

Explanation:

Town A, because 1.0 > 0.7 is correct because population growth rate is represented by the slope of each line on a graph of population versus time. Slope measures the vertical change divided by the horizontal change: here, the change in population (in thousands of people) per one-year change in time. Reading the graph shows that Town A's line rises by approximately 1.0 thousand people each year, whereas Town B's line rises by approximately 0.7 thousand people each year. Since 1.0 thousand people per year exceeds 0.7 thousand people per year, Town A has the greater rate of population growth. The population values 6.5 and 5.5 are individual population amounts at a particular time, rather than rates of change. A line's starting height indicates its initial population, but its steepness determines how quickly the population is increasing. This use of slope as a rate of change is a core interpretation of linear functions and graphs. For a discussion of slope as vertical change over horizontal change, see OpenStax College Algebra: The Slope of a Line. For further coverage of interpreting linear functions in context, see OpenStax College Algebra: Functions and Function Notation.

QUESTION NO: 8

The populations, in thousands, of two towns are shown in the graph, where the horizontal axis measures the time in years.



Which town's population is growing at a faster rate?

A. Town B, because 1.3 > 1.1

B. Town B, because 6.5 > 5.5

C. Town A, because 6.5 > 5.5

D. Town A, because 1.3 > 1.1

ANSWER: A

Explanation:

Town B, because 1.3 > 1.1 is correct. A population's growth rate is represented by the slope of its graph: the vertical change in population divided by the corresponding horizontal change in time. Since both populations are measured over the same time scale, the line with the larger slope represents the town whose population increases by more thousands of people per year. The graph shows Town B has a slope of 1.3 (thousand people per year), while Town A has a slope of 1.1 (thousand people per year). Because 1.3 is greater than 1.1, Town B's population is growing faster. The values 6.5 and 5.5 identify population amounts shown on the graph, rather than the rates of change. A higher current population does not by itself establish a faster growth rate; the slope determines how quickly the population changes over time. For additional review of slope as a rate of change, see Khan Academy's slope lesson and OpenStax's discussion of slope.

QUESTION NO: 9

The value of a collection is modeled by the function

$V(t)=500(1.07)^t$

where t represents the number of years since 2010 and V(t) represents the value of the collection in dollars.

Which value represents the average yearly rate of change of the collection's value from 2014 to 2017?

A. 7.00

B. 21.07

C. 49.16

D. 147.49

ANSWER: C

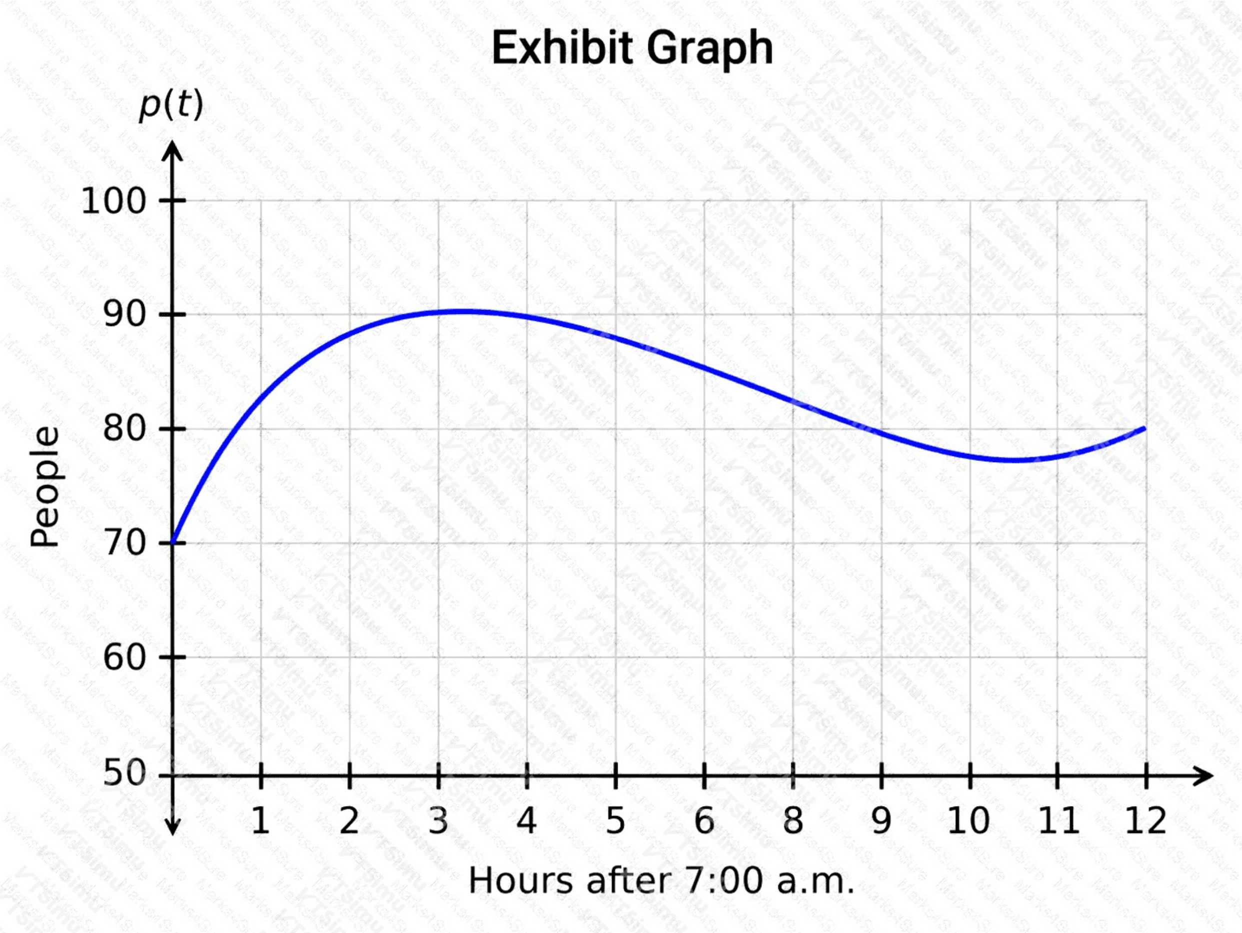
Explanation:

The correct average yearly rate of change is **49.16 dollars per year**. Since t represents years since 2010, the year 2014 corresponds to t=4 and the year 2017 corresponds to t=7.

Evaluate the model at both endpoints: $V(4)=500(1.07)^4 \approx 655.40$ and $V(7)=500(1.07)^7 \approx 802.89$. The value increases by approximately 802.89 − 655.40 = 147.49 dollars over 3 years. Dividing by 3 gives approximately 49.16 dollars per year. The total increase, 147.49 dollars, is not the average yearly rate.

QUESTION NO: 10

The figure shows the graph of p(t), which represents the number of people, p, at a gym thours after 7:00 a.m.



How should the concavity between t=1.3and t=3.4be interpreted?

A. The number of people is increasing faster and faster.

B. The number of people is decreasing faster and faster.

C. The number of people is increasing slower and slower.

D. The number of people is decreasing slower and slower.

ANSWER: C

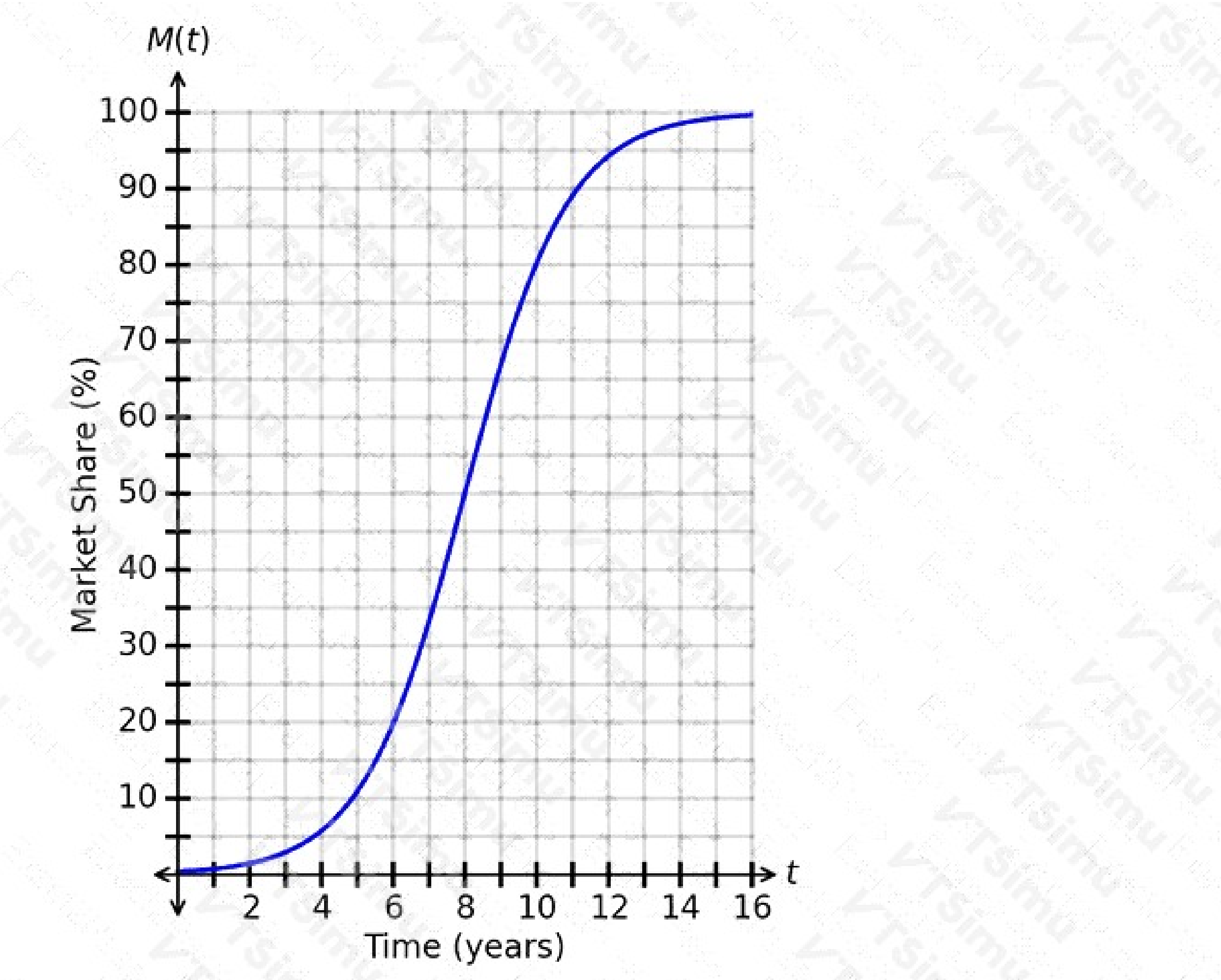
Explanation:

The number of people is increasing slower and slower. Over the stated time interval, the graph rises from left to right, so the gym's attendance is increasing. At the same time, the graph bends downward and becomes progressively less steep as it approaches a high point. This downward bend is concavity down. Concavity describes how the rate of change is changing rather than simply whether the quantity itself is rising or falling. Here, the slope of the attendance graph remains positive, but its value decreases over time. Thus, people are still arriving in a net sense, but the rate at which the gym population grows is slowing.

In calculus terms, a rising graph has a positive first derivative, while a concave-down graph has a decreasing first derivative (and, where defined, a negative second derivative). Applied to attendance, this means the number of people increases by smaller amounts during equal successive time intervals. For example, the population might gain many people in one portion of the interval and fewer people in the next portion, while still gaining people overall. This is the standard graphical interpretation of an increasing, concave-down function. See OpenStax: Concavity and Points of Inflection and Khan Academy: Second derivative and concavity.

QUESTION NO: 11

A new company just launched and is using the function $M(t)$to predict its market share after $t$years. The graph of $M(t)$is shown.



When should the company expect to have a market share of 40%?

A. After 0.8 years

B. After 2 years

C. After 7.4 years

D. After 3 years

ANSWER: C

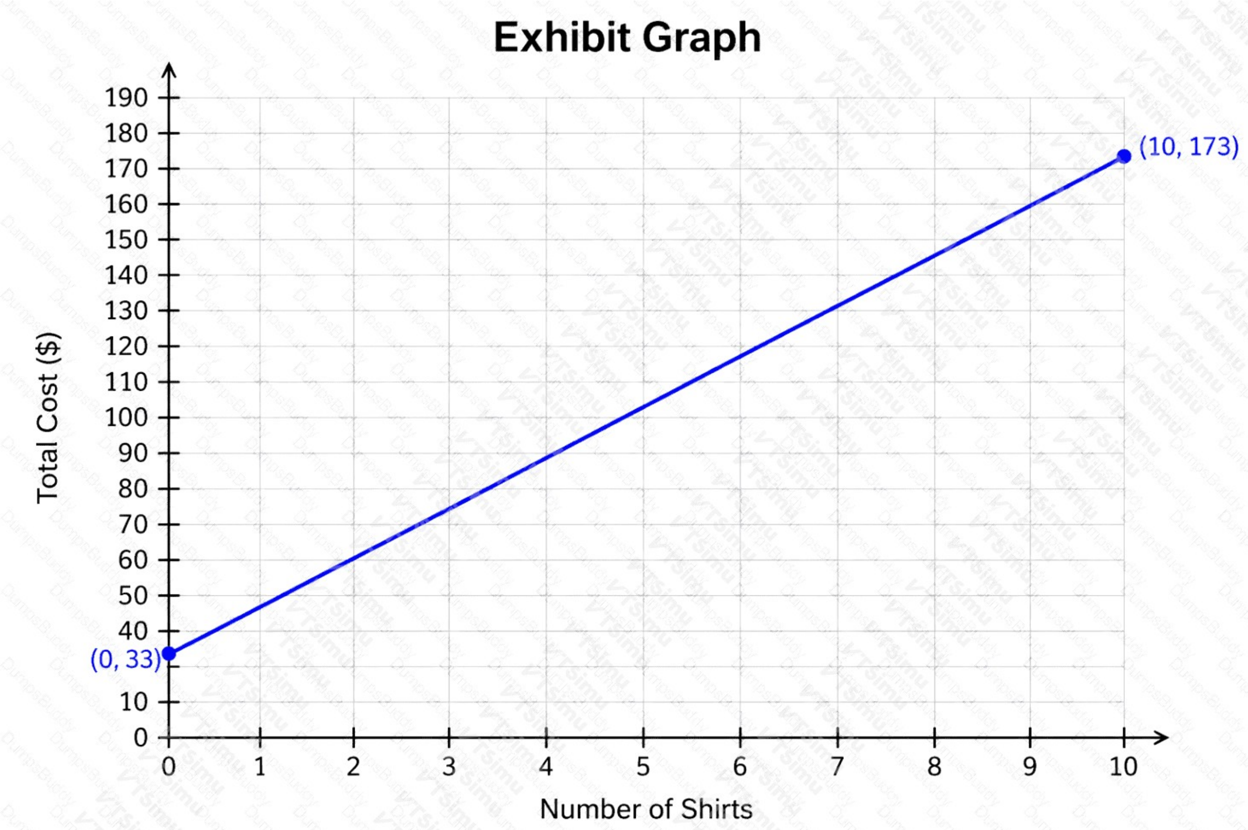
Explanation:

After 7.4 years is correct because the graph defines market share as the output, $M(t)$, and time in years as the input, t. To answer the question, begin at 40% on the vertical market-share axis. Trace horizontally from that value until reaching the graph of $M(t)$, then trace vertically downward to the horizontal time axis. The corresponding input value is approximately 7.4. Therefore, the model predicts that the company reaches a 40% market share about 7.4 years after launch.

This is an application of interpreting a function represented graphically: a specified output value is given, and the matching input is read from the point on the curve with that output. Because the displayed value is estimated from a graph rather than calculated from an explicitly provided formula, “about” or “approximately” is appropriate. For a review of reading coordinates and relationships from graphs, see Khan Academy’s graphing overview and OpenStax College Algebra: Functions and Function Notation.

QUESTION NO: 12

A coach is placing an order for team shirts. The graph shows the total cost based on the number of shirts.



What is the cost of each additional shirt?

A. $3.30

B. $14.00

C. $17.30

D. $47.00

ANSWER: B

Explanation:

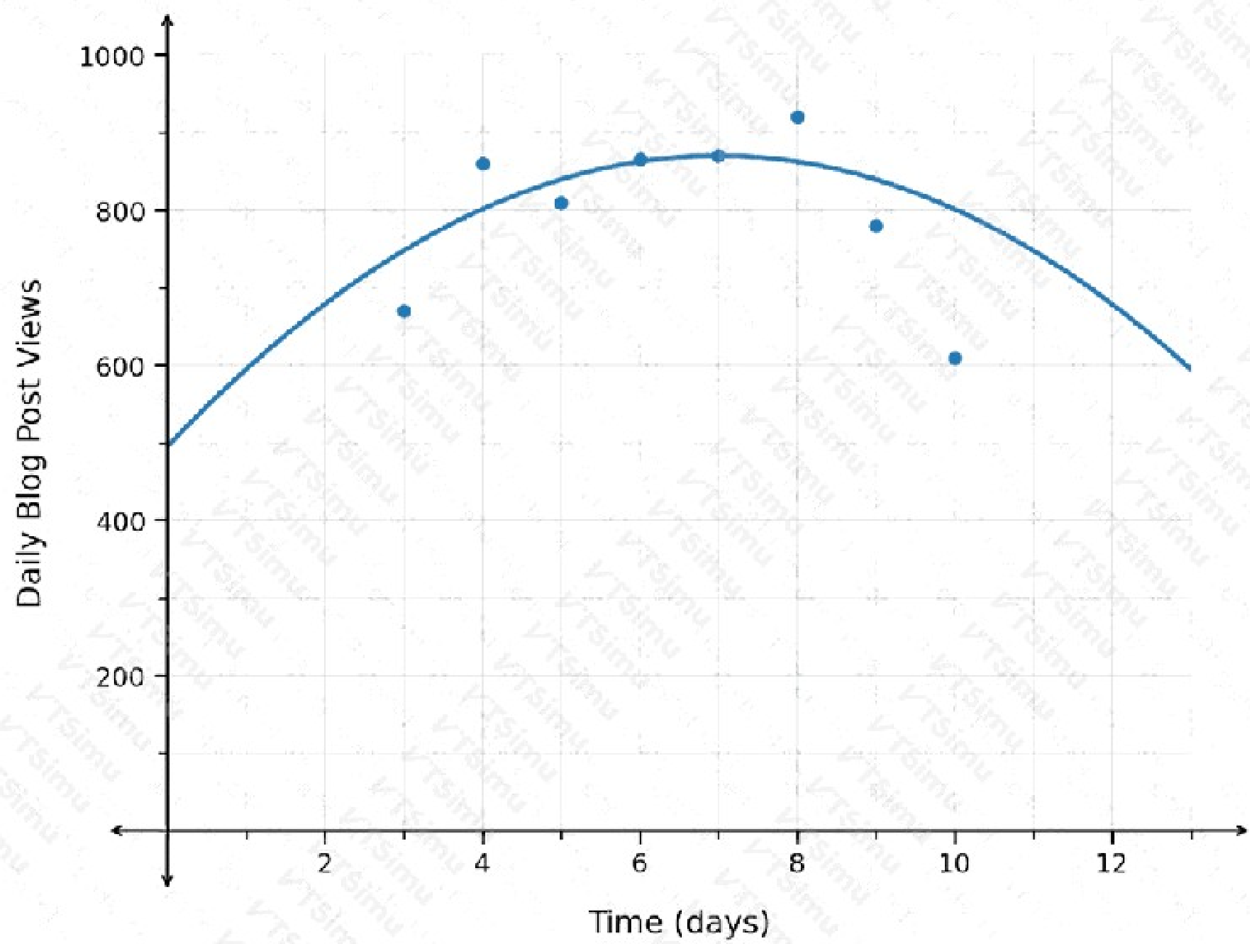
$14.00 is the cost of each additional shirt because it is the rate at which total cost changes as the number of shirts increases. This rate is the slope of the line on the graph. Using the labeled points (0, 33) and (10, 173), the total cost rises from $33 to $173 when the order increases from 0 shirts to 10 shirts. Thus, the change in cost is $173 − $33 = $140 for 10 shirts. Dividing the cost change by the change in number of shirts gives $140 ÷ 10 = $14 per shirt. Therefore, every additional shirt adds $14.00 to the total cost. The value of $33 is the initial fixed cost shown by the y-intercept; it is charged even when zero shirts are ordered and is not part of the per-shirt rate. This follows the slope formula, change in output divided by change in input, as described in Khan Academy's slope overview and the linear-function rate-of-change guidance from OpenStax College Algebra.

QUESTION NO: 13

A researcher collected data on the number of daily posts on a blog. The results are shown in the scatterplot. The graphed regression function has an r

2

value of 0.89.



Is it appropriate to make a prediction for the number of daily posts after 18.6 months?

A. No. The r2value indicates a moderate fit, but x=18.6 is more than 25% of the range beyond the maximum value.

B. No. The r2value indicates a strong fit, but x=18.6 is more than 50% of the range beyond the maximum value.

C. Yes. The r2value indicates a strong fit, and x=18.6 is within 50% of the range of the maximum value.

D. Yes. The r2value indicates a moderate fit, and x=18.6 is within 25% of the range of the maximum value.

ANSWER: C

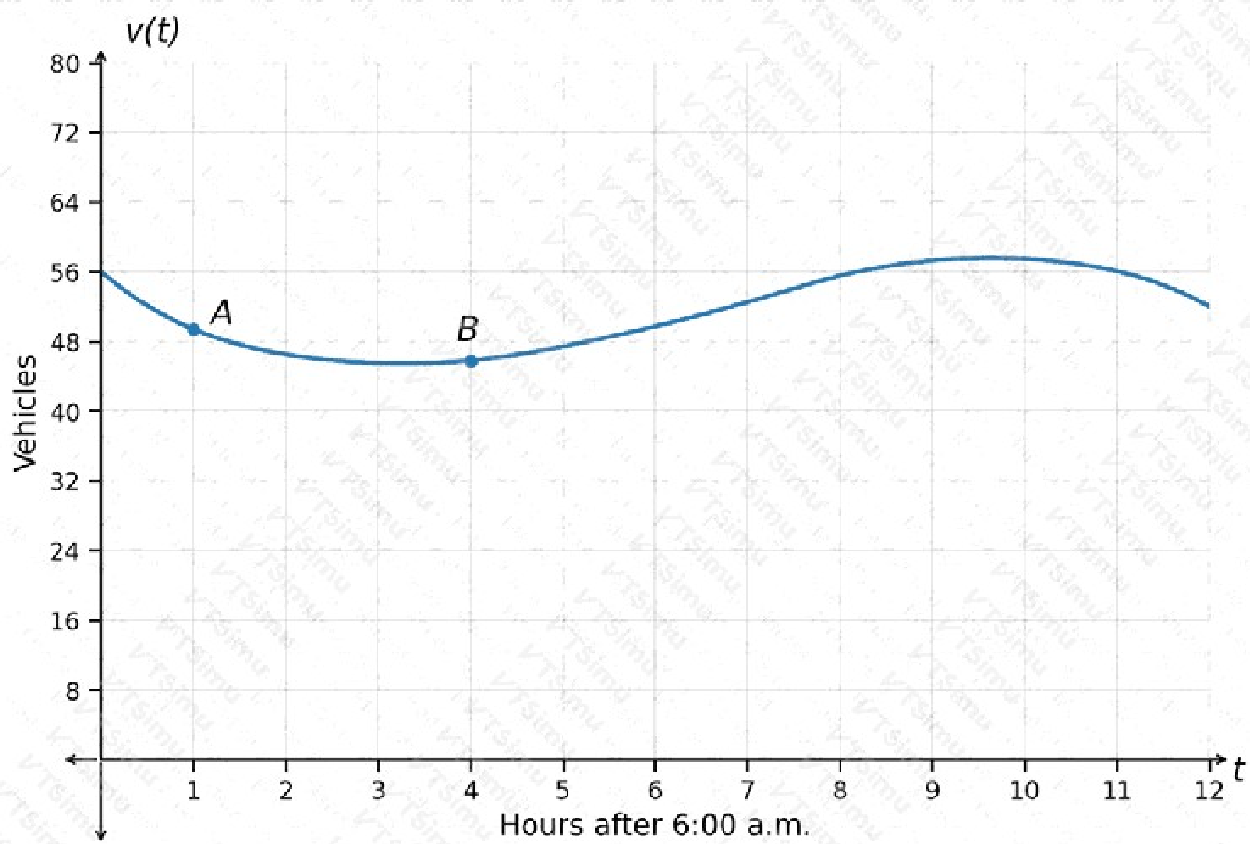
Explanation:

“Yes. The r^2 value indicates a strong fit, and x=18.6 is within 50% of the range of the maximum value.” is correct. The coefficient of determination, r^2, measures the proportion of variation in the response variable accounted for by the regression model. An r^2 value of 0.89 means that the linear regression explains about 89% of the variability in the number of daily blog posts. Because this is close to 1, the fitted line provides a strong representation of the observed relationship and is suitable for making a model-based prediction.

The requested time of 18.6 months lies beyond the observed x-values, so this is an extrapolation rather than an interpolation. Extrapolation should be approached cautiously because a trend may not continue indefinitely. In this case, though, the requested value is only a limited distance beyond the maximum observed month—within the stated 50% guideline—and the model has a strong fit. Those two facts support treating the prediction as appropriate. For background on interpreting r^2 and regression fit, see NIST’s regression analysis guidance and OpenStax’s regression-equation overview.

QUESTION NO: 14

The graphed function v(t) represents the number of vehicles, v, stopped at a toll booth t hours after 6:00 a.m. The coordinates of points A and B are (1,49.4) and (4,45.8), respectively.



What is the average rate of change of the number of vehicles from point A to point B?

A. -3.6

B. -1.2

C. 19.04

D. 47.6

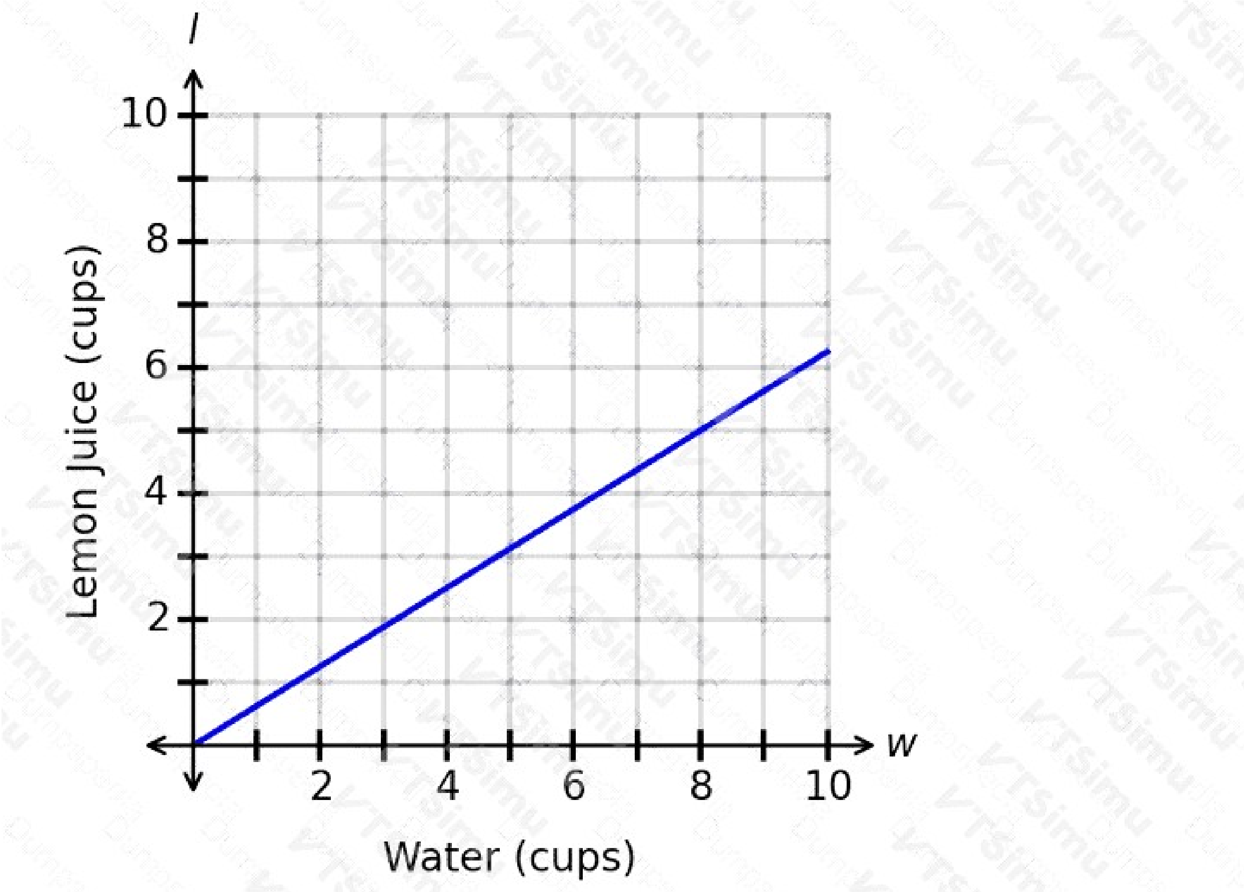
ANSWER: B

Explanation:

The correct answer is **-1.2**. Average rate of change is calculated as the change in the function's output divided by the corresponding change in its input. For the points (1, 49.4) and (4, 45.8), the number of vehicles changes by 45.8 − 49.4 = −3.6 vehicles, while time changes by 4 − 1 = 3 hours. Dividing gives −3.6 ÷ 3 = −1.2. Thus, over the interval from 1 hour to 4 hours after 6:00 a.m., the number of vehicles stopped at the toll booth decreased at an average rate of 1.2 vehicles per hour. The negative sign is essential because it communicates the direction of change: the function's value falls rather than rises as time increases. This calculation is also the slope of the secant line connecting the two specified points on the graph. Average rate of change and secant-line slope are standard applications of the slope formula, as described by OpenStax College Algebra and Khan Academy's average-rate-of-change review.

QUESTION NO: 15

A recipe calls for a constant ratio of water and lemon juice. The graph shows the relationship between the amounts of these two ingredients, where wis the volume of water and lis the volume of lemon juice.



What is the correct interpretation of the rate of change?

A. The amount of lemon juice must be the amount of water plus 5/8.

B. The amount of lemon juice must be 8/5 of the amount of water.

C. The amount of lemon juice must be the amount of water plus 8/5.

D. The amount of lemon juice must be 5/8 of the amount of water.

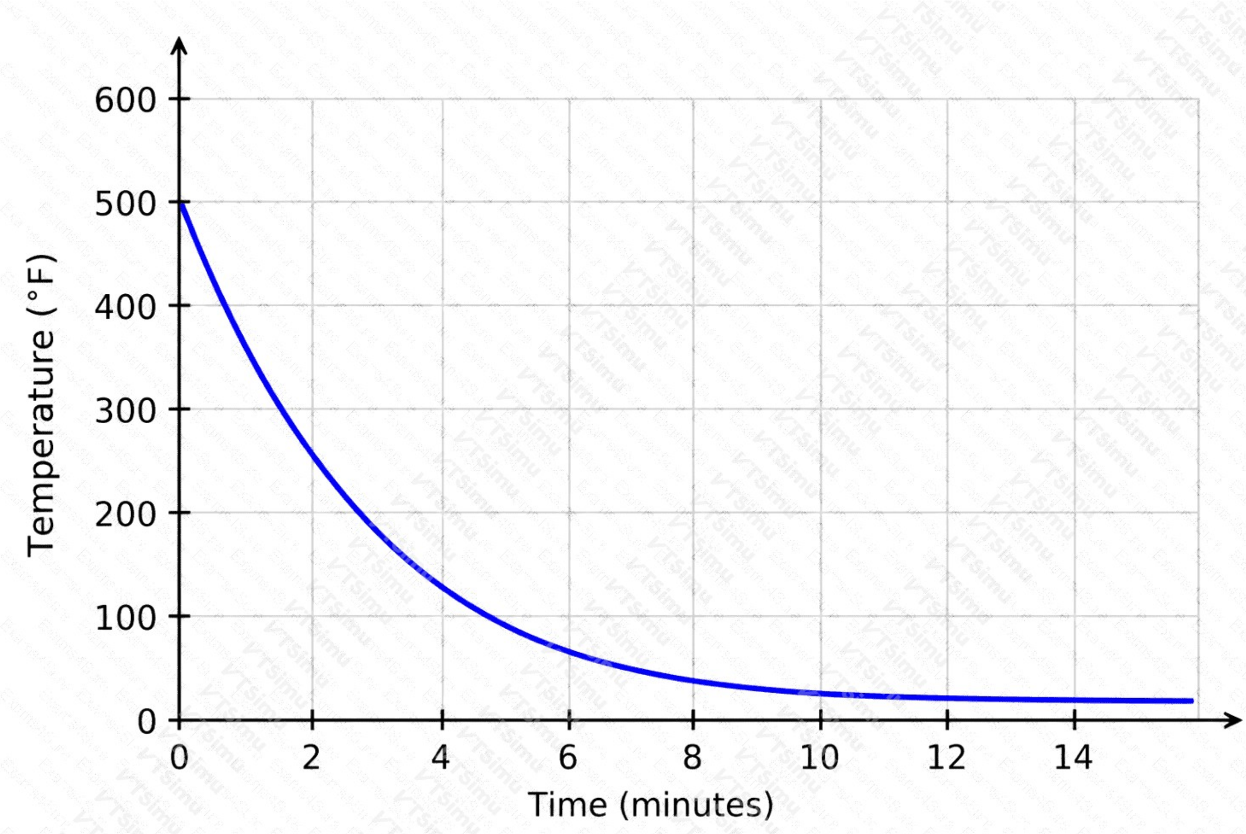
ANSWER: D

Explanation:

The amount of lemon juice must be 5/8 of the amount of water. The graph represents lemon juice volume, *l*, as a function of water volume, *w*. Because the line passes through the origin, the relationship is proportional and can be written as *l* = *mw*, where *m* is the constant rate of change. Using the point shown on the graph, 8 cups of water correspond to 5 cups of lemon juice. Therefore, the slope is calculated as the change in lemon juice divided by the change in water: *5/8*. This means that for every 8 cups of water used in the recipe, 5 cups of lemon juice are needed. Equivalently, multiplying any water amount by 5/8 gives the matching lemon juice amount. Since the ratio remains constant for every point on a proportional graph, 5/8 is the unit rate relating lemon juice to water. Slope is interpreted as vertical change per horizontal change, and a proportional relationship has a graph that includes the origin. See OpenStax: Slope of a Line and OpenStax: Proportional Relationships.

QUESTION NO: 16

The temperature of an object changes according to the relationship in the graph.



Which equation represents the horizontal asymptote of the function?

A. x=25

B. y=25

C. x=525

D. y=525

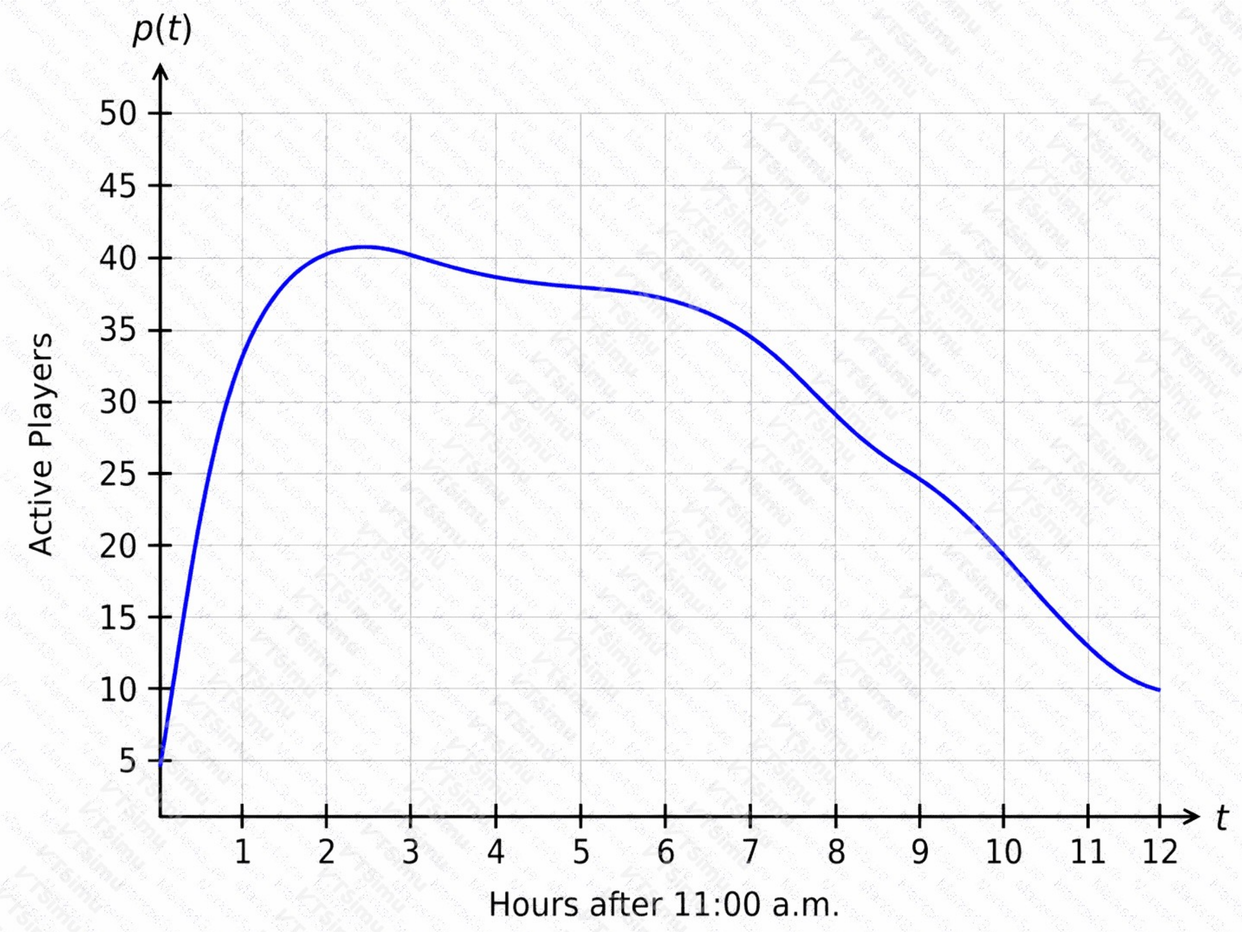
ANSWER: B

Explanation:

y=25 is the equation of the horizontal asymptote because the graph's temperature values level off closer and closer to 25 as the input increases. A horizontal asymptote is a horizontal line that represents the output value a function approaches as the independent variable moves far to the right or left. In this temperature context, it represents the long-term or equilibrium temperature approached by the object. The graph may approach that value from above or below, and it does not need to touch the line for the line to be an asymptote. Since horizontal lines have a constant output value, their equations take the form *y* = *constant*. Here, the constant approached by the curve is 25, so the horizontal asymptote is **y=25**. This distinguishes the limiting temperature from input values such as 25 or 525, which would instead describe vertical lines. For additional discussion of asymptotes and exponential functions, see OpenStax College Algebra: Exponential Functions and Khan Academy: Horizontal Asymptotes.

QUESTION NO: 17

Consider the graph of p(t)shown. The function represents the number of active players, p, in a game thours after 11:00 a.m.



Which interpretation of the concavity between t=0.4and t=3.6is correct?

A. The number of players is decreasing slower and slower.

B. The number of players is increasing faster and faster.

C. The number of players is increasing slower and slower.

D. The number of players is decreasing faster and faster.

ANSWER: C

Explanation:

“The number of players is increasing slower and slower.” is correct because, over the stated time interval, the graph rises while becoming less steep. A rising graph means that the number of active players is increasing as time passes. However, the flattening shape shows that equal time increments produce progressively smaller increases in the player count. In calculus terms, the first derivative is positive because the function is increasing, but the first derivative is decreasing because the slopes of tangent lines are getting smaller. Therefore, the second derivative is negative, which is the defining characteristic of concave-down behavior.

Concavity describes how a rate of change changes, rather than merely whether the function itself rises or falls. Here, the population of active players continues to grow, but its growth rate diminishes throughout the interval. This is precisely the everyday interpretation of an increasing function that is concave down. For a discussion of using changes in slope and the second derivative to determine concavity, see [OpenStax Calculus: Concavity and Points of Inflection]. Additional guidance on interpreting derivatives as rates of change is available from [Khan Academy].