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Key features of graphs

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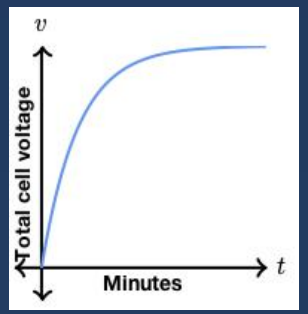
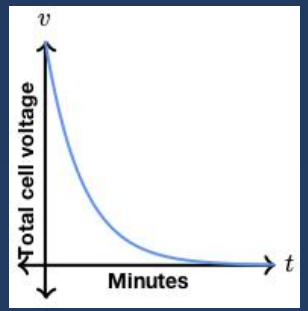
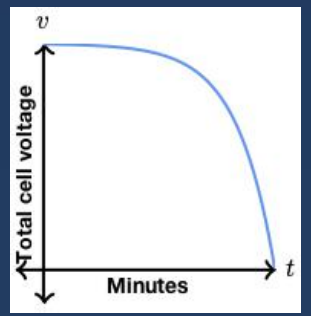
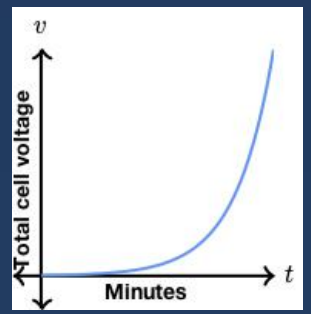
1.A laptop battery gains cell voltage as it charges. The battery initially charges quickly, then gradually slows as it approaches its maximum charge. Which of the following graphs in the tv-plane could represent the total cell voltage, v, in a laptop battery after t minutes of charging time?









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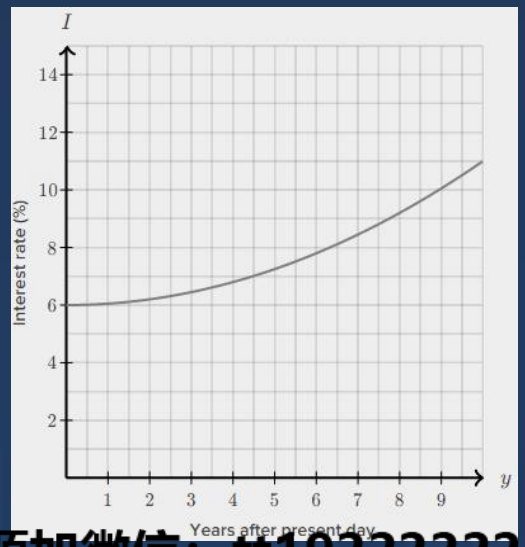
2.The graph at left in the yI-plane shows the interest rate percentage, I, one can expect for a savings account lasting y years up to a maximum of 10 years. Accounts lasting for less than 1 year are short-lived and accounts lasting for more than 5 years are long-lived. What is the significance of the I-intercept?

A. Short-lived accounts have the minimum interest rate of 6percent.
B. Long-lived accounts have the minimum interest rate of 6percent.
C. Long-lived accounts have the maximum interest rate of 11percent.
D. The average increase in interest rates is 0.5 percent per year.



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3.The graph at left in the *th*-plane shows Brayden's height, *h*, in inches above the ground, *t* seconds after he jumps. What is the best interpretation of the *t*-intercepts of the graph?

A. Brayden jumped 0.6 feet into the air.
B. Brayden jumped 0.6 times per second.
C. Brayden remained in the air for 0.6 seconds.
D. Brayden reached the peak of his jump after 0.6 seconds.

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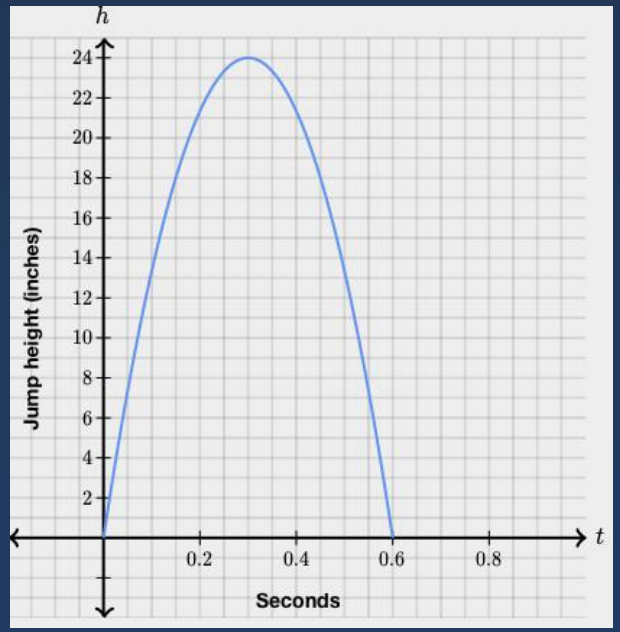

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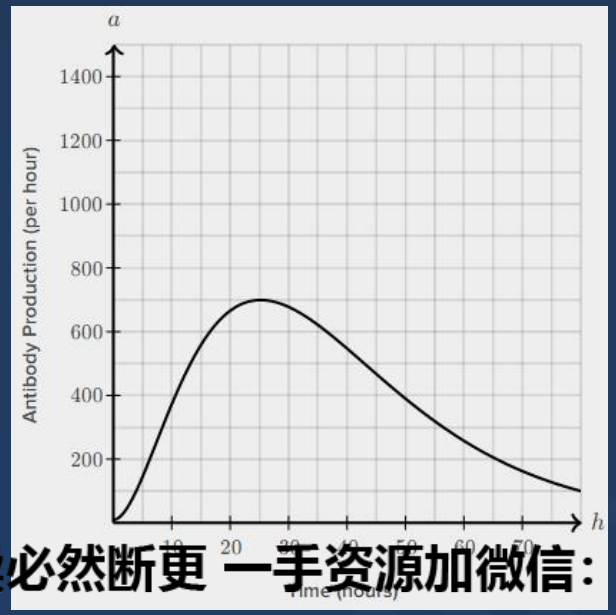
4.The graph at left shows the antibody production, a, in number of antibodies per hour h hours after the introduction of a vaccine. What is the maximum number of antibodies produced per hour?



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5.The plot at left in the yD-plane shows the depth, D, in meters of a volcanic lake exactly y years after the date of first recording. What is the significance of the point plotted on the D-axis?

A. The most recently recorded depth is 175 m.
B. The depth of the lake is approximately decreasing.
C. The maximum recorded depth occurred on the first recording.
D. The volcanic lake disappears 225 years after first recording.

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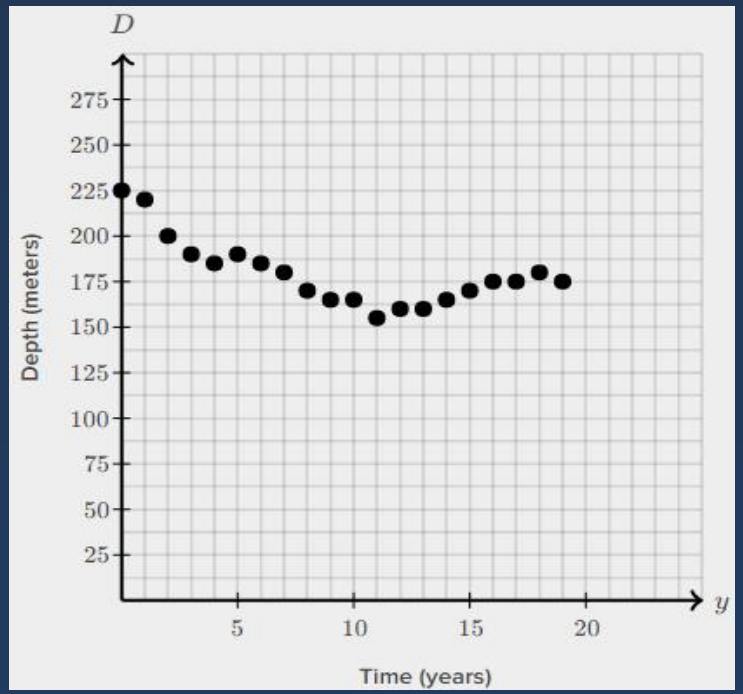

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6.The graph at left in the RI-plane shows the current, I, in amperes for a circuit with a resistor having R ohms of resistance. What is the significance of the value I=4 shown by the dotted line?

A. The current for a resistor with 0 ohms of resistance is 4amperes.
B. The current reaches a minimum when the resistor has a resistance of 4 ohms.
C. As the current becomes large, the resistance becomes approximately 4 ohms.
D. As the resistance becomes large, the current becomes approximately 4 amperes.

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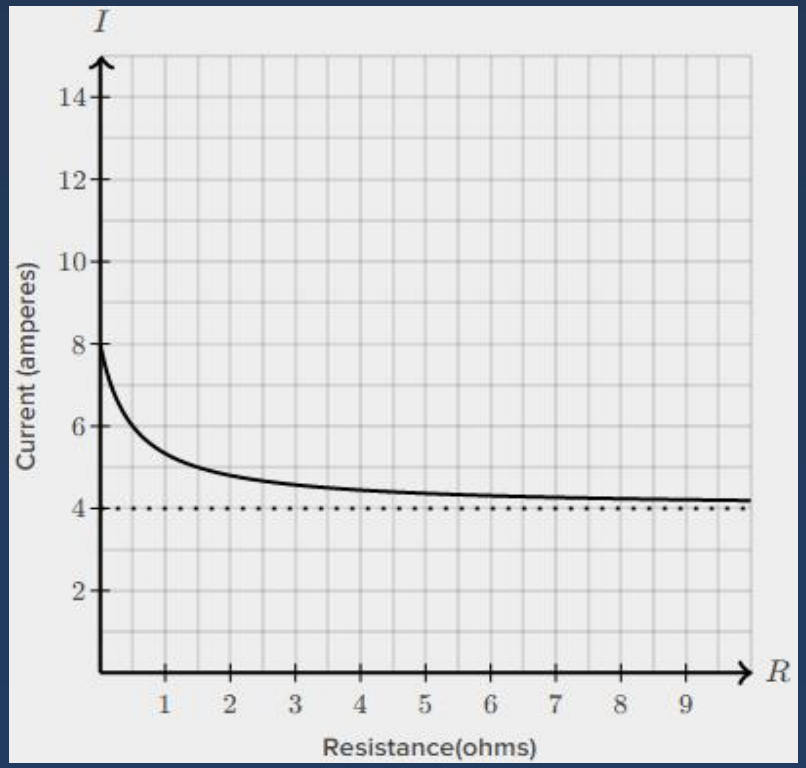

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7.The acceleration, a, in meters per second squared (m/s2) due to gravity is 0 at the Earth's center. It reaches a maximum of 9.8 m/s2 at the surface of the earth approximately 4 thousand miles (mi) from the Earth's center. If d represents the distance from the Earth's center in thousands of miles, which of the following graphs in the da-plane could represent this relationship?

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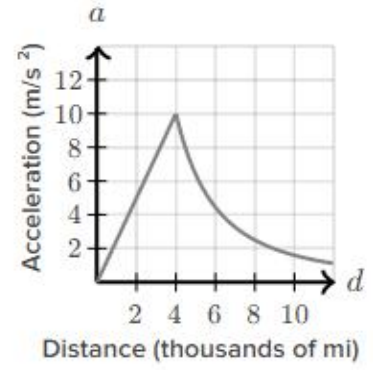
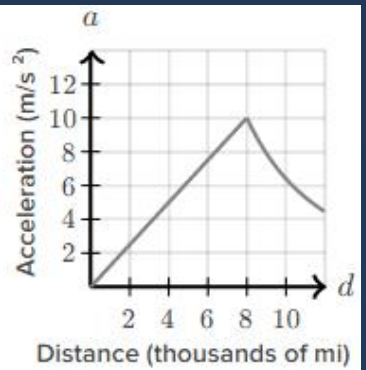
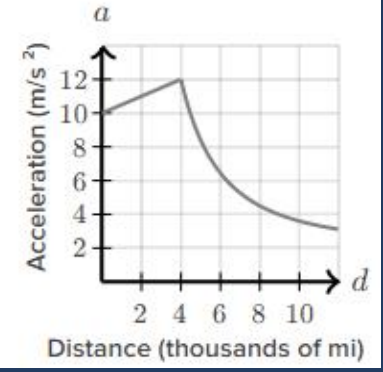
A



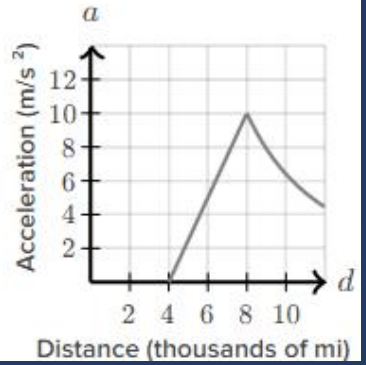
C



B



D



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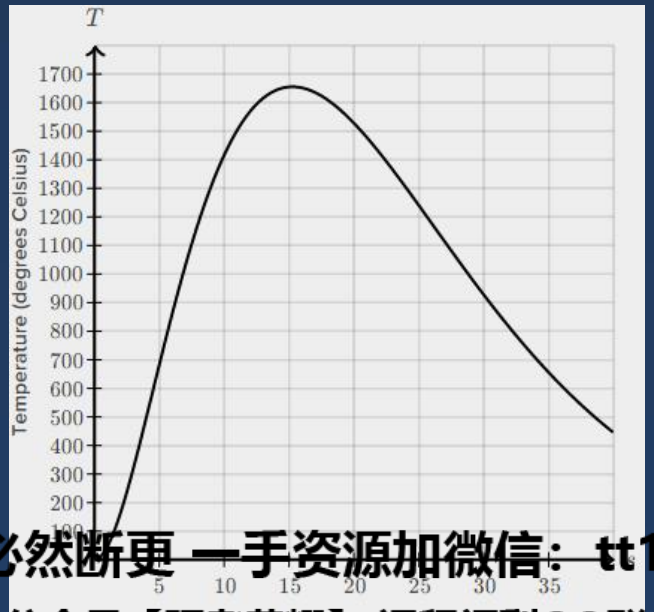
8.The graph at left in the sT-plane shows the temperature, T, of a thermite reaction s seconds after ignition. What is the average rate of increase in temperature per second
between s=0 and s=15 in degrees Celsius per second?

A. 110
B. 140
C. 550
D. 1650



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9.The plot at left in the Th-plane shows how the height, h, in inches (in)of the first bounce of a ball dropped from 3 feet depends on the temperature, T, in degrees Fahrenheit (◦ F). What is the significance of the value h=27 as shown by the dotted line?

A. The ball reaches a height of 80 in at a temperature of 0◦ F.
B. The ball reaches a height of 80 in at a temperature of 27◦ F.
C. The ball reaches a maximum height of 27 in across all temperatures shown.
D. The ball reaches a maximum height of 27 in approximately 80 in along its trajectory.

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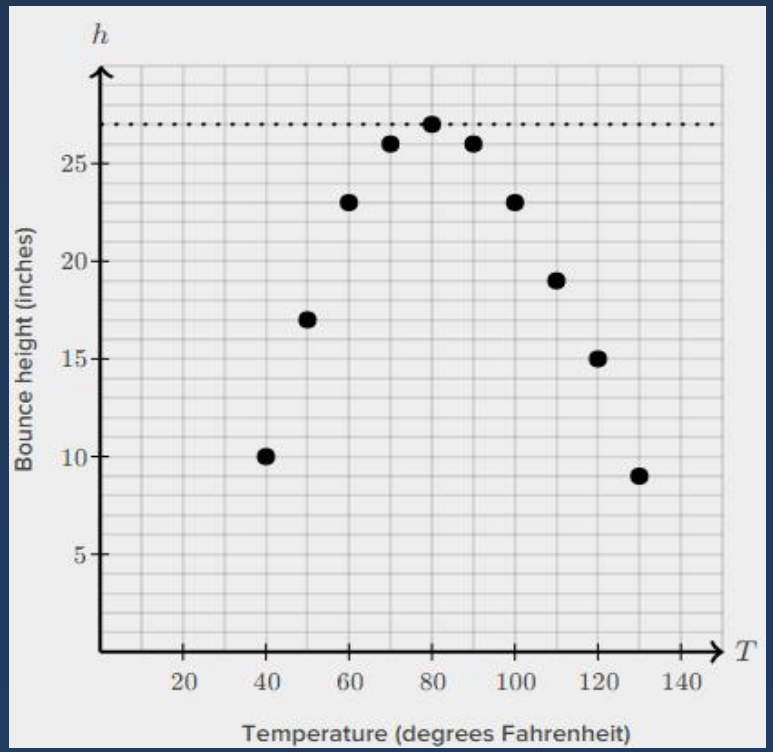

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10.The graph at left in the ta-plane shows the acceleration, a, in meters per second per second (m/s2) of a dropped elastic ball tt milliseconds (ms) after the ball impacts a tile surface. What is the significance of the graph at t=15ms?

A. The elastic ball touches the ground for 30ms.
B. The elastic ball reaches its greatest height 15ms after impact.
C. The elastic ball experiences the greatest acceleration 15ms after impact.
D. The elastic ball experiences the greatest acceleration 15ms after being dropped.

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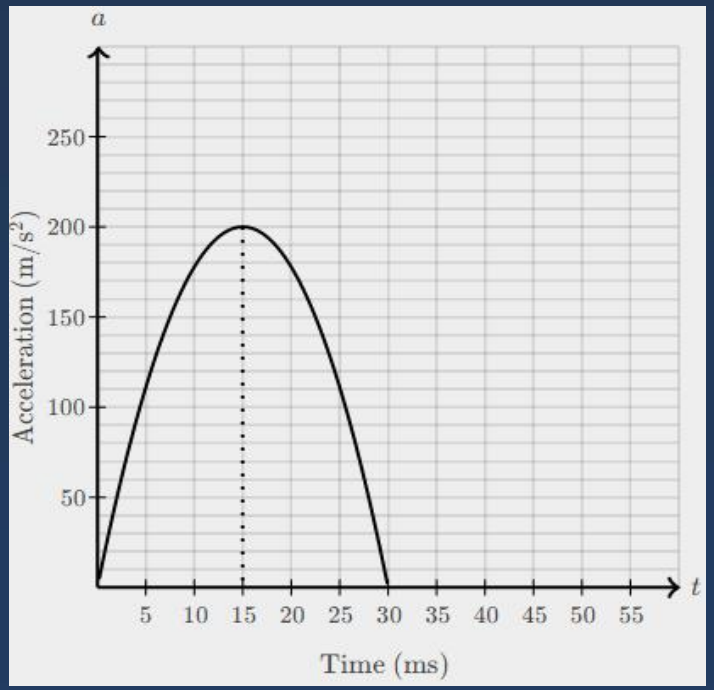

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11.The National Retail Federation introduced the term "Cyber Monday" in 2005 to describe a sharp rise in online revenue and traffic the first Monday after Thanksgiving. The graph at left in the tr-plane approximates the total revenue, r, in millions of dollars, from Cyber Monday sales in the year t years after 2009. What is the best interpretation of the portion of the graph to the left of the r-axis?

A. It refers to loss of revenue.
B. It refers to revenue in years before 2009.
C. It is irrelevant, because you cannot have negative revenue.
D. It is irrelevant, because there were no Cyber Monday sales before 2009.

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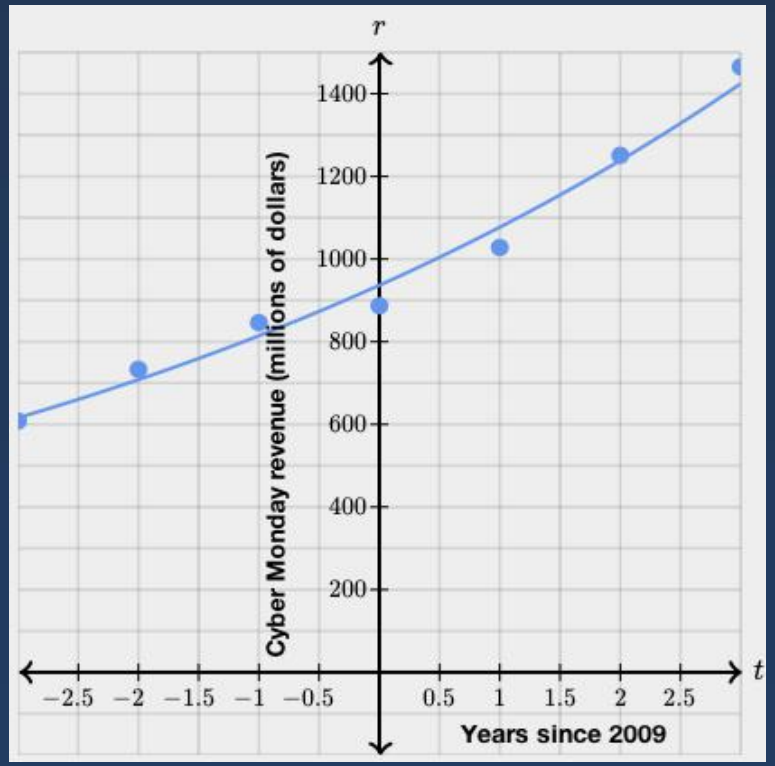

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12.The graph at left in the mf-plane relates the length in meters (m) of a particular thickness of guitar string to the frequency in Hertz (Hz) at which it will vibrate for a first harmonic note. By what factor does the frequency decrease between string lengths of 0.5m and 0.6m?

A. 0.16
B. 0.5
C. 0.6
D. 0.75

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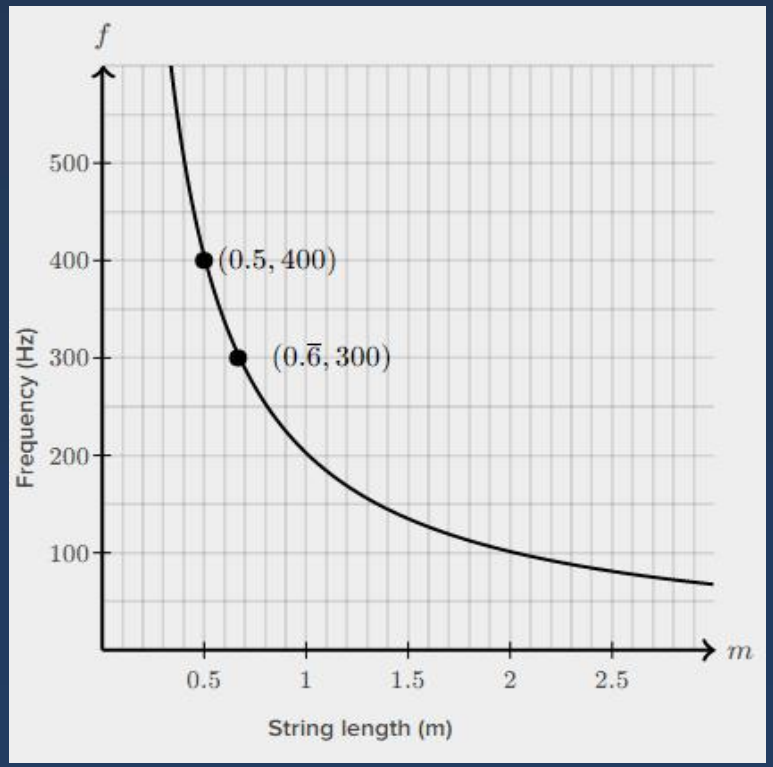

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13.The graph in the xC-plane at left shows the long run average cost curve for a company producing appliances. The function C gives the average production cost per appliance when the total output is xx appliances per day. Approximately how many appliances should the company produce per day to minimize average production cost?

A. 28 appliances
B. 50 appliances
C. 600 appliances
D. 1200 appliances

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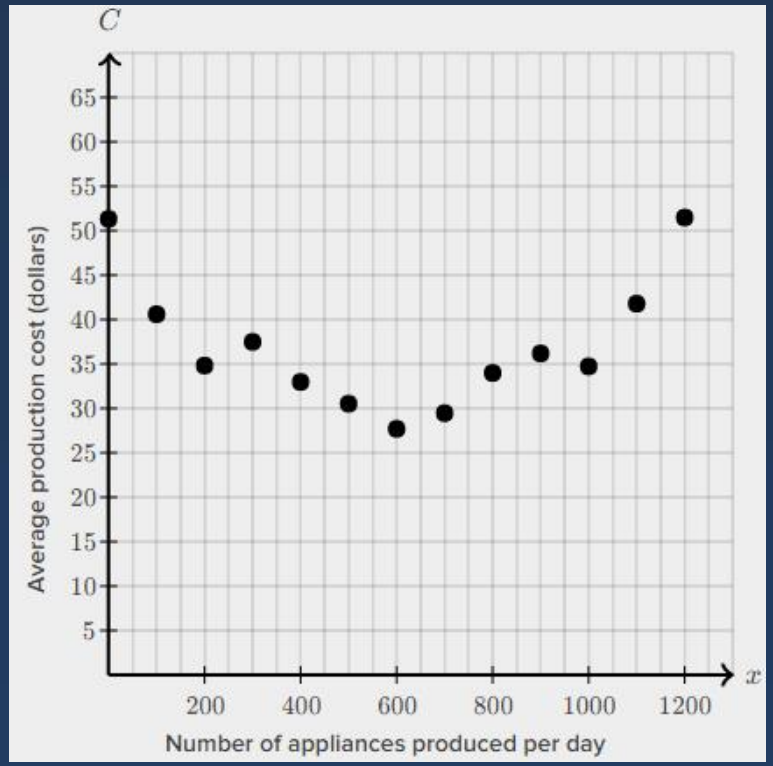

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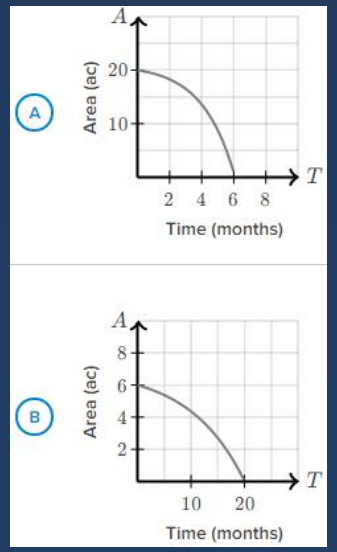
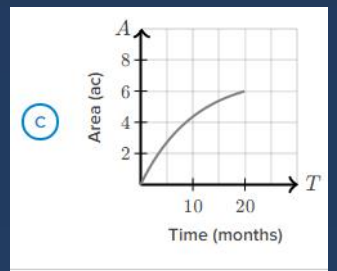
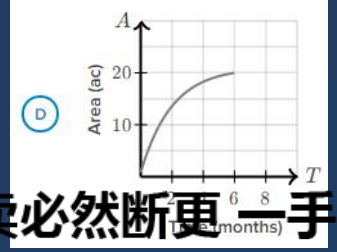
14.A foreign species of insect has invaded a small island and begins to consume the island's mustard plants over a time, T, in months. The area inhabited by mustard plants, A, in acres (ac) immediately after the insect's introduction is 20 ac, and after 6 months the mustard plants disappear from the island. Which of the following graphs in the TA-plane could represent this situation?







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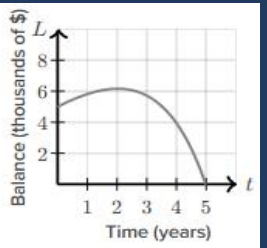
15.A loan is paid back with increasing payments. The balance of the loan upon purchase is equal to $6,000. The balance reaches a maximum 2 years after purchase and 5 years after purchase it reaches $0. If L is the balance of the loan in thousands of dollars and t is the time since the purchase, which of the following graphs in the tL-plane represents this payment plan?

A



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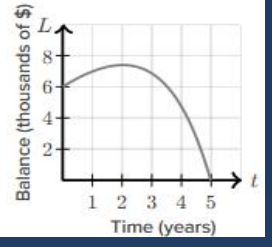
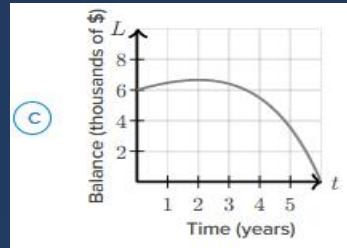


C



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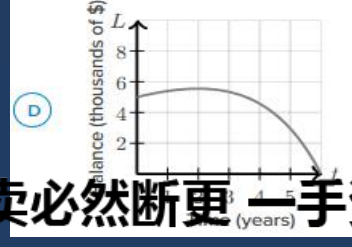

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16.The graph at left in the sC-plane shows the hourly cost C in dollars to a small clothing factory producing s shirts in one hour. Which of the following is correct regarding the average cost per shirt when producing s shirts in one hour?

A. The average cost always increases as the number of shirts produced in one hour increases.
B. The average cost always decreases as the number of shirts produced in one hour increases.
C. The average cost reaches a maximum when the number of shirts produced in one hour is 100.
D. The average cost reaches a minimum of 0.25 dollars per shirt per hour.

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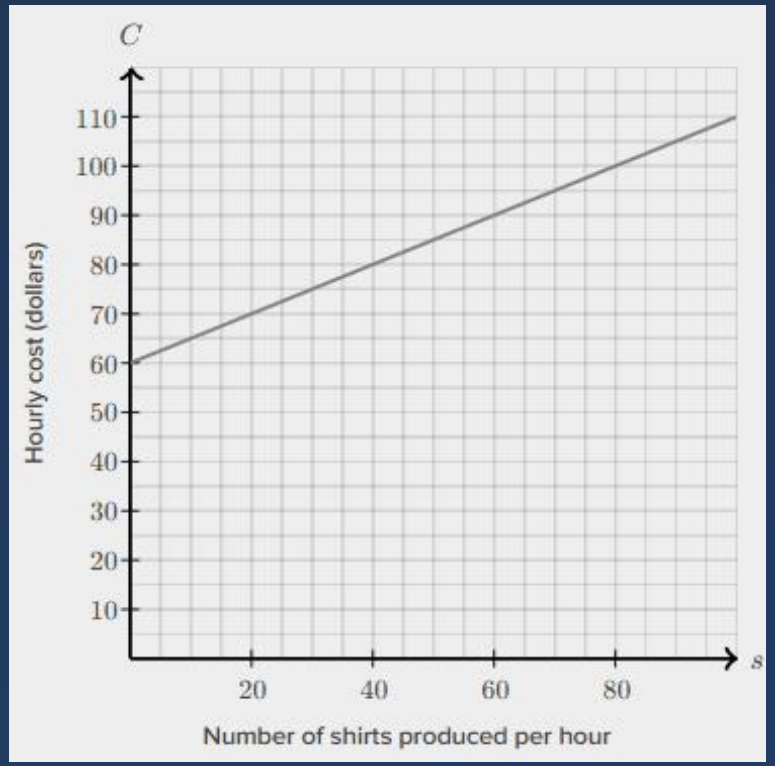

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