

AP Precalculus

Parametric Motion and Intersections

Parametric Motion and Intersections | APPC-U04-P03

96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
02	Grid Rounds	24 tasks
03	Match & Move	24 cards
04	Error Analysis & Strategy	24 tasks
05	Quick Answer Key	96 answers
06	Full Worked Solutions	96 solutions
07	Teacher / Parent Use Guide	included
08	Terms of Use & License	included

Topic focus

Across 96 tasks this topic asks for all extrema with times and points, rightmost and highest positions, feasible interval, paired rules, paired model and all times and positions.

8 PDFs and a README; 149 buyer pages.

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Name: _____ Date: _____ Class: _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Do the robots collide during the observation window?

Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

Condition or evidence	Supplied value
Original time range or clock definition	$0 \leq t \leq 3$ seconds
Robot A	X t Y $2t$
Robot B	X $6 - 2t$ Y $8 - 2t$

Bank label: _____

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: At $t = 4$ seconds, at $(4, 3)$.

When is the object inside the corridor and at nonnegative height?

Solve the card, use the complete requested response as the outgoing match, and move to the unique card whose incoming header matches it; continue until FINISH.

Condition or evidence	Supplied value
Conditions	$-2 \leq x \leq 4$
	$y \geq 0$
Original time range or clock definition	$0 \leq t \leq 8$ seconds
Given $x(t)$	$x = t - 3$ meters
Given $y(t)$	$y = 12 - 2t$ meters

Your response: _____

Incoming: $t \in [0, 2] \cup [4, 5]$.Find the position at $t = 3$ seconds.

Solve the card, use the complete requested response as the outgoing match, and move to the unique card whose incoming header matches it; continue until FINISH.

Condition or evidence	Supplied value
Original time range or clock definition	$0 \leq t \leq 6$ seconds
Time to evaluate	3
Given $x(t)$	$x = t - 4$ meters
Given $y(t)$	$y = 2t + 1$ meters

Your response: _____

Incoming: Leftmost and highest occur at $t = 0, 4$, both at $(0, 3)$.Rightmost and lowest occur at $t = 2$ at $(4, -1)$.When does the object cross the x -axis?

Solve the card, use the complete requested response as the outgoing match, and move to the unique card whose incoming header matches it; continue until FINISH.

Condition or evidence	Supplied value
Original time range or clock definition	$0 \leq t \leq 4$ seconds
Given $x(t)$	$x = \frac{1}{t+2}$ meters
Given $y(t)$	$y = t - 1$ meters

Your response: _____

Incoming: At $t = 1$ the position is $(0, 0)$, and at the included endpoint $t = 3$ it is $(0, 2)$.When is the object both on or right of the y -axis and at nonnegative height?

Solve the card, use the complete requested response as the outgoing match, and move to the unique card whose incoming header matches it; continue until FINISH.

Condition or evidence	Supplied value
Conditions	$x \geq 0$
	$y \geq 0$
Original time range or clock definition	$0 \leq t \leq 6$ seconds
Given $x(t)$	$x = t^2 - 1$ meters
Given $y(t)$	$y = 5 - t$ meters

Your response: _____

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Name: _____ Date: _____ Class: _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Repair the student's claim using the two supplied times.

Identify the error or first invalid step, give the corrected result, and state a brief mathematical reason.

Condition or evidence	Supplied value
Comparison times	
	2
	3
Original time range or clock definition	$0 \leq t \leq 6$ seconds
Student claim to examine	At $t = 2$ the cart is moving left because $x(2) < 0$.
Given $x(t)$	$x = -5 + t$ meters
Given $y(t)$	$y = 2$ meters

A student claims the motion never reaches the y -axis during $0 \leq t \leq 3$ because the event would occur only after the interior of the interval. Identify the error, then give the correct event time and position.

Identify the error or first invalid step, give the corrected result, and state a brief mathematical reason.

Condition or evidence	Supplied value
Original time range or clock definition	$0 \leq t \leq 3$ seconds
Event	y -axis means $x = 0$
Given $x(t)$	$x = 3 - t$ meters
Given $y(t)$	$y = t^2 + 1$ meters

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Full Worked Solutions - excerpt

Worked example

Problem. When does the object cross the y -axis?

Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

Condition or evidence	Supplied value
Original time range or clock definition	$0 \leq t \leq 4$ seconds
Given $x(t)$	$x = 3t - 6$ meters
Given $y(t)$	$y = t^2$ meters

Answer. At $t = 2$ seconds, at $(0, 4)$ meters.

Explanation and check.

Set $x = 0$ to get $t = 2$, then evaluate y at that same time.

Worked example

Problem. List every ground event in the time window and the position at each one.

Show a complete response in the numbered workspace, preserving requested exactness, units, interval endpoints, and justification.

Condition or evidence	Supplied value
Original time range or clock definition	$0 \leq t \leq 5$ seconds
Given $x(t)$	$x = 2t - 3$ meters
Given $y(t)$	$y = (t - 1)(t - 4)$ meters

Answer. At $t = 1$ the position is $(-1, 0)$, and at $t = 4$ it is $(5, 0)$.

Explanation and check.

The height factors vanish at $t = 1$ and $t = 4$; the horizontal coordinate must be evaluated separately at each event time.