

AP Precalculus
Interpreting and Comparing Function Models

Interpreting and Comparing Function Models | APPC-U01-P24

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 direction and changing-rate conclusion, growth conclusion, existence conclusion, rate and interpretation, rate and meaning and rate and sign meaning.

8 PDFs and a README; 85 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.

Find the modeled tank volume after 4 hours and state its unit. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value. Context: water storage. Work on the domain $0 \leq t \leq 10$. Evaluate at the input 4. Measure the input in hours. Use the model $V(t) = 480 + 35t - 2t^2$. Measure the output in liters. _____ Bank label: _____	At what time does the graph predict exactly 20 customers in line? For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value. Context: queue length. the horizontal axis measures minutes; the vertical axis measures customers. The curve relation is below $y = 20$ for $t < 18$ and above $y = 20$ for $t > 18$. Work on the domain $0 \leq t \leq 30$. The intersection is $(18, 20)$. The scale is 2 minutes horizontally and 5 customers vertically. The target is 20 customers. _____ Bank label: _____
Where is the modeled arch height positive? For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value. Context: playground arch. The constraint is $H(x) > 0$. Work on the domain $0 \leq x \leq 12$. Measure the input in feet. Use the model $H(x) = -(x + 2)(x - 10)$. Measure the output in feet. _____ Bank label: _____	Find the modeled factory output on day 3. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value. Context: factory output. Evaluate at the input 3. Measure the input in days. Use the model $Q(d) = 90 + 24d - 3d^2$. Measure the output in units. _____ 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.

START Find the average download rate over the indicated interval. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context: page downloads. Measure the input in minutes. The interval is $(2, 7)$. Use the model $D(t) = 180 + 45t$. Measure the output in downloads. Your response: _____	Incoming: At $t = 2$ and $t = 6$ hours; the maximum is 48 milligrams per liter. Use the supplied rounded model to predict temperature at 7 minutes. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context: coffee cooling. The coefficient note is 0.18 is rounded to two decimal places. Evaluate at the input 7. Measure the input in minutes. Use the model $T(t) = 21 + \frac{68}{1+0.18t}$. Measure the output in degrees Celsius. The report precision is nearest tenth. Your response: _____
Incoming: 25.5 kilograms and 7 containers. At what allowed price does the model predict 132 rentals? Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context: rental demand. Work on the domain $8 \leq p \leq 14$. Measure the input in dollars. Use the model $D(p) = 180 - 12(p - 8)^2$. Measure the output in rentals. The target is 132. Your response: _____	Incoming: $-5 \leq x < 3$ valve turns. Find when the modeled noise level satisfies the 65-decibel limit. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context: warehouse noise. The constraint is $N(t) \leq 65$. Work on the domain $0 \leq t \leq 10$. Measure the input in hours. Use the model $N(t) = 65 + (t - 2)(t - 5)(t - 8)$. Measure the output in decibels. Your response: _____

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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.

State when the modeled lake temperature is at least 18 degrees Celsius. Student work: $3 < m \leq 8$ months after January. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Context: lake temperature.

the horizontal axis measures months after January; the vertical axis measures degrees Celsius.

The crossings is $(3, 8)$.

The curve relation is below $y = 18$ before $m = 3$, on or above $y = 18$ from $m = 3$ through $m = 8$, below afterward.

Work on the domain $0 \leq m \leq 11$.

The endpoints is included.

The threshold is at least 18 degrees.

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Full Worked Solutions - excerpt

Worked example

Problem. Determine the feasible width that maximizes modeled area and give the maximum area.

Context: garden area.

Work on the domain $4 \leq w \leq 18$.

Measure the input in meters.

Use the model $A(w) = 48w - 2w^2$.

Measure the output in square meters.

Answer. $w = 12$ meters, with maximum area 288 square meters.

Explanation and check.

$A(w) = -2(w - 12)^2 + 288$, and the interior vertex lies in the allowed interval.

Worked example

Problem. Describe the long-run prediction of the model as impressions increase.

Context: advertising response.

Work on the domain $x \geq 0$.

Measure the input in thousands of impressions.

Use the model $R(x) = 72 \frac{x}{x+18}$.

Measure the output in percent awareness.

Answer. Predicted awareness approaches 72 percent and does not exceed it under the model.

Explanation and check.

The numerator and denominator have the same degree, so the horizontal asymptote is $R = 72$ percent.