



AP[®] Computer Science A 2009 Scoring Guidelines

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Question 1: Number Cube

Part (a)	getCubeTosses	4 points
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- +1 constructs array
- +1/2 constructs an array of type `int` **or** size `numTosses`
- +1/2 constructs an array of type `int` **and** size `numTosses`
- +2 1/2 processes tosses
 - +1 repeats execution of statements `numTosses` times
 - +1 tosses cube in context of iteration
 - +1/2 collects results of tosses
- +1/2 returns array of generated results

Part (b)	getLongestRun	5 points
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- +1 iterates over `values`
 - +1/2 accesses element of `values` in context of iteration
 - +1/2 accesses all elements of `values`, no out-of-bounds access potential
- +1 determines existence of run of consecutive elements
 - +1/2 comparison involving an element of `values`
 - +1/2 comparison of consecutive elements of `values`
- +1 always determines length of at least one run of consecutive elements
- +1 identifies maximum length run based on all runs
- +1 return value
 - +1/2 returns starting index of identified maximum length run
 - +1/2 returns -1 if no run identified

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Question 2: Stockpile Critter (GridWorld)

- +1 class header
 - +1/2 properly formed class header for `StockpileCritter`
 - +1/2 extends `Critter` class
- +1 1/2 stockpile state
 - +1/2 declares instance variable capable of maintaining state
 - +1/2 private visibility
 - +1/2 initialization of state appropriate to usage of variable
- +1 overrides methods and maintains all necessary postconditions
(No points awarded if overrides `act` method)
- +1 `processActors` overridden (No points awarded if overrides `act` method)
- +1 stockpile state maintenance
 - +1/2 accumulates based on number of actors passed to `processActors`
 - +1/2 decrements appropriately each `act`
- +1 1/2 removes neighboring actors from grid
 - +1/2 removes **at least one** neighboring actor from grid
 - +1 removes **all** neighboring actors from grid
- +2 self-removal
 - +1/2 checks status of stockpile by using state variable in a relational expression
 - +1/2 ever removes self from grid
 - +1 removes self from grid when and only when stockpile state indicates empty

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Question 3: Battery Charger

Part (a)	<code>getChargingCost</code>	5 points
+1 1/2	accesses array elements	
+1/2	accesses any element of <code>rateTable</code>	
+1/2	accesses an element of <code>rateTable</code> using an index derived from <code>startHour</code>	
+1/2	accesses multiple elements of <code>rateTable</code> with no out-of-bounds access potential	
+2 1/2	accumulates values	
+1/2	declares and initializes an accumulator	
+1/2	accumulates values from elements of <code>rateTable</code>	
+1/2	selects values from <code>rateTable</code> using an index derived from <code>startHour</code> and <code>chargeTime</code>	
+1	determines correct sum of values from <code>rateTable</code> based on <code>startHour</code> and <code>chargeTime</code>	
+1	value returned	
+1/2	returns any nonconstant (derived) value	
+1/2	returns accumulated value	

Part (b)	<code>getChargeStartTime</code>	4 points
+1/2	invokes <code>getChargingCost</code> or replicates functionality with no errors	
+1	determines charging cost	
+1/2	considers all potential start times; must include at least 0 ... 23	
+1/2	determines charging cost for potential start times	
	<i>Note: No penalty here for parameter passed to <code>getChargingCost</code> that violates its preconditions (e.g., 24)</i>	
+1	compares charging costs for two different start times	
+1	determines minimum charging cost based on potential start times	
	<i>Note: Penalty here for using result of call to <code>getChargingCost</code> that violates its preconditions (e.g., 24)</i>	
+1/2	returns start time for minimum charging cost	

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Question 4: Tile Game

Part (a)	getIndexForFit	6 points
+1	empty board	
+1/2	checks for zero-sized board	
+1/2	returns 0 if empty board detected	
+1	accesses tiles from board	
+1/2	accesses any tile from board	
+1/2	accesses all tiles of board (as appropriate) with no out-of-bounds access potential	
+1	uses tile values	
+1/2	accesses left or right value of any tile	
+1/2	compares left (right) value of parameter with right (left) value of any tile from board	
+2	determines tile fit	
+1/2	only right value of parameter compared with left value of initial tile of board	
+1/2	only left value of parameter compared with right value of final tile of board	
+1	compares appropriate values of parameter and interior tiles of board	
+1	result	
+1/2	returns located index if tile fits in board	
+1/2	returns -1 if tile does not fit in board	

Part (b)	insertTile	3 points
+1/2	invokes <code>getIndexForFit</code> or replicates functionality with no errors	
+1 1/2	tile orientation	
+1/2	invokes <code>rotate</code> on parameter	
+1/2	performs all necessary rotations	
+1/2	invokes <code>getIndexForFit</code> for each necessary orientation	
+1/2	adds tile correctly and only if <code>getIndexForFit</code> returns value other than -1	
+1/2	returns <code>true</code> if <code>getIndexForFit</code> returns value other than -1; <code>false</code> otherwise	