

**Solutions to the Sample Multiple-Choice Questions
from
2019 AP CSA Course Description**

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1. Since `a` and `b` are integers, `a/b` is truncated to an integer: `5/2` gives `2`. `2` is then multiplied by a `double`, `3.0`, which yields a `double`, `6.0`. Lastly, `5 + 6.0 - 1` gives a `double`, `10.0`. The answer is C.
2. No need to worry about substrings. Since `result = str2 + str1` and `str2` is not an empty string, `str2` is found at the beginning of `result` and so `result.indexOf(str2)` gives `0`. The answer is A.
3. In Choices A, B, and C, the smallest possible value for `rn` is too big: `36`, `60`, and `60`, respectively (but it needs to be `25`). In Choice E, the largest value is too big: `24 + 60`. The answer is D.
4. Only statements under `if` and the first `else if` can be executed, because their conditions are mutually exclusive. All five `volume` values in the five choices are less than `120`, so for all of them `carClass` will be set to `"Mid-Size"`. Only `volume = 115` is actually "mid size." The answer is E.
5. By the De Morgan's Law, `a && !(b || a) = a && (!b && !a) = a && !b && !a`. Since `a` and `!a` are mutually exclusive, the value of the given expression is always `false`. The answer is B.
6. The sequence of pairs of `(val, div)` is `(48, 6)`, `(24, 5)`, `(12, 4)`, `(6, 3)`, and `(3, 2)`. Of these only `48`, `12`, and `6` are printed. The answer is A.
7. The method must be `public` and return an `int`. The answer is C.
8. The indices of an array must be in the range from `0` to `array.length - 1`. Here `i = animals.length` will raise an `ArrayIndexOutOfBoundsException`. The answer is A. (A common idiom for traversing an array is

```
for (int i = 0; i < animals.length; i++) ...
```

of course.)

9. In Option I, `k` needs to be incremented in the `while` loop, but it's not — a common bug — so it is an infinite loop. In Option III, `n` acts as a local variable. `n` is squared, but the corresponding element of the `nums` array remains unchanged. In general, a for-each loop does not work when you need to modify or replace elements of an array that holds values of a primitive data type or immutable objects (such as `Strings` or `Integers`). The answer is A.

10. The “evolution” of `numbers` is:

```

[] (empty)
['one']
['one', 'two']
['three', 'one', 'two']
['three', 'one', 'four']
['three', 'one', 'four', 'five']
['three', 'four', 'five']

```

The answer is D.

11. When you removed an element, the indices of the subsequent elements are decremented by 1. But `i` is incremented on each iteration through the loop. So if you have two even numbers in a row, the second one will be skipped. The answer is E.
12. The first row is printed in its entirety in reverse order; this eliminates choices A, B, and C. The second row only goes to the value on the main diagonal, `points[1][1]`. The answer is D.
13. The code adds to `sum` the elements in each row of `arr` excluding the last element. This gives $6 + 18 + 30 = 54$. The answer is B.
14. This question tests your understanding of polymorphism. Even though `t` is disguised as a `Thing1`, it is actually a `Thing2`. So when `t.calc(2)` is called, it is `Thing2`'s `calc` that is executed, due to polymorphism. That method increments `n` by 2, making it 4, then calls `Thing1`'s `calc`. The latter prints `n*3`, which is 12. `n` acts as a local variable in `Thing1`'s `calc`; so `n` in `Thing2`'s `calc` remains unchanged. When the control returns to `Thing2`'s `calc`, it prints the value of “its” `n`, which remains 4. The answer is D.
15. `mystery1(1)` returns 1, so `mystery2(1)` should return 1, too. This alone leads to the answer A, because none of the other choices will produce 1 in `mystery2(1)`. `mystery2` would work properly if it initialized `total` to 1. To be more certain, compare `mystery1(2)`, which returns $5 + \text{mystery1}(1) = 6$, and `mystery2(2)`, which also returns 6 if `total` is initialized to 1. The answer is A.