

2010 AP[®] COMPUTER SCIENCE A FREE-RESPONSE QUESTIONS

2. An `APLine` is a line defined by the equation $ax + by + c = 0$, where a is not equal to zero, b is not equal to zero, and a , b , and c are all integers. The slope of an `APLine` is defined to be the `double` value $-a/b$. A point (represented by integers x and y) is on an `APLine` if the equation of the `APLine` is satisfied when those x and y values are substituted into the equation. That is, a point represented by x and y is on the line if $ax + by + c$ is equal to 0. Examples of two `APLine` equations are shown in the following table.

Equation	Slope ($-a/b$)	Is point (5, -2) on the line?
$5x + 4y - 17 = 0$	$-5/4 = -1.25$	Yes, because $5(5) + 4(-2) + (-17) = 0$
$-25x + 40y + 30 = 0$	$25/40 = 0.625$	No, because $-25(5) + 40(-2) + 30 \neq 0$

Assume that the following code segment appears in a class other than `APLine`. The code segment shows an example of using the `APLine` class to represent the two equations shown in the table.

```
APLine line1 = new APLine(5, 4, -17);
double slope1 = line1.getSlope();           // slope1 is assigned -1.25
boolean onLine1 = line1.isOnline(5, -2);    // true because 5(5) + 4(-2) + (-17) = 0

APLine line2 = new APLine(-25, 40, 30);
double slope2 = line2.getSlope();           // slope2 is assigned 0.625
boolean onLine2 = line2.isOnline(5, -2);    // false because -25(5) + 40(-2) + 30 ≠ 0
```

Write the `APLine` class. Your implementation must include a constructor that has three integer parameters that represent a , b , and c , in that order. You may assume that the values of the parameters representing a and b are not zero. It must also include a method `getSlope` that calculates and returns the slope of the line, and a method `isOnline` that returns `true` if the point represented by its two parameters (x and y , in that order) is on the `APLine` and returns `false` otherwise. Your class must produce the indicated results when invoked by the code segment given above. You may ignore any issues related to integer overflow.