

Directions: SHOW ALL YOUR WORK. REMEMBER THAT PROGRAM SEGMENTS ARE TO BE WRITTEN IN JAVA.

Notes:

- Assume that the classes listed in the Quick Reference found in the Appendix have been imported where appropriate.
- Unless otherwise noted in the question, assume that parameters in method calls are not null and that methods are called only when their preconditions are satisfied.
- In writing solutions for each question, you may use any of the accessible methods that are listed in classes defined in that question. Writing significant amounts of code that can be replaced by a call to one of these methods may not receive full credit.

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  $-25(5) + 40(-2) + 30 \neq 0$ 
```

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.