

1. Find the quotient and remainder when  $a$  is divided by  $b$ .

(a)  $a = 302, b = 19$

(d)  $a = 2000, b = 17$ .

5. Prove that the square of any integer  $a$  is either of the form  $3k$  or of the form  $3k + 1$  for some integer  $k$ .

*Hint:* By the Division Algorithm,  $a$  must be of the form  $3q, 3q + 1$  or  $3q + 2$ , where  $q$  is an integer.

8.

(a) Divide  $5^2, 7^2, 11^2$ , and  $27^2$  by 8 and note the remainder in each case.

(b) Make a conjecture about the remainder when the square of an odd integer is divided by 8.

(c) Prove your conjecture.

9. Prove that the cube of any integer has to be exactly one of these forms:  $9k$  or  $9k + 1$  or  $9k + 8$  for some integer  $k$ .