Example 1: Do We have Enough Gas to Make it to the Gas Station?

Your mother has accelerated onto the interstate beginning a long road trip and you notice that the low fuel light is on, indicating that there is a half a gallon left in the gas tank. The nearest gas station is 26 miles away. Your mother keeps a log where she records the mileage and the number of gallons purchased each time she fills up the tank. Use the information in the table below to determine whether you will make it to the gas station before the gas runs out. You know that if you can determine the amount of gas that her car consumes in a particular number of miles, then you can determine whether or not you can make it to the next gas station.

Mother's Gas Record

Gallons (x)	Miles driven (y)
8	224
10	280
4	112

$k = \frac{y}{x}$

$\frac{224}{8} = 28$

$\frac{280}{10} = 28$

$\frac{112}{4} = 28$

a. Find the constant of proportionality and explain what it represents in this situation.

The Constant of Proportionality (k) is 28.
The car can travel 28 miles per 1 gallon of gas.
$k = 28$

b. Write equation(s) that will relate the miles driven to the number of gallons of gas.

$y = kx$ $y = 28x$ or $M = 28g$

c. Knowing that there is a half-gallon left in the gas tank when the light comes on, will she make it to the nearest gas station? Explain why or why not.

14 miles
26 mile away
Knowing that there is a half-gallon left, YO MAMA will not make it to the gas station, because she can only drive 14 miles on the half-gallon and the gas station is 26 miles away.

d. Using the equation found in part (b), determine how far your mother can travel on 18 gallons of gas. Solve the problem in two ways: once using the constant of proportionality and once using an equation.

$28(18) = 504$ miles

$M = 28g$
$M = 28(18)$
$M = 504$ miles

$y = 28x$
$y = 28(18)$
$y = 504$ miles

Your mother can drive 504 miles on 18 gallons of gas.

e. Using the constant of proportionality, and then using the equation found in part (b), determine how many gallons of gas would be needed to travel 750 miles.

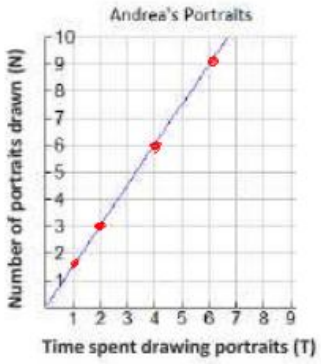
$\frac{750}{28} = 26.8$ gallons

$M = 28g$
$\frac{(750)}{28} = \frac{28g}{28}$
$\frac{750}{28} = g$
$26.8 = g$

You would need 26.8 gallons of gas to travel 750 miles.

Example 2: Andrea's Portraits

Andrea is a street artist in New Orleans. She draws caricatures (cartoon-like portraits) of tourists. People have their portrait drawn and then come back later to pick it up from her. The graph below shows the relationship between the number of portraits she draws and the amount of time in hours she needs to draw the portraits.



a. Write several ordered pairs from the graph and explain what each ordered pair means in the context of this graph.

(2, 3) means that in 2 hrs she can draw 3 portraits.

(4, 6)

(6, 9)

b. Write several equations that would relate the number of portraits drawn to the time spent drawing the portraits.

$T = \frac{3}{2}N$

$T = \frac{6}{4}N$

$T = \frac{9}{6}N$

$\frac{3}{2} = \frac{6}{4} = \frac{9}{6}$

c. Determine the constant of proportionality and explain what it means in this situation.

$k = \frac{3}{2}$