Name _____ Date _____ Hour _____

THINKING WITH MATHEMATICAL MODELS

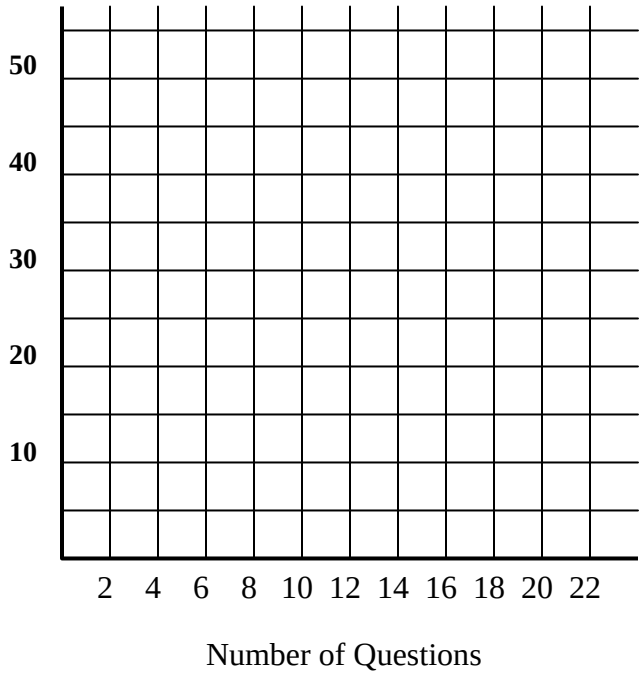
INV 3 – ACE # 10, 11, 43-48 pg. 55 - 60

10.) Students in Mr. Einstein's science class complain about the length of his tests. He argues that a test with more questions is better for students because each question is worth fewer points. All of Mr. Einstein's tests are worth 100 points. Each question is worth the same number of points.

a.) Make a table and a graph that show how the number of points per question changes as the number of questions increases. Show point values for 2 to 20 questions in intervals of 2.

# of Questions	**Points per Question**
2	
4	
6	
8	
10	
12	
14	
16	
18	
20	

Mr. Einstein's Tests



b.) Write an equation for the relationship between the number of questions ***n*** and the points per question ***p***.

c.) Tell how the points per question change as the number of questions increases:

from 2 to 4: from 4 to 6: from 6 to 8: from 8 to 10:

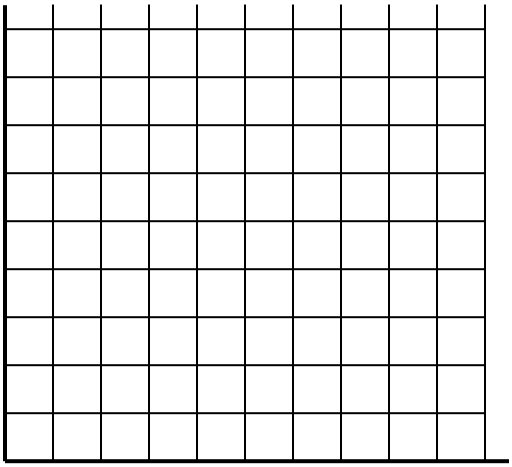
d.) How do the answers for part (**c**) show that the relationship between the number of questions and the points per question is **not linear**?

11.) Testers drive eight vehicles 200 miles on a test track at the same speed. The table shows the amount of fuel each vehicle uses.

a.) Find the fuel efficiency in miles per gallon for each vehicle.

Vehicle Type	Fuel Used (gal)	Fuel Efficiency
Large Truck	20	
Large SUV	18	
Limousine	16	
Large Sedan	12	
Small Truck	10	
Sports Car	12	
Compact Car	7	
Sub-Compact Car	5	

Fuel Efficiency



b.) Make a graph of the (*fuel used, miles per gallon*) data. Describe the pattern of change shown in the graph.

c.) Write a formula for calculating the fuel efficiency based on the fuel used for a **200-mile test drive**.

d.) Tell how the fuel efficiency changes as the amount of fuel used increases from:

5 to 10 gallons: from 10 to 15 gallons: From 15 to 20 gallons:

e.) How do the answers for part (**d**) show that the relationship between the amount of fuel used, and the fuel efficiency is not linear?

Name _____ Date _____ Hour _____

THINKING WITH MATHEMATICAL MODELS

INV 3 – ACE # 10, 11, 43-48 pg. 55 – 60 continued

For Exercises 43– 45, find the value of *c* for which both ordered pairs satisfy the same inverse variation. Then, write an equation for the relationship.

43. (3, 16), (12, *c*)

44. (3, 9), (4, *c*)

45. (3, 4), (4, *c*)

46. Multiple Choice The force acting on a falling object due to gravity is related to the mass and acceleration of the object. For a fixed force *F*, the relationship between mass *m* and acceleration *a* is an inverse variation. Which equation shows the relationship between *F*, *m*, and *a*?

A. $F = ma$ **B.** $m = Fa$ **C.** $m/F = a$ **D.** $m / a = F$

47. Multiple Choice Suppose the time *t* in the equation $d = rt$ is held constant. What happens to the distance *d* as the rate *r* increases?

F. *d* decreases. **G.** *d* increases. **H.** *d* stays constant. **J.** There is not enough information.

48. Multiple Choice Suppose the distance *d* in the equation $d = rt$ is held constant. What happens to the time *t* as the rate *r* increases?

A. *t* decreases. **B.** *t* increases. **C.** *t* stays constant. **D.** There is not enough information.