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Date

MAT 231
Homework Assignment 10

Chapter 1.10-MATHEMATICAL MODELING & VARIATION

Directions: Provide complete responses to each question. Make sure to show all your work.

1. Assume that y is directly proportional to x . Use the given x -value and y -value to find a linear model that relates y and x .

$$x = 5, y = 24$$

a. $y = -\frac{24}{5}x$

b. $y = 24x$

c. $y = -\frac{5}{24}x$

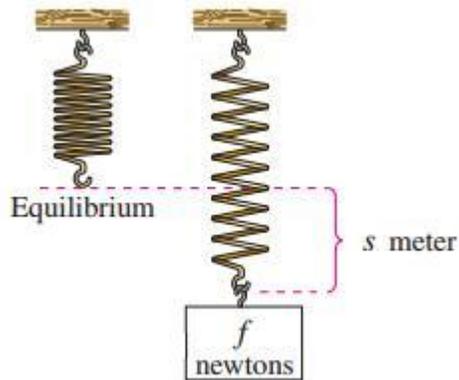
d. $y = \frac{24}{5}x$

e. $y = \frac{5}{24}x$

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2. A force of $f = 245$ newtons stretches a spring $s = 0.5$ meter (see figure).



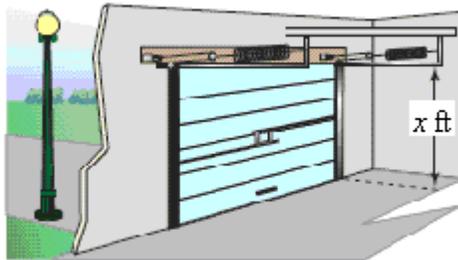
How far will a force of 90 newtons stretch the spring? What force is required to stretch the spring 0.3 meter? (Round your answer to two decimal places.)

- a. 0.5 m; 147 N
- b. 0.5 m; 245 N
- c. 0.18 m; 147 N
- d. 0.09 m; 285 N
- e. 0.18 m; 245 N

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3. An overhead garage door has two springs, one on each side of the door (see figure). A force of 20 pounds is required to stretch each spring 1 foot. Because of a pulley system, the springs stretch only one-half the distance the door travels. The door moves a total of $x = 18$ feet, and the springs are at their natural length when the door is open. Find the combined lifting force applied to the door by the springs when the door is closed.



- a. Combined lifting force = $2F = 356$ lb
- b. Combined lifting force = $2F = 360$ lb
- c. Combined lifting force = $2F = 362$ lb
- d. Combined lifting force = $2F = 358$ lb
- e. Combined lifting force = $2F = 364$ lb

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4. Determine whether the variation model is of the form $y = kx$ or $y = \frac{k}{x}$ and find k .
Then write a model that relates y and x .

x	4	8	12	16	20
y	1	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$

a. $y = 4x$

b. $y = \frac{1}{x}$

c. $y = \frac{4}{x}$

d. $y = x$

e. $y = \frac{x}{4}$

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5. Use the given value of k to complete the table for the direct variation model $y = kx^2$.

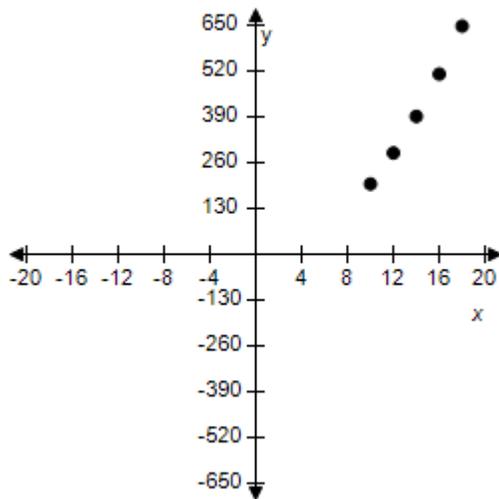
Plot the points on a rectangular coordinate system.

x	10	12	14	16	18
$y = kx^2$					

$$k = 2$$

a.

x	10	12	14	16	18
$y = kx^2$	200	288	392	512	648

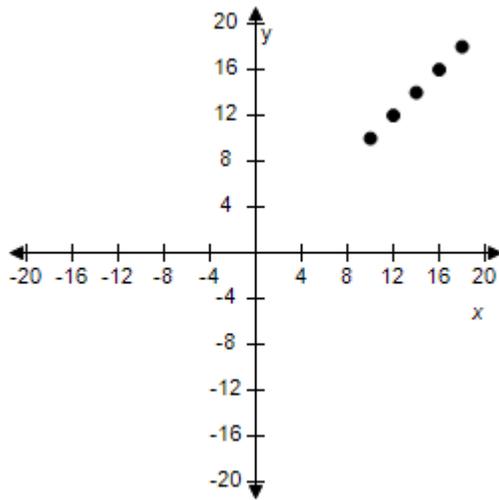


b.

x	10	12	14	16	18
$y = kx^2$	10	12	14	16	18

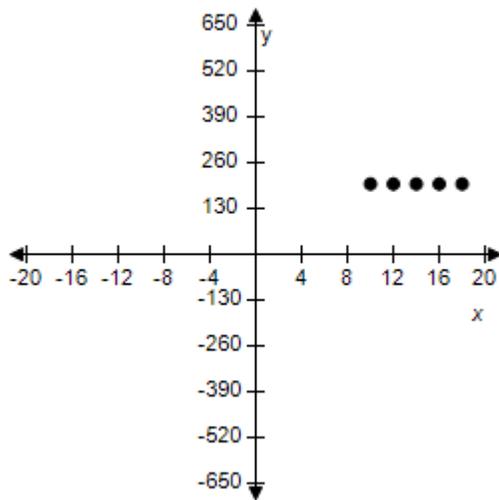
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c.

x	10	12	14	16	18
$y = kx^2$	200	200	200	200	200

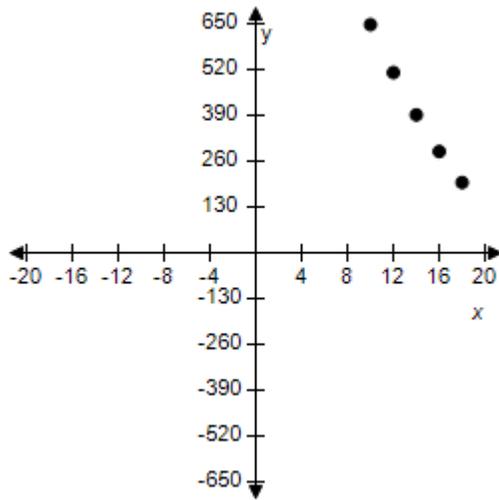


d.

x	10	12	14	16	18
$y = kx^2$	648	512	392	288	200

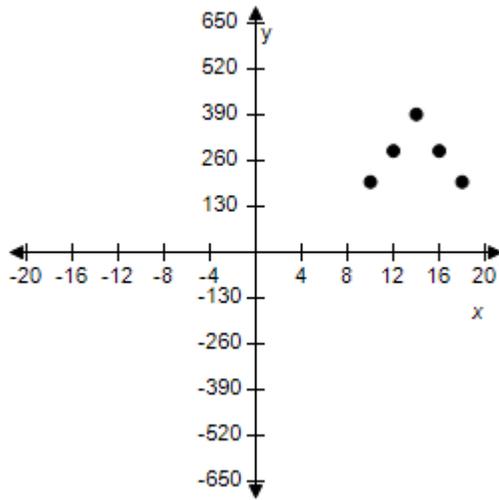
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e.

x	10	12	14	16	18
$y = kx^2$	200	288	392	288	200



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6. Use the given value of k to complete the table for the inverse variation model $y = \frac{k}{x^2}$.

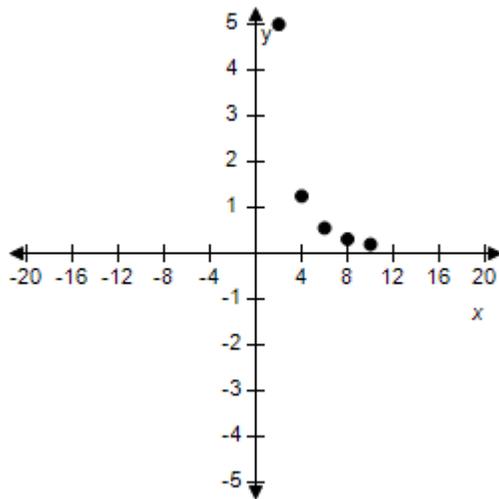
Plot the points on a rectangular coordinate system.

x	2	4	6	8	10
$y = \frac{k}{x^2}$					

$k = 20$

a.

x	2	4	6	8	10
$y = \frac{k}{x^2}$	5	$\frac{5}{4}$	$\frac{5}{9}$	$\frac{5}{16}$	$\frac{1}{5}$

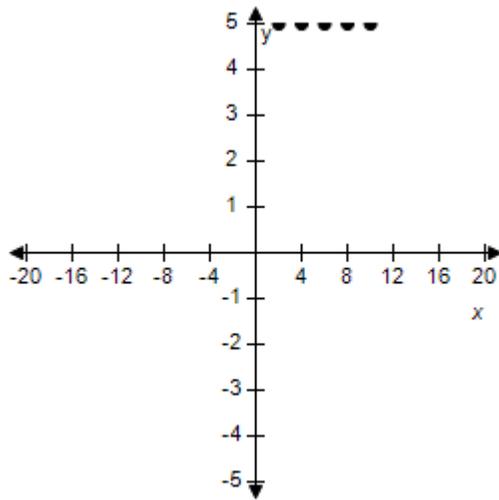


b.

x	2	4	6	8	10
$y = \frac{k}{x^2}$	5	5	5	5	5

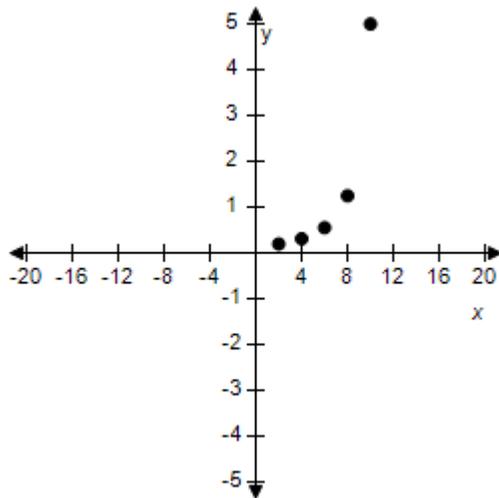
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c.

x	2	4	6	8	10
$y = \frac{k}{x^2}$	$\frac{1}{5}$	$\frac{5}{16}$	$\frac{5}{9}$	$\frac{5}{4}$	5

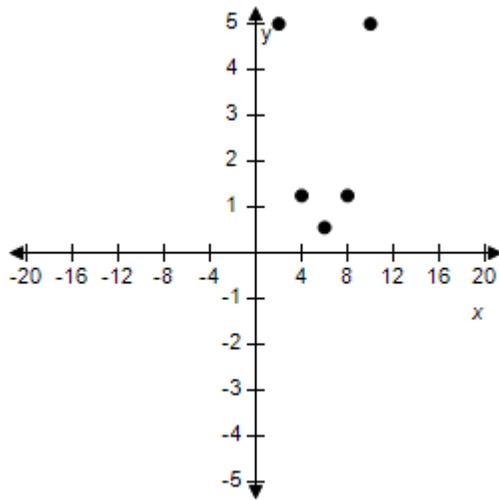


d.

x	2	4	6	8	10
$y = kx^2$	5	$\frac{5}{4}$	$\frac{5}{9}$	$\frac{5}{4}$	5

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e.

x	2	4	6	8	10
$y = \frac{k}{x^2}$	2	4	6	8	10

