Chapter 12. Rational Expressions and Equations

Ex. 12.1

Answer 1CU.

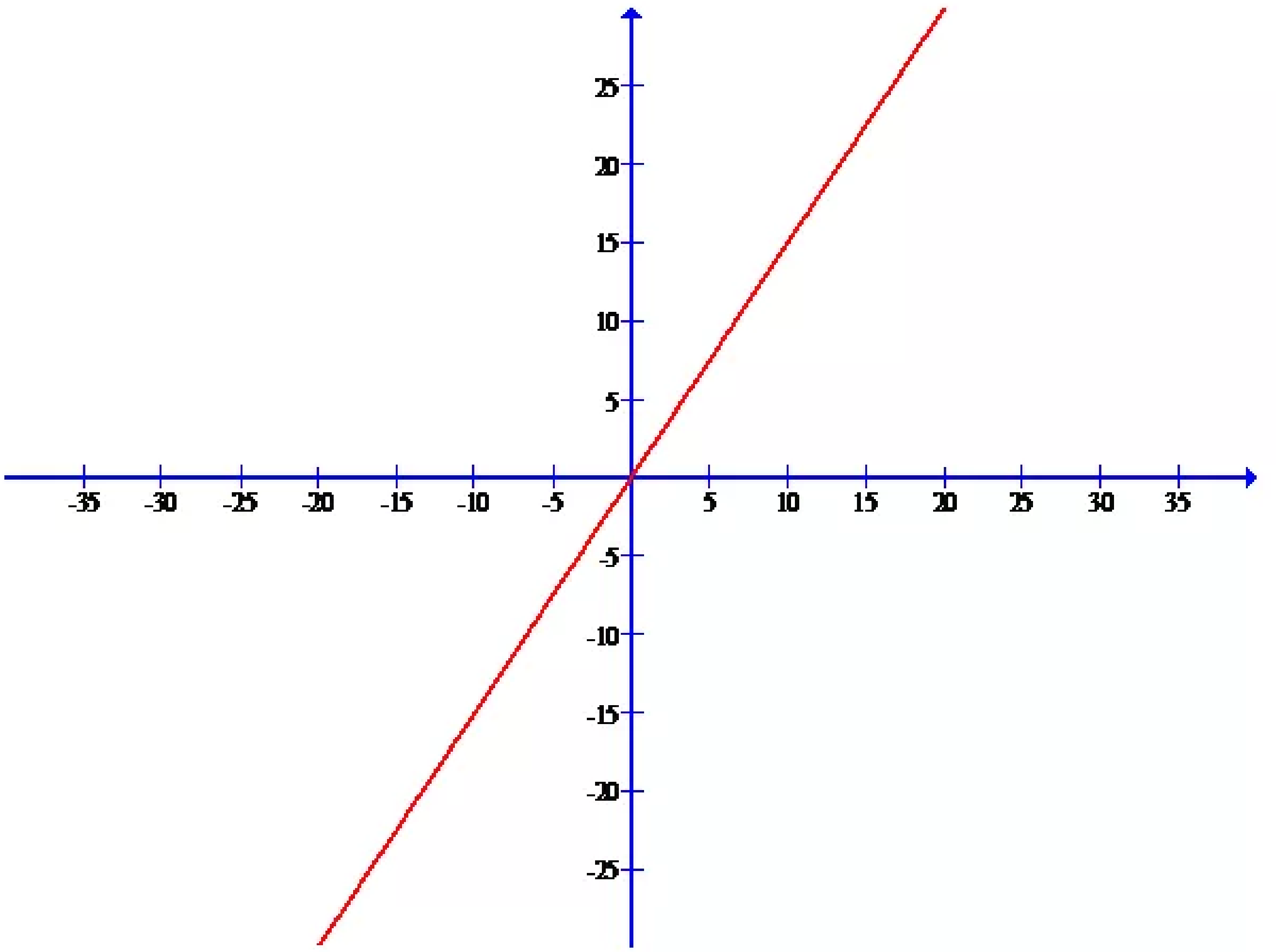
An equation showing an inverse variation with a constant of 8 is given by:

$$xy = 8$$

Answer 2CU.

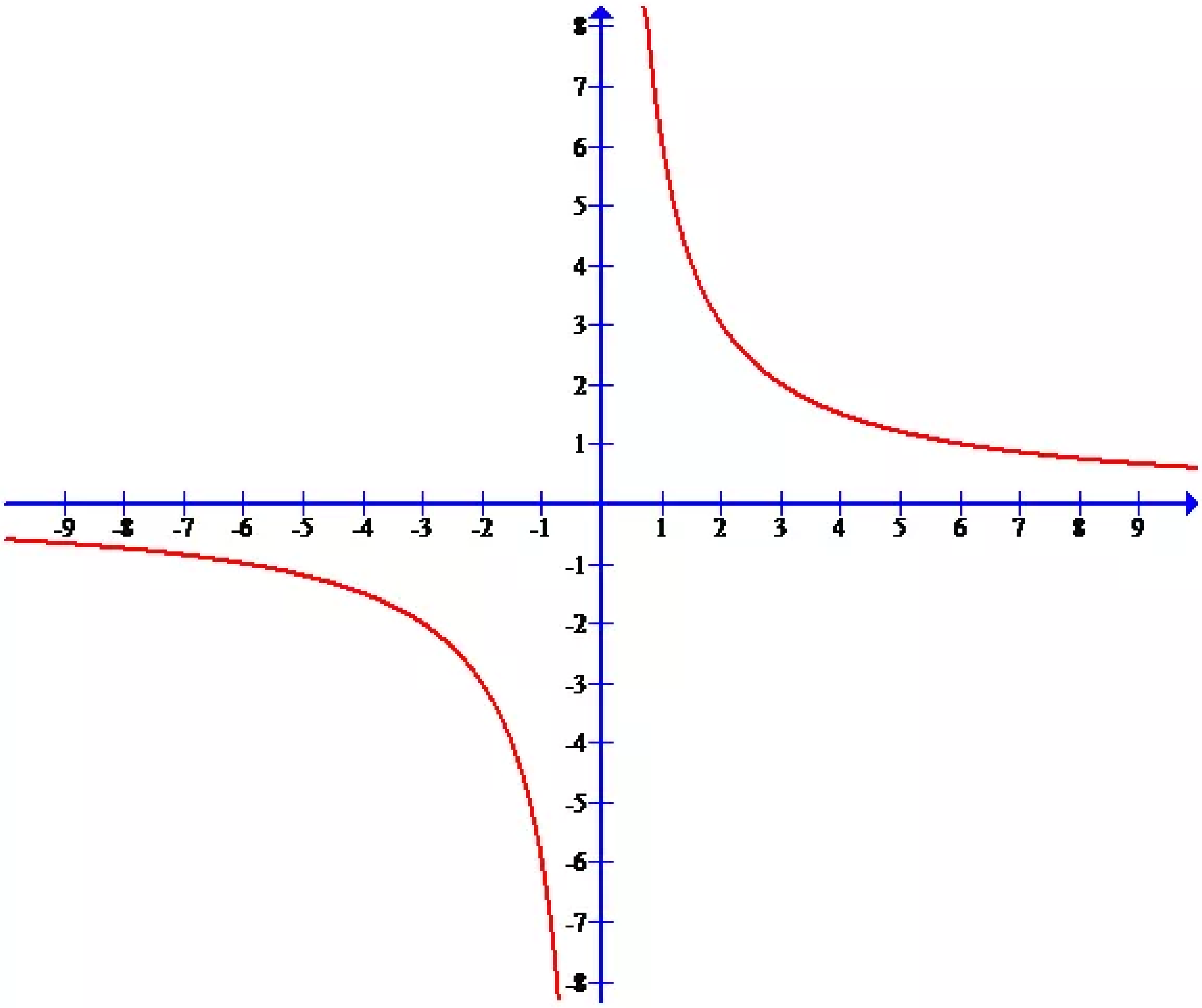
If *b* is directly proportional to *a*, then the equation is of the form $b = ka$, where, *k* is a constant.

The graph of direct variation is given by:



If b is inversely proportional to a, then the equation is of the form $b = \frac{k}{a}$, where, k is a constant.

The graph of indirect variation is given by:



Answer 3CU.

The situation b. is an example of inverse variation because as the price increases the number purchased decreases.

Answer 4CU.

Graph an inverse variation in which y varies inversely as x and $y = 24$ when $x = 8$.

First solve for k:

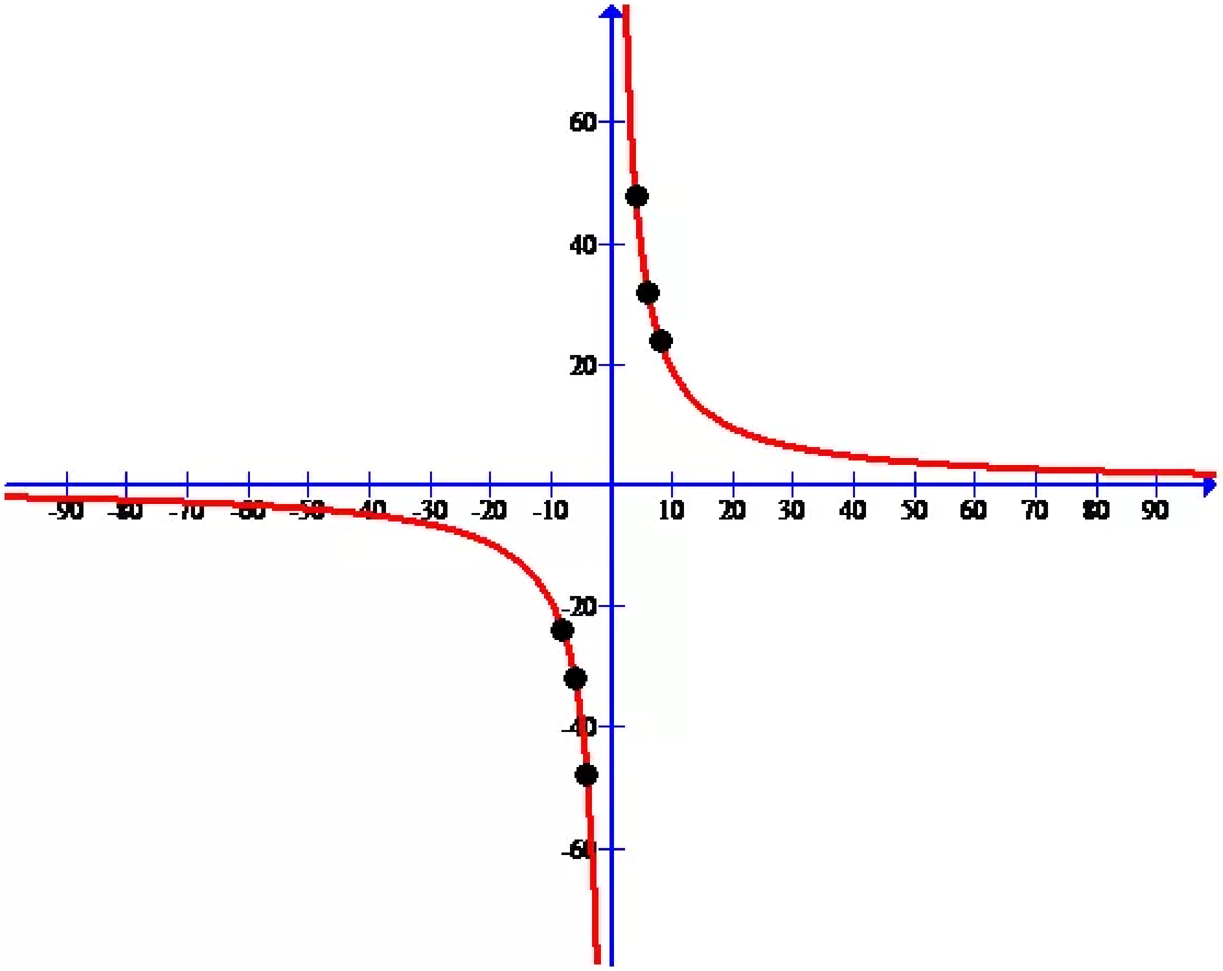
$xy = k$	Inverse variation equation
$(8)(24) = k$	Substitue $x = 8$ and $y = 24$
$192 = k$	Multiply

Thus, the constant of variation is 192.

Choose value for x and y whose product is 192.

x	y
−8	−24
−6	−32
−4	−48
−3	−64
−2	−96
0	undefined
2	96
3	64
4	48
6	32
8	24

Now plot the graph:



Answer 5CU.

Graph an inverse variation in which *y* varies inversely as *x* and $y = -6$ when $x = -2$.

First solve for *k*:

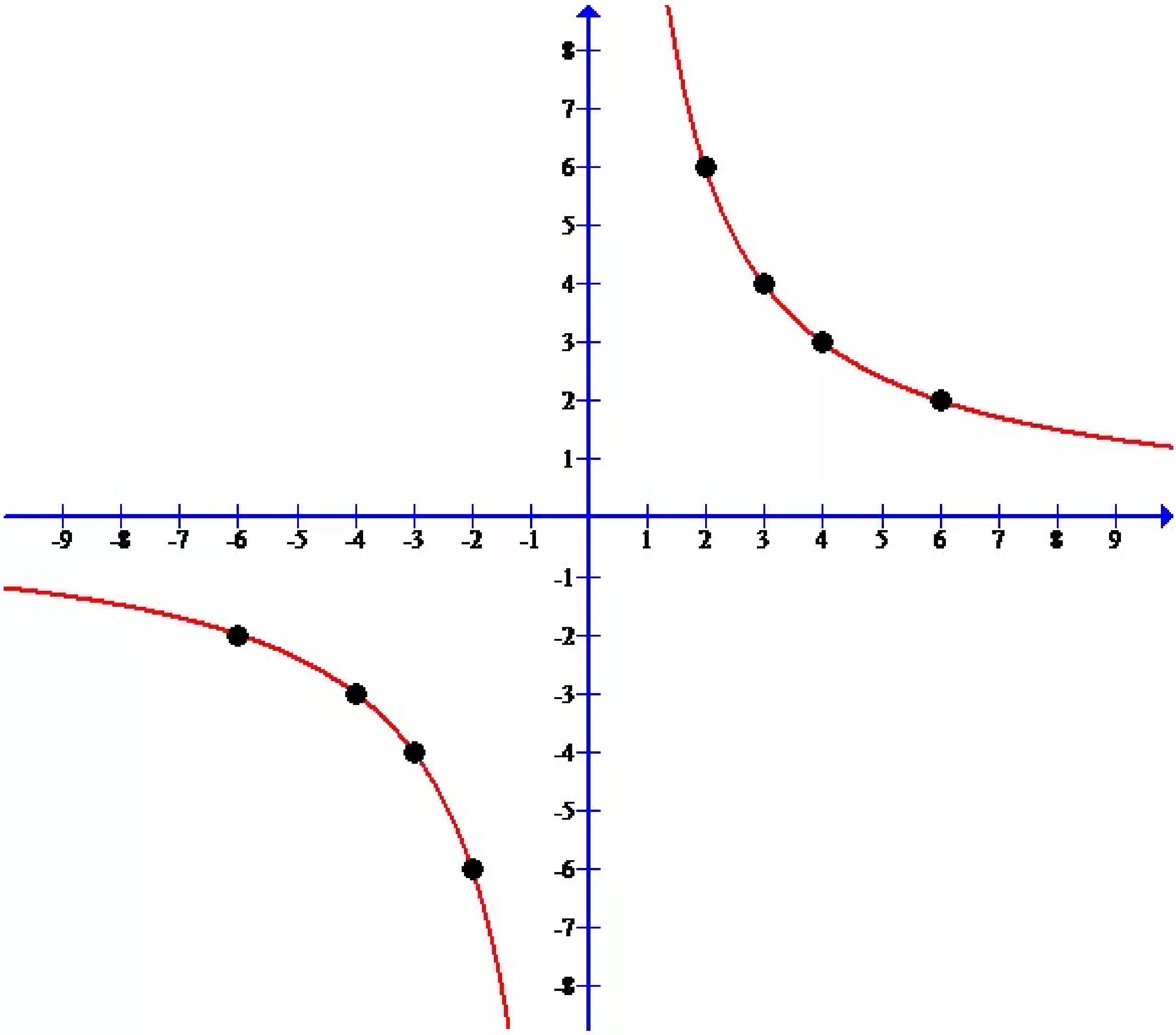
$xy = k$	Inverse variation equation
$(-2)(-6) = k$	Substitue $x = -2$ and $y = -6$
$12 = k$	Multiply

Thus, the constant of variation is 12.

Choose value for *x* and *y* whose product is 12.

x	*y*
−6	−2
−4	−3
−3	−4
−2	−6
0	undefined
6	2
4	3
3	4
2	6

Now plot the graph:



Answer 6CU.

First write an inverse variation equation that relates *x* and *y*.

$xy = k$	Inverse variation equation
$(6)(12) = k$	Substitue $x = 6$ and $y = 12$
$72 = k$	Multiply

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 72}$.

Now solve for *y*:

If $y = 12$ when $x = 6$, find y when $x = 8$

Let $x_1 = 6, y_1 = 12 \text{ and } x_2 = 8$. Solve for y_2.

Use product property.

$$\begin{aligned} x_1y_1 &= x_2y_2 && \text{Product rule for inverse variation.} \\ (6)(12) &= (8)y_2 && \text{Substitue } x_1 = 6, y_1 = 12 \text{ and } x_2 = 8 \\ \frac{72}{8} &= y_2 && \text{Divide each side by 8} \\ y_2 &= 9 && \text{Simplify} \end{aligned}$$

Thus, $\boxed{y = 9}$ when $x = 8$.

Answer 7CU.

First write an inverse variation equation that relates *x* and *y*.

$$\begin{aligned} xy &= k && \text{Inverse variation equation} \\ (-3)(-8) &= k && \text{Substitue } x = -3 \text{ and } y = -8 \\ 24 &= k && \text{Multiply} \end{aligned}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 24}$.

Now solve for *y*:

If $y = -8$ when $x = -3$, find y when $x = 6$

Let $x_1 = -3, y_1 = -8 \text{ and } x_2 = 6$. Solve for y_2.

Use product property.

$$\begin{aligned} x_1y_1 &= x_2y_2 && \text{Product rule for inverse variation} \\ (-3)(-8) &= (6)y_2 && \text{Substitue } x_1 = -3, y_1 = -8 \text{ and } x_2 = 6 \\ \frac{24}{6} &= y_2 && \text{Divide each side by 6} \\ y_2 &= 4 && \text{Simplify} \end{aligned}$$

Thus, $\boxed{y = 4}$ when $x = 6$.

Answer 8CU.

First write an inverse variation equation that relates *x* and *y*.

$$\begin{aligned} xy &= k && \text{Inverse variation equation} \\ (8.1)(2.7) &= k && \text{Substitue } x = 8.1 \text{ and } y = 2.7 \\ 21.87 &= k && \text{Multiply} \end{aligned}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 21.87}$.

Now solve for *x*:

If $y = 2.7$ when $x = 8.1$, find *x* when $y = 5.4$

Let $x_1 = 8.1, y_1 = 2.7$ and $y_2 = 5.4$. Solve for x_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation}$$

$$(8.1)(2.7) = (5.4)x_2 \quad \text{Substitue } x_1 = 8.1, y_1 = 2.7 \text{ and } y_2 = 5.4$$

$$\frac{21.87}{5.4} = x_2 \quad \text{Divide each side by 5.4}$$

$$x_2 = 4.05 \quad \text{Simplify}$$

Thus, $\boxed{x = 4.05}$ when $y = 5.4$.

Answer 9CU.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \quad \text{Inverse variation equation}$$

$$\left(\frac{1}{2}\right)(16) = k \quad \text{Substitue } x = \frac{1}{2} \text{ and } y = 16$$

$$8 = k \quad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 8}$.

Now solve for *x*:

If $y = 16$ when $x = \frac{1}{2}$, find *x* when $y = 32$

Let $x_1 = \frac{1}{2}, y_1 = 16$ and $y_2 = 32$. Solve for x_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation}$$

$$\left(\frac{1}{2}\right)(16) = (32)x_2 \quad \text{Substitue } x_1 = \frac{1}{2},\ y_1 = 16 \text{ and } y_2 = 32$$

$$\frac{8}{32} = x_2 \quad \text{Divide each side by 32}$$

$$x_2 = \frac{1}{4} \quad \text{Simplify}$$

Thus, $\boxed{x = \frac{1}{4}}$ when $y = 32$.

Answer 10CU.

Find the frequency of an 8-inch string when it is given that the length of a violin string varies inversely as the frequency of its vibration and it is given that if the length of the string is 10 inches then it vibrates at a frequency of 512 cycles per second.

Let the length of the string be *x* and frequency be *y*.

Now solve for *y*:

If $y = 512$ when $x = 10$, find *y* when $x = 8$

Let $x_1 = 10, y_1 = 512$ and $x_2 = 8$. Solve for y_2.

Use product property.

$x_1 y_1 = x_2 y_2$	Product rule for inverse variation
$(10)(512) = (8) y_2$	Substitue $x_1 = 10, y_1 = 512$ and $x_2 = 8$
$\frac{5120}{8} = y_2$	Divide each side by 8
$y_2 = 640$	Simplify

Thus, the frequency of an 8-inch string $\boxed{640 \text{ inches}}$.

Answer 11PA.

Graph an inverse variation in which *y* varies inversely as *x* and $y = 24$ when $x = -8$.

First solve for *k*:

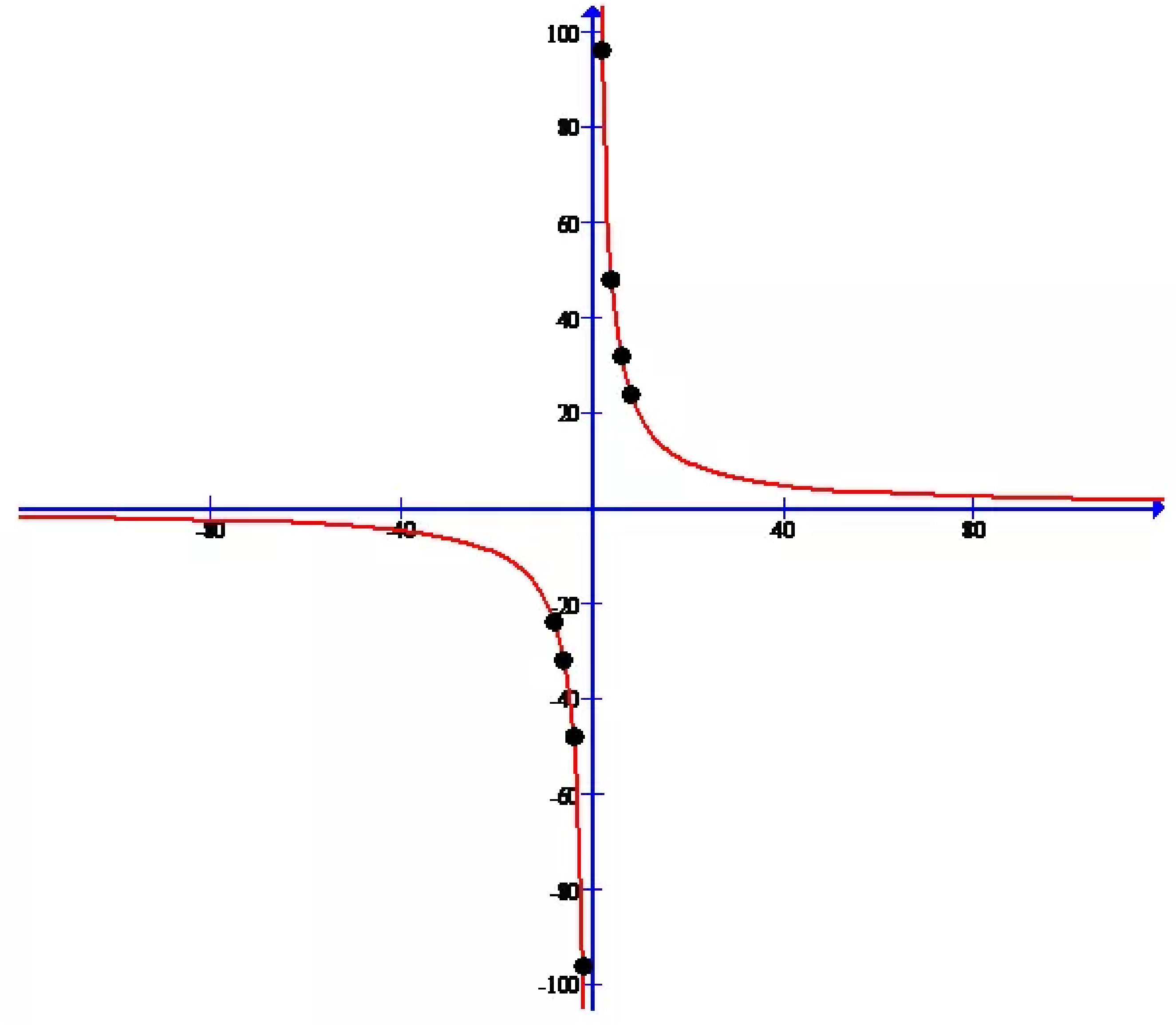
$xy = k$	Inverse variation equation
$(-8)(24) = k$	Substitue $x = -8$ and $y = 24$
$-192 = k$	Multiply

Thus, the constant of variation is -192.

Choose value for *x* and *y* whose product is -192.

x	y
−8	24
−6	32
−4	48
−3	64
−2	96
0	undefined
2	−96
3	−64
4	−48
6	−32
8	−24

Now plot the graph:



Answer 12PA.

Graph an inverse variation in which *y* varies inversely as *x* and $y = 3$ when $x = 4$.

First solve for *k*:

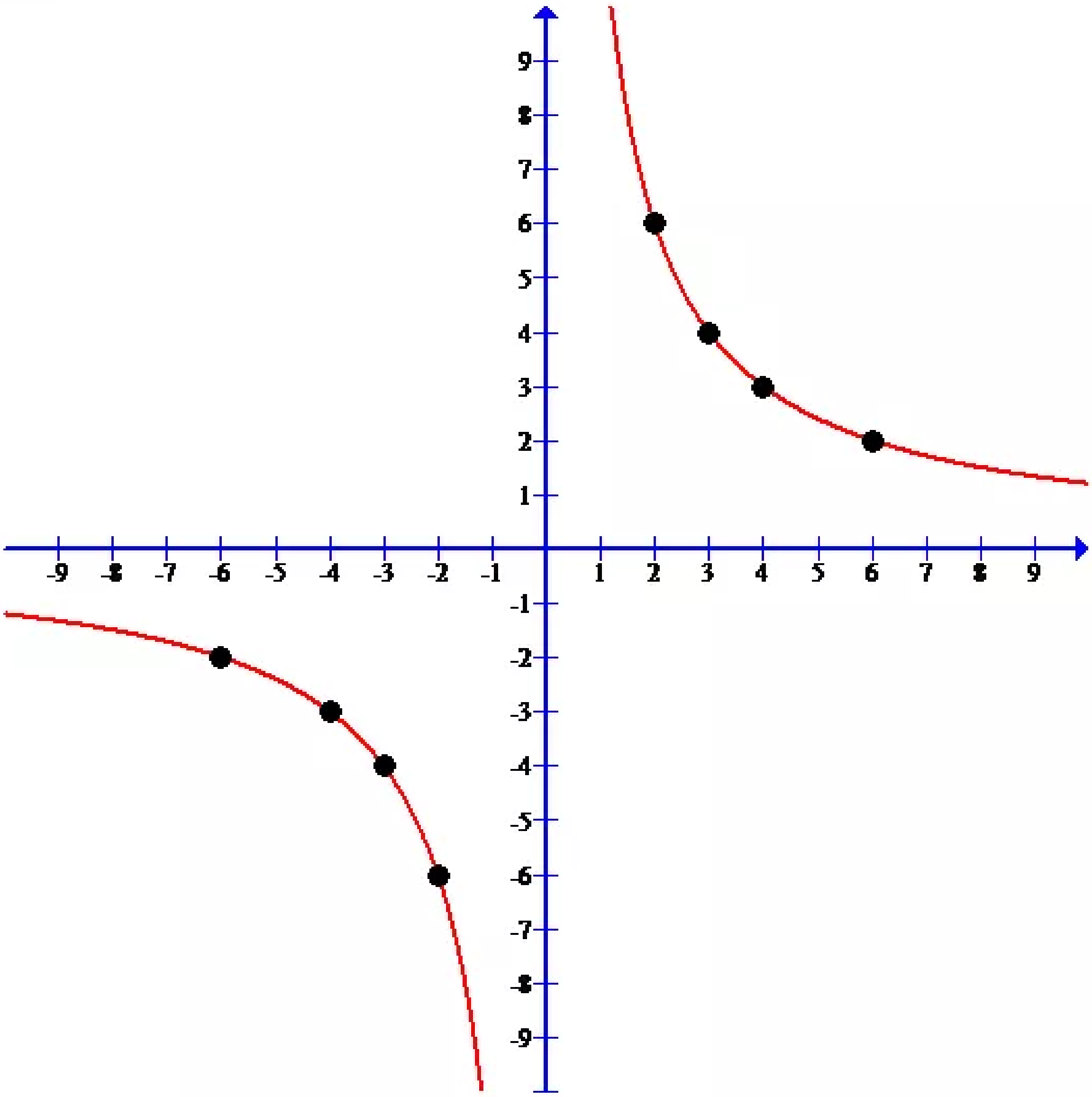
$xy = k$	Inverse variation equation
$(4)(3) = k$	Substitue $x = 4$ and $y = 3$
$12 = k$	Multiply

Thus, the constant of variation is 12.

Choose value for *x* and *y* whose product is12.

x	y
−6	−2
−4	−3
−3	−4
−2	−6
0	undefined
2	6
3	4
4	3
6	2

Now plot the graph:



Answer 13PA.

Graph an inverse variation in which *y* varies inversely as *x* and $y = 5$ when $x = 15$.

First solve for *k*:

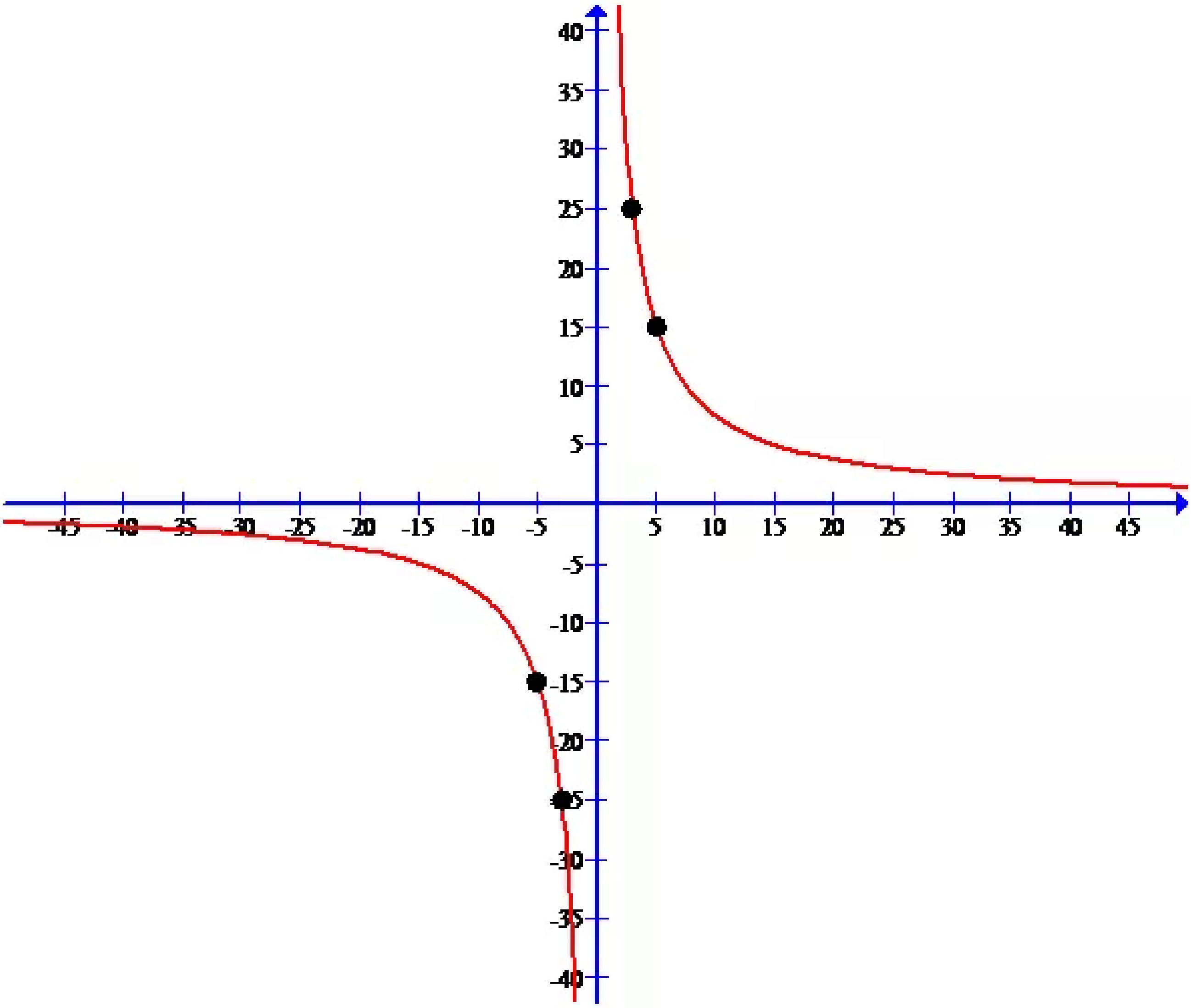
$xy = k$	Inverse variation equation
$(15)(5) = k$	Substitue $x = 15$ and $y = 5$
$75 = k$	Multiply

Thus, the constant of variation is 75.

Choose value for *x* and *y* whose product is75.

x	*y*
−3	−25
−5	−15
0	undefined
5	15
3	25

Now plot the graph:



Answer 14PA.

Graph an inverse variation in which *y* varies inversely as *x* and $y = -4$ when $x = -12$.

First solve for *k*:

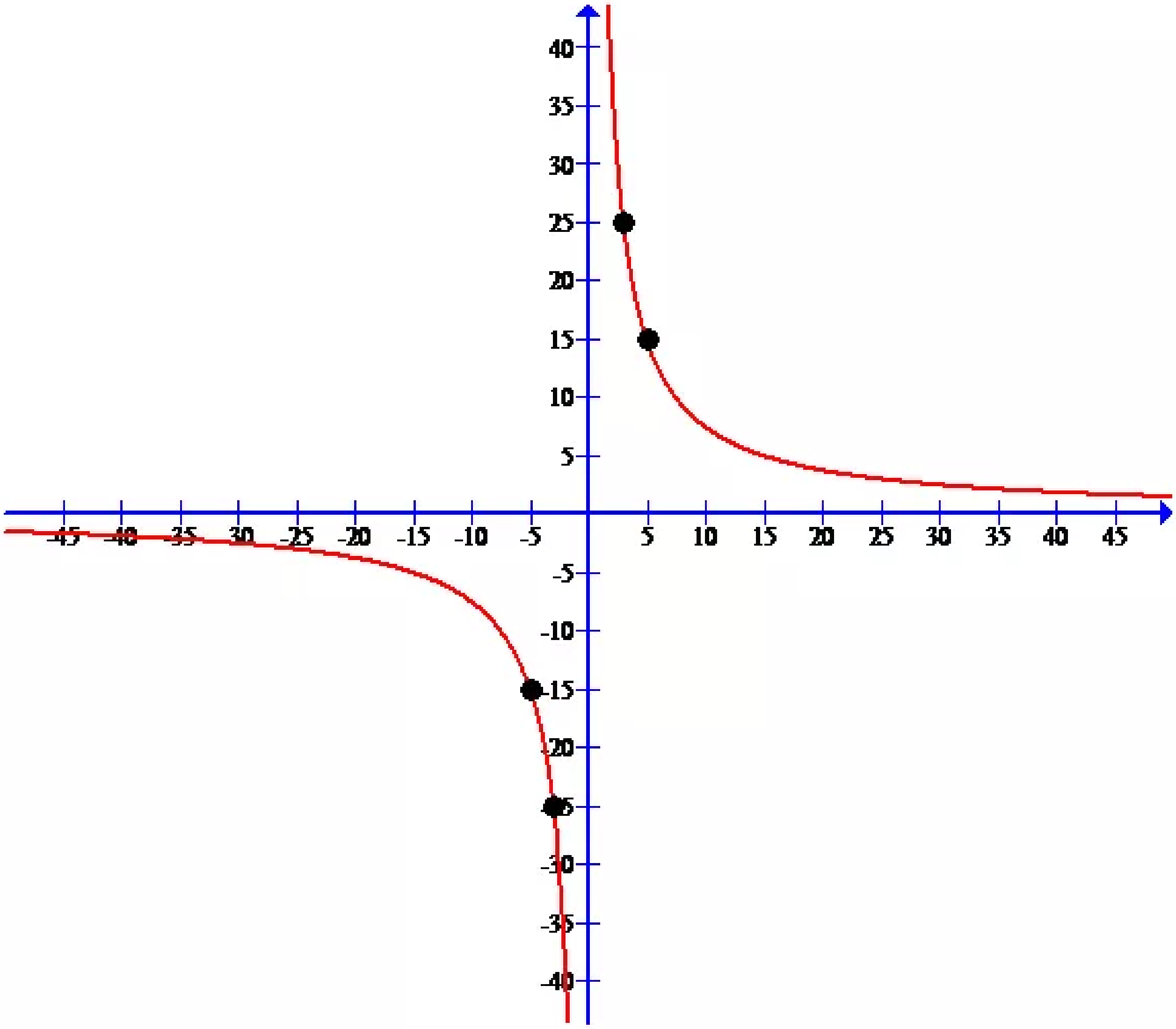
$xy = k$	Inverse variation equation
$(-12)(-4) = k$	Substitue $x = -12$ and $y = -4$
$48 = k$	Multiply

Thus, the constant of variation is 48.

Choose value for *x* and *y* whose product is 48.

x	y
−8	−6
−6	−8
−4	−12
−3	−16
−2	−24
0	undefined
2	24
3	16
4	12
6	8
8	6

Now plot the graph:



Answer 15PA.

Graph an inverse variation in which *y* varies inversely as *x* and $y = 9$ when $x = 8$.

First solve for *k*:

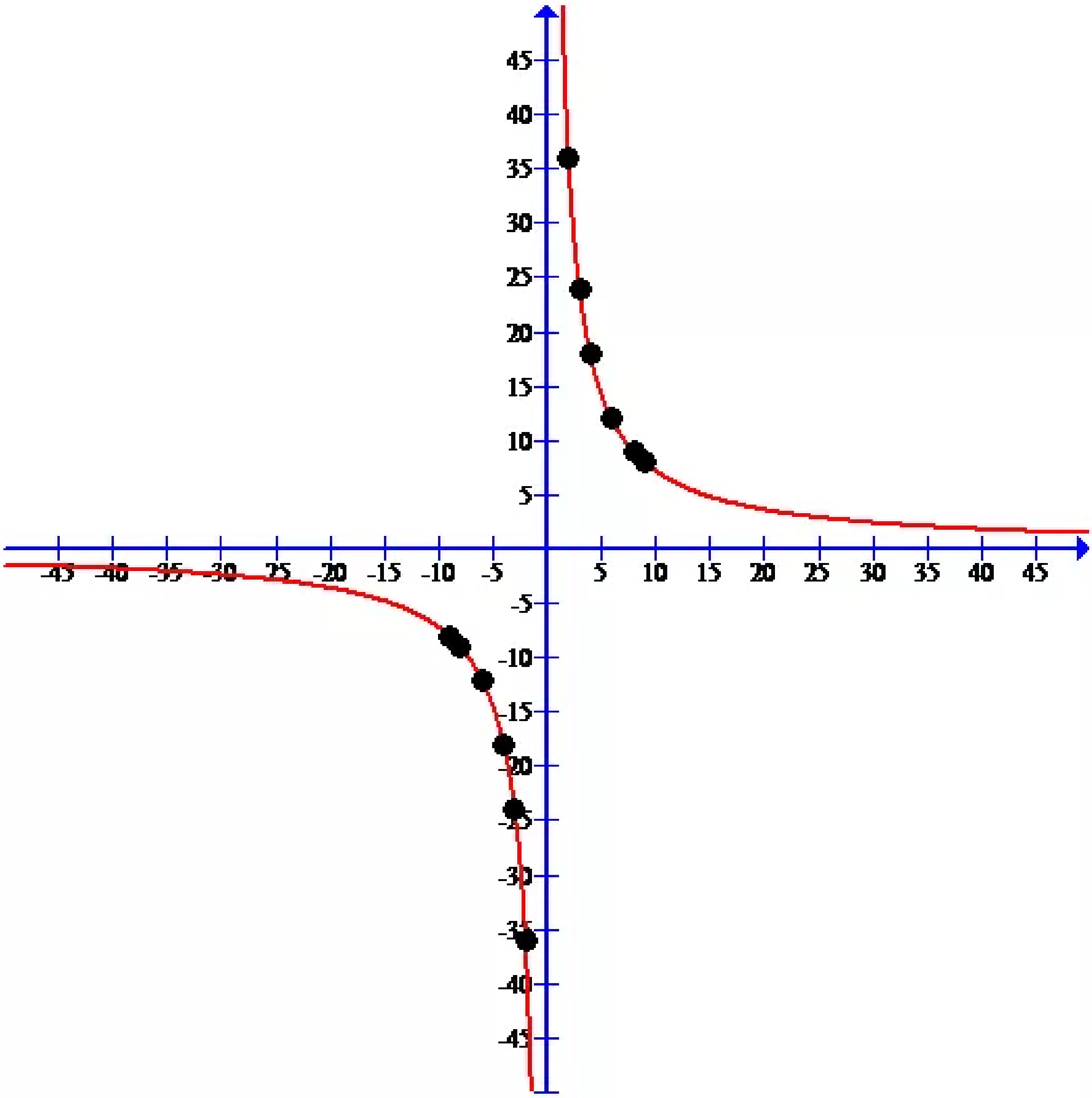
$xy = k$	Inverse variation equation
$(8)(9) = k$	Substitue $x = 8$ and $y = 9$
$72 = k$	Multiply

Thus, the constant of variation is 72.

Choose value for *x* and *y* whose product is 72.

x	y
−9	−8
−8	−9
−6	−12
−4	−18
−3	−24
−2	−36
0	undefined
2	36
3	24
4	18
6	12
8	9
9	8

Now plot the graph:



Answer 16PA.

Graph an inverse variation in which *y* varies inversely as *x* and $y = 2.4$ when $x = 8.1$.

First solve for *k*:

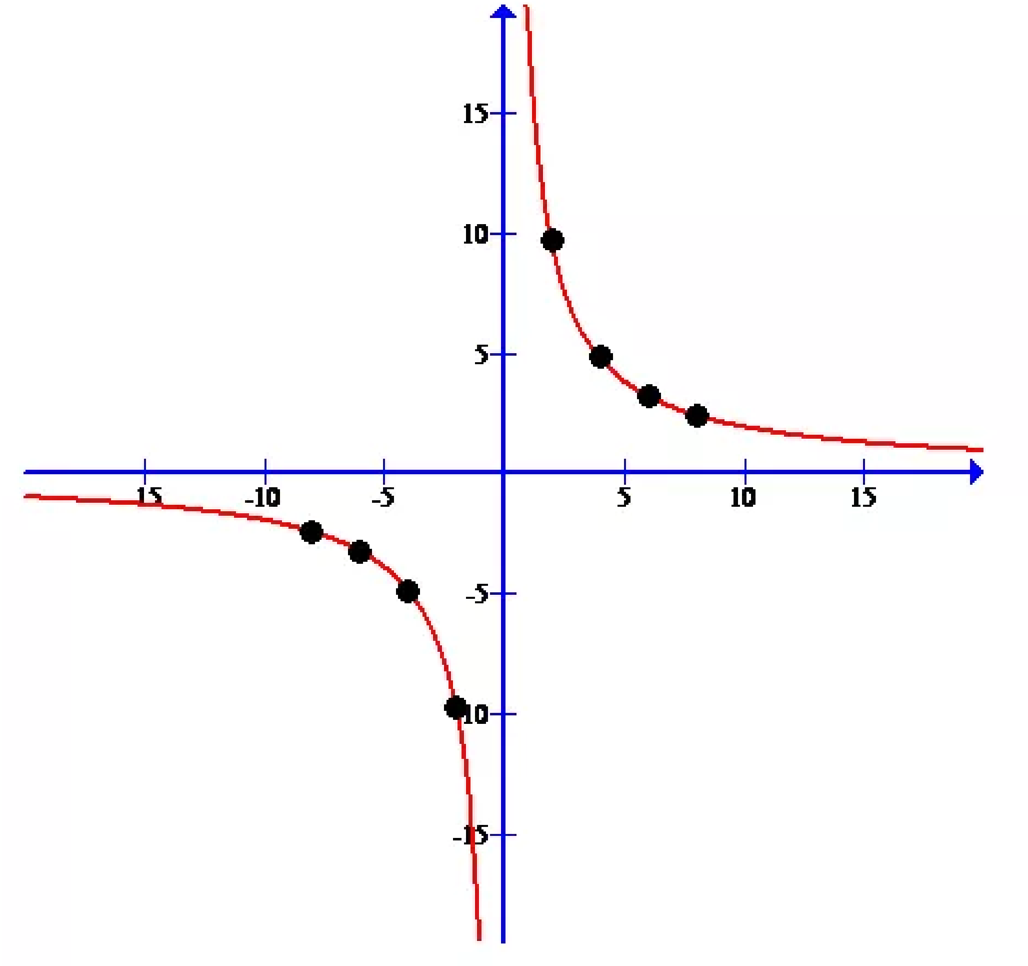
$$\begin{aligned} xy &= k && \text{Inverse variation equation} \\ (8.1)(2.4) &= k && \text{Substitue } x = 8.1 \text{ and } y = 2.4 \\ 19.44 &= k && \text{Multiply} \end{aligned}$$

Thus, the constant of variation is 19.44.

Choose value for *x* and *y* whose product is 19.44.

x	y
−8	−2.43
−6	−3.24
−4	−4.86
−3	−6.48
−2	−9.72
0	undefined
2	9.72
3	6.48
4	4.86
6	3.24
8	2.43

Now plot the graph:



Answer 17PA.

First write an inverse variation equation that relates *x* and *y*.

$xy = k$	Inverse variation equation
$(5)(12) = k$	Substitue $x = 5$ and $y = 12$
$60 = k$	Multiply

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 60}$.

Now solve for *y*:

If $y=12$ when $x=5$, find *y* when $x=3$

Let $x_1=5, y_1=12$ and $x_2=3$. Solve for y_2.

Use product property.

$x_1 y_1 = x_2 y_2$	Product rule for inverse variation
$(5)(12)=(3)y_2$	Substitue $x_1=5, y_1=12$ and $x_2=3$
$\frac{60}{3}=y_2$	Divide each side by 3
$y_2=20$	Simplify

Thus, $\boxed{y=20}$ when $x=3$.

Answer 18PA.

First write an inverse variation equation that relates *x* and *y*.

$xy=k$	Inverse variation equation
$(-2)(7)=k$	Substitue $x=-2$ and $y=7$
$-14=k$	Multiply

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy=-14}$.

Now solve for *y*:

If $y=7$ when $x=-2$, find *y* when $x=7$

Let $x_1=-2, y_1=7$ and $x_2=7$. Solve for y_2.

Use product property.

$x_1 y_1 = x_2 y_2$	Product rule for inverse variation
$(-2)(7)=(7)y_2$	Substitue $x_1=-2, y_1=7$ and $x_2=7$
$\frac{-14}{7}=y_2$	Divide each side by 7
$y_2=-2$	Simplify

Thus, $\boxed{y=-2}$ when $x=7$.

Answer 19PA.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \quad \text{Inverse variation equation}$$
$$(-1)(8.5) = k \quad \text{Substitue } x = -1 \text{ and } y = 8.5$$
$$-8.5 = k \quad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = -8.5}$.

Now solve for *x*:

If $y = 8.5$ when $x = -1$, find *x* when $y = -1$

Let $x_1 = -1, y_1 = 8.5 \text{ and } y_2 = -1$. Solve for y_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation}$$
$$(-1)(8.5) = (-1)x_2 \quad \text{Substitue } x_1 = -1, y_1 = 8.5 \text{ and } x_2 = -1$$
$$\frac{-8.5}{-1} = x_2 \quad \text{Divide each side by -1}$$
$$x_2 = 8.5 \quad \text{Simplify}$$

Thus, $\boxed{x = 8.5}$ when $y = -1$.

Answer 20PA.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \quad \text{Inverse variation equation}$$
$$(1.55)(8) = k \quad \text{Substitue } x = 1.55 \text{ and } y = 8$$
$$12.4 = k \quad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 12.4}$.

Now solve for *x*:

If $y = 8$ when $x = 1.55$, find *x* when $y = -0.62$

Let $x_1 = 1.55, y_1 = 8 \text{ and } y_2 = -0.62$. Solve for y_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation}$$
$$(1.55)(8) = (-0.62)x_2 \quad \text{Substitue } x_1 = 1.55, y_1 = 8 \text{ and } x_2 = -0.62$$
$$\frac{12.4}{-0.62} = x_2 \quad \text{Divide each side by } -0.62$$
$$x_2 = -20 \quad \text{Simplify}$$

Thus, $\boxed{x = -20}$ when $y = -0.62$.

Answer 21PA.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \quad \text{Inverse variation equation}$$
$$(4.4)(6.4) = k \quad \text{Substitue } x = 4.4 \text{ and } y = 6.4$$
$$28.16 = k \quad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 28.16}$.

Now solve for *x*:

If $y = 6.4$ when $x = 4.4$, find *x* when $y = 3.2$

Let $x_1 = 4.4, y_1 = 6.4 \text{ and } y_2 = 3.2$. Solve for y_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation}$$
$$(4.4)(6.4) = (3.2)x_2 \quad \text{Substitue } x_1 = 4.4, y_1 = 6.4 \text{ and } x_2 = 3.2$$
$$\frac{28.16}{3.2} = x_2 \quad \text{Divide each side by 3.2}$$
$$x_2 = 8.8 \quad \text{Simplify}$$

Thus, $\boxed{x = 8.8}$ when $y = 3.2$.

Answer 22PA.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \quad \text{Inverse variation equation}$$
$$(1.6)(0.5) = k \quad \text{Substitue } x = 1.6 \text{ and } y = 0.5$$
$$0.8 = k \quad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 0.8}$.

Now solve for *x*:

If $y = 1.6$ when $x = 0.5$, find *x* when $y = 3.2$

Let $x_1 = 0.5, y_1 = 1.6 \text{ and } y_2 = 3.2$. Solve for y_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation}$$
$$(0.5)(1.6) = (3.2)x_2 \quad \text{Substitue } x_1 = 0.5, y_1 = 1.6 \text{ and } x_2 = 3.2$$
$$\frac{0.8}{3.2} = x_2 \quad \text{Divide each side by 3.2}$$
$$x_2 = 0.25 \quad \text{Simplify}$$

Thus, $\boxed{x = 0.25}$ when $y = 3.2$.

Answer 23PA.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \quad \text{Inverse variation equation}$$
$$(4)(4) = k \quad \text{Substitue } x = 4 \text{ and } y = 4$$
$$16 = k \quad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 16}$.

Now solve for *y*:

If $y = 4$ when $x = 4$, find y when $x = 7$

Let $x_1 = 4, y_1 = 4 \text{ and } x_2 = 7$. Solve for y_2.

Use product property.

$$x_1y_1 = x_2y_2 \quad \text{Product rule for inverse variation}$$
$$(4)(4) = (7)y_2 \quad \text{Substitue } x_1 = 4, y_1 = 4 \text{ and } x_2 = 7$$
$$\frac{16}{7} = y_2 \quad \text{Divide each side by 7}$$
$$y_2 = \frac{16}{7} \quad \text{Simplify}$$

Thus, $\boxed{y = \frac{16}{7}}$ when $x = 7$.

Answer 24PA.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \quad \text{Inverse variation equation}$$
$$(-2)(-6) = k \quad \text{Substitue } x = -2 \text{ and } y = -6$$
$$12 = k \quad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 12}$.

Now solve for *y*:

If $y = -6$ when $x = -2$, find y when $x = 5$

Let $x_1 = -2, y_1 = -6 \text{ and } x_2 = 5$. Solve for y_2.

Use product property.

$$x_1y_1 = x_2y_2 \quad \text{Product rule for inverse variation}$$
$$(-2)(-6) = (5)y_2 \quad \text{Substitue } x_1 = -2, y_1 = -6 \text{ and } x_2 = 5$$
$$\frac{12}{5} = y_2 \quad \text{Divide each side by 5}$$
$$y_2 = \frac{12}{5} \quad \text{Simplify}$$

Thus, $\boxed{y = \frac{12}{5}}$ when $x = 5$.

Answer 25PA.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \qquad \text{Inverse variation equation}$$
$$\left(\frac{2}{3}\right)(7) = k \qquad \text{Substitue } x = \frac{2}{3} \text{ and } y = 7$$
$$\frac{14}{3} = k \qquad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = \frac{14}{3}}$.

Now solve for *y*:

If $y = 7$ when $x = \frac{2}{3}$, find y when $x = 7$

Let $x_1 = \frac{2}{3}, y_1 = 7 \text{ and } x_2 = 7$. Solve for y_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \qquad \text{Product rule for inverse variation}$$
$$\left(\frac{2}{3}\right)(7) = (7)\, y_2 \qquad \text{Substitue } x_1 = \frac{2}{3}, y_1 = 7 \text{ and } x_2 = 7$$
$$\frac{14}{3 \cdot 7} = y_2 \qquad \text{Divide each side by 7}$$
$$y_2 = \frac{2}{3} \qquad \text{Simplify}$$

Thus, $\boxed{y = \frac{2}{3}}$ when $x = 7$.

Answer 26PA.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \qquad \text{Inverse variation equation}$$
$$\left(\frac{1}{2}\right)(16) = k \qquad \text{Substitue } x = \frac{1}{2} \text{ and } y = 16$$
$$8 = k \qquad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = \frac{14}{3}}$.

Now solve for *y*:

If $y = 16$ when $x = \frac{1}{2}$, find y when $x = 32$

Let $x_1 = \frac{1}{2}, y_1 = 16 \text{ and } x_2 = 32$. Solve for y_2.

Use product property.

$x_1 y_1 = x_2 y_2$	Product rule for inverse variation
$\left(\frac{1}{2}\right)(16) = (32)\, y_2$	Substitue $x_1 = \frac{1}{2}, y_1 = 16$ and $x_2 = 32$
$\frac{8}{32} = y_2$	Divide each side by 32
$y_2 = \frac{1}{4}$	Simplify

Thus, $\boxed{y = \frac{1}{4}}$ when $x = 32$.

Answer 27PA.

First write an inverse variation equation that relates *x* and *y*.

$xy = k$	Inverse variation equation
$(6.1)(4.4) = k$	Substitue $x = 6.1$ and $y = 4.4$
$26.84 = k$	Multiply

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 26.84}$.

Now solve for *x*:

If $x = 6.1$ when $y = 4.4$, find *x* when $y = 3.2$

Let $x_1 = 6.1, y_1 = 4.4 \text{ and } y_2 = 3.2$. Solve for x_2.

Use product property.

$x_1 y_1 = x_2 y_2$	Product rule for inverse variation
$(6.1)(4.4) = (3.2)\, x_2$	Substitue $x_1 = 6.1, y_1 = 4.4$ and $y_2 = 3.2$
$\frac{26.84}{3.2} = x_2$	Divide each side by 3.2
$x_2 = 8.3875$	Simplify

Thus, $\boxed{x = 8.3875}$ when $y = 3.2$.

Answer 28PA.

First write an inverse variation equation that relates *x* and *y*.

$$xy = k \quad \text{Inverse variation equation}$$
$$(0.5)(2.5) = k \quad \text{Substitue } x = 0.5 \text{ and } y = 2.5$$
$$1.25 = k \quad \text{Multiply}$$

Therefore, an inverse variation equation that relates *x* and *y* is $\boxed{xy = 26.84}$.

Now solve for *x*:

If $x = 0.5$ when $y = 2.5$, find *x* when $y = 20$

Let $x_1 = 0.5, y_1 = 2.5 \text{ and } y_2 = 20$. Solve for x_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation}$$
$$(0.5)(2.5) = (20)x_2 \quad \text{Substitue } x_1 = 0.5, y_1 = 1.5 \text{ and } y_2 = 20$$
$$\frac{1.25}{20} = x_2 \quad \text{Divide each side by 0}$$
$$x_2 = 0.0625 \quad \text{Simplify}$$

Thus, $\boxed{x = 0.0625}$ when $y = 0$.

Answer 29PA.

A rectangle is 36 inch wide and 20 inches long.

Let the wide of the rectangle is *y*, when its length is *x*.

Now solve for *y*:

If $y = 20$ when $x = 36$, find *y* when $x = 90$

Let $x_1 = 36, y_1 = 20, \text{and } x_2 = 90$. Solve for y_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation.}$$
$$(36)(20) = (90)y_2 \quad \text{Substitue } x_1 = 36, y_1 = 20, \text{and } x_2 = 90.$$
$$\frac{720}{90} = y_2 \quad \text{Divide each side by 90.}$$
$$y_2 = 8 \quad \text{Simplify.}$$

Thus, the wide of the rectangle is $\boxed{8 \text{ in}}$.

Answer 30PA.

The tone has a pitch of 440 vibrations per second and a wavelength of 2.4 feet.

Let *y* represents the pitch of a tone that has a wavelength of *x*.

Now solve for *y*:

If $y = 440$ when $x = 2.4$, find *y* when $x = 1.6$

Let $x_1 = 2.4, y_1 = 440, \text{and } x_2 = 1.6$. Solve for y_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation.}$$

$$(2.4)(440) = (1.6)\, y_2 \quad \text{Substitue } x_1 = 2.4, y_1 = 440, \text{and } x_2 = 1.6.$$

$$\frac{1056}{1.6} = y_2 \quad \text{Divide each side by 1.6.}$$

$$y_2 = 660 \quad \text{Simplify.}$$

Thus, the pitch of a tone is $\boxed{660 \text{ vibrations}}$.

Answer 31PA.

Find how long it would take if 15 students hand out the same number of flyers this year when it is given that last year 12 students were able to distribute 1000 flyers in 9 hours .

Let time taken to distribute 1000 flyers be *y* and number of students be *x*.

Now solve for *y*:

If $y = 9$ when $x = 12$, find *y* when $x = 15$

Let $x_1 = 12, y_1 = 9 \text{ and } x_2 = 15$. Solve for y_2.

Use product property.

$$x_1 y_1 = x_2 y_2 \quad \text{Product rule for inverse variation}$$

$$(12)(9) = (15)\, y_2 \quad \text{Substitue } x_1 = 108, y_1 = 9 \text{ and } x_2 = 15$$

$$\frac{108}{15} = y_2 \quad \text{Divide each side by 15}$$

$$y_2 = 7.2 \quad \text{Simplify}$$

Thus, the time taken to distribute 1000 flyers by 15 students is $\boxed{7.2\text{h}}$.

Answer 32PA.

Find how long it will take the family if they drive 65 miles per hour when it is given that the family can drive the 220 miles to their cabin in 4 hours at 55 miles per hour.

Let time taken by the family to reach their cabin be *y* and number of speeds be *x*.

Now solve for *y*:

If $y = 4$ when $x = 55$, find *y* when $x = 65$

Let $x_1 = 55, y_1 = 4 \text{ and } x_2 = 65$. Solve for y_2.

Use product property.

$x_1 y_1 = x_2 y_2$	Product rule for inverse variation
$(55)(4) = (65)\,y_2$	Substitue $x_1 = 55, y_1 = 4$ and $x_2 = 65$
$\frac{220}{65} = y_2$	Divide each side by 65
$y_2 = 3.38$	Simplify

Thus, the time taken to reach their cabin when they travel with the speed 65 miles per hour is $\boxed{3.38\text{h or } 3\text{h } 23\text{min}}$.

Answer 33PA.

Find how much time would be saved driving at 65 miles per hour when it is given that the family can drive the 220 miles to their cabin in 4 hours at 55 miles per hour.

Since, the time taken to reach their cabin when they travel with the speed 65 miles per hour is $3\text{h } 23\text{min}$.

Thus, the time saved by travelling at the speed 65 miles per hour is $\boxed{37\text{m}}$.

Answer 34PA.

Boyle's law states that the volume of a gas *V* varies inversely with applied pressure *P*.

The equation that shows the relationship between volume and pressure according to Boyle's law is given by $\boxed{PV = k}$

Answer 35PA.

Find new volume which the gas occupies when Pressure on 60 cubic meters of a gas is raised from 1 atmosphere to 3 atmospheres.

Let volume of the gas be *y* and pressure be *x*.

Now solve for *y*:

If $y = 60$ when $x = 1$, find *y* when $x = 3$

Let $x_1 = 1, y_1 = 60 \text{ and } x_2 = 3$. Solve for y_2.

Use product property.

$x_1 y_1 = x_2 y_2$	Product rule for inverse variation.
$(1)(60) = (3) y_2$	Substitue $x_1 = 1, y_1 = 60$ and $x_2 = 3$.
$\frac{60}{3} = y_2$	Divide each side by 3.
$y_2 = 20$	Simplify.

Thus, the new volume of the gas is $\boxed{20 \text{ cubic meter}}$.

Answer 36PA.

Find the volume of the balloon when Pressure on 22 cubic meters at sea a level of a helium gas balloon is released from 1 atmosphere to 0.8 atmosphere.

Let volume of the gas be *y* and pressure be *x*.

Now solve for *y*:

If $y = 22$ when $x = 1$, find y when $x = 0.8$

Let $x_1 = 1, y_1 = 22 \text{ and } x_2 = 0.8$. Solve for y_2.

Use product property.

$x_1 y_1 = x_2 y_2$	Product rule for inverse variation.
$(1)(22) = (0.8) y_2$	Substitue $x_1 = 1, y_1 = 22$ and $x_2 = 0.8$.
$\frac{22}{0.8} = y_2$	Divide each side by 0.8.
$y_2 = 27.5$	Simplify.

Thus, the new volume of the helium gas balloon is $\boxed{27.5 \text{ cubic meter}}$.

Answer 39PA.

It is assumed that *y* varies inversely as *x*; if the value of *y* is tripled then find what happens to the value of *x*.

$yx = k$	Inverse variation equation.
$y = \frac{k}{x}$	
$3x = \frac{k}{y/3}$	For keep both sides equal.

Therefore, *y* reduced to <u>one third</u>.

Answer 41PA.

Determine the constant of variation:

$xy = k$	Inverse variation equation
$(-1.3)(4.25) = k$	Substitue $x = -1.3$ and $y = 4.25$
$-5.525 = k$	Multiply

Therefore, an inverse variation equation that relates *x* and *y* is option $\boxed{B.\ -5.525}$

Answer 42PA.

Graph an inverse variation in which *y* varies inversely as *x* and $y = -4$ when $x = -2$.

First solve for *k*:

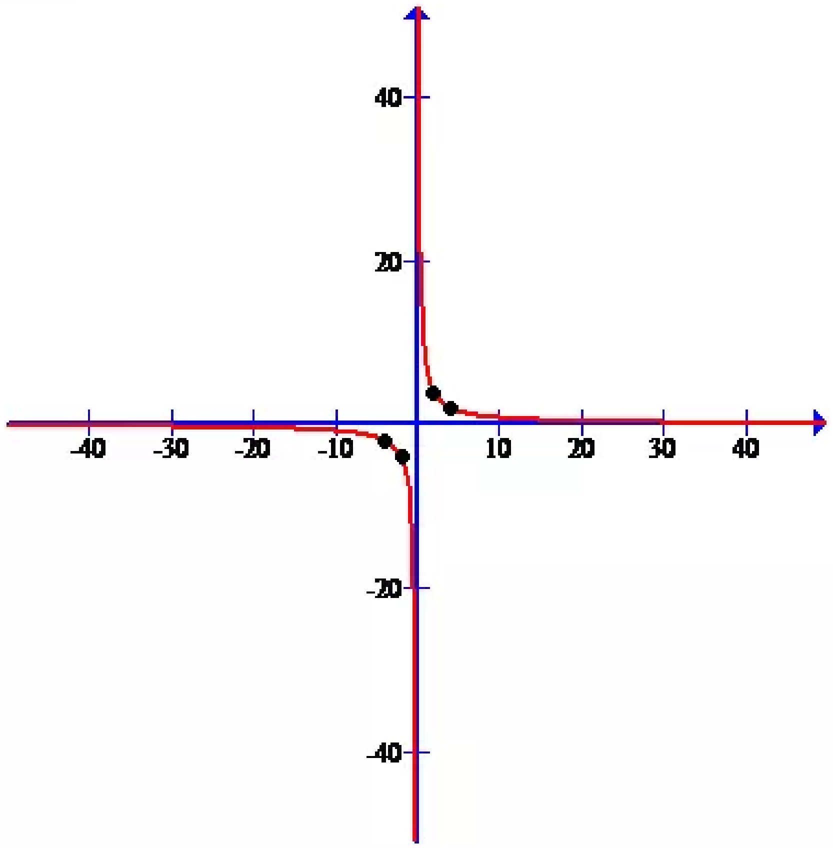
$xy = k$	Inverse variation equation
$(-2)(-4) = k$	Substitue $x = -2$ and $y = -4$
$8 = k$	Multiply

Thus, the constant of variation is 8.

Choose value for *x* and *y* whose product is 8.

x	*y*
−4	−2
−2	−4
0	undefined
2	4
4	2

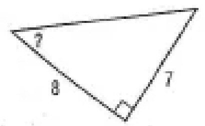
Now plot the graph:



Therefore, the correct choice is $\boxed{A}$.

Answer 43MYS.

Find the measure of the indicated angle:



Use trigonometry ratios to find the angle.

Let the indicated angle be θ.

$$\tan\theta = \frac{p}{b} = \frac{7}{8}$$

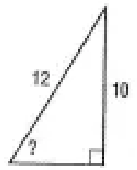
$$\theta = \tan^{-1}\frac{7}{8}$$

$$= 41^{\circ}$$

Therefore, the angle is $\boxed{41^{\circ}}$.

Answer 44MYS.

Find the measure of the indicated angle:



Use trigonometry ratios to find the angle.

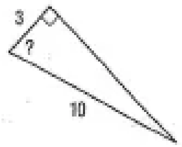
Let the indicated angle be θ.

$$\sin\theta = \frac{p}{h} = \frac{10}{12}$$
$$\theta = \sin^{-1}\frac{10}{12}$$
$$= 56.4^\circ$$

Therefore, the angle is $\boxed{56.4^\circ}$.

Answer 45MYS.

Find the measure of the indicated angle:



Use trigonometry ratios to find the angle.

Let the indicated angle be θ.

$$\cos\theta = \frac{b}{h} = \frac{3}{10}$$
$$\theta = \cos^{-1}\frac{3}{10}$$
$$= 73^\circ$$

Therefore, the angle is $\boxed{73^\circ}$.

Answer 46MYS.

Find the measures of the missing sides when it is given that $\triangle ABC \sim \triangle DEF$:

Consider set of sides:

$a = 3, b = 10, c = 9, d = 12$

Now find the value of e and f:

$$\frac{a}{d} = \frac{b}{e} = \frac{c}{f} \quad \text{Using the law of similar triangle}$$

$$\frac{3}{12} = \frac{10}{e} = \frac{9}{f} \quad \text{Substitute the value of } a, b, c, d$$

Finding the value of *e*:

$$\frac{3}{12} = \frac{10}{e}$$
$$e = 40$$

Finding the value of *f*:

$$\frac{3}{12} = \frac{9}{f}$$
$$f = 36$$

Therefore, the measures of the missing sides are $\boxed{40 \text{and} 36}$.

Answer 47MYS.

Find the measures of the missing sides when it is given that $\triangle ABC \sim \triangle DEF$:

Consider set of sides:

$b = 8, c = 4, d = 21, e = 28$

Now find the value of e and f:

$$\frac{a}{d} = \frac{b}{e} = \frac{c}{f} \quad \text{Using the law of similar triangle}$$

$$\frac{a}{21} = \frac{8}{28} = \frac{4}{f} \quad \text{Substitute the value of } a, b, c, d$$

Finding the value of *a*:

$$\frac{a}{21} = \frac{8}{28}$$
$$a = 6$$

Finding the value of *f*:

$$\frac{4}{f} = \frac{8}{28}$$
$$f = 14$$

Therefore, the measures of the missing sides are $\boxed{6 \text{and} 14}$.

Answer 49MYS.

Consider the equation:

$7(2y-7)=5(4y+1)$ Original equation

$14y-49=20y+5$ Distributive property.

$-6y-49=5$ Subtract $20y$ from both sides.

$-6y=54$ Add 49 to both sides.

$y=-9$ Divide both sides by -6.

Therefore, the solution is $\boxed{-9}$.

Answer 50MYS.

Consider the equation:

$w(w+2)=2w(w-3)+16$ Original equation

$w^2+2w=2w^2-6w+16$ Distributive property.

$w^2-8w+16=0$ Standard form.

$(w-4)^2=0$ Factor the trinomial.

$w-4=0$ Use zero factor property.

$w=4$ Simplify.

Therefore, the solution is $\boxed{4}$.

Answer 51MYS.

Consider the following system of linear inequalities:

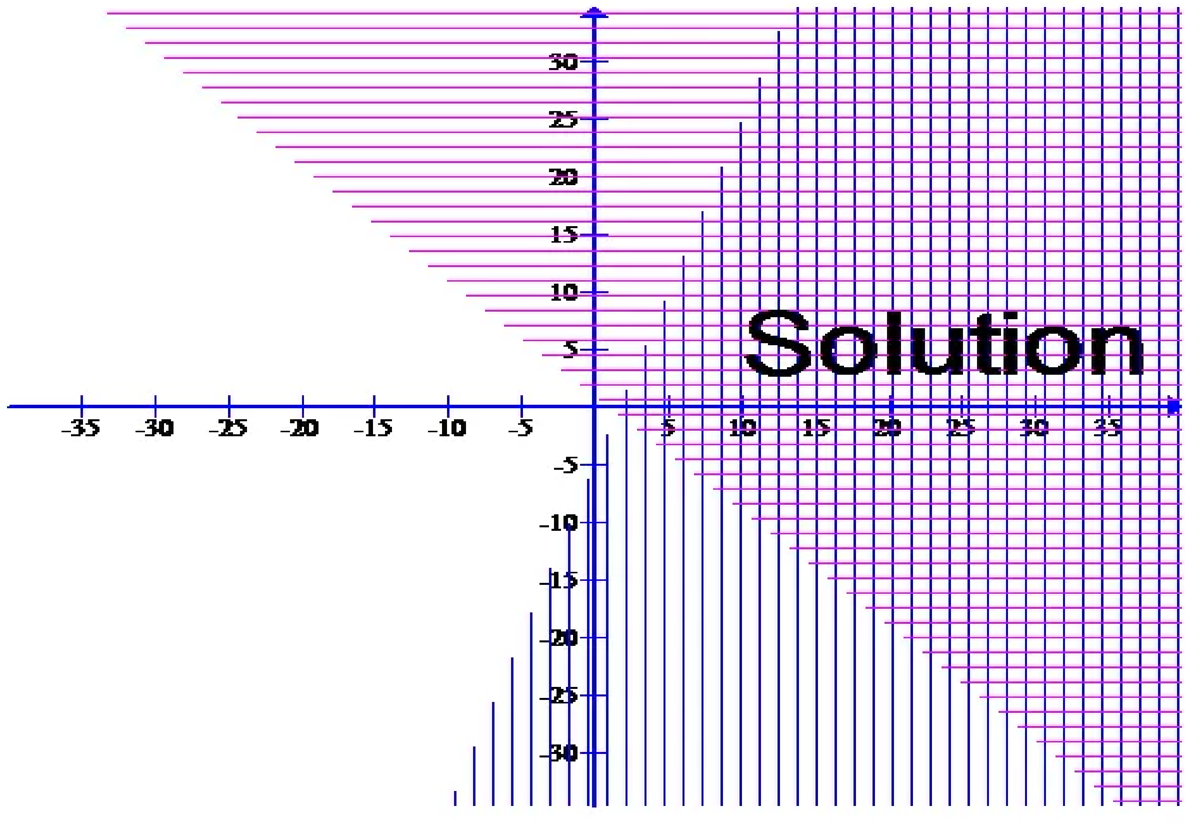
$y \le 3x-5$

$y > -x+1$

Solving the system of linear inequalities means graphing each inequality individually and then finding the overlap regions.

The solution of the system is the region where all the inequality is happy, that is, the solution where all solutions work.

Thus the solution of the system of linear inequalities is



Answer 52MYS.

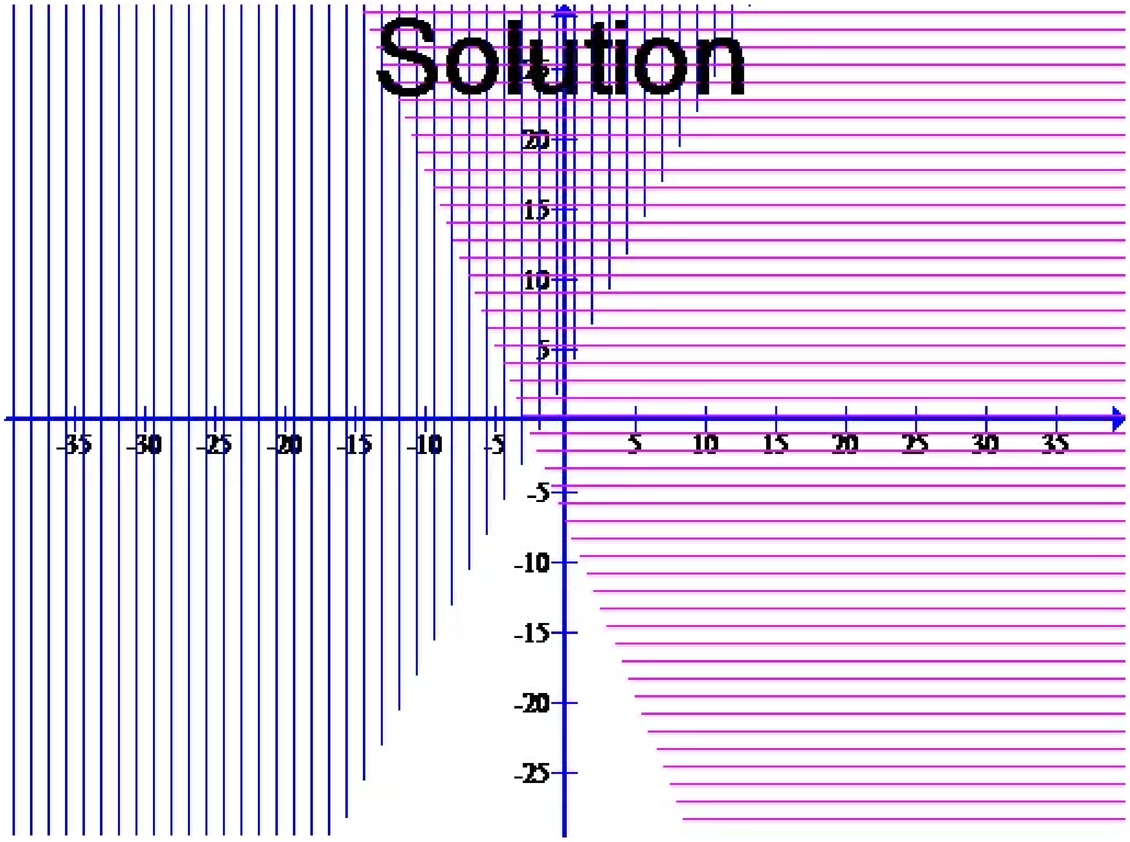
Consider the following system of linear inequalities:

$$y \geq 2x + 3$$
$$2y \geq -5x - 14$$

Solving the system of linear inequalities means graphing each inequality individually and then finding the overlap regions.

The solution of the system is the region where all the inequality is happy, that is, the solution where all solutions work.

Thus the solution of the system of linear inequalities is



Answer 53MYS.

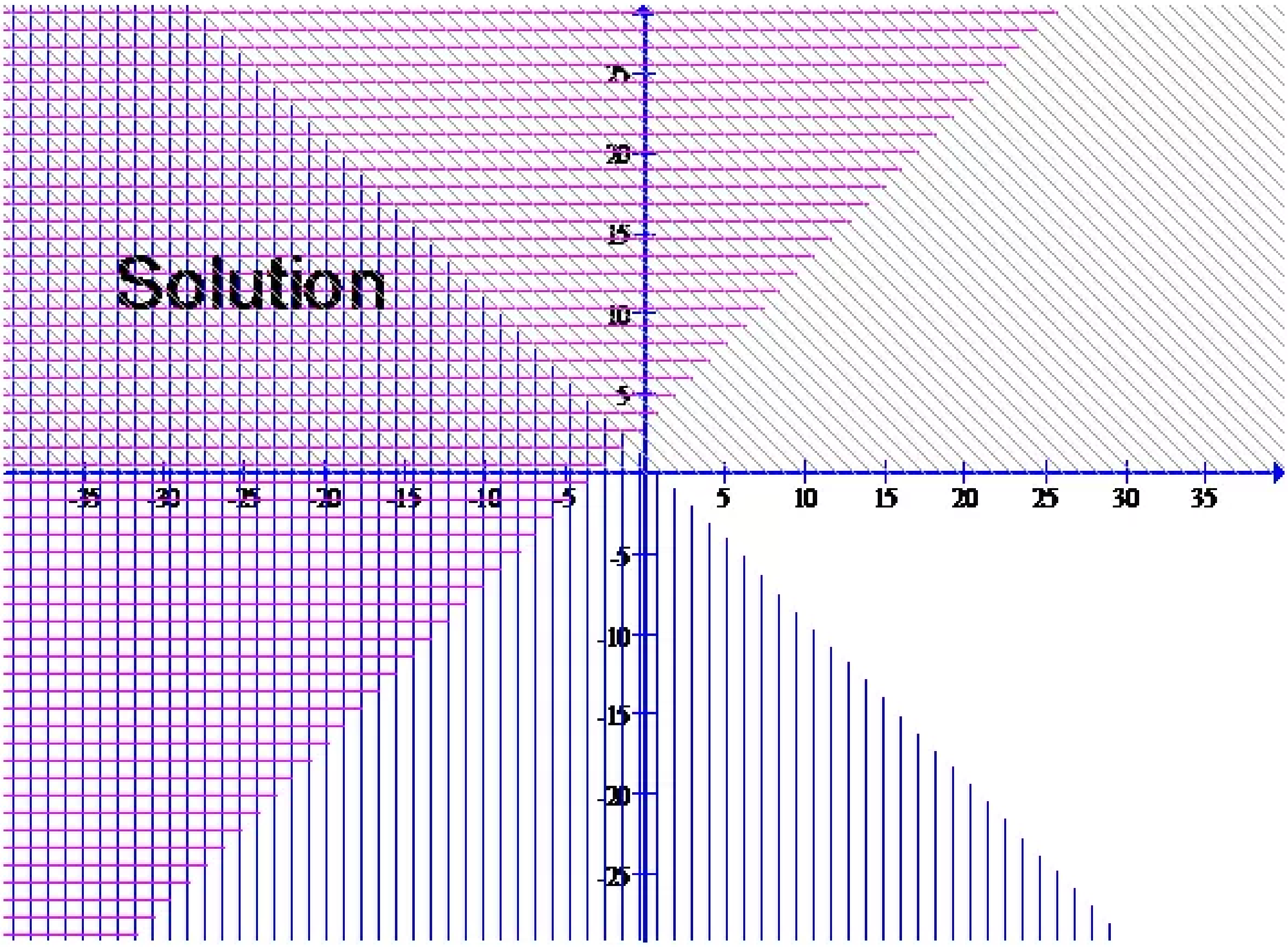
Consider the following system of linear inequalities:

$$x + y \le 1$$
$$x - y \le -3$$
$$y \ge 0$$

Solving the system of linear inequalities means graphing each inequality individually and then finding the overlap regions.

The solution of the system is the region where all the inequality is happy, that is, the solution where all solutions work.

Thus the solution of the system of linear inequalities is



Answer 54MYS.

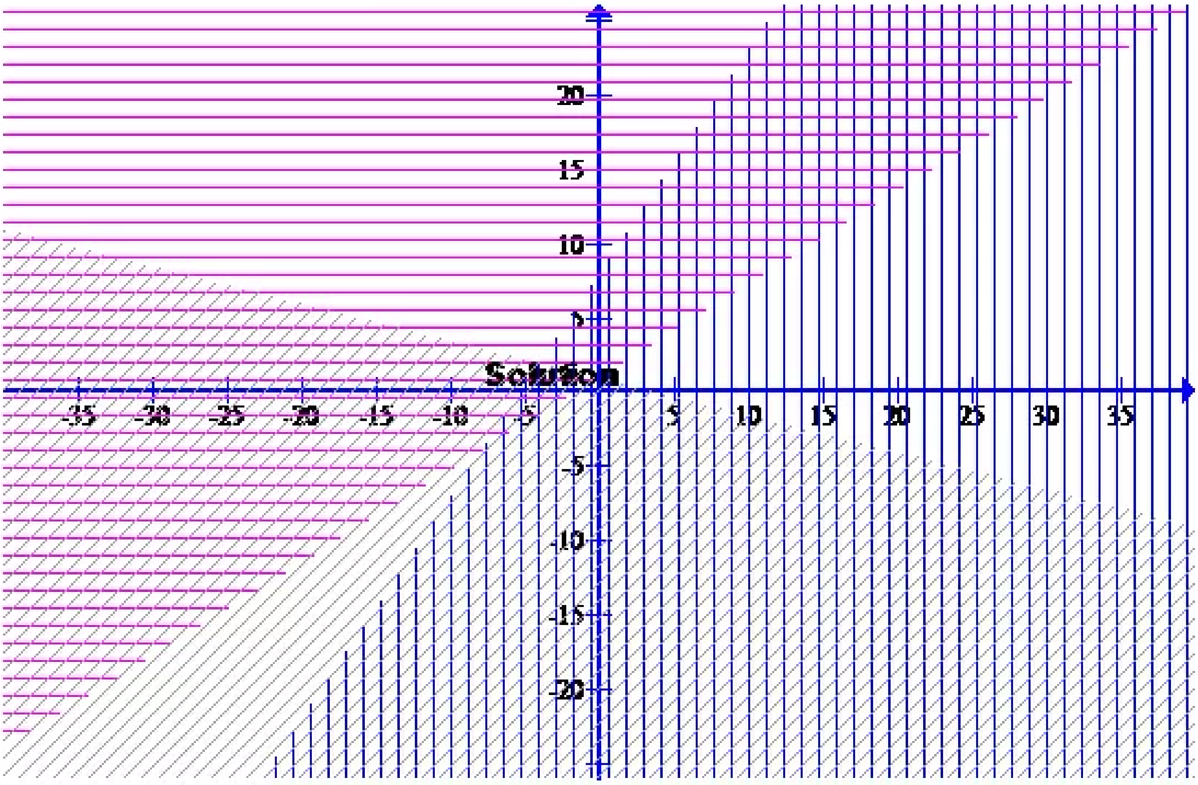
Consider the following system of linear inequalities:

$$3x - 2y \geq -16$$
$$x + 4y < 4$$
$$5x - 8y < -8$$

Solving the system of linear inequalities means graphing each inequality individually and then finding the overlap regions.

The solution of the system is the region where all the inequality is happy, that is, the solution where all solutions work.

Thus the solution of the system of linear inequalities is



Answer 55MYS.

Consider the following set of monomials:

36, 15, 45

The prime factorizations are:

$$36 = 2^2 \cdot 3^2$$
$$15 = 3 \cdot 5$$
$$45 = 5 \cdot 3^2$$

The common factor is 3, so the greatest common factor of monomials will be $\boxed{3}$.

Answer 56MYS.

Consider the following set of monomials:

48, 60, 84

The prime factorizations are:

$$48 = 2^4 \cdot 3$$
$$60 = 2^2 \cdot 3 \cdot 5$$
$$84 = 2^2 \cdot 3 \cdot 7$$

The common factors are 2^2 and 3, so the greatest common factor of monomials will be $2^2 \cdot 3 = \boxed{12}$.

Answer 57MYS.

Consider the following set of monomials:

210, 330, 150

The prime factorizations are:

$$210 = 2 \cdot 3 \cdot 5 \cdot 7$$
$$330 = 2 \cdot 3 \cdot 5 \cdot 11$$
$$150 = 2 \cdot 3 \cdot 5^2$$

The common factors are $2, 3$ and 5, so the greatest common factor of monomials will be $2 \cdot 3 \cdot 5 = \boxed{30}$.

Answer 58MYS.

Consider the following set of monomials:

$$17a, 34a^2$$

The prime factorizations are:

$$17a = 17 \cdot a$$
$$34a^2 = 2 \cdot 17 \cdot a^2$$

The common factors are 17 and a, so the greatest common factor of monomials will be $17 \cdot a = \boxed{17a}$.

Answer 59MYS.

Consider the following set of monomials:

$$12xy^2, 18x^2y^3$$

The prime factorizations are:

$$12xy^2 = 2^2 \cdot 3 \cdot x \cdot y^2$$
$$18x^2y^3 = 2 \cdot 3^2 \cdot x^2 \cdot y^3$$

The common factors are $2, 3, x,$ and y^2, so the greatest common factor of monomials will be $2 \cdot 3 \cdot x \cdot y^2 = \boxed{6xy^2}$.

Answer 60MYS.

Consider the following set of monomials:

$$12pr^2, 40p^4$$

The prime factorizations are:

$$12pr^2 = 2^2 \cdot 3 \cdot p \cdot r^2$$
$$40p^4 = 2^3 \cdot 5 \cdot p^4$$

The common factors are 2^2, and p, so the greatest common factor of monomials will be $2^2 \cdot p = \boxed{4p}$.