

**Topic:** Rational equations**Question:** Solve the equation for  $x$ .

$$\frac{1}{x} + m + ab = c$$

**Answer choices:**

A  $x = -\frac{1}{m + ab - c}$

B  $x = -m - ab + c$

C  $x = \frac{1}{m + ab - c}$

D  $x = m + ab - c$



**Solution: A**

In order to get rid of the fraction, we have to multiply both sides of the equation by the denominator of  $1/x$ .

$$\frac{1}{x} + m + ab = c$$

$$\left(\frac{1}{x} + m + ab\right)x = (c)x$$

$$\frac{1}{x}(x) + m(x) + ab(x) = c(x)$$

$$1 + mx + abx = cx$$

To solve for  $x$ , we'll need to collect all terms containing  $x$  on one side of the equation, and then factor out the  $x$ .

$$mx + abx - cx = -1$$

$$x(m + ab - c) = -1$$

$$x = \frac{-1}{m + ab - c}$$

$$x = -\frac{1}{m + ab - c}$$



**Topic:** Rational equations**Question:** Solve the equation for  $x$ .

$$\frac{1}{x} + \frac{b}{a} = c$$

**Answer choices:**

A  $x = \frac{a}{b - ac}$

B  $x = \frac{b - ac}{a}$

C  $x = \frac{a}{ac - b}$

D  $x = \frac{ac - b}{a}$



**Solution: C**

In order to get rid of the fractions, we have to multiply both sides of the equation by the denominators of both fractions,  $x$  and  $a$ .

$$\frac{1}{x} + \frac{b}{a} = c$$

$$\left(\frac{1}{x} + \frac{b}{a}\right)ax = (c)ax$$

$$\frac{1}{x}(ax) + \frac{b}{a}(ax) = c(ax)$$

$$a + bx = acx$$

To solve for  $x$ , we'll need to collect all terms containing  $x$  on one side of the equation.

$$a = acx - bx$$

To end up with the variable that we're solving for (in this case  $x$ ) on the left side, we'll switch the two sides of this equation, and then factor out an  $x$  and solve for it.

$$acx - bx = a$$

$$x(ac - b) = a$$

$$x = \frac{a}{ac - b}$$



**Topic:** Rational equations**Question:** Solve the equation for  $k$ .

$$\frac{mx + b}{k} + a = z$$

**Answer choices:**

A  $k = \frac{a - z}{-mx - b}$

B  $k = \frac{a - z}{mx + b}$

C  $k = \frac{mx + b}{z - a}$

D  $k = \frac{mx + b}{a - z}$



**Solution: C**

In order to get rid of the fraction, we have to multiply both sides of the equation by the denominator of  $(mx + b)/k$ .

$$\frac{mx + b}{k} + a = z$$

$$\left( \frac{mx + b}{k} + a \right) k = (z)k$$

$$\frac{mx + b}{k}(k) + a(k) = z(k)$$

$$mx + b + ak = zk$$

To solve for  $k$ , we'll need to collect all terms containing  $k$  on one side of the equation, and then factor out the  $k$ .

First, we'll move  $zk$  to the left side, by subtracting  $zk$  from both sides.

$$mx + b + ak - zk = zk - zk$$

$$mx + b + ak - zk = 0$$

Next, we'll move  $mx + b$  to the right side, by adding  $-mx - b$  to both sides.

$$mx + b + ak - zk - mx - b = 0 - mx - b$$

Now we'll combine like terms on the left side.

$$mx - mx + b - b + ak - zk = 0 - mx - b$$

$$ak - zk = -mx - b$$



$$k(a - z) = -mx - b$$

$$\frac{k(a - z)}{a - z} = \frac{-mx - b}{a - z}$$

$$k = \frac{-mx - b}{a - z}$$

We have negative signs in both terms of the numerator. To get rid of them, we'll multiply the numerator and denominator of the fraction by  $-1$  (remember that  $(-1)/(-1) = 1$ , so when we do this we won't change the value of anything in our equation) and then simplify.

$$k = \frac{-1(-mx - b)}{-1(a - z)}$$

$$k = \frac{mx + b}{-a + z}$$

Finally, we'll switch the two terms in the denominator.

$$k = \frac{mx + b}{z - a}$$

