Topic: Adding and subtracting rational functions

Question: Simplify the expression by combining the three rational functions into a single rational function.

$$\frac{x}{4y}+\frac{a}{yz^2}-\frac{m}{4z^4}$$

Answer choices:

A $\frac{xz^4+4az^2-my}{4yz^4}$

B $\frac{4yz^4}{xz^4+4az^2-my}$

C $\frac{xz^4-4az^2+my}{4yz^4}$

D $\frac{4yz^4}{xz^4-4az^2+my}$

Solution: A

We need to combine the three fractions in the expression into one fraction, which we'll do by finding a common denominator.

The lowest common denominator will be the least common multiple of the three denominators in

$$\frac{x}{4y} + \frac{a}{yz^2} - \frac{m}{4z^4}$$

If we list the factors of each denominator, we get the following table.

	Coefficients	y's	z's
4y	4	y	
yz²		y	z^2
4z⁴	4		z^4

In order to generate the least common multiple, we have to take the least common multiple of the entries in each column, and then form the product of the results.

- The least common multiple of the entries in the coefficients column is 4.
- The least common multiple of the entries in the base-y column is y.
- The least common multiple of the entries in the base-z column is z^4.

Therefore, the least common multiple of $4y$, yz^2, and $4z^4$ is

$$4yz^4$$

Now we need to multiply the numerator and denominator of each fraction by whatever expression is needed to make its denominator equal to $4yz^4$.

$$\frac{x}{4y}\left(\frac{z^4}{z^4}\right)+\frac{a}{yz^2}\left(\frac{4z^2}{4z^2}\right)-\frac{m}{4z^4}\left(\frac{y}{y}\right)$$

$$\frac{xz^4}{4yz^4}+\frac{4az^2}{4yz^4}-\frac{my}{4yz^4}$$

$$\frac{xz^4+4az^2-my}{4yz^4}$$

Topic: Adding and subtracting rational functions

Question: Simplify the expression by combining the three rational functions into a single rational function.

$$\frac{m}{cx^2}+\frac{a}{2c}+\frac{z}{2cx}$$

Answer choices:

A $\dfrac{m+a+xz}{c}$

B $\dfrac{c}{m+a+xz}$

C $\dfrac{2m+ax^2+xz}{2cx^2}$

D $\dfrac{2cx^2}{2m+ax^2+xz}$

Solution: C

We need to combine the three fractions in the expression into one fraction, which we'll do by finding a common denominator.

The lowest common denominator will be the least common multiple of the three denominators in

$$\frac{m}{cx^2}+\frac{a}{2c}+\frac{z}{2cx}$$

If we list the factors of each denominator, we get the following table.

	Coefficients	c's	x's
cx^2		c	x^2
2c	2	c	
2cx	2	c	x

In order to generate the least common multiple, we have to take the least common multiple of the entries in each column, and then form the product of the results.

- The least common multiple of the entries in the coefficients column is 2.
- The least common multiple of the entries in the base-c column is c.
- The least common multiple of the entries in the base-x column is x^2.

Therefore, the least common multiple of cx^2, $2c$, and $2cx$ is

$$2cx^2$$

Now we need to multiply the numerator and denominator of each fraction by whatever expression is needed to make its denominator equal to $2cx^2$.

$$\frac{m}{cx^2}\left(\frac{2}{2}\right)+\frac{a}{2c}\left(\frac{x^2}{x^2}\right)+\frac{z}{2cx}\left(\frac{x}{x}\right)$$

$$\frac{2m}{2cx^2}+\frac{ax^2}{2cx^2}+\frac{xz}{2cx^2}$$

$$\frac{2m+ax^2+xz}{2cx^2}$$

Topic: Adding and subtracting rational functions

Question: Simplify the expression by combining the two rational functions into a single rational function.

$$\frac{p-2q}{4p^2q}-\frac{p+2q}{4p^2q}$$

Answer choices:

A $-\frac{1}{p^2}$

B 0

C $\frac{-4q}{p^2}$

D $\frac{pq}{4}$

Solution: A

To simplify the expression

$$\frac{p-2q}{4p^2q}-\frac{p+2q}{4p^2q}$$

we'll combine the numerators in the two fractions over one denominator, since we already have a common denominator.

$$\frac{p-2q-(p+2q)}{4p^2q}$$

$$\frac{p-2q-p-2q}{4p^2q}$$

$$\frac{-4q}{4p^2q}$$

Simplifying this fraction to lowest terms gives

$$-\frac{1}{p^2}$$