MATHEMATICS · GRADES 10-12

Finding common denominators

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you get fractions onto the same footing so you can add or compare them. Two recipes that use different measuring cups need a shared size before you can combine them, and fractions need the same thing. The common denominator is that shared size. Once both fractions use it, adding or comparing them is straightforward.



Rule

Lowest common denominator: the smallest expression that every denominator divides into.

It must contain each distinct factor once, to the highest power it appears in any denominator.

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Worked examples

EXAMPLE 1

Q Find the LCD of $\frac{1}{(x - 1)}$ and $\frac{1}{(x + 2)}$

SOLUTION

Factor both denominators: they are already in factored form.

The LCD must contain each distinct factor once: $(x - 1)(x + 2)$

So the LCD is $(x - 1)(x + 2)$

EXAMPLE 2

Q Find the LCD of $\frac{1}{(2x)}$ and $\frac{1}{(3x^2)}$

SOLUTION

Factor: $2x = 2 \times x$ and $3x^2 = 3 \times x^2$

Take the highest power of each factor: $2 \times 3 = 6$ and x^2

So the LCD is $6x^2$

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Practice questions

1 A baker measures out $\frac{1}{x}$ of a bag of flour for a cake and $\frac{1}{(x+1)}$ of a bag for a loaf. What single denominator could rewrite both fractions?

- **A** x(x - 1)
- **B** x(x + 1)
- **C** (x + 1)(x + 2)
- **D** x + 1

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2 A baker measures out $\frac{1}{(x+1)}$ of a bag of flour for a cake and $\frac{1}{(x+1)^2}$ of a bag for a loaf. What single denominator could rewrite both fractions?

A $(x + 1)$

B $(x + 1)^2$

C $(x + 1)^3$

D $2(x + 1)$

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3 A painter mixes $\frac{1}{(2x)}$ of a can of blue paint and $\frac{1}{(4x)}$ of a can of white paint into one batch. Find the smallest denominator both fractions share.

- **A** 2x
- **B** 8x
- **C** 4x
- **D** $4x^2$

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4 Two identical jars each hold $\frac{1}{(x+1)}$ of a litre of honey. What is the least common denominator of the two fractions?

- **A** $(x + 1)^2$
- **B** x + 1
- **C** 2(x + 1)
- **D** x - 1

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5 A carpenter cuts a board into pieces that are $\frac{1}{(x^2 - 4)}$ and $\frac{1}{(x - 2)}$ of its length. Which denominator works for both fractions?

A (x - 2)(x + 2)

B (x - 2)(x - 2)

C (x + 2)(x + 2)

D (x - 2)(x + 3)

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6 Two runners run $\frac{1}{(2x)}$ and $\frac{1}{(3x)}$ of a lap per minute. What is the least common denominator of the two fractions?

- **A** 2x
- **B** 3x
- **C** 5x
- **D** 6x

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7 A baker uses $\frac{1}{(2x)}$ of a bag of flour for a cake and $\frac{1}{(x+2)}$ of a bag for a loaf. What is the LCD of the two fractions?

- **A** $x(x + 2)$
- **B** $2(x + 2)$
- **C** $2x(x + 2)$
- **D** $2x^2(x + 2)$

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8 A recipe calls for $\frac{1}{x}$ of a cup of oil, $\frac{1}{(x+1)}$ of a cup of milk and $\frac{1}{(x+2)}$ of a cup of cream. What single denominator could rewrite all three fractions?

A x(x + 1)(x + 2)

B (x + 1)(x + 2)

C x(x - 1)(x - 2)

D x(x + 1)(x + 3)

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9 A gardener waters $\frac{1}{6}$ of a bed in the morning and $\frac{1}{(x+3)}$ of a bed in the evening. What is the LCD of the two fractions?

- **A** $6(x + 3)$
- **B** $(x + 3)$
- **C** $6x$
- **D** $6(x - 3)$

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10 Two painters mix $\frac{1}{(x^2)}$ and $\frac{1}{(x+1)}$ of a can of paint into one batch. What single denominator could rewrite both fractions?

- **A** $x(x + 1)$
- **B** $x^2(x + 1)^2$
- **C** $(x + 1)$
- **D** $x^2(x + 1)$

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ANSWER KEY

1. $x(x + 1)$

2. $(x + 1)^2$

3. $4x$

4. $x + 1$

5. $(x - 2)(x + 2)$

6. $6x$

7. $2x(x + 2)$

8. $x(x + 1)(x + 2)$

9. $6(x + 3)$

10. $x^2(x + 1)$

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