MATH 020 Support 1: Operations with Real Numbers

Fractions

Multiplying Fractions: $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$

Dividing Fractions: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$ (division means multiply by the reciprocal)

To add or subtract fractions, you need a common denominator.

Adding Fractions: $\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$

Subtracting Fractions: $\frac{a}{b} - \frac{c}{b} = \frac{a-c}{b}$

Exponents

Exponents are used to represent repeated multiplication. For example, $5^3 = 5 \cdot 5 \cdot 5$. In this exponential expression, the base is 5 and the exponent is 3.

Operations with Real Numbers

Adding Real Numbers with the Same Sign: Add the absolute value of the numbers and keep the sign.

Adding Real Numbers with Opposite Signs: Subtract the smaller absolute value from the larger absolute value, and keep the sign of the larger absolute value.

Subtracting Real Numbers: If a and b are real numbers, a – b = a + (-b). Subtractions means adding the opposite.

Multiplying Real Numbers: The product of two numbers with the same sign is positive. The product of two numbers with opposite signs is negative.

Dividing Real Numbers: The quotient of two numbers with the same sign is positive. The quotient of two numbers with opposite signs is negative.

Order of Operations

1. Parentheses/grouping symbols
2. Exponents
3. Multiply & Divide in order from left to right
4. Add & Subtract in order from left to right

Examples

Simplify the fraction.

1. $\frac{3}{12}$

2. $\frac{55}{25}$

Perform the indicated operation. Simplify all answers.

3. $\frac{3}{8} \cdot \frac{5}{7}$

4. $\frac{4}{15} \cdot \frac{1}{2}$

5. $\left(\frac{3}{4}\right)^2$

6. $\frac{3}{2} \div \frac{7}{5}$

7. $\frac{5}{2} \div 10$

8. $\frac{\frac{7}{12}}{\frac{3}{4}}$

9. $\frac{0}{5}$

10. $\frac{5}{0}$

11. $\frac{1}{2} + \frac{1}{2}$

12. $\frac{8}{15} - \frac{2}{15}$

13. $\frac{1}{2} + \frac{1}{4}$

14. $\frac{1}{2} - \frac{1}{3}$

15. $-3(7)$

16. $2(3-5)$

17. $-\frac{15}{5}$

18. $-6+10$

19. $2\cdot 3-4\cdot 5$

20. $-6+6$

21. $14-20$

22. 5^2

23. -5^2

24. $(-5)^2$

25. $2\cdot 3^2$

26. $(-10)+4\cdot 2$

27. $8-3\cdot 2+2^3$

28. $\sqrt{16}$

29. Evaluate the expression $x^2 - y$ when x = 2 and y = 3.

30. Evaluate the expression $y^2 - 4xy$ when x = 2 and y = 3.