

Multiplication Table

x	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

$13^2 =$

$17^2 =$

$14^2 =$

$18^2 =$

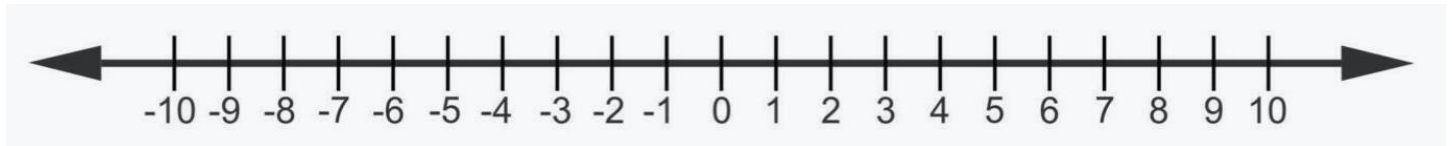
$15^2 =$

$19^2 =$

$16^2 =$

$20^2 =$

Negative Numbers



$$a + (-b) = a - b$$

$$a - (-b) = a + b$$

$$7 + (-11) =$$

$$3 - (-2) =$$

$$-2 + (-8) =$$

$$4 - (-6) =$$

$$9 + (-20) =$$

$$-2 - (-5) =$$

$$30 + (-20) =$$

$$-10 - (-6) =$$

$$15 + (-22) =$$

$$-6 - (-15) =$$

$$3 - (-10) =$$

$$4 + (-7) =$$

$$-2 - (-9) =$$

$$11 - (-11) =$$

$$-8 + (-20) =$$

$$6 - (-34) =$$

$$2 + (-104) =$$

Multiplying and Dividing Negative Numbers

Same signs →	Different signs →
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Multiplication

$$(4)(3) =$$

$$(-5)(7) =$$

$$(-4)(3) =$$

$$(-9)(-4) =$$

$$(4)(-3) =$$

$$(12)(-3) =$$

$$(-4)(-3) =$$

$$(-7)(5) =$$

Division

$$\frac{12}{3} =$$

$$\frac{42}{-6} =$$

$$\frac{-12}{3} =$$

$$\frac{-56}{-7} =$$

$$\frac{12}{-3} =$$

$$\frac{72}{-8} =$$

$$\frac{-12}{-3} =$$

$$\frac{-81}{9} =$$

The sign rules for division are the same as the sign rules for multiplication.

Square Roots and Exponents

A square root asks: what number times itself gives this number?

$$\sqrt{49} = 7$$

because $(7)(7) = 49$

$$\sqrt{144} = 12$$

because $(12)(12) = 144$

Evaluate:

$$\sqrt{25} =$$

$$\sqrt{196} =$$

$$\sqrt{64} =$$

$$\sqrt{400} =$$

$$\sqrt{121} =$$

$$\sqrt{900} =$$

Perfect Squares to Know

$$1^2 =$$

$$11^2 =$$

$$30^2 =$$

$$2^2 =$$

$$12^2 =$$

$$40^2 =$$

$$3^2 =$$

$$13^2 =$$

$$50^2 =$$

$$4^2 =$$

$$14^2 =$$

$$60^2 =$$

$$5^2 =$$

$$15^2 =$$

$$70^2 =$$

$$6^2 =$$

$$16^2 =$$

$$80^2 =$$

$$7^2 =$$

$$17^2 =$$

$$90^2 =$$

$$8^2 =$$

$$18^2 =$$

$$100^2 =$$

$$9^2 =$$

$$19^2 =$$

$$10^2 =$$

$$20^2 =$$

Exponents

An exponent tells how many times to use the base as a factor.

$$3^2 = (3)(3) = 9$$

$$2^3 = (2)(2)(2) = 8$$

Evaluate:

$$5^2 =$$

$$2^4 =$$

$$8^2 =$$

$$3^4 =$$

$$4^5 =$$

$$5^4 =$$

$$10^3 =$$

$$2^6 =$$

Powers of 3

Powers of 4

Powers of 6

$$2^3 =$$

$$2^4 =$$

$$3^3 =$$

$$3^4 =$$

$$2^6 =$$

$$4^3 =$$

$$4^4 =$$

$$3^6 =$$

$$5^3 =$$

$$5^4 =$$

$$6^3 =$$

$$7^3 =$$

Powers of 5

$$8^3 =$$

$$2^5 =$$

$$9^3 =$$

$$3^5 =$$

$$10^3 =$$

Powers of 2

Each answer _____ the previous answer.

$2^1 =$

$2^6 =$

$2^2 =$

$2^7 =$

$2^3 =$

$2^8 =$

$2^4 =$

$2^9 =$

$2^5 =$

$2^{10} =$

 $9^2 =$

$10^5 =$

$\sqrt{169} =$

$\sqrt{10000} =$

$3^4 =$

$5^4 =$

$\sqrt{2500} =$

$2^{10} =$

$2^6 =$

$\sqrt{324} =$

$\sqrt{361} =$

$3^3 =$

Order of Operations

1. Parentheses

Do what is inside parentheses first.

2. Exponents and square roots

Evaluate powers and roots next.

3. Multiplication and division

Move left to right.

4. Addition and subtraction

Move left to right.

Parentheses First

$$(2 + 5)^2 - (3)(4) =$$

$$(8 - 3)^2 + (6)(4) =$$

$$\frac{(2 + 3)^2 - (-1 + 11)^2}{5} =$$

$$(10 - 4)^2 - (5)(3) =$$

Exponents and Square Roots

$$4^2 + \sqrt{81} - 6 =$$

$$(5^2 - 3^2) + \sqrt{64} =$$

$$(3^2 + 4^2) - \sqrt{100} =$$

$$2^3 + (6 - 1)^2 - \sqrt{49} =$$

Fraction Bars Mean Divide

Everything above the bar is grouped together. Everything below the bar is grouped together.

$$\frac{(2+5)^2 - (3)(4)}{2} =$$

$$\frac{(-2+8)^2 + 4(5)}{7} =$$

$$\frac{(10-4)^2 - \sqrt{36}}{6} =$$

$$\frac{7 - 2^2 + 15}{5} =$$

Order of Operations

$$(4 + 3)^2 - (2)(6) =$$

$$\frac{(2 + 3)^2 - (-1 + 11)^2}{5} =$$

$$8 + (3)(5) - 2^2 =$$

$$(6 - 2)^3 - (5)(9) =$$

$$(-3 + 9)^2 - (4)(5) =$$

$$(10 - 4)^2 - \sqrt{81} =$$

$$\sqrt{144} + 3^2 - (2)(7) =$$

$$2^5 - (3)(7) + (-4) =$$

Reducing Fractions

Divide the numerator and denominator by the same number until the fraction is reduced.

$$\frac{18}{24} =$$

$$\frac{45}{60} =$$

$$\frac{21}{28} =$$

$$\frac{63}{81} =$$

$$\frac{36}{48} =$$

$$\frac{72}{90} =$$

$$\frac{42}{56} =$$

$$\frac{84}{96} =$$

A fraction is reduced when the numerator and denominator have no common factor greater than 1.

Fractions

Adding and Subtracting Fractions

Like denominators: add or subtract the numerators.

$$\frac{3}{8} + \frac{1}{8} =$$

$$\frac{7}{10} - \frac{3}{10} =$$

Unlike denominators: make common denominators first.

$$\frac{1}{3} + \frac{1}{4} =$$

$$\frac{5}{6} - \frac{1}{4} =$$

$$\frac{2}{5} + \frac{1}{10} - \frac{1}{2} =$$

$$\frac{3}{4} - \frac{1}{6} + \frac{1}{12} =$$

Multiplying and Dividing Fractions

Multiply straight across. To divide, multiply by the reciprocal.

$$\frac{2}{3} \cdot \frac{9}{10} =$$

$$\frac{3}{5} \div \frac{9}{10} =$$

$$\frac{5}{8} \cdot \frac{4}{15} =$$

$$\frac{7}{12} \div \frac{14}{15} =$$

$$\frac{4}{9} \cdot \frac{3}{8} =$$

$$\frac{5}{6} \div \frac{10}{9} =$$

Finding a Fraction of a Number

The word “of” usually means multiply.

$$\frac{1}{12} \text{ of } 48 =$$

$$\frac{2}{3} \text{ of } 27 =$$

$$\frac{3}{4} \text{ of } 36 =$$

$$\frac{5}{8} \text{ of } 40 =$$

$$\frac{7}{10} \text{ of } 90 =$$

$$\frac{2}{5} \text{ of } 60 =$$

Exponents and Square Roots with Fractions

Apply the exponent or square root to the numerator and denominator.

$$\left(\frac{2}{3}\right)^2 =$$

$$\left(\frac{3}{4}\right)^3 =$$

$$\sqrt{\frac{36}{49}} =$$

$$\sqrt{\frac{81}{100}} =$$

$$\left(\frac{5}{6}\right)^2 =$$

$$\sqrt{\frac{16}{25}} =$$

Decimals

Adding and Subtracting

Line up the decimal points. Add zeros if it helps keep the place values lined up.

$$3.7 + 2.4 =$$

$$6.4 + 1.35 =$$

$$8.25 - 3.1 =$$

$$10.5 - 2.75 =$$

$$12.6 + 0.48 =$$

$$0.82 + 4.6 =$$

Multiplying

Use the multiplication fact first. Then place the decimal point.

$$0.6(7) =$$

$$0.9(8) =$$

$$1.2(4) =$$

$$2.3(6) =$$

$$0.8(0.5) =$$

$$0.4(0.7) =$$

Basic Division

$$4.8 \div 6 =$$

$$5.6 \div 8 =$$

$$7.2 \div 0.9 =$$

$$8.4 \div 1.2 =$$

$$0.63 \div 0.7 =$$

$$0.45 \div 0.5 =$$

Percents

Turn the percent into a fraction, reduce, then multiply.

$$12\% \text{ of } 300 =$$

$$25\% \text{ of } 80 =$$

$$15\% \text{ of } 200 =$$

$$40\% \text{ of } 60 =$$

$$250\% \text{ of } 300,000 =$$

$$125\% \text{ of } 48 =$$

Percent Applications

A \$400 television is 20% off. What is the sale price?

A house is now worth 250% of its original \$300,000 price. What is it worth now?

A \$250 item is 20% off. Then 8% sales tax is added to the sale price. What is the final cost?

A \$120 jacket is 25% off. Then another 10% is taken off the sale price. What is the final price?

Real Numbers

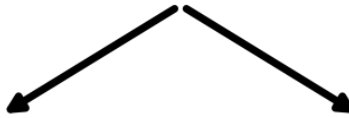
Irrational Numbers

Rational Numbers

Integer

Whole Numbers

Natural Numbers



Integer

Irrational

Natural

Rational

Whole

0

-5

$\frac{3}{4}$

0.6

$\sqrt{25} =$

$\sqrt{10}$

Integer

Irrational

Natural

Rational

Whole

$$\frac{100}{25}$$

$$\frac{-18}{6}$$

$$\frac{42}{56} =$$

$$\frac{\sqrt{144}}{3}$$

$$\sqrt{81}$$

$$\sqrt{50}$$