Middle School Math Reference Sheet

Fractions, decimals and percents

One quarter	**1/4 = 0.25 = 25%**
One half	**1/2 = 0.5 = 50%**
Three quarters	**3/4 = 0.75 = 75%**

To find a decimal, divide the numerator by the denominator. Percent means parts per hundred.

Fraction operations

Add or subtract	**a/c ± b/c = (a ± b) / c**
Multiply	**(a/b) × (c/d) = ac/(bd)**
Divide	**(a/b) ÷ (c/d) = ad/(bc)**

Find a common denominator for addition or subtraction. Denominators and divisors cannot be zero.

Signed numbers

Subtract	**a − b = a + (−b)**
Same-sign product	**(−3)(−4) = 12**
Opposite-sign product	**(−3)(4) = −12**

The same sign rules apply to division by a nonzero number.
Absolute value is distance from zero.

Ratios and unit rates

Unit rate	**rate = amount / quantity**
Example	**$12 ÷ 3 kg = $4 per kg**
Proportional relation	**y = kx**

Name the units and keep the ratios in the same order.
k is the rate per one unit of x.

Percents

Percent as a decimal	**p% = p / 100**
Part of a whole	**part = rate × whole**

Use the decimal form for the rate.
Example: 15% of 80 is 0.15 × 80 = 12.

Equations and inequalities

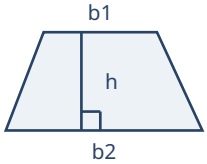
Undo addition	**x + 7 = 12; x = 5**
Undo multiplication	**4x = 18; x = 4.5**
Undo a negative factor	**−2x > 8; x < −4**

Apply the same operation to both sides.
Reverse an inequality when multiplying or dividing both sides by a negative.

Area of plane figures

Triangle	**A = ½bh**
Rectangle or parallelogram	**A = bh**
Trapezoid	**A = ½(b$_1$ + b$_2$)h**

Measure h perpendicular to the base.
The trapezoid bases are parallel.
Use square units.



Center and spread

Mean	**sum / count**
Median	**middle of the ordered data**
Range	**maximum − minimum**

For an even count, the median is the mean of the two middle values.
Example: 1, 4, 7, 8 has median 5.5.