

## ± Operations and signs

- ✓ Results:
  - **Sum:** addition
  - **Difference:** subtraction
  - **Product:** multiplication
  - **Quotient:** division
- ✓ **Subtracting is adding the negative:**  $-2 - 4 = -2 + (-4) = -6$
- ✓ Multiplying or dividing signs:
  - Two negatives make a positive
  - Mixed signs make a negative
- ✓ Ones and zeros:
  - $n \times 1 = n$  and  $n \div 1 = n$ ;  $n \times 0 = 0$
  - $0 \div n = 0$ : zero on top is OK
  - $n \div 0$  is **undefined**: zero on the bottom is no

## ☰ Order of operations: PEMDAS

- ✓ Parentheses, then Exponents
- ✓ Multiplication and Division, left to right
- ✓ Addition and Subtraction, left to right
- ✓  $(3 + 2 \div 2 \times 6 - 4) \times 3 = (3 + 6 - 4) \times 3 = 15$

## ☐ Factors and primes

- ✓ **Factor:** a whole number that divides another evenly; list them in pairs: 12 is  $1 \times 12$ ,  $2 \times 6$ ,  $3 \times 4$
- ✓ **Prime:** a whole number above 1 divisible only by 1 and itself: 2, 3, 5, 7, 11, 13 ...
- ✓ **Composite:** a whole number above 1 with more than two factors
- ✓ **Greatest common factor (GCF):** the largest factor two numbers share

## ≥ Inequalities

- ✓  $<$  less than,  $>$  greater than,  $\leq$  and  $\geq$  "or equal to"; the open side faces the larger number
- ✓ Solve like an equation, but **flip the sign when you multiply or divide by a negative**
- ✓  $-2x > 12$  gives  $x < -6$

## 📏 Units and probability

- ✓ 60 seconds = 1 minute; 60 minutes = 1 hour
- ✓ 12 inches = 1 foot; 3 feet = 1 yard
- ✓ **Probability** =  $\frac{\text{favorable outcomes}}{\text{possible outcomes}}$ , from 0 (impossible) to 1 (certain)
- ✓ 6 red and 4 blue marbles:  $P(\text{blue}) = \frac{4}{10} = \frac{2}{5} = 0.4 = 40\%$

## ÷ Fractions

- ✓  $\frac{\text{numerator}}{\text{denominator}} = \frac{\text{parts you have}}{\text{equal parts in the whole}}$
- ✓ **Add or subtract:** find a common denominator, then add the numerators:  $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$
- ✓ Multiplying the denominators always gives a common one, if not the least
- ✓ **Multiply** straight across:  $\frac{2}{3} \times \frac{1}{3} = \frac{2}{9}$
- ✓ **Divide:** keep, change, flip:  $\frac{1}{2} \div \frac{3}{4} = \frac{1}{2} \times \frac{4}{3} = \frac{4}{6} = \frac{2}{3}$
- ✓ **Simplify:** divide top and bottom by their GCF:  $\frac{14}{35} = \frac{2}{5}$
- ✓ **Improper fraction:** the numerator is greater than or equal to the denominator
- ✓ **Improper to mixed:** divide; the remainder goes over the denominator:  $\frac{17}{5} = 3\frac{2}{5}$
- ✓ **Mixed to improper:** denominator  $\times$  whole number + numerator:  $5\frac{3}{4} = \frac{23}{4}$

## ‰ Decimals and percents

- ✓ **Add or subtract:** line up the decimal points
- ✓ **Multiply:** ignore the points, then give the product as many decimal places as both factors together:  $3.25 \times 5.6 = 18.2$
- ✓ **Long division:** divide, multiply, subtract, bring down
  - $13 \div 4 = 3 \text{ r } 1$ , or add a point and zeros to keep going:  $5 \div 4 = 1.25$
- ✓ **Decimal to percent:**  $\times 100$  (point two places right); percent to decimal:  $\div 100$
- ✓ **Decimal to fraction:** by place value:  $0.25 = \frac{25}{100}$
- ✓ **Fraction to percent:** divide, then  $\times 100$ :  $\frac{3}{5} = 0.6 = 60\%$

| Fraction      | Decimal | Percent | Fraction       | Decimal | Percent |
|---------------|---------|---------|----------------|---------|---------|
| $\frac{1}{2}$ | 0.5     | 50%     | $\frac{1}{5}$  | 0.2     | 20%     |
| $\frac{1}{4}$ | 0.25    | 25%     | $\frac{1}{8}$  | 0.125   | 12.5%   |
| $\frac{3}{4}$ | 0.75    | 75%     | $\frac{1}{10}$ | 0.1     | 10%     |

## ☰ Word problems

- ✓ Five steps:
  - **Read** for what the question really asks
  - **Identify** what you are given
  - **Draw** it out
  - **Write** the equation, if you need one
  - **Solve**, and check the answer is what was asked
- ✓ **Ratios:** set up a proportion and cross-multiply: 4 cups flour to 3 sugar, with 16 flour:  $\frac{4}{3} = \frac{16}{x}$ ,  $x = 12$
- ✓ **"Each side":** adding 1 m to every side of a  $4 \times 6$  patio makes it  $6 \times 8$
- ✓ **Consecutive numbers:**  $x$ ,  $x + 1$ ,  $x + 2$