1. If $a$ is nonzero answer the following:
   (a) $a/1 = a$
   (b) $a/a = 1$ for $a \neq 0$
   (c) $0/a = 0$
   (d) $(-a)^2 = a^2$
   (e) $(-1)a + a = 0$
   (f) $(-a)^3 = -(a^3)$
   (g) $a^0 = 1$

2. Add, multiply and divide $5/3$ and $4/7$.
   \[
   \frac{5}{3} + \frac{4}{7} = \frac{35}{21} \quad \frac{5}{3} \cdot \frac{4}{7} = \frac{20}{21} \quad \frac{5}{4} = \frac{12}{7}
   \]

3. What is the prime factorization of 30?
   \[2 \cdot 3 \cdot 5 = 30\]

4. If $a < 0$ what is the absolute value of $a$?
   \[|a| = -a\]

5. Multiply $(2x - 3)(3x + 4)$.
   FOIL to get $6x^2 - x - 12$.

   \[(x + 3)(x - 3)\]

7. What is a function?
   A relationship between two sets called the domain and the co-domain such that each thing in the domain is related to exactly one thing in the co-domain.
8. What is the quadratic formula and what is it used for?
   If we have a second degree polynomial \( ax^2 + bx + c \) and we want to find the roots we use
   \[
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
   \]

9. If a circle has radius \( r \) what is the circle’s area and circumference?
   Area is \( A = \pi r^2 \), circumference is \( C = 2\pi r \).

10. If a right triangle has base \( b \) and height \( h \) what is the length of the hypotenuse and what is the area of the triangle? Use the Pythagorean Theorem to give the hypotenuse has length \( \sqrt{b^2 + h^2} \); we can use basic geometry to find that the area of the triangle is \( A = \frac{1}{2}bh \).

11. Solve \( x^2 + 5x + 4 = 0 \).
    We factor and get \( (x + 4)(x + 1) = 0 \) \( \iff \) \( x = -4 \) or \( x = -1 \).

12. If \( f(x) = x^2 + 2x - \pi^2 \), what is \( \sin(f(\pi)) \)?
    First we plug \( \pi \) into our function \( f \) to get \( f(\pi) = \pi^2 + 2\pi - \pi^2 = 2\pi \), then we plug \( 2\pi \) into the sine function to get \( \sin(f(\pi)) = \sin(2\pi) = 0 \).

13. If a line goes through the point \((2, 3)\) and has a slope of \(-1/3\) what is the equation of the line?
    Use the point slope formula to get \( y - 3 = -1/3(x - 2) \).

14. What are the domain and range of the function \( f(x) = x^2 \)?
    The domain of a function is the set of numbers that we are allowed to plug into a function without making the function do something bad (like divide by zero or take the square root of a negative number). The range of a function are the set of numbers that the function outputs. In this case the domain is the set of all real numbers and the range is the set of non-negative real numbers.

15. Multiply and divide 762 and 3 (i.e. what is \( 762 \cdot 3 \) and what is \( \frac{762}{3} \))?  
    Without using a calculator we use our multiplication and division algorithms to get \( 762 \cdot 3 = 2286 \) and \( \frac{762}{3} = 254 \)

16. Solve \( \frac{2}{3} + \frac{4}{x} = \frac{1}{2} \).
    Multiply both sides of the equation by 6\( x \) to clear out all fractions and we are left with \( 4x + 24 = 3x \Rightarrow x = -24 \).