Four Step Strategy

1. **Simplify the integrand if possible**: Use algebraic manipulation or trigonometric identities to simplify the integrand and make the method of integration clear.

2. **Look for a substitution**: Try to find some function $u = f(x)$ in the integrand whose differential $du = f'(x)\,dx$ also occurs, apart from a constant factor.

3. **Classify the integrand according to its form**:

   - *Trigonometric functions*: If f is a product of powers of sine and cosine, of tangent and secant, or of cotangent and cosecant, then we use the substitutions recommended in Section 8.2.

   - *Rational functions*: If f is a rational function, we use partial fraction decomposition.

   - *Integration by parts*: If f is a product of a power of x (or a polynomial) and a transcendental function (trigonometric, exponential, logarithmic), then we try integration by parts choosing u and dv appropriately. Remember that it also works on integrands of other forms as well.

   - *Radicals*: When radicals of a specific type appear, we use trigonometric substitutions.
     - If $\sqrt{x^2 - a^2}$ occurs, use $x = a\sec\theta$.
     - If $\sqrt{a^2 - x^2}$ occurs, use $x = a\sin\theta$.
     - If $\sqrt{x^2 + a^2}$ occurs, use $x = a\tan\theta$.
     - If $\sqrt[n]{ax+b}$ occurs (or more generally $\sqrt[n]{f(x)}$), use the rationalizing substitution $u = \sqrt[n]{ax+b}$ (or more generally $u = \sqrt[n]{f(x)}$).

4. **Try again**: Use some ingenuity to rewrite and/or manipulate the integrand. Remember that occasionally you will need to use several methods.