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// SOLUTION to example problem in ENGG 233 L02 Oct. 5, 2004
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#include <iostream>
using namespace std;

const double METERS_PER_INCH = 0.0254;

double get_meters();
// Prompt user to enter a positive number of meters, read the
// user's input from cin, and return that value.

void
convert(double meters,      // must be positive
        int& feet,        // will be set to number of feet in meters
        int& inches,      // number of inches left after computing feet
        bool& plus_a_half); // true means 1/2 inch left after computing inches
// Convert meters to nearest height in feet, inches, and half-inches.

void display(int feet, int inches, bool plus_a_half);
// Use cout to display height. Examples:
// display(5, 10, true) would show "5 feet, 10 and 1/2 inches"
// display(6, 2, false) would show "6 feet, 2 inches"

int main()
{
    double user_meters;
    int ft, in;
    bool half;
    user_meters = get_meters();
    convert(user_meters, ft, in, half);
    cout << "To the nearest half-inch, that is ";
    display(ft, in, half);
    cout << '.' << endl;
    return 0;
}

void
convert(double meters, int& feet, int& inches, bool& plus_a_half)
{
    // Find the whole numbers of feet and inches in meters.
    double total_inches = meters / METERS_PER_INCH;
    feet = int(total_inches) / 12;
    inches = int(total_inches) % 12;

    // Is there an extra 1/2 inch? Or should the number of inches be
    // rounded upwards?
    double inch_fraction = total_inches - 12 * feet - inches;
    if (inch_fraction < 0.25)
        plus_a_half = false;
    else if (inch_fraction < 0.75)
        plus_a_half = true;
    else {
        inches++;
        plus_a_half = false;
    }
}

void display(int feet, int inches, bool plus_a_half)
{
    cout << feet << " feet, " << inches;
    if (plus_a_half)
        cout << " and 1/2";
    cout << " inches";
}

double get_meters()
{
    double user_input = 0.0;
    cout << "Enter a positive number of meters"
        << " (such as 1.71 or 2 or 2.07):" << endl;
    cin >> user_input;
    cout << "Using a value of " << user_input << " meters ... " << endl;
    return user_input;
}

```