

```

import java.awt.*;

import java.awt.event.*;

public class Calculator extends Frame implements ActionListener {

    private TextField display;

    private Panel buttonPanel;

    private boolean isScientificMode = false;

    private double operand1 = 0;

    private String operator = "";

    public Calculator() {

        // Frame setup

        setTitle("Scientific Calculator");

        setSize(400, 500);

        setLayout(new BorderLayout());

        setResizable(false);

        // Display setup

        display = new TextField();

        display.setFont(new Font("Arial", Font.BOLD, 20));

        display.setEditable(false);

        add(display, BorderLayout.NORTH);

        // Buttons panel

        buttonPanel = new Panel();

        buttonPanel.setLayout(new GridLayout(5, 4, 5, 5));

        add(buttonPanel, BorderLayout.CENTER);
    }

```

```

// Add basic buttons initially
addBasicButtons();

// Menu setup for switching modes
MenuBar menuBar = new MenuBar();
Menu menu = new Menu("Mode");
MenuItem basicMode = new MenuItem("Basic Mode");
MenuItem scientificMode = new MenuItem("Scientific Mode");

basicMode.addActionListener(e -> {
    isScientificMode = false;
    updateButtons();
});

scientificMode.addActionListener(e -> {
    isScientificMode = true;
    updateButtons();
});

menu.add(basicMode);
menu.add(scientificMode);
menuBar.add(menu);
setMenuBar(menuBar);

// Close action
addWindowListener(new WindowAdapter() {
    public void windowClosing(WindowEvent e) {
        dispose();
    }
});

```

```
}
```

```
private void addBasicButtons() {
```

```
    buttonPanel.removeAll();
```

```
    String[] basicButtons = {
```

```
        "7", "8", "9", "/",
```

```
        "4", "5", "6", "*",
```

```
        "1", "2", "3", "-",
```

```
        "0", ".", "=", "+",
```

```
        "C", "√", "x²", "1/x"
```

```
    };
```

```
    for (String text : basicButtons) {
```

```
        Button button = new Button(text);
```

```
        button.setFont(new Font("Arial", Font.BOLD, 16));
```

```
        button.addActionListener(this);
```

```
        buttonPanel.add(button);
```

```
    }
```

```
    buttonPanel.revalidate();
```

```
    buttonPanel.repaint();
```

```
}
```

```
private void addScientificButtons() {
```

```
    buttonPanel.removeAll();
```

```
    String[] scientificButtons = {
```

```
        "sin", "cos", "tan", "log",
```

```
        "exp", "ln", "π", "C",
```

```
        "7", "8", "9", "/",
```

```
        "4", "5", "6", "*",
```

```
        "1", "2", "3", "-",
```

```
        "0", ".", "=", "+"
```

```

};

for (String text : scientificButtons) {
    Button button = new Button(text);
    button.setFont(new Font("Arial", Font.BOLD, 16));
    button.addActionListener(this);
    buttonPanel.add(button);
}
buttonPanel.revalidate();
buttonPanel.repaint();
}

```

```

private void updateButtons() {
    if (isScientificMode) {
        addScientificButtons();
    } else {
        addBasicButtons();
    }
}
}

```

@Override

```

public void actionPerformed(ActionEvent e) {
    String command = e.getActionCommand();
    try {
        if ("C".equals(command)) {
            display.setText("");
            operand1 = 0;
            operator = "";
        } else if ("=".equals(command)) {
            calculate();
        }
    }
}

```

```

    } else if ("+".equals(command) || "-".equals(command) || "*".equals(command) ||
"/".equals(command)) {
        operator = command;
        operand1 = Double.parseDouble(display.getText());
        display.setText("");
    } else if ("√".equals(command)) {
        double num = Double.parseDouble(display.getText());
        display.setText(String.valueOf(Math.sqrt(num)));
    } else if ("x²".equals(command)) {
        double num = Double.parseDouble(display.getText());
        display.setText(String.valueOf(Math.pow(num, 2)));
    } else if ("1/x".equals(command)) {
        double num = Double.parseDouble(display.getText());
        display.setText(String.valueOf(1 / num));
    } else if ("sin".equals(command)) {
        double num = Double.parseDouble(display.getText());
        display.setText(String.valueOf(Math.sin(Math.toRadians(num))));
    } else if ("cos".equals(command)) {
        double num = Double.parseDouble(display.getText());
        display.setText(String.valueOf(Math.cos(Math.toRadians(num))));
    } else if ("tan".equals(command)) {
        double num = Double.parseDouble(display.getText());
        display.setText(String.valueOf(Math.tan(Math.toRadians(num))));
    } else if ("log".equals(command)) {
        double num = Double.parseDouble(display.getText());
        display.setText(String.valueOf(Math.log10(num)));
    } else if ("exp".equals(command)) {
        double num = Double.parseDouble(display.getText());
        display.setText(String.valueOf(Math.exp(num)));
    } else if ("ln".equals(command)) {
        double num = Double.parseDouble(display.getText());

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        display.setText(String.valueOf(Math.log(num)));
    } else if ("π".equals(command)) {
        display.setText(String.valueOf(Math.PI));
    } else {
        display.setText(display.getText() + command);
    }
} catch (Exception ex) {
    display.setText("Error");
}
}

private void calculate() {
    try {
        double operand2 = Double.parseDouble(display.getText());
        double result = 0;

        switch (operator) {
            case "+":
                result = operand1 + operand2;
                break;
            case "-":
                result = operand1 - operand2;
                break;
            case "*":
                result = operand1 * operand2;
                break;
            case "/":
                if (operand2 == 0) {
                    throw new ArithmeticException("Division by zero");
                }
                result = operand1 / operand2;

```

```

        break;
    default:
        display.setText("Error");
        return;
    }

    display.setText(String.valueOf(result));
    operator = "";
    operand1 = result;
} catch (Exception ex) {
    display.setText("Error");
}
}

public static void main(String[] args) {
    Calculator calculator = new Calculator();
    calculator.setVisible(true);
}
}

```