

Building Java Programs, 4th Edition

Exercise Solutions

NOTE: Answers to exercises are considered a private resource for instructors. Please do not post these answers on a public web site. Other instructors assign these problems as homework and do not want the answers to become publicly available. Thank you.

Many exercises can be solved in more than one way. Some exercises have more than one solution shown.

Chapter 1

1.

```
public class Stewie {
    public static void main(String[] args) {
        System.out.println("////////////////////////");
        System.out.println("|| Victory is mine! ||");
        System.out.println("\////////////////////////////////////////");
    }
}
```

2.

```
public class Spikey {
    public static void main(String[] args) {
        System.out.println("  \\\");
        System.out.println("  \\\\"/>
```

3.

```
public class WellFormed {
    public static void main(String[] args) {
        System.out.println("A well-formed Java program has");
        System.out.println("a main method with { and }");
        System.out.println("braces.");
        System.out.println();
        System.out.println("A System.out.println statement");
        System.out.println("has ( and ) and usually a");
        System.out.println("String that starts and ends");
        System.out.println("with a \" character.");
        System.out.println("(But we type \"\" instead!)");
    }
}
```

4.

```
public class Difference {
    public static void main(String[] args) {
        System.out.println("What is the difference between");
        System.out.println("a ' and a \"? Or between a \" and a \\\"?");
        System.out.println();
        System.out.println("One is what we see when we're typing our program.");
        System.out.println("The other is what appears on the \"console.\"");
    }
}
```

5.

```
public class MuchBetter {
    public static void main(String[] args) {
        System.out.println("A \"quoted\" String is");
        System.out.println("'much' better if you learn");
        System.out.println("the rules of \"escape sequences.\"");
        System.out.println("Also, \"\" represents an empty String.");
        System.out.println("Don't forget: use \"\" instead of \" !");
        System.out.println("' is not the same as \"");
    }
}
```

6.

```
public class Meta {
    public static void main(String[] args) {
        System.out.println("public class Hello {}");
        System.out.println("    public static void main(String[] args) {}");
        System.out.println("        System.out.println(\"Hello, world!\");");
        System.out.println("    }");
        System.out.println("");
    }
}
```

7.

```
public class Mantra {
    public static void main(String[] args) {
        message();
        System.out.println();
        message();
    }
    public static void message() {
        System.out.println("There's one thing every coder must understand:");
        System.out.println("The System.out.println command.");
    }
}
```

8.

```
// This program prints a message multiple times using static methods.
public class Stewie2 {
    public static void main(String[] args) {
        System.out.println("////////////////");
        printVictory();
        printVictory();
        printVictory();
        printVictory();
        printVictory();
    }
    public static void printVictory() {
        System.out.println("|| Victory is mine! ||");
        System.out.println("////////////////////////////////");
    }
}
```

9.

```
// Draws an egg figure.
public class Egg {
    public static void main(String[] args) {
        System.out.println(" ");
        System.out.println(" / \");
        System.out.println("/  \");
        System.out.println("-'-\"'-\"'-\"'-\"");
        System.out.println("\\  /");
        System.out.println(" \\ /");
    }
}
```

10.

```
// Draws several egg figures.
public class Egg2 {
    public static void main(String[] args) {
        drawEgg();
        drawEgg();
        drawBottom();
        drawTop();
        drawLine();
        drawBottom();
    }
    public static void drawEgg() {
        drawTop();
        drawBottom();
        drawLine();
    }
    public static void drawTop() {
        System.out.println("      ");
        System.out.println(" /      \");
        System.out.println("/        \");
    }
    public static void drawBottom() {
        System.out.println("\      /");
        System.out.println(" \      /");
    }
    public static void drawLine() {
        System.out.println("-'-\"'-\"'-\"'-\"");
    }
}
```

11.

```
// Draws two rocket ship figures side-by-side.
public class TwoRockets {
    public static void main(String[] args) {
        printTop();
        printSquare();
        printLabel();
        printSquare();
        printTop();
    }
    public static void printTop() {
        System.out.println("  /\  /\");
        System.out.println(" /  \ /  \");
        System.out.println("/    \ /    \");
    }
    public static void printSquare() {
        System.out.println("+-----+ +-----+");
        System.out.println("|         | |         |");
        System.out.println("|         | |         |");
        System.out.println("+-----+ +-----+");
    }
    public static void printLabel() {
        System.out.println("|United| |United|");
        System.out.println("|States| |States|");
    }
}
```

12.

```
// This program prints a college "fight song" with verses and repetition.
// The code uses static methods for structure and to remove redundancy.
public class FightSong {
    public static void main(String[] args) {
        goTeamGo();
        System.out.println();
        bigVerse();
        bigVerse();
        goTeamGo();
    }

    public static void goTeamGo() {
        System.out.println("Go, team, go!");
        System.out.println("You can do it.");
    }

    public static void bigVerse() {
        goTeamGo();
        System.out.println("You're the best,");
        System.out.println("In the West.");
        goTeamGo();
        System.out.println();
    }
}
```

13.

```
// This program prints a pattern of starry figures.
public class StarFigures {
    public static void main(String[] args) {
        printFigure1();
        System.out.println();
        printFigure2();
        System.out.println();
        printFigure3();
    }

    public static void printFigure1() {
        printHorizontalBar();
        printX();
    }

    public static void printFigure2() {
        printHorizontalBar();
        printX();
        printHorizontalBar();
    }

    public static void printFigure3() {
        System.out.println(" *");
        System.out.println(" *");
        System.out.println(" *");
        printFigure1();
    }

    public static void printHorizontalBar() {
        System.out.println("*****");
        System.out.println("*****");
    }

    public static void printX() {
        System.out.println(" * *");
        System.out.println("  *");
        System.out.println(" * *");
    }
}
```

```
// This program prints a pattern of vaguely lantern-like figures.
// The code uses static methods for structure and to remove redundancy.
public class Lanterns {
    public static void main(String[] args) {
        figure1();
        System.out.println();

        lantern1();
        System.out.println();

        lantern2();
        System.out.println();
    }

    public static void figure1() {
        shortLong();
    }

    public static void lantern1() {
        shortLong();
        middle();
        longLine();
        shortLong();
    }

    public static void lantern2() {
        shortLong();
        shortLine();
        middle();
        middle();
        shortLine();
        shortLine();
    }

    public static void shortLong() {
        shortLine();
        System.out.println(" *****");
        longLine();
    }

    public static void shortLine() {
        System.out.println(" *****");
    }

    public static void longLine() {
        System.out.println("*****");
    }

    public static void middle() {
        System.out.println("* | | | | *");
    }
}
```

```
// This program prints a pattern of figures such as eggs and stop signs.
// The code uses static methods for structure and to remove redundancy.
public class EggStop {
    public static void main(String[] args) {
        egg();
        System.out.println();
        egg();
        line();
        System.out.println();
        stopSign();
        line();
        System.out.println();
    }
    public static void egg() {
        eggTop();
        eggBottom();
    }
    public static void eggTop() {
        System.out.println("      ");
        System.out.println(" /_____\\"");
        System.out.println("/          \");
    }
    public static void eggBottom() {
        System.out.println("\\      /");
        System.out.println("\\_____/");
    }
    public static void stopSign() {
        eggTop();
        System.out.println("|  STOP  |");
        eggBottom();
    }
    public static void line() {
        System.out.println("+-----+");
    }
}
}
```

```
// This program prints a memorable movie quote 1000 times.
public class Shining {
    public static void main(String[] args) {
        allWork3();
        allWork3();
        allWork3();
        allWork3();
        allWork3();
        allWork3();
        allWork3();
        allWork3();
        allWork3();
        allWork3();
    }
    public static void allWork3() {
        allWork2();
        allWork2();
        allWork2();
        allWork2();
        allWork2();
        allWork2();
        allWork2();
        allWork2();
        allWork2();
        allWork2();
    }
    public static void allWork2() {
        allWork1();
        allWork1();
        allWork1();
        allWork1();
        allWork1();
        allWork1();
        allWork1();
        allWork1();
        allWork1();
        allWork1();
    }
    public static void allWork1() {
        System.out.println("All work and no play makes Jack a dull boy.");
    }
}
```

Chapter 2

1.

```
double s0 = 12.0;
double v0 = 3.5;
double a = 9.8;
int t = 10;
double s = s0 + v0 * t + a * t * t / 2.0;
System.out.println(s);
```

2.

```
int number = 1;
int increment = 3;
for (int i = 1; i <= 10; i++) {
    System.out.print(number + " ");
    number = number + increment;
    increment = increment + 2;
}
System.out.println(); // to end the line
```

```
for (int i = 1; i <= 10; i++) {
    System.out.print(i * i + " ");
}
System.out.println(); // to end the line
```

3.

```
int n1 = 1;
int n2 = 1;
System.out.print(n1 + " " + n2 + " ");
for (int i = 3; i <= 12; i++) {
    int n3 = n1 + n2;
    n1 = n2;
    n2 = n3;
    System.out.print(n2 + " ");
}
System.out.println();
```

4.

```
for (int i = 1; i <= 4; i++) {
    for (int j = 1; j <= 5; j++) {
        System.out.print("*");
    }
    System.out.println();
}
```

5.

```
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= i; j++) {
        System.out.print("*");
    }
    System.out.println();
}
```

6.

```
for (int i = 1; i <= 7; i++) {
    for (int j = 1; j <= i; j++) {
        System.out.print(i);
    }
    System.out.println();
}
```

7.

```
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= 5 - i; j++) {
        System.out.print(" ");
    }
    System.out.println(i);
}
```

8.

```
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= 5 - i; j++) {
        System.out.print(" ");
    }
    for (int nums = 1; nums <= i; nums++) {
        System.out.print(i);
    }
    System.out.println();
}
```

9.

```
int count = 20;
for (int i = 1; i <= count; i++) {
    System.out.print("--");
}
System.out.println();
for (int i = 0; i < count / 2; i++) {
    System.out.print("_^-");
}
System.out.println();
for (int i = 1; i <= count; i++) {
    System.out.print(i % 10);
    System.out.print(i % 10);
}
System.out.println();
for (int i = 1; i <= count; i++) {
    System.out.print("--");
}
System.out.println();
```

10.

```
for (int i = 1; i <= 6; i++) {
    System.out.print("      |");
}
System.out.println();
for (int i = 1; i <= 6; i++) {
    for (int j = 1; j <= 10; j++) {
        System.out.print(j % 10);
    }
}
System.out.println();
```

11.

```
public class NumberOutput2 {
    public static final int COUNT = 6;
    public static final int INNER_COUNT = 10;
    public static void main(String[] args) {
        for (int i = 1; i <= COUNT; i++) {
            for (int j = 1; j <= INNER_COUNT - 1; j++) {
                System.out.print(" ");
            }
            System.out.print("|");
        }
        System.out.println();
        for (int i = 1; i <= COUNT; i++) {
            for (int j = 1; j <= INNER_COUNT; j++) {
                System.out.print(j % INNER_COUNT);
            }
        }
        System.out.println();
    }
}
```

12.

```
for (int i = 1; i <= 3; i++) {
    for (int j = 0; j <= 9; j++) {
        for (int k = 1; k <= 3; k++) {
            System.out.print(j);
        }
    }
    System.out.println();
}
```

13.

```
for (int i = 1; i <= 5; i++) {
    for (int j = 9; j >= 0; j--) {
        for (int k = 1; k <= 5; k++) {
            System.out.print(j);
        }
    }
    System.out.println();
}
```

14.

```
for (int i = 1; i <= 4; i++) {
    for (int j = 9; j >= 0; j--) {
        for (int k = 1; k <= j; k++) {
            System.out.print(j);
        }
    }
    System.out.println();
}
```

15.

```
public static void printDesign() {
    for (int line = 1; line <= 5; line++) {
        for (int dash = 1; dash <= -1 * line + 6; dash++) {
            System.out.print("-");
        }
        for (int number = 1; number <= 2 * line - 1; number++) {
            System.out.print(2 * line - 1);
        }
        for (int dash = 1; dash <= -1 * line + 6; dash++) {
            System.out.print("-");
        }
        System.out.println();
    }
}
```

16.

```
public class SlashFigure {
    public static void main(String[] args) {
        for (int line = 1; line <= 6; line++) {
            for (int i = 1; i <= 2 * line - 2; i++) {
                System.out.print("\\");
            }
            for (int i = 1; i <= -4 * line + 26; i++) {
                System.out.print("!");
            }
            for (int i = 1; i <= 2 * line - 2; i++) {
                System.out.print("/");
            }
            System.out.println();
        }
    }
}
```

17.

```
public class SlashFigure2 {
    public static final int SIZE = 4;
    public static void main(String[] args) {
        for (int line = 1; line <= SIZE; line++) {
            for (int i = 1; i <= 2 * line - 2; i++) {
                System.out.print("\\");
            }
            for (int i = 1; i <= -4 * line + (4 * SIZE + 2); i++) {
                System.out.print("!");
            }
            for (int i = 1; i <= 2 * line - 2; i++) {
                System.out.print("/");
            }
            System.out.println();
        }
    }
}
```

18.

```
overall algorithm:
    draw a horizontal line
    draw 3 lines of bars
    draw a line
    draw 3 lines of bars
    draw a line
how to draw a horizontal line:
    print a +
    print 3 = signs
    System.out.print("+");
    print a +
    print 3 = signs
    print a +
how to draw a line of bars:
    print a |
    print 3 spaces
    print a |
    print 3 spaces
    print a |
```