

Critical Thinking

1. a) List four legal identifier names.
b) List four illegal identifier names and explain why each is illegal.
2. a) In two statements, declare a variable named `numBeads` and assign it the value 5.
b) In one statement, declare a variable named `numBeads` and assign it the value 5.
3. a) What is the final value of `yourNumber` after the last statement executes?

```
int myNumber = 5;
int yourNumber = 4;
myNumber = yourNumber * 2;
yourNumber = myNumber + 5;
```

 b) What is the final value of `yourNumber` after the last statement executes?

```
int myNumber;
int yourNumber = 4;
myNumber = yourNumber + 7;
yourNumber = myNumber;
```
4. Determine the appropriate data type for each of the following values:
 - a) the number of basketballs in a department store.
 - b) the price of a basketball.
 - c) the number of players on a basketball team.
 - d) the average age of the players on a basketball team.
 - e) whether a basketball player has received a jersey or not.
 - f) the first initial of a basketball player's first name.
5. a) What is the difference between a primitive data type and an abstract data type?
b) What is the difference between a class and an object?
6. Assume a class named `Team` defines a sports team.
 - a) Methods define the actions in a class and typically include action words in their name. For example, `getTeamName` is a method name that returns the name of the team. List three more possible method names for the `Team` class.
 - b) List three possible object names of type `Team`.
7. The `java.util` package contains a class named `Random`. Write a statement that makes the `Random` class accessible to an application.
8. What is the value of each of the following expressions?
 - a) $5 + 7 - 3$
 - b) $10 * 2 - 3$
 - c) $10 * (2 - 3)$
 - d) $8 - 3 * 2$
 - e) $10 / 5 * 4$
 - f) $10 / 2 + 3$
 - g) $6 \% 3 + 4$
 - h) $12 \% 5 * 3$
 - i) $12 \% (5 * 3)$
9. What is the result of the following expression when `x` is 2005? When `x` is 1776? When `x` is 39?
 $(x/10)\%10$
10. Write each equation as a valid Java expression:
 - a) $A = lw$ (geometry)
 - b) $P = \frac{R - C}{N}$ (business)
 - c) $A = \frac{h(b_1 + b_2)}{N}$ (geometry)
 - d) $V = \frac{4}{3}\pi r^3$ (geometry)
 - e) $A = \frac{F + S + T}{3}$ (algebra)
 - f) $P = \frac{5F}{4d^2}$ (physics)
 - g) $A = P + Prt$ (business)
11. Using the following declarations, rewrite the statements to include the appropriate type casting, rounding where necessary. If type casting is not necessary, explain why.


```
int j = 5;
double k = 1.6;
int y;
double z;
```

 - a) `y = j * k;`
 - b) `z = j * k;`

- c) `z = k * k;`
 - d) `j = k;`
 - e) `k = j;`
 - f) `y = j + 3;`
12. Compare the way the `/` and `%` operators perform to the effects of type casting.
 13. Rewrite the statements below using the appropriate assignment operator:
 - a) `total = total + 10;`
 - b) `numStones = numStones - 1;`
 - c) `days = days % 24;`
 - d) `price = price * 1.2;`
 14. Determine if each of the following are better represented by a variable or a constant and then write declarations using appropriate data types and descriptive identifiers:
 - a) the number of votes received by an election candidate
 - b) the percentage of votes won by a candidate
 - c) the first, middle, and last initials of an election candidate
 - d) the year of the election
 15. Determine if each of the following segments of code contain a syntax error, logic error, or runtime error. Explain.
 - a) `duble salary;`
 - b) `int numHats`
 - c) `length == 12;`
 - d) `int test1 = 90;`
`int test2 = 85;`
`double avg;`
`avg = test1 + test2 / 2;`
 - e) `double x = 12;`
`double y = 0;`
`double z;`
`z = x / y;`
 - f) `double payCheck = 120.00;`
`NumberFormat money =`
`NumberFormat.getPercentInstance();`
`System.out.println(money.format(payCheck);`
 - d) Values typed by the user cannot be used in an application.
 - e) The Scanner class is part of a Java package.
 - f) The `+` operator has higher precedence than the `-` operator.
 - g) The `-` operator has lower precedence than the `%` operator.
 - h) `byte` is a keyword.
 - i) The identifiers `apple` and `Apple` are considered the same in Java.
 - j) Errors that violate the rules of Java are called semantic errors.

True/False

16. Determine if each of the following are true or false. If false, explain why.
 - a) An identifier can contain spaces.
 - b) Data of type `double` is sometimes referred to as floating point.
 - c) An abstract data type is also called a primitive data type.