

# AP CS Unit 4: Classes and Objects Exercises

Ask them to share what they see in code. // document

Questions 1 to 14 can be answered after covering the first 2 pages of notes.

1. Write what is displayed in the space provided.

```
public class Runner {
    public static void main(String[] args) {
        Thing w = new Thing();
        w.set(3);
        int num = w.get();
        System.out.println( num );

        Thing joe= new Thing( 12 );
        joe.set( -5 );
        num = joe.get();
        System.out.println( num );
    }
}
```

8

7

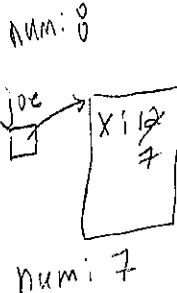
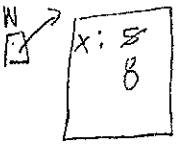
```
public class Thing{
    private int x; // instance variable

    public Thing() { // constructor, no param
        x = 5;
    }

    public Thing( int n) { // constructor, one param
        x = n;
    }

    public int get() {
        return x;
    }

    public void set( int h) {
        x = x + h;
    }
}
```



Given that the code to the right compiles,

2. The first line of the Arg class constructor is:

- a) public Arg()
- b) public void Arg( int a, int b );
- c) public Arg( int a, int b )

3. The first line of the avast method is:

- a) public avast()
- b) public void avast()
- c) public void avast( int x )

4. The first line of the parrot method is:

- a) public void parrot ( double x )
- b) public double parrot ()
- c) public void parrot ( int x )
- d) public int parrot ( )

5. The first line of the ayeMatey method is:

- a) public int ayeMatey( double x )
- b) public int ayeMatey()
- c) public int ayeMatey( int x )
- d) public void ayeMatey()

```
public class PirateRunner {
    public static void main(String[] args) {
        Arg g = new Arg( 5, 6 );
        g.avast();
        g.parrot( 4.78 );
        int x = g.ayeMatey();
        System.out.println( x );
    }
}
```

← no param, not returning a value!  
 ← not returning a value double input  
 ← returning int, input is int (param)

roo →

```
a: 3 7
b: 7 3
```

please add documentation for methods!

n: 15

n:

6. Write what is displayed in the space provided.

```
public class Bunny {
    public static void main(String[] args) {
        Rumpus roo = new Rumpus(3, 7);
        int n = roo.clang(5);
        System.out.println(n);
        roo.roar();
        n = roo.get();
        System.out.println(n);
    }
}
```

7. In the Rumpus class, name all the:

parameters: n1, n2, k  
 instance variables: a, b  
 local variables: c, n

```
public class Rumpus{
    private int a, b;

    public Rumpus ( int n1, int n2 ) {
        a = n1;
        b = n2;
    }

    public int clang( int k ) {
        int n = a + b + k;
        return n;
    }

    public void roar() {
        int c = a;      c: 3
        a = b;          a: 7
        b = c;          b: 3
    }

    public int get(){
        return a;
    }
}
```

8. Assuming the code compiles, select the TRUE statement(s).

- This is a method. *kind of*
- This is a constructor.
- The name of the class is Superman.
- There is not enough information to determine the name of the class.

```
public Superman( int x, int y ) {
    double w = x + y;
    v = w;
}
```

9. Name the following (if none, write "none")

The parameter(s). x y  
 The instance variables(s). v ← have to be defined up higher in the class  
 The local variable(s). w

10. The Apple class has at least how many different constructors? 2

11. What does the spit method probably return? nothing

12. What does the eat method return? int

13. In the last line, what does the mmm method return?

might be a string?

probably an int since we know there is an int instance var

// code inside the main method

```
Apple core = new Apple(8);
core.spit();
Apple sauce = new Apple();
int x = sauce.eat(71);
System.out.println(core.mmm());
```

if you print an object, you get strange stuff

<p>14. In the main method below, do the following:</p> <ul style="list-style-type: none"> <li>- create a Box object 2 ft wide by 6 ft long</li> <li>- call the getArea method and display the result</li> <li>- call the makeBigger method and double the dimensions of the box</li> <li>- call the getPerimeter method and display the result</li> </ul> <pre> public class TestBoxes {     public static void main(String[] args) {         Box myBox = new Box(6, 2);         int myArea = myBox.getArea();         System.out.println("Area of my box is: " + myArea);         myBox.makeBigger(2.0);         double myPerim = myBox.getPerimeter();         System.out.println(" " + myPerim);     } } </pre>	<pre> public class Box {     private double len, width;      public Box( double ln, double w ) {         len = ln;         width = w;     }      public double getArea() {         return len * wid;     }      public double getPerimeter () {         double p = 2.0*(len + width);         return p;     }      public void makeBigger( double percent ){         len = percent * len;         width = percent * width;     } } </pre>
--	---

<p>15. What does this display?</p> <p><u>true, false, true</u></p>	<p><u>1</u></p> <p>1 2 3 4</p>	<pre> boolean b = false; for ( int n = 1; n &lt; 4; n++ ){     b = !b;     System.out.print( b + " "); } </pre>
--	--	---

<p>16. The Banana class has at least how many different constructors? <u>1 that we can see</u></p> <p>17. What does the remove method return? <u>boolean</u></p> <p>18. Write the header for the eat method in the space below:</p> <pre>public void eat (int time)</pre> <p>19. Write the header for the add method in the space below:</p> <pre>public void add (Banana b)</pre>	<p>// code inside the main method</p> <pre> Banana peel = new Banana(); Banana split = new Banana(); if ( peel.remove() )     peel.eat( 32 ); split.add( peel ); </pre>
--	---

Note. Java uses "short circuit evaluation" (aka "minimal evaluation") when evaluating compound boolean expressions. If the first part of an AND statement is false, java does not evaluate the second expression because it does not matter. Similarly, if the first part of an OR statement is true, then the second statement is ignored.

<p>20. This compiles and runs. What is displayed?</p> <p><u>false</u></p>	<pre> boolean b = !(10 &gt; 15 &amp;&amp; 8 &lt; 12); boolean c = 66 != 88    -5 &lt;= -3; System.out.print( b &amp;&amp; !c); </pre>
---	---

T F 3

$$c = 66 \neq 88 \quad || \quad -5 \leq -3$$

$$F \quad || \quad T$$

$$c = T$$

true

Note. The following generates a run-time error

```
int a = 6;
int b = a / 0; // java.lang.ArithmeticException: division by zero
```

Though this code runs:

```
double a = 6;
double b = a / 0.0;
System.out.print( b ); // prints Infinity
```

my guess is that this is not pure 0 prob a very very small #

We will not discuss why dividing a double by 0.0 yields Infinity.

What the foci? bc 0.0 is not actually zero when stored.

21. If x = 0 and y = 6, what is displayed? B 2nd bit not executed, cool!	int x, y; // x and y are assigned values
22. If x = 0 and y = -3, what is displayed? failure, ArithmeticException	if (y < x && 10 / x > 0) System.out.println( "A" ); else if ( Math.sqrt( x ) < 1    y > 5 ) System.out.println( "B" );
23. If x = -4 and y = 8 C Returns NaN if Math.sqrt(neg)	else System.out.println( "C" );

i ran this, very weird.

24. What is displayed? 6	String s = "ok go!"; // one space between words System.out.println( s.length() ); < gives int length, # chars
25. What is displayed? 0	System.out.println( "animal".indexOf( "a" ) );
26. What is displayed? 4	System.out.println( "animal".indexOf( "a", 1 ) );
27. What is displayed? 3	String s = "Havana"; System.out.println( s.indexOf( "a", 3 ) );
28. What is displayed? 2 2 2 3 -1	String s = "floor"; for ( int n = 0; n < s.length(); n++ ) System.out.print( s.indexOf( "o", n ) );
29. What is displayed? case matters 15	String s = "The theater is the best." System.out.println( s.indexOf( "the" ) );

0  
1  
2

30. What is displayed? 5	String s = "The theater is there"; int n = 0, loc = 0; do { loc = s.indexOf( "e", loc ); if ( loc >= 0 ) { loc++; n++; } } while ( loc != -1 && loc < s.length() ); System.out.println( n );
-----------------------------	---

you is kind, you is smart, you is important

n	loc	s.length()
0	0	20
1	2	
2	8	
3	6	
4	7	
5	9	
	10	
	11	
	13	
	14	
	20	

31. What is displayed? rway	String s = "doorway".substring( 3 ); System.out.println( s );
32. What is displayed? ple	String s1 = "apple"; s1 = s1.substring( 2 ); System.out.println( s1 );
33. What is displayed? apple Strings are immutable.	String s1 = "apple"; s1.substring( 2 ); ← must assign to new string or reassign. (rewrite) System.out.println( s1 );
34. What is displayed? so od da	String s = "soda"; for ( int n = 0; n <= 2; n++ ) System.out.println( s.substring( n, n + 2 ) );
35. What is displayed? e pe ape	String s = "ape"; for ( int n = 2; n >= 0; n-- ) System.out.print( s.substring( n ) );
36. What is displayed? a) gr8 b) GR8 c) Gr8 d) GR*	String s1 = "gr8"; s1.toUpperCase(); System.out.println( s1 );
37. In the string literal, there are 2 spaces before the first word, one space between the words, and 2 spaces after the second word. What is displayed? 11 7	String s1 = " one dog "; String s2 = s1.trim(); System.out.println( s1.length() ); System.out.println( s2.length() );
38. What is displayed? 0	String s1 = ""; blank char int n = s1.length(); System.out.println( n );
39. What is displayed? null ptr exception	String s1 = null; int n = s1.length(); System.out.println( n );
40. This compiles and runs but if the user enters hi, the response is ? What is wrong with the if statement? ? it should say : if ( answer.equals( s ) )	import java.util.Scanner;  public class Problem { public static void main( String[] args ) { String s = "hi"; Scanner sara = new Scanner( System.in ); System.out.println( "Say something." ); String answer = sara.nextLine(); if ( answer == s ) System.out.println( "You said hi!" ); else System.out.println( "?" ); } }

5  
this compares the ref ptr not the string values

The cow said "mooo". 1 character

41. What is displayed?

$\frac{n}{0} \quad \frac{l}{0}$   
 4      length is 20!

```
String s = "The cow said 'mooo'";
int n = 0;
for (int i = 0; i < s.length(); i++) {
    String sub = s.substring(i, i+1);
    if (sub.equals("o"))
        n++;
}
System.out.println(n);
```

42. This code should count the number of times that "the" appears in s. It compiles but throws the following runtime exception:  
 StringIndexOutOfBoundsException  
 What does this mean and how do we fix the code?  
 make sure to not try and access past the length of String.  
 n = 3      when i is 18, the end is 21 which means it will look thru 20 but we go from 0--19

```
String s = "the withered breathe";
int n = 0;
for (int i = 0; i < s.length(); i++) {
    String sub = s.substring(i, i+3);
    if (sub.equals("the"))
        n++;
}
System.out.println(n);
```

$\frac{n}{0} \quad \frac{l}{2}$   
 1 + 2

43. What is displayed?

15

44. In general terms, what does this code do?

counts spaces that follow letters

```
String s = "That was great, Squidward! ";
s += "All those wrong notes you played ";
s += "made. it sound more original. ";
s = s.trim();
↑ remove in s.trim();

int count = 1;
int pos = 0;
while (pos < s.length()) {
    pos = s.indexOf(" ", pos);
    if (pos > 0) {
        String temp = s.substring(pos-1, pos);
        if (!temp.equals(" ")) {
            count++;
        }
        pos++;
    } else
        break;
}

System.out.println(count);
```

count	pos	s.length()
1	0	62
2	4	
3	5	
4	8	
5	9	
	15	
	16	
	26	