Unit 3 Activity 1

```
package hola;
public class Hola {
   public static void main(String[] args) {
     System.out.println("Hola bafethu");
   }
}
```

Unit 3 Activity 2

```
package playwithoutput;
public class PlayWithOutput {
    public static void main(String[] args) {
        System.out.println("I am a Java program!");
        System.out.println();
        System.out.println("Hola bafethu");
        System.out.println("How are you?");
        System.out.println("I can do mathematics");
        System.out.println("6 + 4 = " + 6 + 4);
        System.out.println("6 + 4 = " + (6 + 4));
        System.out.println("*********************");
    }
}
```

Unit 3 Activity 5

```
package greetme;
import java.util.Scanner;
public class GreetMe
{ // begin class
   public static void main(String[] args)
   { // begin main method
      Scanner keyboard = new Scanner(System.in);
      String sName; //declare a variable
      System.out.print("What is your name?");
      sName = keyboard.nextLine();
      System.out.println("Dumela " + sName);
   } // end main method
}  //end class
```

Unit 3 Activity 6

```
package nameandage;
import java.util.Scanner;
public class NameAndAge
{ // begin class
   public static void main(String[] args)
   { // begin main method
      Scanner keyboard = new Scanner(System.in);
      String sName;
      int iAge;
      System.out.print("What is your name? ");
```

```
        sName = keyboard.nextLine();
        System.out.print("How old are you? ");
        iAge = keyboard.nextInt();
        System.out.println("Dumela " + sName + ", you are " + iAge +
                             " years old.");
    } // end main method
}  //end class
```

Unit 3 Activity 7a) CalculateAverage

```java
package calculateaverage;

import java.util.Scanner;
public class CalculateAverage
{ //start class
   public static void main(String[] args)
   { //start main method
       Scanner keyboard = new Scanner(System.in);
       //declare variables
       String sStudentName;
       int iPPA,iCOH,iCFA;
       double rAverage;
       //input
       System.out.print("Enter the name of the student: ");
       sStudentName = keyboard.nextLine();
       System.out.print("Enter the marks for PPA: ");
       iPPA = keyboard.nextInt();
       System.out.print("Enter the marks for COH: ");
       iCOH = keyboard.nextInt();
       System.out.print("Enter the marks for CFA: ");
       iCFA = keyboard.nextInt();
       //processing
       rAverage = (iPPA + iCOH + iCFA )/3;
       //output
       System.out.println("In the three tests conducted " + sStudentName +
                         " scored an average of " + rAverage + "%");
   } //end main method
} //end of the class
```

Unit 3 Activity 7b) PoolDimentions

```java
package pooldimentions;


import java.util.Scanner;
public class PoolDimentions
{ //start class
   public static void main(String[] args)
   { //start main method
      Scanner keyboard = new Scanner(System.in);
      //declare variables
      String sPoolName;
      double rLength, rWidth, rPerimeter, rArea;
      System.out.println();
      //Prompt the user to provide the Name of the pool used
      System.out.print("Which pool are you interested in? ");
      //Read the name from the keyboard and store it in variable sPoolName
      sPoolName = keyboard.nextLine();
      System.out.println();
      //Prompt the user to enter the length of the pool
      System.out.print("What is its Length? ");
      //Read the length from the keyboard and store it in variable rLength
      rLength = keyboard.nextDouble();
      System.out.println();
      //Prompt the user to enter the Width of the pool
      System.out.print("What is its Width?");
      //Read the length from the keyboard and store it in variable rWidth
      rWidth = keyboard.nextDouble();
      System.out.println();
      //Perform the calculations
      rPerimeter = 2 * (rLength + rWidth);
      rArea = rLength * rWidth;
      //Display the Answers
      System.out.println("The Perimeter of " + sPoolName + " is " +
                    rPerimeter + " meters, and its Area is " +
                    rArea + " square meters");
   } //end main method
} //end of the class
```

Unit 3 Activity 8a) ConvertDistance

```
ConvertDistance // the class name
begin //start of the class
   main method
      begin //main method
      display "How many Kilometers did you cover today? "
      enter iKilometer
      iMeter = iKilometer * 1000
      iCentimeter = iMeter * 100
      display "Today you covered an equivalent of " + iMeter + " m"
      display "This is also equivalent to " + iCentimeter + " cm"
         end //main method
end //end of the class
```

Unit 3 Activity 8b) CalculateSalary

```
CalculateSalary // the class name
begin //start of the class
   main method
   begin //main method
      //declare variables
      String sAssistantName
      double rSalary, rRate
      int iHourWorked
      //Input
      display " Please provide the name of the Assistant: "
      enter sAssistantName
      display "Please provide the hours worked: "
      enter iHourWorked
      display "Please provide the pay per hour: "
      enter rRate
      //Calculate the salary
      rSalary = iHourWorked * rRate
      // Display the Salary
      display " For this month, " + sAssistantName +
            " will earn a total of R " + rSalary
   End //main method
End //end of the class
```

Unit 3 Activity 11: Determine the best data type
Which data type is the most appropriate for the following variables' values?

Variables descriptions	Data types						
	byte	short	int	long	float	double	char
The interest rate is 13.50					x		
5000 registered students		x					
The number of meters is 1 274 367 851			x				
The number of tickets sold is 5	x						
The change is R45.50					x		
The answer is the square root of 500					x		
The class group is H							x
The weight is 10	x						

Unit 3 Activity 12: Valid / suitable identifiers

Type and Name	Valid? ✓/✗	motivation & suggestion	Suitable? ✓/✗	motivation & suggestion
variable iNum&Litres	✗	A variable name may not contain a special character other than an underscore.	N/A	N/A
variable iHours	✓		✓	
Class Hours	✓		✓	
Class Class	✗	An identifier name may not be a Java keyword	N/A	N/A
variable price 2	✗	The variable name should be one word	N/A	N/A
variable payRate	✓		✗	The additional convention is to let the first letter be an indication of the data type stored in a variable
method print Ln	✗	The method println is in one word	N/A	
method nextInt	✓		✓	

| class | ✓ | | ✗ | The convention is to start the name of a class with a capital letter |
| rands | | | | |

Unit 3 Activity 13 Declare and initialize variables

1. Translate the following lines into Java code:

   a) Declare an integer variable called iDistance with an initial value 100.

   ```
   int iDistance = 100;
   ```

   b) Declare and initialize a double variable called rValue to 1.406.

   ```
   double rValue = 1.406;
   ```

   c) Declare a Boolean variable bAnswer and set the value of the variable to true.

   ```
   boolean bAnswer= true;
   ```

2. Which of the following is an invalid assignment statement?

   a) iTotal=9;

   b) 75.00=price;

   //Invalid. Variable name should be on the left-hand side of the assignment operator.

   c) cAns='N';

   d) iSum=150;

3. Fix all the errors in the following code:

```
public class Test
{
pablic statics void main(string[] args)
public statics void main(String[] args)
{
iAge = 52 ;
int iAge = 52;
int iGift = iAge * 5
int iGift = iAge * 5;

System.Out.printline("Your gift is R" + Gift);
System.out.println("Your gift is R" + iGift);

}
}
```

Unit 3 Activity 14: Calculate age this year (Class name CalculateAge)

Data type of variable	Variable name	What value will be stored in thevariable	Is it an input/intermediate / output variable
int	iThisYear	Date of current year e.g. 2020	input
int	iBirthYear	Year the person was born, e.g. 1995	input

int	iAge	Age the person will become in the current year.	output

```
package calculateage;
import java.util.Scanner;
public class CalculateAge
{ //start class
    public static void main(String[] args)
    { //start main method
        Scanner keyboard = new Scanner(System.in);
        int iThisYear, iBirthYear, iAge;
        System.out.print("Please enter the current year: ");
        iThisYear = keyboard.nextInt();
        System.out.print("Please enter your birth year: ");
        iBirthYear = keyboard.nextInt();
        iAge = iThisYear - iBirthYear;
        System.out.println("By the end of this year, you will be " + iAge +
                        " years old.");
    } //end main method
} //end class
```

Unit 3 Activity 15 Library fine (Class name LibraryFine)

Data type of variable	Variable name	What value will be stored in thevariable	Is it an input/intermediate / output variable
double	AMT_BOOK_DAY	Fine per book per day	constant
int	iNumBooks	Number of books the student had	input
int	iNumdays	Number of days the books are late	input
double	rFine	The fine the student should pay	output

```
package libraryfine;
import java.util.Scanner; // Scanner is in the java.util package
public class LibraryFine //A new class called LibraryFine is created
{ //start class
    public static void main(String[] args)
    { //start main method
        Scanner input = new Scanner(System.in);

        //Declare variables and constant values
        int iNumBooks, iNumdays;
        double rFine;
        final double AMT_BOOK_DAY = 0.5;
```

```
        //Input
        System.out.print("How many books:");
        iNumBooks = input.nextInt();
        System.out.print("How many days late:");
        iNumdays = input.nextInt();

        //Processing
        rFine = iNumBooks * iNumdays * AMT_BOOK_DAY;

        //Display the cost on the screen
        System.out.println("The fine is: R " + rFine);
    } //end main method
} //end class
```

Unit 3 Activity 16 Calculate phone call cost Class name PhoneCallCost)

Data type of variable	Variable name	What value will be stored in the variable	Is it an input/intermediate / output variable
int	FIRST_MIN	The number of minutes that has a standard cost.	constant
double	FIRST_COST	Cost for the first number of minutes.	constant
double	REM_COST	Cost of the remaining minutes each.	constant
double	rDuration	Duration of the phone call.	input
double	rRemMin	Number of minutes above the standard cost minutes.	intermediate
real	rCostRem	Amount to pay for the remaining minutes.	intermediate
real	rTotalCost	Total amount to pay.	output

```
package phonecallcost;
import java.util.Scanner;
public class PhoneCallCost
{ //start class
    public static void main(String[] args)
    { //start main method
        Scanner input = new Scanner(System.in);

        // Declare constant values
        final int FIRST_MIN = 3;
        final double FIRST_COST = 0.5;
        final double REM_COST = 0.15;
        //Declare variables
        double rDuration, rRemMin, rCostRem, rTotalCost;
```

```
        //Prompt the user to enter the duration of the call
        System.out.print("Duration of call: ");
        rDuration = input.nextDouble();

        //Calculate the remaining minutes
        rRemMin = rDuration - FIRST_MIN;
        //Calculate the cost for the remaining minutes
        rCostRem = rRemMin * REM_COST;
        //Calculate cost for total call
        rTotalCost = FIRST_MIN * FIRST_COST + rCostRem;

        //Display the total cost on the screen
        System.out.println("The total cost is: R " + rTotalCost);
    } //end main method
} //end class
```

Unit 3 Activity 17: Calculate wages (class name CalculateWages)

Data type of variable	Variable name	What value will be stored in the variable	Is it an input/intermediate / output variable
int	FIRSTHOURS	The number of hours that pays a standard amount.	constant
double	BASE	Amount paid for the first hours (standard amount)	constant
double	PERC_INC	% by which base salary will be increased for hours more than the first hours.	constant
double	TAX_PERC	% tax to be paid	constant
double	rHoursWorked	Number of hours worked	input
double	rOtherHours	Number of hours more than the base (first hours)	intermediate
double	rGrossWage	Total amount earned before tax deducted	output
double	rTax	Amount of tax to be paid	intermediate
double	rNett	Amount earned after tax is deducted	intermediate

```
package calculatewages;
import java.util.Scanner;
public class CalculateWages {
    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);

        //Declare constant values
```

```
        final int FIRSTHOURS = 5;
        final double BASE = 100.0;
        final double PERC_INC = 15.0;
        final double TAX_PERC = 22.5;

        //Declare variables
        double rHoursWorked, rOtherHours, rGrossWage, rTax, rNett;

        //Input
        System.out.print("Please enter number of hours worked: ");
        rHoursWorked = keyboard.nextDouble();

        //Processing
        rOtherHours = rHoursWorked - FIRSTHOURS;
        rGrossWage = FIRSTHOURS * BASE +
                        BASE * (1 + PERC_INC/100) * rOtherHours;
        rTax = (TAX_PERC / 100) * rGrossWage;
        rNett = rGrossWage - rTax;

        //Output
        System.out.println("Gross wage: R" + rGrossWage);
        System.out.println("Tax: R" + rTax);
        System.out.println("Amount earned: R" + rNett);
    }
}
```

Unit 3 Activity 18: Contractor fees (class name ContractorFees)

Data type of variable	Variable name	What value will be stored in the variable	Is it an input/intermediate / output variable
double	LABOUR_SQ_M	The cost for labout to install 1 m^2 of tiles.	constant
double	DEPOSIT_PERC	The % deposit to pay.	constant
double	rLength	Length of the room to be tiled.	Input and output
double	rWidth	Width of the room to be tiled.	Input and output
double	rArea	Area of the room to be tiled	Output
double	rCost	Labour cost.	Output
double	rDeposit	The amount to pay as deposit.	Output
double	rBalance	The balance to be paid when the job is done.	Output

```
package contractorfees;
```

```java
import java.util.Scanner;
public class ContractorFees {
    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);
        //Declare constants
        final double LABOUR_SQ_M = 65.45;
        final double DEPOSIT_PERC = 10.0;
        //Declare variables
        double rLength, rWidth, rArea, rCost, rDeposit, rBalance;
        //Input
        System.out.print("Length of room in meters: ");
        rLength = keyboard.nextDouble();
        System.out.print("Width of room in meters: ");
        rWidth = keyboard.nextDouble();

        //Processing
        rArea = rLength * rWidth;
        rCost = LABOUR_SQ_M * rArea;
        rDeposit = DEPOSIT_PERC/100 * rCost;
        rBalance = rCost - rDeposit;

        //Output
        System.out.println("The room is " + rLength + " x " + rWidth);
        System.out.println("Area " + rArea + " square meters");
        System.out.println("Total cost: R"+ rCost);
        System.out.println("Deposit : R" + rDeposit);
        System.out.println("Balance: R" + rBalance);
    }
}
```

Unit 3 Activity 19: Food cost (class name EatALot)

```java
package eatalot;
import java.util.Scanner;
public class EatALot {
    public static void main(String[] args) {
        Scanner kb = new Scanner(System.in);
        final double PLATE = 1.05; //plate weighs 1.05 kg
        final double FOOD_UNIT = 100.0; //cost is calculated per 100g food
        final double COST_PER_UNIT = 7.35; //R7.35 per 100 g
        final double VAT_PERC = 0.15; //VAT % in South Africa in 2021
        double rFoodPlate, rFoodOnly, rCostFood, rAmtPay;
        //input
        System.out.print("Weight of food plus plate in kg: ");
        rFoodPlate = kb.nextDouble();
        //processing
        rFoodOnly = rFoodPlate - PLATE;
        rCostFood = COST_PER_UNIT * rFoodOnly * 1000/100;
        rAmtPay = rCostFood + rCostFood * VAT_PERC;
        //output
        System.out.println("Weight of food: " + rFoodOnly + " kg");
        System.out.println("Amount to pay R" + rAmtPay);
    }
}
```

}

Unit 3: Activity 22 Translate Math to Java and vice versa

Mathematical equation	Java assignment statement
$percentageIncrease = \dfrac{New - Old}{Old} \times 100$	`rPercIncrease = (rNew - rOld)/rOld * 100;`
$result = \dfrac{2(x + 3y)}{2x - 3y}$	`rResult = 2*(rX + 3*rY) / (2*rX - 3*rY);`
$result = 2a - \dfrac{ab}{a + b} \div \dfrac{b}{b - 1}$	`rResult = 2*rA - rA*rB / (rA + rB) / (rB / (rB - 1));`

Important! Note the parentheses.

```
public static void main(String[] args) {
    double rA = 5.0, rB = 6.0;
    double rResult1 = 2 * rA - rA * rB / (rA + rB) / (rB / (rB - 1));
    double rResult2 = 2 * rA - rA * rB / (rA + rB) / rB / (rB - 1);
    System.out.println(rResult1);
    System.out.println(rResult2);
}
```

```
7.7272727272727275
9.909090909090908
```

Mathematical equation	Java assignment statement
$AgeA = 3(AgeB - 10)$	`iAgeA = 3 * (iAgeB - 10);`
$weeklyWage = dailyWage \times noDays$	`rWeeklyWage = rDailyWage * iNoDays;`
$z = 2a(ab - \dfrac{a}{b - 2})$	`rZ = 2*rA * (rA * rB - rA / (rB - 2));`
$z = \dfrac{x}{2x - 3y} + 6y$	`rZ = rX / (2 * rX - 3 * rY) + 6 * rY;`
$z = 3xy + \dfrac{xy}{y - 2y} - 2y$	`rZ = 3 * rX * rY + rX * rY / (rY - 2 * rY) - 2 * rY;`

Unit 3: Activity 23 Predict results of \ and MOD operators

1. Fill in the blanks:

int result = 10 / 3;	// result will be ___**3**___	int iNumSweets = 35;
		int iNumChildren = 4;
		int iNumEach = iNumSweets / iNumchildren;
		int iNumLeft = iNumSweets % iNumchildren;
			iNumEach = ___**8**___
			iNumLeft = ____**3**____

int result = 10 % 3;	// result will be ___**1**___		
int result = -10 / 3;	// result will be ___**-3**___		
int result = 3 % 10;	// result will be ___**3**___		

int result = 11 % 3 % 2;	// result will be ___**0**___	int iMinutes = 112;
		int iHours = iMinutes / 60;
		int iRemMinutes = iMinutes % 60;
			iHours = ___**1**___
			iRemMinutes __**52**__

double result = 10.0 / 5 / 4;	// result will be ___**0.5**___		
double result = 1.5 / 0.5;	// result will be ___**3.0**___		
double result = 12 % 2.5;	// result will be ___**2.0**___		

2. Predict the exact output of the following program

```
public class CapeToCairo
{ //start class
        public static void main(String[] args)
        { //start main method
                int iTime = 588224; // time in seconds, to drive from Cape Town to Cairo

                int iSeconds = iTime % 60;        // iSeconds will be _____44_____ seconds
                iTime = iTime / 60;               // iTime will be _____9803_____ minutes
                int iMinutes = iTime % 60;        // iMinutes will be _____23_____ minutes
                iTime = iTime / 60;               // iTime will be _____163_____ hours
                int iHours = iTime % 60;          // iHours will be _____19_____ hours
                int iDays = iTime / 24;           // iDays will be _____6_____ days

                System.out.println("Driving from Cape Town to Cairo would take " + iDays + "days " + iHours + "hours " +
                        iMinutes + "min and " + iSeconds + "sec.");
        } //end main method
} //end class
```

Screen output:

Driving from Cape Town to Cairo would take 6days 19hours 23min and 44sec.

Unit 3 Activity 24: Chairs in student centre (class ChairsStudentCentre)

```
package chairsstudentcentre;
import java.util.Scanner;
public class ChairsStudentCentre {

    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);
        // declare constants
        final int CHAIRSINROW = 54;
        // declare variables
        int iNumChairs, iMaxNumRows, iNumChairsLeft;
        //input
        System.out.print("How many chairs are available? ");
        iNumChairs = keyboard.nextInt();
        // Calculate number of rows and left over chairs
        iMaxNumRows = iNumChairs / CHAIRSINROW;
        iNumChairsLeft = iNumChairs % CHAIRSINROW;
        // output
        System.out.println("The maximum number of rows is " + iMaxNumRows);
        System.out.println(iNumChairsLeft + " chairs will be left.");
    }
}
```

Unit 3: Activity 25 Tablets in bottles (class name TabletsInBottle)

```
package tabletsinbottles;
import java.util.Scanner;
public class TabletsInBottles {
    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);
        // Declare constants
        final int TABS_BIG_BOTTLE = 250;
        final int TABS_SMALL_BOTTLE = 15;
        // Declare variables
        int iNumTablets, iNumBigBottles, iRem, iNumSmallBottles, iRemTablets;
        // input
        System.out.print("Please enter the number of tablets: ");
        iNumTablets = keyboard.nextInt();
        // processing
        iNumBigBottles = iNumTablets / TABS_BIG_BOTTLE;
        iRem = iNumTablets % TABS_BIG_BOTTLE;
        iNumSmallBottles = iRem / TABS_SMALL_BOTTLE;
        iRemTablets = iRem % TABS_SMALL_BOTTLE;
        // Show the results
        System.out.println(iNumBigBottles + " bottles with " + TABS_BIG_BOTTLE + "
tablets");
        System.out.println(iNumSmallBottles + " bottles with " + TABS_SMALL_BOTTLE + "
tablets");
        System.out.println(iRemTablets + " tablets remaining");
    }
}
```

Unit 3 Activity 28 ASCII Decoder

Use the ASCII table to decode the message below.

8	10	10	11	3	10	11	3	9	3	11	10	9	11	10	11	3	10	10	11	11	9	10	10	3
4	4	5	5	2	5	5	2	7	2	5	1	9	4	1	6	2	9	1	5	5	7	3	1	3
T	h	i	s		i	s		a		s	e	c	r	e	t		m	e	s	s	a	g	e	!

Unit 3 Activity 29 Coconut puzzle

Key:
◯ = 0
⬤ = 1

83	S
79	O
83	S

72	H
69	E
76	L
80	P

83	S
69	E
78	N
68	D

78	N
79	O
87	W

Unit 3 Activity 30 Display initials

```java
package dispinit;

import java.util.Scanner;

public class DispInit {


    public static void main(String[] args) {
        String sName, sSurname;

        char cNameInit, cSurnInit, cClassGroup;

        Scanner keyboard = new Scanner(System.in);

        System.out.print("Enter first name: ");

        sName = keyboard.nextLine();

        System.out.print("Enter surname: ");

        sSurname = keyboard.nextLine();

        System.out.print("Enter class group: ");

        cClassGroup = keyboard.next().charAt(0);

        cNameInit = sName.charAt(0);

        cSurnInit = sSurname.charAt(0);

        System.out.println("Your initials are: " + cNameInit + "." + cSurnInit + ".");

        System.out.println("You are in group " + cClassGroup);

    }

}
```

Unit 3 Activity 31 Widening conversion

Specify the output and/or data type and/or whether the casting is valid or not.

Operation	Casting valid? Y/N	Data type of output	Output displayed

`int x=7;`
`float y = x/2;`
`System.out.println(y);`
	Y	float	3.0

`float x = 9.2/3;` `System.out.println(x);`	N (Type mismatch: cannot convert from double to float)	N/A	N/A

`byte x = 27;`
`x = x+1;`
`System.out.println(x);`
	N
	(Type mismatch: cannot convert from int to byte)
		N/A	N/A

`long x = 21L;`
`double y = x/3.0;`
`System.out.println(y);`
	Y	double	7.0

`long x = 25L;`
`double y = x/5;`
`System.out.println(y);`
	Y	double	5.0

`long x = 200L;` `System.out.println(x/2.0);`	Y – the casting is valid	**The data type of the output will be double.**	The vlaue 100.0 will be displayed.

`double x = 200;`
`int y = x/2;`
`System.out.println(y);`
	N
	(Type mismatch: cannot convert from double to int)
		N/A	N/A

`double x = 200.0;`
`int y = 2;`
`Long z = x/y;`
`System.out.println(z);`
	N
	(Type mismatch: cannot convert from double to Long)
		N/A	N/A

`Long x = 10/5L;`
`byte y = x;`
`System.out.println(x);`
	N
	(Type mismatch: cannot convert from Long to byte)
		N/A	N/A

(handwritten, top) lower float ← double | double High   float y = (float) (x/2.0); ✓

PPA/TRO F05D 2021 Unit 3 solutions

Operation	Casting valid? Y/N	Data type of output	Output displayed

`double x = 10.0;`
`float y = x/2.0;`
`System.out.println(x);`
	N
	(Type mismatch: cannot convert from double to float)
		N/A	N/A

Unit 3 Activity 32 Narrowing casting

Specify the output and/or data type and/or whether the casting is valid or not.

Operation	Casting valid? Y/N	Data type of output	Output displayed

`double x = 11.9;`
`int y = (int)x;`
`System.out.println(y);`
	Y	int	11

`double x = 11.9;`
`float y = (int)x;`
`System.out.println(y);`
	Y	float	11.0

`double x = 11.0;`
`float y = (int)x/2;`
`System.out.println(y);`
	Y	float	5.0

`int x = 11;`
`double y = (float)x/2;` *low*
`System.out.println(y);`
	Y ✓	double ✓	5.5 ✓

`int x = 10;`
`float y= (long)(x/5L);`
`System.out.println(y);`
	Y	float ✓	2.0 ✓

(handwritten) high.

(handwritten bottom) int/long   long   .10/.5 (2)   11/2 = 5   11.0/2 = 5·5   float/long   narrow = explicit add code

Unit 3 Activity 33 Number of 85g packets

```java
package numsmallpackets;
import java.util.Scanner;
public class NumSmallPackets {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        double rKgContainer1;
        double rKgContainer2;
        int iNumSmallPackets;
        final int SMALLPACK = 85;

        System.out.print("Enter the mass of container 1 of sweets (in Kg): ");
        rKgContainer1 = sc.nextDouble();

        System.out.print("Enter the mass of container 2 of sweets (in Kg): ");
        rKgContainer2 = sc.nextDouble();

        iNumSmallPackets = (int)((rKgContainer1 + rKgContainer2)* 1000 / SMALLPACK) ;

        System.out.println(iNumSmallPackets + " small packets of sweets of " + SMALLPACK + " g can be packed");
    }
}
```

Unit 3 Activity 36 a) RoomCost

```java
package roomcost;

import java.util.Scanner;

public class RoomCost {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        double rLength, rWidth, rRoomArea, rPriceToPay;

        final double PRICE_PER_METRE = 50.00;
```

```
        System.out.print("What is the length of your desired room? (in metres): ");

        rLength = sc.nextDouble();

        System.out.print("What is the width of your desired room? (in metres): ");

        rWidth = sc.nextDouble();


        rRoomArea = rLength * rWidth;

        rPriceToPay = rRoomArea * PRICE_PER_METRE;

        rPriceToPay = Math.round(rPriceToPay * 100)/100.0;


        System.out.println("You will have to pay R"+ rPriceToPay);

    }

}
```

Unit 3 Activity 36 b) ConvertPounds

```
package convertpounds;

import java.util.Scanner;

public class ConvertPounds {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        double rPound, rConvertedAmt;

        final double randToPound = 22.00;


        System.out.print("Hi Leo, how much do you have? (in pounds): ");

        rPound = sc.nextDouble();
```

```
        rConvertedAmt = rPound * randToPound;

        rConvertedAmt = Math.round(rConvertedAmt * 100)/100.0;


        System.out.println("Leo's pounds amount to R"+ rConvertedAmt);

    }

}
```

Unit 3 Activity 36 c) HighestMark

```java
package highestmark;

import java.util.Scanner;

public class HighestMark {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        double rMark1, rMark2, rHighestMark;


        System.out.print("Enter the first test mark: ");

        rMark1 = sc.nextDouble();

        System.out.print("Enter the second test mark: ");

        rMark2 = sc.nextDouble();


        rHighestMark = Math.max(rMark1, rMark2);


        System.out.println("Higest test mark is "+ rHighestMark);
```

```
    }

}
```

Unit 3 Activity 36 d) AvgThree

```java
package avgthree;

import java.util.Scanner;

public class AvgThree {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        double rMark1, rMark2, rMark3;

        int iAverage;


        System.out.print("Enter the first test mark:");

        rMark1 = sc.nextDouble();

        System.out.print("Enter the second test mark:");

        rMark2 = sc.nextDouble();

        System.out.print("Enter the third test mark:");

        rMark3 = sc.nextDouble();


        iAverage = (int) Math.round((rMark1 + rMark2 + rMark3)/3);

        System.out.println("Your average mark is "+ iAverage);

    }

}
```

Unit 3 Activity 36 e) FlashDrives

```java
package flashdrives;

import java.util.Scanner;

public class FlashDrives {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        final int NUM_FLASH_DRIVE = 48;

        int iNumStudents, iEqualUsb;


        System.out.print("How many students are in class?");

        iNumStudents = sc.nextInt();


        iEqualUsb = (int) Math.floor(NUM_FLASH_DRIVE/iNumStudents);


        System.out.println("Students can get "+ iEqualUsb + " USB Flash Drives each");
    }

}
```

Unit 3 Activity 36 f) StudentNumber

```java
package studentnumber;

public class StudentNumber {

    public static void main(String[] args) {

        double rStudNumber;

        int iStudNumber;


        rStudNumber = Math.random();

        System.out.println(rStudNumber);

        rStudNumber = rStudNumber * Math.pow(10,7) + 22 * Math.pow(10,7);

        iStudNumber = (int) rStudNumber;


        System.out.println(iStudNumber);

    }

}
```

Unit 3 Activity 36 g) CircleMeasurements

```java
package circlemeasurements;

import java.util.Scanner;

public class CircleMeasurements {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        double rDiameter, rRadius;

        double rCircumference;

        double rArea;
```

```java
        System.out.print("Enter the diameter: ");

        rDiameter = sc.nextInt();


        rRadius = rDiameter/2;

        rArea = Math.PI * Math.pow(rRadius,2);

        rCircumference = 2 * Math.PI * rRadius;


        System.out.println("The circumference is: "+ rCircumference);

        System.out.println("The area is: "+ rArea);

    }

}
```

Unit 3 Activity 36 h) BoxesTiles

```java
package boxestiles;

import java.util.Scanner;

public class BoxesTiles {


    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        double rLength, rWidth, rArea;

        int iNumTileBoxes;

        final int AREA_PER_BOX = 2;
```

```java
        System.out.print("Enter the length: ");

        rLength = sc.nextDouble();

        System.out.print("Enter the breadth: ");

        rWidth = sc.nextDouble();


        rArea = rLength * rWidth;

        iNumTileBoxes = (int) Math.ceil(rArea/AREA_PER_BOX);


        System.out.println("They should buy "+ iNumTileBoxes + " boxes of tiles");
    }
}
```

Unit 3 Activity 37

Mathematical equation	Pseudo code	Java assignment statement
$A = AB + \dfrac{B - A}{3B} + \dfrac{C^{(B+2)}}{A - 2B}$	A = A * B + (B − A) / (3 * B) + C ^ (B + 2) / (A − 2 * B)	
		A = A * B + (B − A) / (3 * B) + Math.pow(C, B + 2) / (A − 2 * B); If the variables A and B are integer, you have to ensure that one of the operands of the division operation is double. For example: A = A * B + (B − A) / (3.0 * B) + Math.pow(C, B + 2.0) / (A − 2 * B); A = A * B + (B − A) / (3 * (double) B) + Math.pow(C, B + 2) / (A − 2 * (double) B);
$B = \dfrac{175 \bmod 54 \bmod 5}{2}$	B = 175 % 54 % 5 / 2	B = 175 % 54 % 5 / 2.0;
$C = 3 + 20 \ MOD \ 7(\dfrac{12 * 9}{4})$	C = 3 + 20 mod 7 * (12 * 9/4)	C = 3 + 20 % 7 * (12 * 9/4.0);
$D = 2 + 7^2(\sqrt[3]{69 - \dfrac{5^2}{5 \bmod 10}})\backslash 2$	D = 2 + 7 ^ 2 * (69 − 5 ^ 2 / (5 mod 10)) ^ (1/3) \ 2	
		D = 2 + Math.pow(7,2) * (int) (Math.pow(69 - 5 * 5 / (5 % 10), 1/3.0) / 2);
$E = 167 \bmod 12 \bmod 2 \ x \ 3 \ x \ 2^2 - \dfrac{5}{3}$	E = 167 mod 12 mod 2 * 3 * 2 ^ 2 − (5/3)	E = 167 % 12 % 2 * 3 * Math.pow(2,2) − 5/3.0; *Parentheses to calculate 5/3.0 are not needed.*
$F \approx \dfrac{\frac{3^5}{4} \bmod 8}{3}$	F = round(3^5 / 4 % 8 / 3)	F = Math.round(Math.pow (3,5) / 4 % 8 / 3) ;
$G = \dfrac{15}{5}(2) + \dfrac{30}{6} + 3$	G = 15 / 5 * 2 + 30 / 6 + 3	G = 15 / 5.0 * 2 + 30 / 6.0 + 3;
$H = 2(\sqrt{56})^3 \bmod 17$	$H = 2 * \sqrt{56}$ ^ 3 mod 17	H = 2 * Math.pow(Math.sqrt(56),3) % 17;
$I = \sqrt{7(3^2) + 1} \bmod 3$	$I = \sqrt{7 * 3^2 + 1}$ % 3	I = Math.sqrt(7* Math.pow (3,2) + 1) % 3;

Unit 3 Activity 38 a)

```
m = 5,  n = 7,  t = 2

g = n * (m ^ t - 40)
```

$$= 7 * (5 \char94 2 - 50)$$

$$= 7 * (25 - 50)$$

$$= 7 * (-25)$$

$$= -175$$

Unit 3 Activity 38 b)

```
A = 5,  B = 14,  C = 23,  D = 2

W = B - (B - A * D) ^ D + A mod C + C \ B
```

$$= 14 - (14 - 5 * 2) \char94 2 + 5 \bmod 23 + 23 \setminus 14$$

$$= 14 - (14 - 10) \char94 2 + 5 \bmod 23 + 23 \setminus 14$$

$$= 14 - 4 \char94 2 + 5 \bmod 23 + 23 \setminus 14$$

$$= 14 - 16 + 5 \bmod 23 + 23 \setminus 14$$

$$= 14 - 16 + 5 + 23 \setminus 14$$

$$= 14 - 16 + 5 + 1$$

$$= -2 + 5 + 1$$

```
  =    3 + 1

  =    4
```

Unit 3 Activity 38 c)

```
a = 10, b = 8, c = 4, d = 30

k = a * (b - c) - a mod c ^ 2 * 2 + d \ c

  = 10 * (8 - 4) - 10 mod 4 ^ 2 * 2 + 30 \ 4

  = 10 * 4 - 10 mod 4 ^ 2 * 2 + 30 \ 4

  = 10 * 4 - 10 mod 16 * 2 + 30 \ 4

  = 40 - 10 mod 16 * 2 + 30 \ 4

  = 40 - 10 * 2 + 30 \ 4

  = 40 - 20 + 30 \ 4

  = 40 - 20 + 7

  = 20 + 7

  = 27
```

Unit 3 Activity 38 d)

```
a = 5, b = 12, c = 6, d = 3

m = a - (b - c) ^ 2 - a mod c * 2 + d \ a

m = 5 - (12 - 6) ^ 2 - 5 mod 6 * 2 + 3 \ 5

m = 5 - 6 ^ 2 - 5 mod 6 * 2 + 3 \ 5

m = 5 - 36 - 5 mod 6 * 2 + 3 \ 5

m = 5 - 36 - 5 * 2 + 3 \ 5

m = 5 - 36 - 10 + 3 \ 5

m = 5 -    + 0

m = -3 + 0

m = -41 + 0
```

Unit 3 Activity 38 e)

$k = 5$, $y = 17$, $z = 10$, $s = 24$

Mathematical formula	Pseudo code	Answer (result)
$w = \dfrac{kz - y}{y - 6} + \dfrac{32 + s}{z + 4}$	`(k*z-y)/(y-6) + (32+s)/(z+4)`	7
$w = (y - z)^{k - 3}$	`(y-z)^(k-3)`	49
$w = s - z - 3k^2$	`s-z-3*(k^2)`	-61

	s-z-3*k^2 //also correct	
$w = \sqrt{k^4} + \dfrac{z}{z-k}$	k^4^(1/2) + z/(z-k)	27
$w = k^2 + \dfrac{10}{\sqrt{z^2}} - s$	k^2 + 10 / z ^ 2 ^ (1/2) - s	2
$w = 4z^2 - sy + k$	4 * z^2 - s * y + k	-3
$w = \dfrac{ks}{z} - \dfrac{\sqrt{100}}{k}(s)$	k * s / z - 100 ^ (1/2)/k * s	-36
$w = \dfrac{5}{3} - kz + \dfrac{sz}{8}$	s/3 - k * z + s * z / 8	-12

Unit 3 Activity 39

Pseudo code	Mathematical formula
a) answer = a + b ^ 2 - 5	$a + b^2 - 5$
b) answer = k – (w + 7) / p + s	$k - \dfrac{w+7}{p} + s$
c) answer = a * b – c + a + (c – k) / s ^ m	$ab - c + a + \dfrac{c-k}{s^m}$
d) answer = 5 mod a * 3/√c * b	$5\ mod\ a\ \dfrac{3}{\sqrt{bc}}$
e) answer = k mod 3 + a + b / c	$k\ mod\ 3 + a + \dfrac{b}{c}$
f) result = p + r – s * g * 5 ^ a	$p + r - sg(5^a)$ $p + r - 5^a gs$ ⬅ More correct acording to mathematics convention.
g) answer = √a ^ (3 + b) + c ^ 2 mod d	$\sqrt{a^{3+b}} + c^2\ mod\ d$

Pseudo code	Mathematical formula
h) answer = $\sqrt[6]{a * b\text{\^}2 - 2 * c\backslash d}$	$\sqrt[6]{ab^2 - 2\left(\dfrac{c}{d}\right)}$
i) answer = a \ b mod 5 * d ^ 2	$\left\lfloor\dfrac{a}{b}\right\rfloor \bmod 5d^2$
j) $answer = (2 * a/c) * ((b3/d) / 5) * e$	$\left(\dfrac{2a}{c}\right)\left(\dfrac{3b/d}{5}\right)(e)$

Unit 3 Activity 40 a)

Step	Type of statement	A	B	C	output	calculations (rough work)
1	assign	5				
2	assign		7			
3	calculation			9		C=A*2-1 = 5*2-1=10-1=9
4	calculation		9			B=B+2=7+2=9
5	output				The value of B = 9	
6	output				The value of C = 9	

Unit 3 Activity 40 b)

Step	Type of statement	a	b	c	d	output	(calculations - rough work)
1	assign	7					
2	calculation		49				b=a ^ (a-5)=7^(7-5)=7^2=49
3	calculation			70			c=b+a*3=49+7*3=49+21=70
4	calculation				0		d=a\b+(b-a)mod3=7\49+(49-7)mod3=7\49+42mod3=0+42mod3=0
5	calculation	70					a=c-b*d mod14=70-49*0mod14=70-0mod14=70-0=70
6	output					700	no parentheses, therefore Java will display the values itself.
7	output					70	parentheses will let Java do the calculation and then display the value

Unit 3 Activity 40 c)

Step	Type of statement	a	b	c	output	calculations (rough work)
1	assign	5				
2	assign		2			
3	calculation			9		c=a+b*2=5+2*2=5+4=9
4	calculation		19			b=a*3+b^2=5*3+2^2=15+2^2=15+4=19
5	output				19	
6	calculation		0			b=cmod3=9mod3=0
7	calculation	3				a=a\3+2=5\3+2=1+2=3
8	output				19a is 3	
9	output				b = 0	
			exact output		19a is 3	
					b = 0	

Unit 3 Activity 40 d)

Step	Type of statement	w	x	y	z	output	calculations (rough work)
1	assign	12					
2	assign			17			
3	calculation		14				x=w+ymod5=12+17mod5 = 12 + 2 = 14
4	calculation				27		z=y-w/3+x=17-12/3+14=17-4+14=27
5	output					x = 14 z = 27	

Unit 3 Activity 40 e)

Step	Type of statement	W	X	Y	Z	output	calculations (rough work)
1	assign		15				
2	assign			23			
3	assign				2		
4	calculation			4			Y=X*Z\7=15*2\7=30\7=4
5	calculation	7					W=XMOD8=15MOD8=7
6	output					The value of Y is 4	
7	output					The value of W is 7	

Unit 3 Activity 42: Unary operators

What is the value of each variable after the calculation is executed? Assume that the initial value of each variable in each statement is integer value 10.

Statements	y	x
a) y = y * ++x;	110	11
b) y =y * x++;	100	11
c) y = y / ++x;	0	11
d) y = y / x++;	1	11
e) y = -(y + x--);	-20	9
f) y = -(y + --x);	-19	9
g) y = -(y + x++);	-20	11
h) y = -(-y + (x+1)*++x);	-111	11
i) y = -(y % x) * (--x / y);	0	9
j) y = -(++y % x) * (x-- / y);	0	9
k) y = -(++y % x) * (++x / y);	-1	11

Unit 3 Activity 43: Compound (augmented) operators

Ordinary Code	Code using Compound operator
`iSum = iSum + iX++;`	`iSum += iX++;`
`iProduct = iProduct * --iX;`	`iProduct *=--iX;`
`rPrice = rPrice - rPrice * 0.05;`	`rPrice -= rPrice * 0.05;`
`iNum = iNum % (iNum / 5);`	`iNum %= iNum / 5;`

Write four different Java statements that add 1 to an integer variable x:

```
x = x + 1;
++x;
x++;
x +=1;
```

Write four different Java statements that subtract 1 to an integer variable x:

```
x = x - 1;
--x;
x--;
x -=1;
```

Use only one statement to assign the product of the current value of integer variables of a and b to x and then increment the value of a:

```
x = a++ * b; or   x = b * a++;
```

Unit 3 Activity 46: Predict output when escape sequences are used

Predict the output of the following statements

```
int iValue = 22, iCount = 10; String sName = "Sofia";
System.out.println ("Hi" + "\n"+ sName);
System.out.println ("Calculate:  answer \t\"times\" \t count is:");
System.out.println ("\t"+iCount*iValue);
```
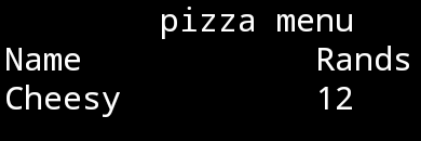
```
Hi
Sofia
Calculate:   answer        "times"            count is:
         220
```

```
System.out.println("Sonia said  \"Hello! \" to me.");
```
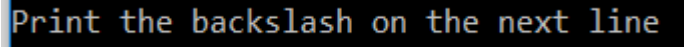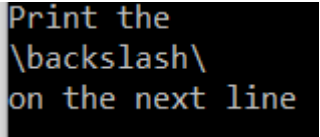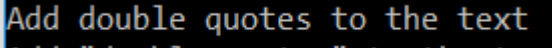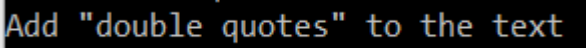
```
Sonia said  "Hello! " to me.
```

Unit 3 Activity 47 : Write code to format output using escape sequences

a)   Complete the statements so that your output looks like the following screenshot using a single println() to display the output.

Output screenshot	Statements

pizza menu
Name   Rands
Cheesy   12
	`int iPrice=12;`
	
	`System.out.println("\t pizza menu\n Name\t\t Rands\n Cheesy \t"+iPrice);`

b)   Use a single println() with escape sequences to change the output statement to produce the formatted output.

Original code and output	
`System.out.println("Print the backslash on the next line");` Print the backslash on the next line	
Formatted output	
`System.out.println("Print the\n\\backslash\\\non the next line");`	Print the \backslash\ on the next line

Original code and output	Formatted output
`System.out.println("Add double quotes to the text");` Add double quotes to the text	`System.out.println("Add \"double quotes\" to the text");` Add "double quotes" to the text

Unit 3 Activity 48: Predict the format of a number when DecimalFormat class is used

How will the values be displayed after they have been formatted with the following formatting patterns?

Values	Formatting patterns	Formatted values	
123456.789	"R###,###.##"	R123,456.79	R123 456.79
0.045	"0.00%"	4.50%	
4561237.3	"###,###.00"	4,561,237.30	4 561 237.30
4561237.3	"###,###.##"	4,561,237.3	4 561 237.3

Values may display differently on different computers, depending on the display settings of the operting system. For example, the thousands' separator for floating-point values may be a space.

Unit 3 Activity 49: Format output using methods from the DecimalFormat class

What formatting pattern should be used to change (modify) the unformatted output to the formatted one

Formatting pattern	Unformatted output	Formatted output
"R.00"	45.0768	R45.08
"00.0%"	0.007892	00.8%
"00.000"	4.05	04.050
"00.##" or "00.00"	4.05	04.05
"###,###.00"	974586.2	974,586.20