Activity 1

The class was shown this information,

> The table shows how monthly electricity charges are calculated, for a given kWh consumption, using a REGULAR RESIDENTIAL rate plan.
>
> You have to write a single method to compute the monthly charge, given the number of kWh of electricity consumed. Discuss the questions below, then define the method.

REGULAR RESIDENTIAL	
Customer Charge	$5.50/month
Distribution Charge*	**6.236**¢/kWh
Transmission Charge	**3.056**¢/kWh

and was given these questions to discuss:

> **Q1: What type of value(s) should the method take as inputs? What do they represent?**
>
> > *You can make a case for either int or double, representing the number of kWh consumed, but double is what we expect.*
>
> **Q2: What type of value should the method produce as output? What does it represent?**
>
> > *double, representing the amount owed.*
>
> **TASK: Define the method.**

```
public double regularResidential(double totalConsumption) {
    double customerCharge =         5.50000;
    double distributionCharge =     0.06236;
    double transmissionCharge =     0.03056;
    double monthlyCharge = customerCharge + totalConsumption *
(distributionCharge + transmissionCharge);
    return monthlyCharge;
}
```

or possibly

```
public double regularResidential(double totalConsumption) {
    return 5.5 + totalConsumption * (0.06236 + 0.03056);
}
```

Assessment 1

The class was shown this information,

> Some gas stations will let you pay at the pump not only for your fuel purchase but also for special products, like lottery tickets:
>
> > *There's a new convenient and fast way to play your favorite California Lottery draw games. At almost 200 gas stations statewide, you can try your luck while you pump your gas. [...]*
> > *It's simple to play! Swipe your card, select [...] the number of Quick Pick plays you want.*
> >
> > *http://www.calottery.com/lucky-retailers/more-ways-to-buy/play-at-the-pump*
>
> To answer the TopHat questions, think about a method that will compute the total bill for the gas and the lottery tickets.

And was given these questions to answer:

> How many parameters does this method need?
>
> > *The correct answer is 2. This method needs to know both how much fuel and how many lottery tickets are being purchased.*
>
> What type(s) are most appropriate to use for the parameter(s) of this method? Choose ALL that apply.
>
> > *Fuel purchases are measured in gallons (reasonably represented by a double).*
> >
> > *Ticket purchases are measured in tickets (reasonably represented by an int).*
> >
> > *The two correct answers were int and double*

Activity 2

The class was shown this information,

> The table shows how monthly electricity charges are calculated, for a given kWh consumption, using a TIME OF USE rate plan.
> You have to write a single method to compute the monthly charge, given the number of kWh of electricity consumed.
> Discuss the questions below, then define the method.

TIME OF USE	
Customer Charge	$20.00/month
Distribution Charge	
Peak Hours*	14.859¢/kWh
Off-Peak Hours*	4.328¢/kWh
Transmission Charge	2.700¢/kWh

and was given these questions to discuss:

> **Q1: What type of value(s) should the method take as inputs? What do they represent?**
>
> *doubles seem the most natural, one for the number of kWh consumed during peak hours, and one for the number of kWh consumed during off-peak hours.*
>
> **Q2: What type of value should the method produce as output? What does it represent?**
>
> *double, representing the amount owed.*
>
> **TASK: Define the method.**

```
public double timeOfUse(double peak, double offPeak) {
    double customerCharge =        20.00000;
    double peakHourCharge =         0.14859;
    double offPeakHourCharge =      0.04328;
    double transmissionCharge =     0.02700;
    double totalConsumption = peak + offPeak;
    double monthlyCharge = customerCharge + peak * peakHourCharge +
offPeak * offPeakHourCharge + totalConsumption * transmissionCharge;
    return monthlyCharge;
}
```

or possibly

```
public double timeOfUse(double peak, double offPeak) {
    return 20.0+peak*0.14859+offPeak*0.04328+(peak+offPeak)*0.02700;
}
```

Assessment 2

The class was shown this information,

> Some gas stations will let you pay at the pump not only for your fuel purchase but also for special products, like lottery tickets:
>
> > *There's a new convenient and fast way to play your favorite California Lottery draw games. At almost 200 gas stations statewide, you can try your luck while you pump your gas. Whether your game is SuperLotto Plus, Powerball, or Mega Millions, all you have to do is swipe your debit or credit card at the gas pump and you might drive away with a lot more than a tank full of gas.*
> > *It's simple to play! Swipe your card, select the number of Quick Pick plays you want for each of the three games.*
> >
> > *http://www.calottery.com/lucky-retailers/more-ways-to-buy/play-at-the-pump*
>
> To answer the TopHat questions, think about a method that will compute the total bill for the gas and the lottery tickets. **Assume that the tickets for different games cost different amounts.**

And was given these questions to answer:

> How many parameters does this method need?
>
> > *The correct answer is 4. This method needs to know both how much fuel and how many of each of the three types of lottery tickets are being purchased.*
>
> What type(s) are most appropriate to use for the parameter(s) of this method? Choose ALL that apply.
>
> > *Fuel purchases are measured in gallons (reasonably represented by a double).*
> >
> > *Ticket purchases are measured in tickets (reasonably represented by an int).*
> >
> > *The two correct answers were int and double*

Activity 3

The class was shown this information,

> Assuming that you have methods to compute the monthly cost for each of the two rate plans, TIME OF USE and REGULAR RESIDENTIAL, write a single method to compute the monthly charge, given the number of kWh of electricity consumed and the applicable rate plan.
> Discuss the questions below.
>
> > (the tables are not reproduced again – see above)
>
> and was given these questions to discuss:
>
> **Q1: What type of value(s) should the method take as inputs? What do they represent?**
>
> > *Two doubles, one for the number of kWh consumed during peak hours, one for the number of kWh consumed during off-peak hours.*
> > *One boolean, indicating e.g. whether TIME OF USE is the correct rate plan to use.*
>
> **Q2: What type of value should the method produce as output? What does it represent?**
>
> > *double, representing the amount owed.*
>
> **TASK: Define the method.**

```
public double monthlyCharge(double peak,double offPeak,boolean isRegular) {
    if (isRegular) {
        return regularResidential(peak + offPeak);
    }
    else {
        return timeOfUse(peak, offPeak);
    }
}
```

Assessment 3

The class was shown this information,

> *Sales tax exemption certificates issued by the New York State Department of Taxation and Finance enable a purchaser to make tax-free purchases that would normally be subject to sales tax. The purchaser fills out the certificate and gives it to the seller. The seller keeps the certificate and may then sell property or services to the purchaser without charging sales tax.*
>
> https://www1.nyc.gov/nycbusiness/description/exemption-certificates-for-sales-tax

And was given this question to answer:

> The following lines, if rearranged correctly, will define a method that computes the total bill for a given subtotal, based on whether the sale is tax exempt or not. Choose the correct order of lines. Assume that the tax rate is 8.375%.

```
A else
B { return subtotal; }
C double taxRate = 0.08375;
D if (isTaxExempt)
E }
F { return subTotal * (1.0 + taxRate); }
G public double totalBill(double subTotal, boolean isTaxExempt) {
```

The correct ordering is GCDBAFE, which produces this program:

```
public double totalBill(double subTotal, boolean isTaxExempt) {   // G
     double taxRate = 0.08375;                                    // C
     if (isTaxExempt)                                             // D
         { return subTotal; }                                     // B
     else                                                         // A
         { return subTotal * (1.0 + taxRate); }                   // F
}                                                                 // E
```

Activity 4

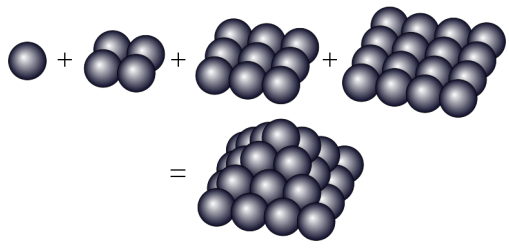
The class was shown this information,

https://en.wikipedia.org/wiki/File:Musée_historique_de_Strasbourg-Boulets_en_pierre.jpg
Author: Ji-Elle

How many cannon balls are in this pyramid?
The top layer has 1 (= 1x1) cannon ball.
The 2nd layer has 4 (= 2x2) cannon balls.
The 3rd layer has 9 (= 3x3) cannon balls.
The 4th layer has 16 (= 4x4) cannon balls.
The bottom layer has 25 (= 5x5) cannon balls.
In total there are $1^2 + 2^2 + 3^2 + 4^2 + 5^2$ cannon balls.

For a smaller pyramid:

https://en.wikipedia.org/wiki/File:Square_pyramidal_number.svg



and was given this task:

Define a method to compute and return the sum of squares to a given integer n:

$$\sum_{i=1}^{n} i^2$$

A possible answer is:

```
public int sumOfSquares(int n) {
    int sum = 0;
    for (int i=1; i<=n; i=i+1) {
        sum = sum + i * i;
    }
    return sum;
}
```

Assessment 4

The class was shown this information,

> *Which of the following methods correctly compute the 1 + 2 + 3 + 4 + ... n ?*
> *Select **ALL** correct answers.*

```
public int a(int n) {
  int sum = 0;
  for (int i=1; i<=n; i=i+1) {
    sum = sum + i;
  }
  return sum;
}
```

```
public int b(int x) {
  int answer = 0;
  for (int k=0; k<x; k=k+1) {
    answer = answer + k;
  }
  return answer;
}
```

```
public int c(int n) {
  int sum = 0;
  for (int i=0; i<=n; i=i+1) {
    sum = sum + i;
  }
  return sum;
}
```

```
public int d(int n) {
  int sum = 0;
  for (int i=0; i<n; i=i+1) {
    sum = sum + i;
  }
  return sum;
}
```

And was given this question to answer:

> **Which method computes the correct value?**

While I intended for the question to require ALL correct answers, I mistakenly set up the question to allow only one answer to be given. Either (a) or (c) is acceptable as correct answer.