2.1 Variables (int)

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variable

variable

`int userAge;` ***declares***

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
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Animation captions:

address


```
int variableName = 0;
```

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Check Show answer

Check Show answer

Check Show answer

Check Show answer

before

PARTICIPATION ACTIVITY

Load default template...

```
1
2  #include <iostream>
3  using namespace std;
4
5  int main() {
6     int userAge = 0;
7     // Declare new variable here
8
9     cout << "Enter your age: " << endl;
10    cin >> userAge;
11    cout << userAge << " is a great age." << endl;
12
13    // Add new print statement here
14
15    return 0;
16 }
17
```

Run

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
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```
int numProtons, numNeutrons, numElectrons;
```

CHALLENGE ACTIVITY

Run

2.2 Assignments

assignment statement numApples = 8;


```
variableName = expression;
```

expression

```
#include <iostream>
using namespace std;

int main() {
   int litterSize    = 3; // Low end of litter size range
   int yearlyLitters = 5; // Low end of litters per year
   int annualMice    = 0;

   cout << "One female mouse may give birth to ";
   annualMice = litterSize * yearlyLitters;
   cout << annualMice << " mice," << endl;

   litterSize    = 14; // High end
   yearlyLitters = 10; // High end
   cout << "and up to ";
   annualMice = litterSize * yearlyLitters;
   cout << annualMice << " mice, in a year." << endl;

   return 0;
}
```

```
One female mouse may give birth to 15 mice,
and up to 140 mice, in a year.
```


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PARTICIPATION ACTIVITY

Check Show answer

Check Show answer

Check Show answer


```
numRodents = houseRats;
```

houseRats

Check Show answer

Check Show answer

```
animalsTotal = dogCount - 3;
```

Check Show answer

```
animalsTotal = dogCount - 3;
```

dogCount

Check Show answer


```
numBooks = 5;
numBooks = 3;
```

Check Show answer

will

```
numItems = numItems + 1
```

overwriting

PARTICIPATION ACTIVITY

Animation captions:

PARTICIPATION ACTIVITY

```
numApples = numApples + 3;
```

Check Show answer

```
numFruit  = numApples;
numFruit  = numFruit + 1;
```

Check Show answer

Check Show answer

PARTICIPATION ACTIVITY

```
w = 1;
y = 2;
z = 4;

x = y + 1;
w = 2 - x;
z = w * y;
```

Check Show answer

```
x = 4;
y = 0;
z = 3;

x = x - 3;
y = y + x;
z = z * y;
```


Check Show answer

```
x = 6;
y = -2;

y = x + x;
w = y * x;
z = w - y;
```

Check Show answer

```
w = -2;
x = -7;
y = -8;

z = x - y;
z = z * w;
z = z / w;
```


Check Show answer

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Run

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andrew ahlstrom
andrew.david.ahlstrom@gmail.com
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2.3 Identifiers

identifier

underscore

reserved word
keyword

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andrew ahlstrom
andrew.david.ahlstrom@gmail.com
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case sensitive

naming conventions

- ***Lower camel case***
-

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alignas (since C++11)	enum	return
alignof (since C++11)	explicit	short
and	export	signed
and_eq	extern	sizeof
	false	static

asm auto(changed C++11) bitand bitor bool break case catch char char16_t(since C++11) char32_t(since C++11) class compl const constexpr(since C++11) const_cast continue decltype(since C++11) default(changed C++11) delete(changed C++11) do double dynamic_cast else	float for friend goto if inline int long mutable namespace new noexcept(since C++11) not not_eq nullptr (since C++11) operator or or_eq private protected public register reinterpret_cast	static_assert(since C++11) static_cast struct switch template this thread_local(since C++11) throw true try typedef typeid typename union unsigned using(changed C++11) virtual void volatile wchar_t while xor xor_eq

2.4 Arithmetic expressions (int)

expression

literal

```
int numKids = 0;                    // Expr: 0
numKids     = 7;                    // Expr: 7
numPeople   = numKids + numAdults;  // Expr: numKids + numAdults
totOffers   = jobsCA + (2 * jobsAZ); // Expr: jobsCA + (2 * jobsAZ)
xCoord      = yCoord;               // Expr: yCoord
xCoord      = -yCoord;              // Expr: -yCoord
```


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```
12
```

```
int eggsInCarton
```

```
eggsInCarton * 3
```


operator ***Arithmetic operators***

+	***addition***
-	***subtraction***
*******	***multiplication***
/	***division***
%	***modulo (remainder)***

not

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`6 + numItems`

- ○
- ○

`6 x numItems`

- ○
- ○

`totDays / 12`

- ○
- ○

`5i`

- ○
- ○

`-userVal`

- ○
- ○

itemsA + itemsB / 2

- ○
- ○

n!

- ○
- ○


```
#include <iostream>
using namespace std;

/* Computes the total cost of leasing a car given the down payment,
   monthly rate, and number of months
*/

int main() {
   int downpayment     = 0;
   int paymentPerMonth = 0;
   int numMonths       = 0;
   int totalCost       = 0;  // Computed total cost to be output

   cout << "Enter down payment: " << endl;
   cin  >> downpayment;

   cout << "Enter monthly payment: " << endl;
   cin  >> paymentPerMonth;

   cout << "Enter number of months: " << endl;
   cin  >> numMonths;

   totalCost = downpayment + (paymentPerMonth * numMonths);

   cout << "Total cost: " << totalCost << endl;

   return 0;
}
```

```
Enter down payment:
500
Enter monthly payment:
300
Enter number of months:
60
Total cost: 18500
```


unary minus

PARTICIPATION ACTIVITY

```
housesCity = housesBlock *10;
```

Check Show answer


```
tot = num1+num2+2;
```

Check Show answer

```
numBalls=numBalls+1;
```

Check Show answer

```
numEntries = (userVal+1)*2;
```

Check Show answer

-
-
-

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
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-
-
-

```
#include <iostream>
using namespace std;

int main() {
   int userMinutes = 0;  // User input: Minutes
   int outHours    = 0;  // Output hours
   int outMinutes  = 0;  // Output minutes (remaining)

   cout << "Enter minutes: " << endl;
   cin  >> userMinutes;

   outHours   = userMinutes / 60;
   outMinutes = userMinutes % 60;

   cout << userMinutes << " minutes is ";
   cout << outHours    << " hours and ";
   cout << outMinutes  << " minutes." << endl;

   return 0;
}
```

```
Enter minutes:
367
367 minutes is 6 hours and 7 minutes.

...

Enter minutes:
180
180 minutes is 3 hours and 0 minutes.
```


divide-by-zero error

```
#include <iostream>
using namespace std;

int main() {
   int salaryPerYear = 0; // User input: Yearly salary
   int daysPerYear   = 0; // User input: Days worked per year
   int salaryPerDay  = 0; // Output:     Salary per day

   cout << "Enter yearly salary:" << endl;
   cin  >> salaryPerYear;

   cout << "Enter days worked per year:" << endl;
   cin  >> daysPerYear;

   // If daysPerYear is 0, then divide-by-zero causes program termination.
   salaryPerDay = salaryPerYear / daysPerYear;

   cout << "Salary per day is: " << salaryPerDay << endl;

   return 0;
}
```

```
Enter yearly salary:
60000
Enter days worked per year:
0
Floating point exception: 8
```


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```
13 / 3
```

Check Show answer

```
4 / 9
```


Check Show answer

```
(5 +  10 + 15) * (1 / 3)
```

Check Show answer

```
50 % 2
```

Check Show answer

```
51 % 2
```

Check Show answer

```
78 % 10
```

Check Show answer


```
596 % 10
```

Check Show answer

```
100 / (1 / 2)
```

Check Show answer

precedence rules

( )		`2 * (A + 1)`
unary -		`2 * -A`
*** / %**		

+ -		`B = 3 + 2 * A`
		B
		`= 3+2 * A`

left-to-right		`B = A * 2 / 3`

`5 * x + 1`

`(5 * 3) + 1` 16

`5 * (3+1)` 20

( )

Use these

(Poster A): Tried rand() % (35 - 18) + 18, but it's wrong.

(Poster B): I don't understand what you're doing with (35 - 18) + 18. Wouldn't that just be 35?

(Poster C): The % operator has higher precedence than the + operator. So read that as (rand() % (35 - 18)) + 18.

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```
numItems = 5;
totCount = 1 + (2 * numItems)  * 4;
```

compound operators

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Run

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
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andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
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2.5 Floating-point numbers (double)

double


```
double variableName = 0.0; // Initial value is optional but recommended.
```

floating-point literal

```
#include <iostream>
using namespace std;

int main() {
   double milesTravel = 0.0; // User input of miles to travel
   double hoursFly    = 0.0; // Travel hours if flying those miles
   double hoursDrive  = 0.0; // Travel hours if driving those miles

   cout << "Enter number of miles to travel: " << endl;
   cin  >> milesTravel;

   hoursFly   = milesTravel / 500.0; // Plane flys 500 mph
   hoursDrive = milesTravel / 60.0;  // Car drives 60 mph

   cout << milesTravel << " miles would take:" << endl;
   cout << hoursFly    << " hours to fly,"     << endl;
   cout << hoursDrive  << " hours to drive."   << endl;

   return 0;
}
```

```
Enter number of miles to travel:
1800
1800 miles would take:
3.6 hours to fly,
30 hours to drive.

...

Enter number of miles to travel:
400.5
400.5 miles would take:
0.801 hours to fly,
6.675 hours to drive.
```


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Show answer

Check Show answer

Check Show answer

Check Show answer

PARTICIPATION ACTIVITY

scientific notation

PARTICIPATION ACTIVITY

Check Show answer

Check Show answer

Check Show answer

Check Show answer

Check Show answer

PARTICIPATION ACTIVITY

floating-point divide-by-zero

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Run

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$(G * M) / (d^2)$

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
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Run

2.6 Constant variables

const

constant variable


```
#include <iostream>
using namespace std;

/*
 * Estimates distance of lightning based on seconds
 * between lightning and thunder
 */

int main() {
   const double SPEED_OF_SOUND   = 761.207; // Miles/hour
(sea level)
   const double SECONDS_PER_HOUR = 3600.0;  // Secs/hour
   double secondsBetween = 0.0;
   double timeInHours    = 0.0;
   double distInMiles    = 0.0;

   cout << "Enter seconds between lightning and thunder:"  <<
endl;
   cin  >> secondsBetween;

   timeInHours = secondsBetween / SECONDS_PER_HOUR;
   distInMiles = SPEED_OF_SOUND * timeInHours;

   cout << "Lightning strike was approximately" << endl;
   cout << distInMiles << " miles away." << endl;

   return 0;
}
```

```
Enter seconds between lightning and
thunder:
7
Lightning strike was approximately
1.48012 miles away.

...

Enter seconds between lightning and
thunder:
1
Lightning strike was approximately
0.211446 miles away.
```

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
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```
int STEP_SIZE = 5;
```

- ○
- ○

```
const int STEP_SIZE = 14;
```

- ○
- ○

```
totalStepHeight = numSteps *
STEP_SIZE;
```

- ○
- ○


```
STEP_SIZE = STEP_SIZE + 1;
```

- ○
- ○

CHALLENGE ACTIVITY

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
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Run

2.7 Type conversions

```
0.504 * numBirths
```


type conversion

implicit conversion

-
-

int-to-double

double-to-int

```
expectedMales = 0.504 * numBirths
```

PARTICIPATION ACTIVITY

Check Show answer

Check Show answer

Show answer

Check Show answer

Check Show answer

PARTICIPATION ACTIVITY

Check Show answer

Check Show answer

```
double someDoubleVar = 0;
someDoubleVar = 5;
```



```
Average kids per family: 3
```

```
#include <iostream>
using namespace std;

int main() {
   int kidsInFamily1 = 3; // Should be int, not double
   int kidsInFamily2 = 4; // (know anyone with 2.3 kids?)
   int numFamilies   = 2; // Should be int, not double

   double avgKidsPerFamily = 0.0; // Expect fraction, so double

   avgKidsPerFamily = (kidsInFamily1 + kidsInFamily2) / numFamilies;

   // Should be 3.5, but is 3 instead
   cout << "Average kids per family: " << avgKidsPerFamily << endl;
   return 0;
}
```


static_cast<type>

type casting

```
#include <iostream>
using namespace std;

int main() {
   int kidsInFamily1 = 3; // Should be int, not double
   int kidsInFamily2 = 4; // (know anyone with 2.3 kids?)
   int numFamilies   = 2; // Should be int, not double

   double avgKidsPerFamily = 0.0; // Expect fraction, so double

   avgKidsPerFamily = static_cast<double>(kidsInFamily1 + kidsInFamily2)
                    / static_cast<double>(numFamilies);

   cout << "Average kids per family: " << avgKidsPerFamily << endl;

   return 0;
}
```

```
Average kids per family: 3.5
```



```
static_cast<double>((5 + 10) / 2)
```

PARTICIPATION ACTIVITY

CHALLENGE ACTIVITY

Run

2.8 Binary

binary number

decimal number

	$2*10^2 + 1*10^1 + 2*10^0 =$ $2*100 + 1*10 + 2*1 =$ $200 + 10 + 2 =$ 212

base 2

	$1*2^3 + 1*2^2 + 0*2^1 + 1*2^0 =$ $1*8 + 1*4 + 0*2 + 1*1 =$ $8 + 4 + 0 + 1 =$ 13

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Check Show answer

Check Show answer

Check Show answer

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
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2.9 Characters

char ***character literal***

```
#include <iostream>
using namespace std;

int main() {
   char arrowBody = '-';
   char arrowHead = '>';

   cout << arrowBody << arrowBody << arrowBody << arrowHead << endl;

   arrowBody = 'o';
   cout << arrowBody << arrowBody << arrowBody << arrowHead << endl;

   return 0;
}
```

```
--->
ooo>
```


myChar = "x"

myChar = x

PARTICIPATION ACTIVITY

Check Show answer

PARTICIPATION ACTIVITY

Load default template...

```
1
2 #include <iostream>
3 using namespace std;
4
5 int main() {
6    char sepSym = '-';
```

Run

```
 7
 8     cout << "!WARNING!";
 9     cout << "  " << sepSym << sepSym << "  ";
10     cout << "!WARNING!";
11     cout << endl;
12
13     return 0;
14 }
15
```


PARTICIPATION ACTIVITY

Animation captions:

PARTICIPATION ACTIVITY

ASCII

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
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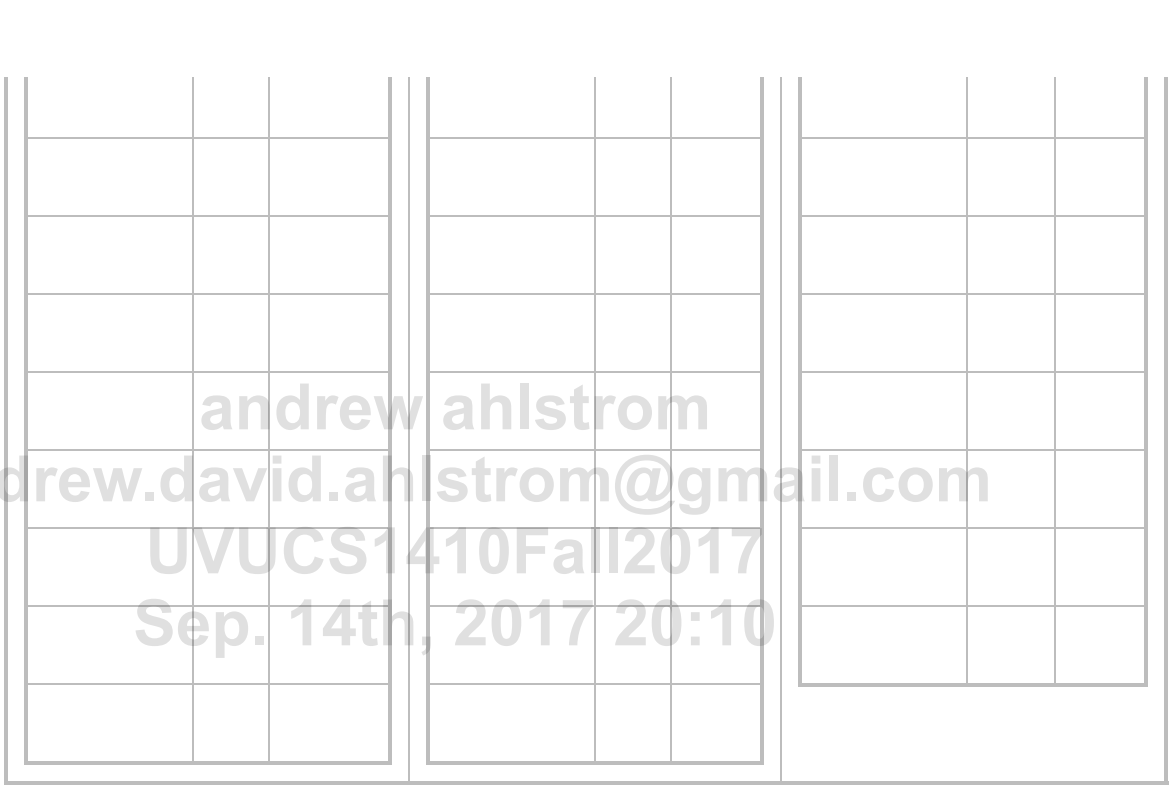

escape sequence

PARTICIPATION ACTIVITY

```
char keyPressed =
```

'R'

Check Show answer

CHALLENGE ACTIVITY

Press the q key 2 times to quit.

Run

CHALLENGE ACTIVITY

Run

2.10 String basics

string

PARTICIPATION ACTIVITY

```
#include <string>
string firstName;
```



```
#include <iostream>
#include <string>    // Supports use of "string" data type
using namespace std;

/* A game inspired by "Mad Libs" where user enters nouns,
 * verbs, etc., and then a story using those words is output.
 */

int main() {
   string wordRelative;
   string wordFood;
   string wordAdjective;
   string wordTimePeriod;

   // Get user's words
   cout << "Type input without spaces." << endl;

   cout << "Enter a kind of relative: " << endl;
   cin  >> wordRelative;

   cout << "Enter a kind of food: " << endl;
   cin  >> wordFood;

   cout << "Enter an adjective: "   << endl;
   cin  >> wordAdjective;

   cout << "Enter a time period: "  << endl;
   cin  >> wordTimePeriod;

   // Tell the story
   cout << endl;
   cout << "My " << wordRelative << " says eating " << wordFood <<
endl;
   cout << "will make me more " << wordAdjective << "," << endl;
   cout << "so now I eat it every " << wordTimePeriod << "." << endl;

   return 0;
}
```

```
Provide input without any
spaces.
Enter a kind of relative:
mother
Enter a kind of food:
apples
Enter an adjective:
loud
Enter a time period:
week

My mother says eating apples
will make me more loud,
so now I eat it every week.
```


PARTICIPATION ACTIVITY

Check Show answer

Check Show answer

Check Show answer


```
string firstMonth = "January";
```

PARTICIPATION ACTIVITY

Check Show answer

```
cin >> stringVar
```

whitespace character

```
Betty Sue(ENTER)
```

getline


```
Enter first name:
Betty Sue
Enter last name:
McKay

Welcome Betty Sue McKay!
May I call you Betty Sue?
```

```cpp
#include <iostream>
#include <string>
using namespace std;

int main() {
   string firstName;
   string lastName;

   cout << "Enter first name:" << endl;
   getline(cin, firstName); // Gets entire line up to ENTER

   cout << "Enter last name:" << endl;
   getline(cin, lastName); // Gets entire line up to ENTER

   cout << endl;
   cout << "Welcome " << firstName << " " << lastName << "!" << endl;
   cout << "May I call you " << firstName << "?" << endl;

   return 0;
}
```


PARTICIPATION ACTIVITY

Fuji Apple (ENTER).

```
cin >> fruitName
```

Check Show answer


```cpp
cout << "Enter fruit name:" << endl;
cin  >> fruitName;
cout << "Enter fruit color: " << endl;
cin  >> fruitColor;
```

Fuji Apple (ENTER)
red (ENTER)

Check Show answer

Check Show answer

PARTICIPATION ACTIVITY

userAddress

Load default template...

```
1
2  #include <iostream>
3  #include <string>
4  using namespace std;
5
6  int main() {
7     string userAddress;
8
9     cout << "Enter street address: ";
10    cin >> userAddress;
11
12    cout <<endl << "Street address is: " << userAddress << endl
13
14    return 0;
15 }
16
```

Run

```
Enter a noun: mice
Enter a verb: eat
Enter a noun: cheese
mice eat cheese.
cheese eat mice.
```

```cpp
#include <iostream>
#include <string>
using namespace std;

int main() {
   string userNoun1;
   string userVerb;
   string userNoun2;
   string sentenceSubject;
   string sentenceObject;

   cout << "Enter a noun: ";
   cin  >> userNoun1;
   cout << "Enter a verb: ";
   cin  >> userVerb;
   cout << "Enter a noun: ";
   cin  >> userNoun2;

   sentenceSubject = userNoun1;
   sentenceObject  = userNoun2;
   cout << sentenceSubject << " ";
   cout << userVerb        << " ";
   cout << sentenceObject  << "." << endl;

   sentenceSubject = userNoun2;
   sentenceObject  = userNoun1;
   cout << sentenceSubject << " ";
   cout << userVerb        << " ";
   cout << sentenceObject  << "." << endl;

   return 0;
}
```


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Check Show answer

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
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Check Show answer

Check Show answer

CHALLENGE ACTIVITY


```
Amy_5
```

Run

2.11 Integer overflow

overflow

PARTICIPATION ACTIVITY

Animation captions:

long long

compiler warning

PARTICIPATION ACTIVITY

long long

Load default template...

Run

```
1
2 #include <iostream>
3 using namespace std;
4
5 int main() {
6    int num = 1000;
```

```
7
8     num = num * 100;
9     cout << "num: " << num << endl;
10
11    num = num * 100;
12    cout << "num: " << num << endl;
13
14    num = num * 100;
15    cout << "num: " << num << endl;
16
17    return 0;
18 }
19
```


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andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
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2.12 Numeric data types

			16 bits

long long

```
cin >> myInt;
```

embedded

PARTICIPATION ACTIVITY

```
int numDaysSchoolYear;
```

```
int numDaysLife;
```

```
int numYearsEarth;
```



```
long long numHeartBeats;
```


overflow

PARTICIPATION ACTIVITY

PARTICIPATION ACTIVITY

2.13 Unsigned

			16 bits

```cpp
#include <iostream>
using namespace std;

int main() {
   unsigned long memSizeGB         = 0;
   unsigned long long memSizeBytes = 0;
   unsigned long long memSizeBits  = 0;

   cout << "Enter memory size in GBs: ";
   cin >> memSizeGB;

   // 1 Gbyte = 1024 Mbytes, 1 Mbyte = 1024 Kbytes, 1 Kbyte = 1024
bytes
   memSizeBytes = memSizeGB * (1024 * 1024 * 1024);
   // 1 byte = 8 bits
   memSizeBits = memSizeBytes * 8;

   cout << "Memory size in bytes : " << memSizeBytes << endl;
   cout << "Memory size in bits : " << memSizeBits << endl;

   return 0;
}
```

```
Enter memory size in GBs: 1
Memory size in bytes :
1073741824
Memory size in bits :
8589934592

...

Enter memory size in GBs: 4
Memory size in bytes :
4294967296
Memory size in bits :
34359738368
```

PARTICIPATION ACTIVITY

Check Show answer

Check Show answer

```
unsigned short numAtoms =
                          ;
```

Check Show answer

2.14 Debugging

Debugging
Troubleshooting

- *Predict a possible cause* of the problem
- *Conduct a test* to validate that cause
- Repeat


```
Enter circumference: 10
Circle area is: 775.157
```

```cpp
#include <iostream>
using namespace std;

int main() {
   double circleRadius        = 0.0;
   double circleCircumference = 0.0;
   double circleArea          = 0.0;
   const double PI_VAL        = 3.14159265;

   cout << "Enter circumference: ";
   cin  >> circleCircumference;

   circleRadius = circleCircumference / 2 * PI_VAL;
   circleArea = PI_VAL * circleRadius * circleRadius;

   cout << "Circle area is: " << circleArea << endl;

   return 0;
}
```



```
area = 999;
```

```cpp
#include <iostream>
using namespace std;

int main() {
   double circleRadius        = 0.0;
   double circleCircumference = 0.0;
   double circleArea          = 0.0;
   const double PI_VAL        = 3.14159265;

   cout << "Enter circumference: ";
   cin  >> circleCircumference;

   circleRadius = circleCircumference / 2 * PI_VAL;
   circleArea = PI_VAL * circleRadius * circleRadius;

   circleArea = 999; // FIXME delete
   cout << "Circle area is: " << circleArea << endl;

   return 0;
}
```

```
Enter circumference: 0
Circle area is: 999
```

```cpp
#include <iostream>
using namespace std;

int main() {
   double circleRadius        = 0.0;
   double circleCircumference = 0.0;
   double circleArea          = 0.0;
   const double PI_VAL        = 3.14159265;

   cout << "Enter circumference: ";
   cin  >> circleCircumference;

   circleRadius = circleCircumference / 2 * PI_VAL;

circleRadius = 0.5; // FIXME delete
   circleArea = PI_VAL * circleRadius * circleRadius;

   cout << "Circle area is: " << circleArea << endl;

   return 0;
}
```

```
Enter circumference: 0
Circle area is: 0.785398
```



```cpp
#include <iostream>
using namespace std;

int main() {
   double circleRadius        = 0.0;
   double circleCircumference = 0.0;
   double circleArea          = 0.0;
   const double PI_VAL        = 3.14159265;

   cout << "Enter circumference: ";
   cin  >> circleCircumference;

circleCircumference = PI_VAL;                // FIXME delete
   circleRadius = circleCircumference / 2 * PI_VAL;
cout << "Radius: " << circleRadius << endl; // FIXME delete

   /*
    circleArea = PI_VAL * circleRadius * circleRadius;

    cout << "Circle area is: " << circleArea << endl;
    */

   return 0;
}
```

```
Enter circumference: 0
Radius: 4.9348
```

```
                                radius = circumference / 2 * PI_VAL;
radius = circumference / (2 * PI_VAL);

radius = circumference / (2 * PI_VAL);
```


-
-
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-

PARTICIPATION ACTIVITY

Load default template...


```
1
2  #include <iostream>
3  using namespace std;
4
5  int main() {
6     int sideLength = 0;
7     int cubeVolume = 0;
8
9     cout << "Enter cube's side length: " << endl;
10    cin >> sideLength;
11
12    cubeVolume = sideLength * sideLength * sideLength;
13
14    cout << "Cube's volume is: " << cubeVolume << endl;
15
16    return 0;
17 }
```

Run

```
18
```

PARTICIPATION ACTIVITY

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
Sep. 14th, 2017 20:10

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2.15 Style guidelines

style guide

Sample		

	x = 25;
	y = x + 1;
		
		x = 25; y = x + 1;
		// No
		if (x == 5) { y = 14; }
		// No

	x = 25;
	y = x + 1;
		
		x = 25;
		// No
		y = x + 1;

	C = 25;
	F = ((9 * C) / 5) + 32;
	F = F / 2;
		
		C=25; // No
		F = ((9*C)/5) + 32; // No
		F = F / 2 ; // No

	if (a < b) {
	  x = 25;
	  y = x + 1;
	}
		
		if (a < b) {
		  x = 25; // No
		  y = x + 1; // No
		}
		if (a < b) {
		 x = 25; // No
		}

	`if (a < b) {`
	`  // Called "K&R" style`
	`}`
	`while (x < y) {`
	`  // K&R style`
	`}`
		`if (a < b)`
		`{`
		`  // Also popular, but we use K&R`
		`}`

	`if (a < b) {`
	`  ...`
	`}`
	`else {`
	`  // "Stroustrup" style, modified K&R`
	`}`
		`if (a < b)`
		`{`
		`  ...`
		`} else {`
		`  // Original K&R style`
		`}`

	`if (a < b) {`
	`  x = 25;`
	`}`
		`if (a < b)`
		`  x = 25;  // No, can lead to error later`

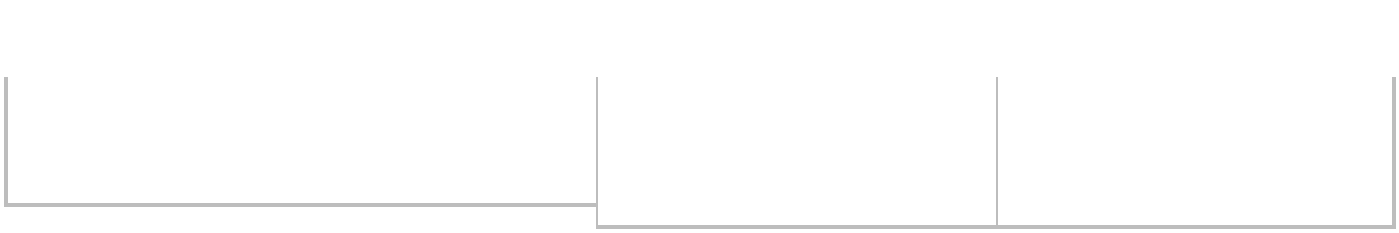
	`int numItems;`	`int NumItems;  // No`
		`int num_items;  // Common, but we don't use`

	`int numBoxes;`
	`char userKey;`
		`int boxes;  // No`
		`int b;  // No`
		`char k;  // No`
		`char usrKey;  // No`

	`const int MAXIMUM_WEIGHT = 300;`	`const int MAXIMUMWEIGHT = 300;  // No`
		`const int maximumWeight = 300;  // No`
		`const int MAXIMUM = 300;  // No`

	`int i = 0;`
	`char userKey = '-';`
		`int i;  // No`
		`char userKey;  // No`
		`userKey = 'c';`
		`int j;  // No`

	`PrintHello()`	`printHello()  // No` `print_hello()  // No`



K&R style

Stroustrup style

-
-

2.16 C++ example: Salary calculation with variables

PARTICIPATION ACTIVITY


```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5    int hourlyWage       = 20;
6    int workHoursPerWeek = 40;
7    // FIXME: Declare and initialize variable workWeeksPerYear, then replace the 50's below
```

```
    int annualSalary     = 0;

    annualSalary = hourlyWage * workHoursPerWeek * 50;
    cout << "Annual salary is: ";
    cout << annualSalary << endl;

    cout << "Monthly salary is: ";
    cout << (hourlyWage * workHoursPerWeek * 50) / 12 << endl;

    return 0;
}
```


Run

PARTICIPATION ACTIVITY


```
#include <iostream>
using namespace std;

int main() {
   int hourlyWage       = 0;
   int workHoursPerWeek = 40;
   int workWeeksPerYear = 50;
   int monthsPerYear    = 12; // FIXME: Declare as const and use standard naming
   int annualSalary     = 0;
   int monthlySalary    = 0;

   cout << "Enter hourly wage: " << endl;
   cin >> hourlyWage;

   // FIXME: Get user input values for workHoursPerWeek and workWeeksPerYear

   annualSalary = hourlyWage * workHoursPerWeek * workWeeksPerYear;
```

```
18    cout << "Annual Salary is: ";
19    cout << annualSalary << endl;
20
```

Run

2.17 C++ example: Married-couple names with varia

PARTICIPATION ACTIVITY


```
1  #include <iostream>
2  #include <string>
3  using namespace std;
4
5  int main() {
6     string firstName1 = "";
7     string lastName1  = "";
8     string firstName2 = "";
9     string lastName2  = "";
10    string firstNames = "";
11    // FIXME: Declare lastName
12
13    cout << "What is the first person's first name?" << endl;
14    cin >> firstName1;
15    cout << "What is the first person's last name?" << endl;
16    cin >> lastName1;
17
18    cout << "What is the second person's first name?" << endl;
```

```
    cin >> firstName2;
    cout << "What is the second person's last name?" << endl;
```

Run

PARTICIPATION ACTIVITY

```
#include <iostream>
#include <string>
using namespace std;

int main() {
   string firstName1 = "";
   string lastName1  = "";
   string firstName2 = "";
   string lastName2  = "";
   string firstNames = "";
   string lastName   = "";

   cout << "What is the first person's first name?" << endl;
   cin >> firstName1;
   cout << "What is the first person's last name?" << endl;
   cin >> lastName1;

   cout << "What is the second person's first name?" << endl;
   cin >> firstName2;
   cout << "What is the second person's last name?" << endl;
   cin >> lastName2;
```


Run

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
Sep. 14th, 2017 20:10

andrew ahlstrom
andrew.david.ahlstrom@gmail.com
UVUCS1410Fall2017
Sep. 14th, 2017 20:10