Conditionals

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1. If-then-else

A conditional is a test: 'if something is true, then do this, otherwise maybe do something else'. The C++ syntax is

```
if ( something ) {
  // do something;
} else {
  // do otherwise;
}
```

- The 'else' part is optional
- You can leave out braces in case of single statement.

2. Complicated conditionals

Chain:

```
if ( /* some test */ ) {
  ...
} else if ( /* other test */ ) {
  ...
}
```

Nest:

```
if ( /* some test */ ) {
  if ( /* other test */ ) {
    ...
  } else {
    ...
  }
}
```

3. What are logical expressions?

```
logical_expression ::
  comparison_expression
  | NOT comparison_expression
  | logical_expression CONJUNCTION comparison_expression
comparison_expression ::
  numerical_expression COMPARE numerical_expression
numerical_expression ::
  quantity
  | numerical_expression OPERATOR quantity
quantity :: number | variable
```

4. Comparison and logical operators

Here are the most common logic operators and comparison operators:

Operator	meaning	example
==	equals	`x==y-1`
!=	not equals	`x*x!=5`
>	greater	`y>x-1`
>=	greater or equal	`sqrt(y)>=7`
<,<=	less, less equal	
&&,||	and, or	`x<1 && x>0`
and,or	and, or	`x<1 and x>0`
!	not	`!( x>1 && x<2 )`
not		`not ( x>1 and x<2 )`

Precedence rules of operators are common sense. When in doubt, use parentheses.

Quiz 1

Any comments on the following?

```
bool x;
// ... code with x ...
if ( x == true )
  // do something
```

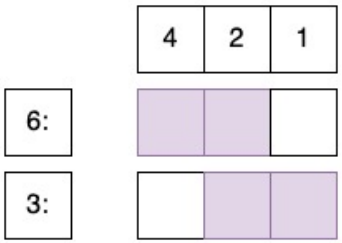
Exercise 1

Read in a positive integer. If it's a multiple of three print 'Fizz!'; if it's a multiple of five print 'Buzz!'. It is a multiple of both three and five print 'Fizzbuzz!'. Otherwise print nothing.

Note:

- Capitalization.
- Exclamation mark.
- Your program should display at most one line of output.

5. Bitwise operations



Code:

```
// basic/bitor.cpp
int x=6,y=3;
cout << "6|3 = " << (x|y)
     << '\n';
cout << "6&3 = " << (x&y)
     << '\n';
```

Output:

```
6|3 = 7
6&3 = 2
```

Exercise 2

How would you test if a number is odd or even with bitwise testing?

6. Local variables in conditionals

The curly brackets in a conditional allow you to define local variables:

```
if ( something ) {
  int i;
  .... do something with i
}
// the variable `i' has gone away.
```

Good practice: only define variable where needed.

Braces induce a scope.

7. Conditional with initializer

Variable local to the conditional:

Code:

```
// basic/ifinit.cpp
if ( char c = getchar();
     c!='a' )
  cout << "Not an a, but: "
    << c
       << '\n';
else
  cout << "That was an a!"
       << '\n';
```

Output:

Script:

```
for c in d b a z ;
    ↪do \
   echo $c |
    ↪./ifinit ; \
done
Not an a, but: d
Not an a, but: b
That was an a!
Not an a, but: z
```

Exercise 3

Write a function `float read_number()` and use it to rewrite your fizzbuzz solution.

Make sure to use an initializer; the number you are testing should be limited in scope to the conditional.

8. Switch statement example

Cases are evaluated consecutively until you 'break' out of the switch statement:

Code:

```
// basic/switch.cpp
switch (n) {
case 1 :
case 2 :
  cout << "very small"
    << '\n';
  break;
case 3 :
  cout << "trinity" <<
    '\n';
  break;
default :
  cout << "large" <<
    '\n';
}
```

Output:

Script:

```
for v in 1 2 3 4 5 ; do \
          echo $v |
    ↪./switch ; \
        done
very small
very small
trinity
large
large
```