

# Index



## Symbols

" 25  
' 23  
\* 128  
. 126  
... 212, 214  
/\* and \*/ 26  
/\*\* and \*/ 27  
// 26  
; 114  
\ 24  
{ } 114, 123  
' 23

## Numerics

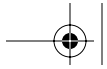
2's complement 598

## A

absolute values 402  
abstract  
  classes 134  
  collection implementations 485  
  interfaces 135  
  methods 147  
abstraction 2, 10  
access order 449, 450  
accessibility 7, 16, 120  
  anonymous classes 311  
  classes 131  
  default 131, 141  
  local classes 304  
  members 120, 133, 137  
  modifiers 131

  non-static member classes 294  
  package 131  
  private 142  
  protected 139  
  public 131, 138  
  static member classes 289  
  UML 137  
actual parameter list 86, 263  
adding to class 226  
additive operators 56  
aggregation 10, 12, 229  
  hierarchy 229  
aliases 5, 69  
  *see also* references  
analyzing program code 492  
and 70, 76  
anonymous  
  arrays 104  
  collection implementations 481  
anonymous classes 308  
  event listeners 308  
Apostrophe 24  
appending elements 441  
application 15  
architect exam 489  
arguments to main method 38  
ArithmeticException 187  
array creation expression 104  
array initializer block 104  
array list 442  
array of arrays 100, 106  
array operations 434  
ArrayIndexOutOfBoundsException 103, 187  
arrays 100, 388  
  anonymous 104





arrays (*Continued*)  
  collection operations 434  
  declarations 100  
  default initialization 101  
  dynamic 442  
  elements 100, 103  
  initialization 101, 102, 106  
  length 100  
  objects 388  
  reference 100, 103, 259  
ArrayStoreException 260  
ASCII 23, 29  
assert statement 209  
  *see* assertions 209  
AssertionError 209, 210  
  *see also* assertions 209  
assertions 208, 307  
  assert statement 208  
  compiling 211  
  conditional compilation 218  
  control flow invariants 217  
  enabling and disabling 212  
  internal invariants 216  
  postconditions 218  
  preconditions 218  
  using 215  
assignable 262  
assignment compatible 262  
assignments  
  bitwise 78  
  cascading 48  
  compound operators 59, 71, 78  
  expression statement 48  
  implicit narrowing 49  
  multiple 48  
  numeric conversions 48  
  operator 42, 47  
  primitive values 47  
  references 47  
associativity 43  
asynchronous 351  
attributes *see* properties  
automatic garbage collection 6, 318  
automatic variables *see* local variables  
AWTException 187

## B

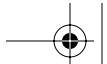
Backslash 24  
Backspace 24

bags 437  
balanced tree 431  
base 22, 394, 398  
base class 226  
basic collection operations 433  
basic map operations 447  
binary  
  numbers 593  
  numeric promotion 46  
  operators 42  
  search 482  
  shift operators 79  
binary numbers 593  
bit patterns 598  
bit shifting 79  
bitwise  
  and 76  
  assignment 78  
  not 76  
  operators 75  
  or 76  
  shifting 79  
  xor 76  
blank final variable 94, 146  
blocked for I/O state 367  
blocked for join completion state 367  
blocked for lock acquisition state 367  
blocks 114, 123  
  catch 190  
  finally 190, 195  
  scope 123  
  try 189  
Boolean wrapper class 400  
booleans 28, 30  
  casting 44  
  expressions 66  
  literals 23  
break statement 163, 164, 172  
BS *see* Backspace  
buckets 471  
building abstractions 10  
bulk map operations 448  
bulk operations on collections 433  
byte 22, 28  
byte code 15

## C

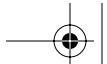
C 148  
C++ 148





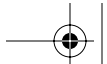
- call-by-reference 91
- call-by-value 91
- callee 86
- caller 86
- carriage return 24, 25
- cascading assignments 48
- cascading if-else statements 161
- case labels 161, 162
- case-sensitivity 20
- cast
  - 44
- cast operator 42
- casting 44
  - downcasting 232
  - upcasting 230
    - see also* conversions
- catch block 190
- catch-and-throw paradigm 181
- catching exceptions 181
- ceil method 402
- certification 489, 561
- chaining
  - constructors 248
  - finalizers 325
  - new operator 297
- char 29
- character set
  - ASCII 23, 29
  - ISO Latin-1 23, 29
  - Unicode 23, 29
- character strings 407
- Character wrapper class 399
- characters 29
  - literals 23
  - searching for 414
- checked exceptions 187, 201
- child class 226
- child threads 351, 355
- choosing between String and StringBuffer
  - class 420
- Class class 389
- class file 15
- class lock 360, 364
- class method 10
- class variable 10
- ClassCastException 187, 265
- classes
  - abstract 134
  - accessibility 131, 284
  - adding to 226
  - anonymous 308
  - as members 284
  - base 226
  - child 226
  - constructors 117, 243
  - declaration context 284
  - definitions 2, 5, 37, 111
  - derived 226
  - diagram 8, 9
  - extending 135, 226
  - file name 289
  - final 135
  - generalized 228
  - grouping 126
  - header 111
  - initialization 337, 345
  - inner 284
  - instance members 112
  - instances 4
  - local 302
  - members 6
  - methods 144
  - modifiers 134
  - mother of all 388
  - name 117, 126
  - nested *see* nested classes
  - non-static member 284, 292
  - Object 388
  - on-the-fly 284
  - parent 226
  - runtime 389
  - scope 121
  - specialized 228
  - static 284
  - static member 287
  - static members 112
  - subclass 10, 226
  - superclass 10, 226
  - top-level 37, 284
  - variables 144
  - wrappers 388, 392
- ClassLoader class 388
- cleaning up 321
- clean-up code 195
- client 15
- Cloneable interface 389
- cloning objects 389
- code optimizations 146
- code reuse 226, 278
- Collection interface 429





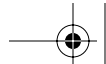
- collections 264, 428, 429
  - abstract implementations 485
  - anonymous implementations 481
  - array operations 434
  - ArrayList 442
  - basic operations 433, 447
  - bulk operations 433, 448
  - Cloneable 430
  - customizing 481
  - data structures 431
  - duplicate elements 437, 440
  - elements 428
  - empty constants 483
  - filling 484
  - first element 456
  - HashMap 449
  - HashSet 437
  - Hashtable 449
  - immutability 481
  - implementations 428, 429, 431
  - interfaces 428
  - iterators 434
  - last element 456
  - LinkedList 442
  - List 442
  - lists 440
  - Map 447, 449
  - map views 448
  - optional operations 432
  - ordered 440
  - range-views 441, 456
  - retaining elements 433
  - Serializable 430
  - shuffle elements 484, 485
  - singleton set 483
  - SortedMap 452
  - SortedSet 452, 456
  - sorting 482
  - subset 456
  - textual representation 440
  - thread-safety 442, 449, 481
  - TreeMap 457
  - TreeSet 457
  - unsupported operations 447
  - utility methods 428
  - Vector 442
  - views 442, 448, 456
- collections framework 428
- Collections utility class 482
- command
  - java 17
  - javac 16
- comments 26
- common memory space 350
- communication 7, 86
- Comparable interface 453
  - compareTo 476
- comparable objects 452
- comparator 452
- Comparator interface
  - compare 452
- comparing objects 389, 453
  - see also* equality
- comparison 67
- compilation unit 127
- complete methods 146
- composite object 10
- compound assignment operators 59
- compound statement 114
- concatenation of strings 413
- concatenation operator 62
- concurrent activities 350
- conditional 66
  - and 72
  - expressions 83, 158
  - operators 72, 83
  - or 72
  - statements 158
- conditions 66
- connecting punctuation 20
- const 21
- constant declarations 251
- constant values 21, 146
- constants 255
- constituent objects 10
- constituents 12
- constructing loops 167
- constructor chaining 244, 248, 342
- constructors 3, 117, 243
  - chaining 244, 248
  - default 118
  - implicit default 118
  - name 117
  - overloading 120
- constructs 20
  - high-level 20
  - loops *see* iteration statements
  - synchronized blocks 363, 364
- context switching 350
- continue statement 174





- contract 2, 252, 253, 275, 278
- contracting lists 441
- control flow
  - break *see* break statement
  - continue 174
  - do-while 168
  - for 169
  - if 158
  - if-else 160
  - iteration *see* iteration statements
  - loops *see* iteration statements
  - return 176
  - statements 113, 158
  - switch 161
  - throw 199
  - transfer statements 171
  - while 167
- control flow invariants 217
- control transfer 171
- conversions 44
  - contexts 44, 46
  - identity 60
  - implicit narrowing 60
  - narrowing 44
  - number systems 594, 596
  - numeric promotions 45
  - parameter passing 263
  - parameters 87
  - reference casting 264
  - references 268
  - string concatenation 62
  - to strings 416, 440
  - truncation 49
  - type safe 263
  - unsafe casts 265
  - widening 44
- converting number systems 594, 596
- core interfaces 428
- counter-controlled loops 169
- CR *see* Carriage return
- crab 171
- creating
  - objects 4, 84
  - threads 351
- currency symbol 20
- current object 114
- cursor 442
  
- D**
- daemon threads 351
- dangling references 318
- data structures 431
- data types *see* types
- date 453
- dead state 367
- deadlocks 381
- declarations
  - arrays 84, 100
  - local 114
  - statements 113
  - variables *see* variable declarations
- declaring *see* declarations
- decorating collections 481
- decorators 481
- decoupling 273
- decrement operator 63
- deep copying 389
- default
  - accessibility 131, 137, 141
  - constructor 118
  - exception handler 184
  - label 162
  - values 33, 332, 342
- defining *see* definitions
- definitions
  - classes 37, 111
  - inheritance 255
  - interfaces 37, 251
  - main method 38
  - methods 112
  - packages 36, 127
- degrees 404
- delegating requests 278
- derived class 226
- destroying objects 324
- destructive collection operations 433
- developer exam 489, 495
- diagrams
  - class 3
  - see also* UML
- dictionary 429
- dictionary order 412
- difference 437
- disjunct collections 440
- disposal of resources 321
- distance of shift 79
- division
  - floating-point 55
  - integer 54
- division operator
  - / 54
- documentation 26
- documentation comment 26





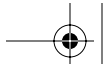
documenting *see* documentation  
 dot 126  
 double 22, 29  
 do-while statement 168  
 downcasting 45, 232  
 duplicate elements 437, 440  
 duplicating objects 389  
 dynamic method binding 231  
 dynamic method lookup 231, 239, 273  
 dynamically resizable arrays 442

## E

elements 100, 428  
 elements of collections 428  
 eligible for garbage collection 319  
 else clause matching 161  
 empty collections 483  
 empty set 437  
 empty statement 114  
 encapsulation 126, 275, 285  
 encapsulation of implementation 278  
 enclosing class 284, 292  
 enclosing context 289, 291, 295  
 entering shared resource 360  
 entries 429, 447  
 entry set 447  
 EOFException 187  
 equality 67, 389  
     equals method 69, 389  
     object value 69  
     objects 69  
     primitive values 67  
     references 68  
 equals method 69, 389  
 equivalence relation 465  
 equivalent collections 440  
 Error 210  
 escape sequences 24  
 evaluation order 43  
     arithmetic expressions 51  
 evaluation short-circuits 73  
 event listeners  
     anonymous classes 308  
 exam 489  
 exam voucher 490  
 Exception class 187  
 exception handler 181  
     *see also* exceptions

exceptions 181, 188  
     ArrayIndexOutOfBoundsException 103  
     ArrayStoreException 260  
     checked *see* checked exceptions  
     ClassCastException 265  
     default handler 184  
     handler 181  
     ignored 324  
     IllegalThreadStateException 351  
     IndexOutOfBoundsException 441  
     NumberFormatException 394  
     throw 199  
     throwing *see* throwing exceptions  
     thrown by method 113  
     types 185  
     uncaught 184  
     unchecked 187  
     UnsupportedOperationException 432  
 exchanging information 86  
 execution paths 350  
 exiting a shared resource 360  
 explicit  
     conversions 232  
     garbage collection 327  
     referencing 304  
 exponent 22  
 exponential functions 404  
 expression statements 48, 114  
 expressions 162  
     boolean 66  
     case labels 162  
     conditional 83  
     deterministic evaluation 42  
     label 162  
     return 176  
     statements 114  
 extending  
     classes 226  
     interfaces 254  
     Thread 355  
 extends clause 226  
     interfaces 251  
 extensions  
     .class 15  
     .java 15  
 external libraries 336  
 extracting substrings 416





## F

- factory methods 481
- fall through 162
- false literal 23
- FF *see* Form feed
- field initialization 342
- fields 2
  - hiding 236
  - see* member variables
- file 453
- file name 37, 289
- filling collections 484
- final
  - classes 135
  - members 146
  - parameters 94
- finalization mechanism 319
- finalize method 324
- finalize method 389
- finalizer 324
- finalizer chaining 325
- finally block 190, 195
- first element 456
- float 22, 29
- floating-point 28
  - double 29
  - float 29
  - literals 22
- floating-point arithmetic 52
  - strictfp 54
- floating-point division 55
- floating-point remainder 56
- floor method 403
- flow control *see* control flow
- for statement 169
- foreign methods 148
- form feed 24, 25
- formal parameters 86, 113, 117, 123, 263
- formatting 26
- fractional signed numbers 28
- framework for collections 428
- fully qualified names 126, 256
  - package 127

## G

- gain lock ownership 360
- general abstractions 228
- general loops 169

- generalization 10
- generalized classes 228
- generic data types 264
- goto 21, 171
- grammar rules 20
- grouping 126
- groups of objects 428
- GUI applications 351

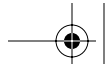
## H

- handles *see* references
- has-a relationship 229
- hash codes 388
- hash function 471
- hash map 449
- hash table 431, 449
- hash value 471
- Hashing 471
- HashSet 437
- head map view 456
- head set view 456
- heap 318
- hexadecimal numbers 593
- hiding internals 275
- Horizontal tab 24
- HT *see* Horizontal tab

## I

- identifiers 20
  - predefined 20
  - reserved 20
  - variable 31
- identity conversion 60
- identity of object 5
- IEEE 754-1985 29
- if-else statement 160
- ignored exceptions 324
- illegal thread state 351
- IllegalArgumentException 187
- immediate superclass 246
- immediately enclosing instance 284
- immutable collections 481
- implementation 2
- implementation inheritance 226
- implementations 228, 275
  - collections 428
  - inheritance hierarchy 135
- implementations of collections 429

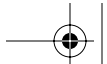




- implementing
  - interfaces 253
- implements clause 253
- implicit
  - default constructor 118
  - inheritance 226
  - narrowing conversions 60
- import
  - declaration 128
  - single type import 128
  - statement 37, 289
  - type import on demand 128
- increment expression 169
- increment operator 63
- independent lifetimes 229
- index 100
- index bounds 441
- IndexOutOfBoundsException 441
- individual array elements 103
- inequality 68
  - see also* equality
- infinite loop 171
- infinity 52
  - negative 52
  - positive 52
- inheritance 10, 229
  - hierarchy 228, 297
- initial capacity 450
- initial state of object 342
- initialization
  - arrays 102, 106
  - code 102
  - default values 33
  - for statement 169
  - object references 32
  - objects 5
  - variables 31
- initializer expressions 331
- initializers 331
  - declaration-before-read rule 332
- initializing *see* initialization
- inner classes 284
  - synchronization 364
- insertion order 438, 450
- instance
  - members 10, 112
  - methods 10, 113, 114
  - variable initialization 33
  - variables 10, 32
  - see also* object
- instance initializer block 338
- instance methods 6
- instance variables 6, 342
- instanceof operator 84, 264
- instantiation 4, 135
  - anonymous classes 311
  - local classes 305
  - non-static member classes 292
  - static member classes 287
- int 22, 28
- integer arithmetic 52
- integer division 54
- integer remainder operation 55
- integers 28
  - and 76
  - byte 28
  - data types 29
  - int 28
  - literals 22
  - long 28
  - not 76
  - or 76
  - representation 598
  - short 28
  - types 29
  - xor 76
- Integral types 28
- integrity (maintaining) 360
- interface-based 430
- interfaces 251
  - abstract 135
  - accessibility 131
  - body 251
  - collection core 428
  - definitions 37
  - extending 254
  - header 251
  - implementing 310
  - initialization 345
  - top-level 37, 284
  - variables 255
- internal invariants 216
- interpreter 16
- intersection 437
- invoking garbage collection 327
- IOException 187
- is-a relationship 228, 229, 278
- ISO Latin-1 23, 29
- iteration statements 167
  - next iteration 174
  - termination 167, 173







iterators 434  
fail-fast 436

## J

JAR 130

Java

interpreter 38

Native Interface *see* JNI

program 15

java 17

-disableassertions or -da 212

-disablesystemassertions or -dsa 215

-enableassertions or -ea 212

-enablesystemassertions or -esa 215

Java 2 SDK 16

Java byte code 15

Java compiler 16

Java Native Interface *see* JNI

Java Virtual Machine *see* JVM

javac 16

-source 1.4 211

javadoc comment 26

javadoc utility 26

JNI 148

joining threads 368

JVM 16

## K

key insertion order 449

key objects 429

key sets 447

key sorting 456

keys 447

keywords 20

abstract 134, 147

assert 209

boolean 30

byte 28

case 161

catch 190

char 29

class 111, 112, 251

const 21

continue 174

default 162

do 168

double 29

else 160

extends 226

final 94, 135, 146

finally 195

float 29

for 169

if 158

implements 253

import 128, 289

instanceof 84, 264

int 28

interface 251

long 28

native 148

new *see* new operator

null 264

package 127

private 142

protected 139

public 138

reserved words 21

return 176

short 28

static 16, 287, 336

strictfp 54

super 235, 238, 246

switch 161

synchronized 147, 360

this 114

throw 199

throws 201

transient 149

try 189

unused words 21

void 16, 393

volatile 150

while 167, 168

## L

labeled break statement 173

labels 171, 173

break 173

case 161

default 162

expressions 162

labeled statement 171

switch statement 161

last element 456

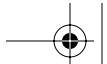
least significant bit 598



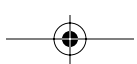


- left
    - associativity 43
    - shift 79
  - left-most bit 598
  - legal assignments 262
  - length method 410
  - lexical tokens 20
  - LF *see* Linefeed
  - libraries 336
  - line terminator 25
  - linear implementation inheritance 228
  - Linefeed 24
  - LinkageError 187
  - linked list 442
  - list 429
  - lists 429, 440, 442
    - iterators 442
  - literals 21
    - boolean 23
    - character 23
    - default type 22
    - double 22
    - escape sequences 24
    - false 23
    - float 22
    - floating-point 22
    - integer 22
    - null 21
    - predefined 21
    - prefix 22, 594
    - quoting 23
    - scientific notation 22
    - string 25
    - suffix 22
    - true 23
  - live threads 368
  - load factor 438, 450
  - local 34
    - chaining of constructors 244, 342
    - classes 302
    - declarations 114
    - variables 33, 123
  - locale 413
  - locks
    - class 359
    - object 359
  - logarithm 404
  - logical
    - and 70
    - or 70
    - xor 70
  - logical AND
    - & 70
  - logical complement
    - ! 70
  - logical exclusive OR
    - ^ 70
  - logical inclusive OR
    - | 70
  - logical XOR
    - ^ 70
  - long 22, 28
    - suffix 22
  - loop condition 167
  - loops *see* iteration statements
- ## M
- magnitude 48
  - main method 16, 17, 38
  - main thread 351
  - maintaining integrity 360
  - manifest constant 19, 146
  - manifest file
    - See* JAR utility 130
  - many-to-one relation 447
  - map 429
  - map views 448
  - mappings 429
    - See entries* 429
  - maps 447, 449
    - access order 449
    - entries 429
    - key insertion order 449
    - mappings 429
    - ordering mode 449
  - marker interfaces 251
  - Math class 116, 401
  - math constants 402
  - mathematical set 437
  - MAX\_VALUE constant 397
  - maximum value 402
  - member declarations 112, 251
  - members 3, 120
    - access 114
    - accessibility 133, 137
    - classes 284
    - default values 33
    - final 146
    - inheritance 226





- instance 112
  - interfaces 284
  - modified 226
  - modifiers 144
  - of objects 6
  - scope 120
  - short-hand 115
  - static 7, 112, 144
  - terminology 10
  - memory management 318
  - message
    - passing 86
    - receiver 7
  - method call 7, 86, 113
    - chaining 423
  - method overloading 116, 237
    - resolution 237
  - method overriding 231, 233, 237, 343
  - method prototype 147, 252
  - method prototype declaration 251, 252
  - method signature 113, 233
  - methods 3
    - abstract 147
    - accessibility 113
    - automatic variables *see* local variables
    - body 113, 123
    - call *see* method call
    - chained 414
    - clone 389
    - definition 87, 112
    - dynamic binding 231
    - dynamic lookup 231, 273
    - equals 69, 389
    - exceptions 113
    - finalize 324, 389
    - foreign 148
    - getClass 389
    - header 112
    - implementation 147
    - invocation *see* method call
    - local variables
    - main *see* main method
    - mutually exclusive 363
    - name 86
    - native 148
    - objects 114
    - overloading *see* method overloading
    - parameters 113
    - prototypes 252
    - return 176
    - return value 113
    - signature 113, 116, 237
    - synchronized 147, 360
    - termination 176
    - throws clause 201
    - toString 389
    - valueOf 416
  - MIN\_VALUE constant 397
  - minimizing overhead 321
  - minimum value 402
  - modifiers
    - abstract 134, 147
    - accessibility 131, 137
    - classes 134
    - final 146
    - main method 38
    - native 148
    - static 144
    - strictfp 54
    - synchronized 147
    - transient 149
    - volatile 150
  - most significant bit 598
  - mother of all classes 388
  - multiple assignments 48
  - multiple implementation inheritance 251
  - multiple interface inheritance 251
  - multiple-line comment 26
  - multiplication operator
    - \* 54
  - multiplicative operators 54
  - multisets 437
  - multitasking 350
  - multithreaded programming 350
  - mutable character strings 420
  - mutex
    - See* locks 359
  - mutually exclusive
    - actions 160
    - locks 359
    - operations 360
- N**
- name 20
  - named constants 146
  - namespaces 117
  - NaN 53
  - narrowing conversions 44
    - primitive 45
    - reference 45
  - native libraries 336





native methods 148  
 natural logarithms 402, 404  
 natural order 452, 453, 482  
 negative zero 53  
 nested classes 284
 

- anonymous 308
- full name 288
- local 302
- non-static member 292
- static member 287
- synchronization 364

 new operator 4, 101, 117, 297, 308, 342
 

- special form 293

 Newline *see* Linefeed  
 NL *see* Newline  
 non-associativity 42  
 non-runnable states 367  
 nonstatic code
 

- See* nonstatic context 112

 nonstatic context 112  
 non-static field 10  
 non-static member classes
 

- full name 288

 not 76  
 notifying threads 370, 371, 390  
 null reference 21
 

- casting 44, 264

 NullPointerException 187  
 Number class 396  
 number systems
 

- base 22
- binary 594
- converting 594, 596
- decimal 22, 594
- hexadecimal 22, 594
- octal 22, 594

 NumberFormatException 187, 394  
 numeric promotions 45
 

- assignment 48
- binary 46
- unary 45

 numeric wrapper classes 396

## O

object 4  
 Object class 228, 388  
 object lock
 

- See* locks 359

 object references 4

object state 6, 91, 117, 342  
 object-oriented programming 2  
 objects 13
 

- alive 319
- arrays 100
- callee 86
- caller 86
- Class class 389
- cleaning up 321
- cloning 389
- communication 86
- comparing 389, 453
- composite 319
- constituent 12, 319
- constructing 342
- contract 275
- create 4
- decoupling 273
- destroying 324
- equality 69, 389
- exchanging information 86
- identity 5
- immutable 392
- implementation 275
- initial state 342
- initialization 5, 117
- initializer block 338
- internals 275
- members 6
- methods 114
- Object class 388
- outer 294
- persistent 149
- reachable 319
- resurrection 319
- services 275
- state *see* object state
- value equality 69

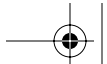
 octal numbers 593  
 one-dimensional arrays 100  
 on-the-fly classes 284  
 OOP 2  
 open range-view operations 441  
 operands 44
 

- evaluation order 43

 operations 2  
 operators 42
 

- 56
- 63
- ! 70





!= 67, 68  
 % 54, 55  
 %= 59  
 & 70, 75  
 && 72  
 &= 71, 78  
 \* 51, 54  
 \*= 59  
 + 56, 62  
 ++ 63  
 += 59  
 . 7, 126  
 / 54  
 /= 59  
 < 67  
 << 79, 80  
 <= 83  
 <= 67  
 -= 59  
 = 47  
 == 67, 68  
 > 67  
 >= 67  
 >> 79, 81  
 >>= 83  
 >>> 79  
 >>> 82  
 >>>= 83  
 ? : 83  
 ^ 70, 75  
 ^= 71, 78  
 | 70, 75  
 |= 71, 78  
 || 72  
 ~ 75  
 assignment 42, 47  
 associativity 42  
 binary 42  
 bitwise 75, 79  
 boolean 67, 70  
 cast 42  
 comparisons 67  
 compound assignment 59, 71, 78  
 conditional 72, 83  
 decrement 63  
 dot 7  
 equality 67  
 execution order 43  
 floating-point 52  
 floating-point division 55  
 floating-point remainder 56  
 increment 63  
 instanceof 84, 264  
 integer 75  
 integer arithmetic 52  
 integer division 54  
 integer remainder 55  
 logical 70  
 multiplicative 54  
 new *see* new operator  
 overflow 52  
 overloaded 52, 54  
 postfix 42  
 precedence 42  
 relational 67  
 shift 79  
 short-circuited 72  
 string concatenation 62  
 ternary 42  
 unary - 54  
 unary + 54  
 optional operations 432  
 or 70, 76  
 ordered collections 429, 440  
 ordering mode 449  
 out of bounds 441  
 outer object 294  
 overflow 52, 598  
 overloaded 52  
 overloading  
   constructors 120  
   methods 116, 237  
   resolution 237  
 override 203  
 overriding  
   equals 69, 461  
   finalizers 324  
   hashCode 471  
   methods 231, 233, 237  
   toString 62

**P**

package accessibility 131, 137  
 package statement 36, 127  
 packages 126  
   accessibility *see* package accessibility  
   definition 36, 127  
   hierarchy 126





- packages (*Continued*)
  - java.lang 388
  - java.util 428
  - members 126
  - naming scheme 127
  - short-hand 128
  - statement *see* package statement
  - unnamed 128
  - using 128
- parameter list *see* formal parameters
- parameters 113
  - actual 86
  - array elements 92
  - arrays 91
  - conversions on passing 263
  - final 94
  - formal *see* formal parameters
  - implicit 114
  - passing 86
  - primitives 88
  - references 89
  - this 114
- parent class 226
- parentheses 42
- parse*Type* method 398
- parsing numeric values 397, 398
- partial implementation 253
- partly synchronizing a method 363
- passing
  - messages 86
  - parameters 86
  - references 89
- paths of execution 350
- permute elements 484, 485
- persistent objects 149
- polymorphism 231, 259, 272, 279, 305
- positive zero 53
- postconditions 218, 307
- postfix operators 42
- power 404
- precedence rules 43
- precision 48
- preconditions 218
- predefined identifiers 20
- predefined literals 21
- preempted threads 369
- preemptive scheduling 369
- prefix 22, 594
  - 0 22, 594
  - 0x 22, 594

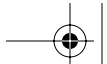
- primitive types 13
  - see also* primitive values
- primitive values
  - assignment 47
  - equality 67
  - passing 88
- priorities 368
- priority of thread 368
- private 11
- private members 142
- process-based multitasking 350
- processes 350
- program
  - application 15
  - compiling 16
  - formatting 26
  - running 17
- programmer exam 489
- promotion 45
- properties 2
  - see also* class members
- protected 11
- protected members 139
- prototypes of methods 252
- pseudorandom number 405
- public 16
- public members 138

## Q

- questions 492
- quotation mark 24, 25
- quote ' 23

## R

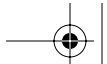
- race condition 361
- radians 404
- radix
  - See* base 394
- raised to power 404
- random number 405
- random order 484, 485
- range
  - character values 29
  - floating-point values 29
  - integer values 28
- range-view 441, 442, 456
- Ready-to-run state 367
- reclaiming memory 318





- reducing complexity 275
  - reference
    - downcasting 45
    - narrowing conversions 45
    - upcasting 45
    - widening conversions 45
  - reference objects 320
  - reference type 32
  - reference values 4
  - reference variable 4, 31
  - references 4, 5, 9, 13, 32, 86
    - abstract types 134
    - aliases 69
    - array 100, 103, 259
    - assignment 47
    - casting 44, 264
    - converting 268
    - dangling 318
    - equality 68
    - null *see* null reference
    - passing 89
    - reachable 318, 319
    - strong 320
    - super 238, 304
    - this 114, 304
  - referent 320
  - relational operators 67
  - remainder operator
    - % 55
  - remove white space 416
  - replacing characters 415
  - reserved identifiers 20
  - reserved keywords 21
    - const 21
    - goto 171
  - reserved literals
    - false 23
    - null *see* null reference
    - true 23
  - resizable arrays 442
  - resources 321
  - resurrecting objects 319
  - retaining elements 433
  - return statement 176
  - return value 7
  - reuse of code 226, 278
  - rhyming order 454
  - right associativity 43
  - right-most bit 598
  - ripple effect 278
  - role relationship 278
  - round method 403
  - rounding functions 402
  - rounding numbers 403
  - Round-Robin scheduling 369
  - Runnable interface 351, 356
  - running out of memory 321
  - Running state 367
  - runtime checks 44
  - Runtime class 388
  - runtime class 389
  - runtime environment 318
  - runtime stack 318
  - RuntimeException 187
- ## S
- schedulers 369
  - scientific notation 22
  - scope 120
    - block 123
    - catch block 194
    - class 121
  - search key 462
  - searching 428
  - searching for elements 482
  - searching in string 414
  - SecurityManager class 388
  - selection statements 158
  - semantic definition 20
  - semicolon 114
  - sequence 429
  - services 275
  - set 429
  - shallow copying 389
  - shared resource 359
  - shift
    - distance 79
    - left 79
    - operators 79
  - shifting 79
  - short 22, 28
  - short-circuit 72
    - evaluation 73
  - shuffle elements 484, 485
  - sign fill 79
  - signature 116, 237
  - signed shift 79
  - simple
    - assignment operator 47
    - if 158
    - statement 114

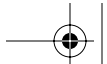




- single implementation inheritance 228, 251, 254
- single-line comment 26
- single-quotes 23
- singleton set 483
- single-valued maps 447
- skeletal source file 36
- sleeping 370
- Sleeping state 367, 370
- sleeping state 367
- sorted map 429, 452
- sorted set 429, 452, 456
- sorting 428, 482
- source
  - file 15, 127
  - file name 37
  - file structure 36
- spaces 25
- spawning threads 351
- special character values 24
- specialization 10
- specialized classes 228
- square root 404
- stack 3
- stack trace 184
- starting threads 352
- state *see* object state
- statements 113
  - assert 209
  - break 172
  - compound 114
  - conditional 158
  - continue 174
  - control flow 113, 158
  - control transfer 171
  - declarations 113
  - do-while 168
  - empty 114
  - expression 114
  - for 169
  - if 158
  - if-else 160
  - iteration 167
  - labeled 171
  - return 176
  - selection 158
  - simple 114
  - simple if 158
  - switch 161
  - throw 199
  - transfer 171
  - while 167
- static
  - initializer block 336
  - members *see* static members
  - methods 7, 10, 113
  - variable initialization 33
  - variables *see* static variables
- static code
  - See* static context 112
- static context 112
- static factory methods 481
- static field 10
- static initializer 218
- static keyword 336
- static member classes 287
  - full name 288
- static members 7
- static members 9, 10, 112
- static variables 7, 10, 33
- storing objects 149
- strictfp 54
- string buffer 63
  - capacity 420
  - constructing 421
- String class 407
- string literals 407
  - interned 407
- StringBuffer class 420
- strings 407
  - appending 422
  - buffers 420
  - capacity 424
  - changing case 413
  - charAt 410
  - compareTo 412
  - comparing 412, 453
  - concat 413
  - concatenation 62, 413
  - concatenation operator + 63, 414
  - constructing 421
  - creating 407
  - deleting 422
  - equals 412
  - extracting substrings 416
  - getChars 410
  - ignoring case in comparison 412
  - indexOf 415
  - individual characters 410, 421
  - initializing 407







- inserting 422
- length 410, 421
- lexicographical order 412
- literals 25
- mutable 420
- natural order 453
- replacing 415
- searching 414
- substrings 416
- trim 416
- strong references 320
- strongly typed language 44
- subclass 10, 11, 12, 226
- subinterface 254
- sublist 442
- submap view 456
- subpackage 126
- subset 437, 440, 456
- substring searching 414
- substrings 414, 416
- subtype 254
- suffix
  - D 22
  - F 22
  - L 22
- Sun Educational Services 490
- super
  - construct 246
  - keyword 235, 238
  - reference 238
- super keyword 246
- superclass 10, 11, 226
- superclass–subclass relationship 228
- superinterfaces 254
- superset 440
- supertypes 254
- switch
  - break 163, 164
  - statement 161
- switching between threads 350
- Sylvan Prometric 490
- synchronization 351, 359
- synchronized
  - blocks 363, 364
  - keyword 360
  - methods 147, 360
- syntactically legal 20
- System class 388
- system classes 213, 215

**T**

- TAB *see* Horizontal tab
- tabs 25
- tabulators 25
- tail map view 456
- tail set view 456
- technology architect exam 489
- telephone directory order 412
- terminating loops 172
- ternary conditional operator 42
- testing locations 491
- textual representation 389
- this
  - reference 114
  - special form 295
- this() constructor call 243, 342
- thread 318
  - live 318
  - termination 380
- Thread class 351
- thread creation 351
- thread of execution 350
- thread safety 350
- thread-based multitasking 350
- ThreadDeath 187
- threads 388
  - alive 351, 368
  - blocked 360
  - Blocked for I/O state 367
  - Blocked for join completion state 367
  - Blocked for lock acquisition state 367
  - child 351, 355
  - class 351
  - code executed 352
  - creation 351
  - daemon 351
  - dead state 367
  - death 184
  - extending Thread 355
  - IllegalThreadStateException 351
  - implemented by inner classes 358
  - joining 368
  - main 351
  - names 353
  - non-runnable state 367
  - notification 370, 372
  - notifying 371, 390
  - priorities 368
  - Ready-to-run state 367





threads (*Continued*)

- Runnable 351, 356
- running 355
- Running state 367
- scheduler 368
- sleeping 370
- Sleeping state 367, 370
- sleeping state 367
- spawning 351
- starting 352, 355
- states 366
- status 351
- switching 350
- synchronization 147, 359
- synchronized 360
- Thread class 351
- transitions 366
- user 351
- waiting for notification state 367
- yielding 369

thread-safe 420

thread-safe collections 481

throw statement 199

Throwable class 185, 388

throwing exceptions 181

throws clause 201

time-sliced scheduling 369

tokens 20

top level

- classes 131

toString method 389, 395

total order 452

transfer flow

- assert 209

transfer statements 171

transient variables 149

tree map 457

tree set 457

trees 431

trigonometry functions 404

trim 416

true literal 23

truth-values 23, 30

try block 189

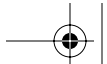
try-catch-finally construct 188

type hierarchy 258

type safe 263

types

- boolean 28, 30
- byte 22, 28



casting 44

- char 29

classes *see* classes

compatibility 44

conversion 44

- double 29

exceptions 185

- float 29

floating-point 28, 29

- generic 264
- int 22, 28
- integers 28, 29
- integral types 28
- long 22, 28

parsing 397, 398

- short 22, 28

wrappers 392

*see also* classes

## U

UML 2

- accessibility 137
- aggregation 12
- classes 3
- inheritance 11
- see also* diagrams

unary numeric promotion 45

unary operators 42

uncaught exceptions 184

unchangeable variables 146

unchecked exceptions 187

underflow 53, 598

Unicode 23, 29

Unified Modeling Language *see* UML

union 437

unsafe casts 265

unsupported operations 432, 447

unused keywords 21

upcasting 45, 230

user threads 351

using packages 128

using variables 31

## V

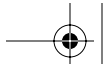
value collection 447

value objects 429

valueOf method 394, 416

values 447, 598





- constants 21
- conversion 44
- overflow 598
- underflow 598
- wrap-around 598
- see also* variables
- variable declarations 4, 31, 123
- variable initialization 8, 34
- variables 31
  - blank final 94, 146
  - constant values 146
  - declarations *see* variable declarations
  - default values 33
  - final 146
  - identifiers 31
  - in interfaces 255
  - initialization *see* variable initialization
  - lifetime 32
  - local 123
  - object reference 32
  - parameters 86, 113
  - references 32
  - static 7
  - storing 149
  - transient 149
  - volatile 150
- vector 442
- Venn diagrams 433
- view of list 442
- VirtualMachineError 187
- void 176, 393
- Void wrapper class 393

- volatile variables 150
- voucher 490

## W

- wait set 371
- waiting for conditions 371
- waiting for notification state 367
- while statement 167
- white space 25, 416
- whole-part relationship 229
- widening conversions 44
  - primitive 44
  - reference 45
- wrapper classes 28, 388, 392, 453
- wrapping collections 481

## X

- xor 70, 76

## Y

- yielding 369

## Z

- zero
  - negative 53
  - positive 53
- zero fill shift 79



