Literals

Any constant value which can be assigned to the variable is called literal.

Eg → `int x = 10;`

- `int` → Data type (keyword)
- `x` → Name of variable (identifier)
- `10` → constant value (literal)

Integral literals

For integral data types (byte, short, int, long) we can specify literal values in the following ways -

① Decimal form (Base 10)
Allowed digits are 0 to 9

eg → `int x = 10;`

② Octal form (Base 8)
Allowed values are 0 to 7

Literal value should be prefix with zero.

eg → `int x = 010;`

Date ___/___/_____ Page No.: _____

③ Hexa-decimal form (Base 16)
Allowed digits are 0 to 9, a to f

For extra digits (a to g) we can use both lower & upper case (character) this is one of very few areas where JAVA is not case-sensitive.

literal value should be prefix with 0X.

eg → int x = 0X10;

these are only possible ways for literals for integral value (data types).

Ex → ✓ int x = 10;

✗ int x = 0786; C.E → integer number too large.

✓ int x = 0777;

✓ int x = 0XFace;

✓ int x = 0XBeef;

✗ int x = 0XBeer;

Ex →

```
class Test
{
public static void main (String [] args)
 {
    int x = 10;
    int y = 010;
    int z = 0X10;
$.pln Super (x + "..." + y + "..." + z)
 }
}
```

output : 10 ... 8 ... 16.

(*) By default, every integral literal is of int type.
But we can specify explicitly ~~with~~ suffixed with (l or L).

✓ int x = 10;

✓ long l = 10L;

X int x = 10L; C.E → Possible loss of precision
found : long
required : int

✓ long l = 10;

Date ___/___/_____ Page No.: _____

There is no direct way byte & short literal explicitly, but indirectly we can specify, whenever we are assigning integral literal to the byte value & if the value within the range of byte then compiler treats it as automaticlly as byte literal similarly short literal also.

Eg → ✓ byte b = 10;
✓ byte b = 127;
× byte b = 128; → C.E → PLP

✓ short s = 32767;
× short s = 32768; → CE → PLP

Floating point literals

By default every floating point literal is of double type & hence we can't assign directly to the float variable, but we can specify floating point literal as float type by suffixed with f or F.

eg → float f = 123.456; → C.E → possible loss of precision found: double required: float

float f = 123.456F;

~~float~~ double d = 123.456;

Date ___/___/_____ Page No.: _____

We can specify explicitly floating point literal as double type by suffixed with d or D.
Ofcourse this convention is not required.

eg → double d = 123.456 D;
float f = 123.456 d;
↓
C.E → Possible loss of Precision
found : double
required : float

We can specify floating point literals only in decimal form & we can't specify in octal & hexa-decimal forms.

eg → ✓ double d = 123.456;
✓ double d = 0123.456;
✗ double d = 0X123.456;
↓
C.E → mal formed floating point literal

We can assign integral literal directly to floating point variables & that integral literal can be specified either in decimal, octal or hexa-decimal forms.

eg → ✗ double d = 0786;
C.E → integer too large.
✓ double d = 0XFace;

Date ___/___/_____ Page No.: _____

✓ double d = 0786.0;
✗ double d = 0xFace.0;
✓ double d = 10;
✓ double d = 0771;

We can't assign floating point literals to integral type.

eg → ✓ double d = 10;
✗ int x = 10.0;
↳ C.E → P L P
found: double
required: int.

We can specify floating point literal even in exponential form.

eg → ✓ double d = 1.2e3;
S.o.p(n ~~super~~ (d);
output → 1200.0.

✗ float f = 1.2e3;
C.E → P L P found: double
✓ float f = 1.2e3F;

Boolean literals

The only allowed value are T/F.

eg → ✓ boolean b = true;
✗ boolean b = 0;
✗ boolean b = True;
✗ boolean b = "True";

Date 2/12/24 Page No.:

char literal

1st way: We can specify char literal as single character within single quotes.

eg → ✓ char ch = 'a';

(X) char ch = a; → C.F → cannot find symbol → symbol → var a, location → class Test

(X) char ch = "a";
↓
C.E → incompatible types found = Java lang String required : char

(X) char ch = 'ab';
↓
C.E : unclosed char literal
CE 2 : unclosed char literal
CE 2 : not a statement

2nd Way: We can specify char literal as integral literal which represents unicode value of the character and that integral literal can be specify either in decimal, octal & Hexa decimal forms.
But allowed range 0 to 65535.

eg → ✓ char ch = 97
✓ char ch = 0XFace;
✓ char ch = 65535;
✓ char ch = 0777;

[9→97;];[1970→?] ; [197→+]
↳ why ?

Date __/__/__ Page No.: _____

✗ char ch = 65536;
CE: Possible loss of precision
found: int
required: char

3rd way We can represent char literal as in unicode representation which is nothing but '\uxxxx'
4-digit Hexa-decimal number

eg → char ch = '\u0061';
S.p/n (ch);
output → a.

Query escape character is a valid char literal.

eg → ✓ char ch = '\n';
✓ char ch = '\t';
✗ char ch = '\m';
CE: illegal escape char

Escape char	Description
\n	new line
\t	Horizontal tab
\r	carriage return
\b	Back space
\f	Form feed
\'	single quote
\"	Double quote
\\	Back slash

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Date ___/___/_____ Page No.: _____

carriage return → moving to 1st cell of second line.

Ques :- which of the following are valid ?

✗ char ch = 65536;

✗ char ch = 0xBeer;

✗ char ch = \uface;

✓ char ch = '\uBeef';

✗ char ch = '\m';

✗ char ch = '\iface';

String literal

Any sequence of characters within double quotes is treated as string literal.

eg → String s = "nonu";

* 1.7 version enhancements wrt literals

Date ___/___/_____ Page No.: _____

① Binary literals

for integral datatypes until 1.6 version we can specify literal values in the following ways -

1) decimal
2) octal
3) Hexa-decimal

→ But from 1.7 version onwards, we can specify literal values in Binary form also.
→ Allowed digits are 0 & 1.

→ Literal value should be prefixed with 0B or 0b.

eg → int x = 0B1111;
S.pln ~~super~~ (x)
output : 15.

② usage of underscore symbol in numeric literals from 1.7 version onwards we can use underscore symbols between digits of numeric literal.

eg → double d = 123456.789
⇓
double d = 1_23_456.7_8_9;
US system → double d = 123_456.7_8_9;

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Date ___/___/_____ Page No.: _____

→ The main advantage of this approach is to improve the readibility of code.

→ At the time of compilation these underscore symbols will be removed automatically.
Hence, after compilation these line will become
⇒ double d = 123456.789;

→ We can use more than one underscore also between the digits.

eg → ✓ double d = 1--23__45--6.7-8-9;

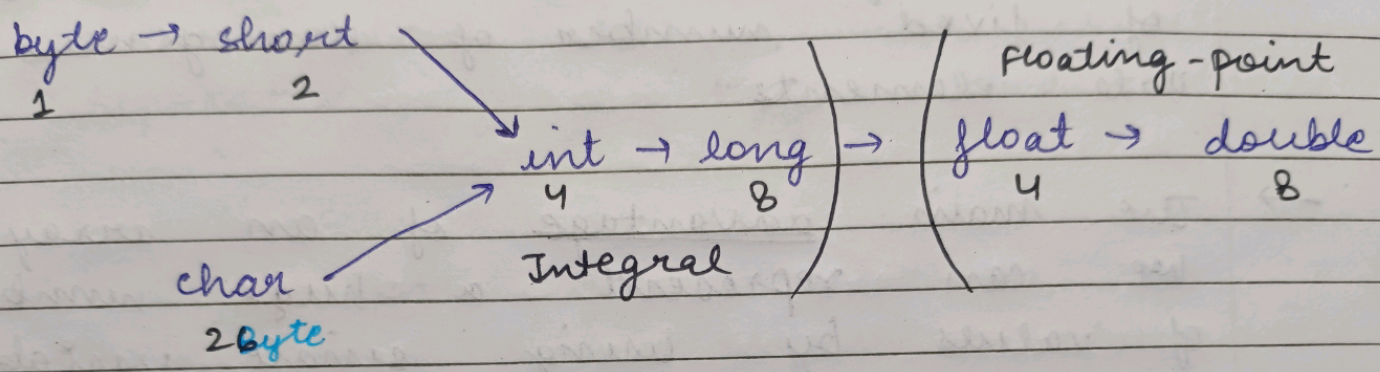
✓ double d = 1---23---45--6.7-8-9;

→ We can use underscore symbols only blw the digits if we are using anywhere else, we will get compile time error.

eg → all are invalid
× double d = 1--23--456.7-8_9;
× double d = _1--23_456.789;
× double d = 1-23--456.7-8-9_;

Date ___/___/___

→ from lower to higher



NOTE: 8 byte long value we can assign to 4 byte float variable b coz both are following different memory representation.

eg → float f = 10l;
S.pln ~~sapln~~ (f); = 10.0;