

Modul I. Lesson 4 Operators

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Repeat the previous lesson

- List
- Canonical
- Reference
- Nullable
- Non-nullable

- Object
- Var
- Dynamic
- Final
- Const

Plan

- What is operator?
- Arithmetic operators
- Order of operators
- Increment and decrement
- Equals operators

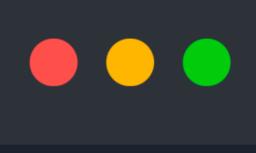
- Type Test operators
- Logical operators
- Bitwise operators and Shift Operator
- Ternary: ?:, ??
- Assignment Operators

Operator

- Operator ma'lum bir vazifani yoki amalni bajarish xususiyatiga ega bo'lgan belgi yoki belgilar to'plami.
- Matematikada va kompyuter dasturlashda operator muayyan matematik yoki mantiqiy harakat yoki jarayonni ifodalovchi belgidir. Masalan, "*" ko'paytirishni ko'rsatadigan arifmetik operator, "&&" esa dasturlashda mantiqiy VA funktsiyasini ifodalovchi mantiqiy operatordir.

Arithmetic operators

Operator	Meaning
+	Add
	Subtract
-expr	Unary minus, also known as negation
*	Multiply
	Divide
~/	Divide, returning an integer result
8	Get the remainder of an integer division





```
void main() {
  print(2 + 3 = 5);
  print(2 - 3 = -1);
  print(2 * 3 = 6);
  print(5 / 2 = 2.5); // Result is a double
  print(5 ~/ 2 = 2); // Result is an int
  print(5 % 2 = 1); // Remainder
  print('5/2 = ${5 ~/ 2} r ${5 % 2}' = '5/2= 2 r 1');
}
```

Increment and decrement

• Dart shuningdek, prefiks va postfiksni oshirish(increment) va kamaytirish(decrement) operatorlarini ham qo'llab-quvvatlaydi.

Operator	Meaning
++var	var = var + 1 (expression value is var + 1)
var++	var = var + 1 (expression value is var)
var	var = var - 1 (expression value is var - 1)
var	var = var - 1 (expression value is var)



```
main.dart
```

```
void main() {
 int a;
 int b;
 a = 0;
  b = ++a; // Increment a before b gets its value.
  print(a = b); // 1 = 1
 a = 0;
 b = a++; // Increment a AFTER b gets its value.
 print(a \neq b); // 1 \neq 0
 a = 0;
 b = --a; // Decrement a before b gets its value.
 print(a = b); // -1 = -1
 a = 0;
 b = a--; // Decrement a AFTER b gets its value.
 print(a \neq b); // -1 * 0
```

Order of Operations

```
void main() {
  const result = ((8000 / (5 * 10)) - 32) ~/ (29 % 5);
  print(result);
}
```

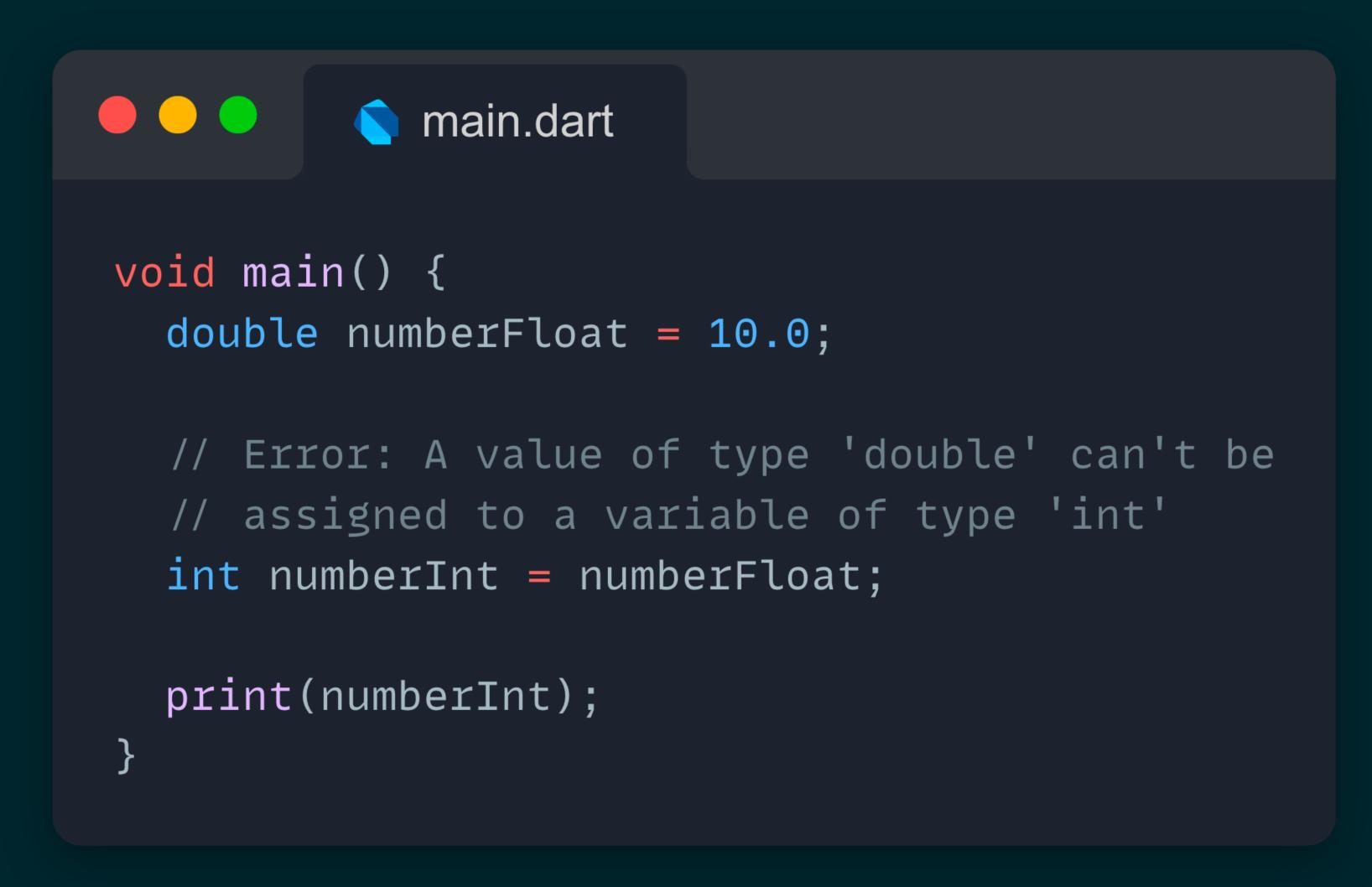
Order of Operations

Exercise

- 1. N soni berilgan. Shu sonning juft son ekanligini aniqlang. isEven yoki isOdd dan foydalanmagan holda.
- 2. Ikkita berilgan butun sonlar orasida nechta butun son borligi aniqlansin.

Type test operators

Operator	Meaning
as	Typecast (kutubxona prefikslarini belgilash uchun ham foydalaniladi)
is	True, agar ob'ekt belgilangan turga ega bo'lsa
is!	True, agar ob'ekt belgilangan turga ega bo'lmasa



```
main.dart
void main() {
  double numberFloat = 10.0;
  // Success: when use as operator
  int numberInt = numberFloat as int;
  print(numberInt);
```

Equality and relational operators

Operator	Meaning
==	Teng
!=	Teng emas
	Katta
	Kichik
>=	Katta yoki teng
<=	Kichik yoki teng

Logical operators

Operator	Meaning
!expr	ifodani o'zgartiradi (yolg'onni rostga o'zgartiradi va aksincha)
	mantiqiy YOKI (OR)
& &	mantiqiy VA(AND)

- 1. N soni berilgan. Shu son 99-1000 oralig'ida ekanligini tekshiring.
- 2. N soni berilgan. Shu son 100 dan katta yoki 10 dan kichkina ekanligini tekshiring

Operator Precedence





Exercise

- 1. 2 ta son berilgan. Berilgan sonlardan biri manfiy bo'lsa true, aks holda false chiqaruvchi programma tuzing.
- 2. Foydalanuvchi tomonidan kiritilgan natural sonning "ikki xonali toq son" ekanligini tekshiring.
- 3. Foydalanuvchi tomonidan kiritilgan uch xonali natural sonning "barcha raqamlari har xil" ekanligini tekshiring.
- 4. Foydalanuvchi tomonidan kiritilgan 3 ta butun (x, y, z) sonlar uchun quyidagi mulohazani rostlikka tekshiruvchi dastur tuzing: "x, y, z sonlaridan faqat bittasi musbat son"

Bitwise and shift operators

Odatda, siz bitwise va shift operatorlarini butun sonlar bilan ishlatasiz.

Operator	Meaning
&	AND
	OR
^	XOR
~expr	Bitwise birlik toʻldiruvchisi (0 lar 1 ga, 1 lar 0 ga aylanadi)
<<	Shift left
>>	Shift right

Bitwise: &





```
void main() {
 print("0 & 0 = \{0 \in 0\}"); // 0
 print("0 & 1 = ${0 & 1}"); // 0
 print("1 & 0 = ${1 & 0}"); // 0
 print("1 & 1 = \{1 & 1\}"); // 1
 int a = 3; // 011
 int b = 5; // 101
    011 \implies 0|1|1
    101 \Rightarrow 1|0|1
       011 \& 101 = 0 | 0 | 1 = 001 = 1
  print("$a & $b = ${a & b}");
```

Bitwise:





```
void main() {
 print("0 | 0 = \{0 | 0\}"); // 0
 print("0 | 1 = ${0 | 1}"); // 1
 print("1 | 0 = ${1 | 0}"); // 1
  print("1 | 1 = ${1 | 1}"); // 1
  int a = 3; // 011
  int b = 5; // 101
    011 \Rightarrow 0|1|1
    101 \implies 1|0|1
       011 \mid 101 = 1 \mid 1 \mid 1 = 111 = 7
  print("$a | $b = ${a | b}");
```

Bitwise: ^





```
void main() {
  print("0 ^{0} = \{0 ^{0} , 0\}"); // 0
  print("0 ^ 1 = ${0 ^ 1}"); // 1
  print("1 ^{0} = \{1 ^{0}\}"); // 1
  print("1 ^ 1 = ${1 ^ 1}"); // 0
 int a = 3; // 011
  int b = 5; // 101
    011 \Rightarrow 0|1|1
    101 \Rightarrow 1|0|1
       011 ^101 = 1|1|0 = 110 = 6
  print("$a ^ $b = ${a ^ b}");
```

Exercise

- Foydalanuvchi tomonidan 3ta son shunday kiritilganki, bu sonlardan 2 tasi bir biriga teng. Bir xil bo'lmagan uchinchi sonni bitwise operatorlaridan foydalanib toping.
- Agar butun son n ikkining darajasi bo'lsa, true qaytaring. Aks holda, false qaytaring. Butun son n ikkining darajasi hisoblanadi, agar x butun soni mavjud bo'lib, n == 2^x tenglikni qanoatlantirsa.

Operator: "~"



```
main.dart
```

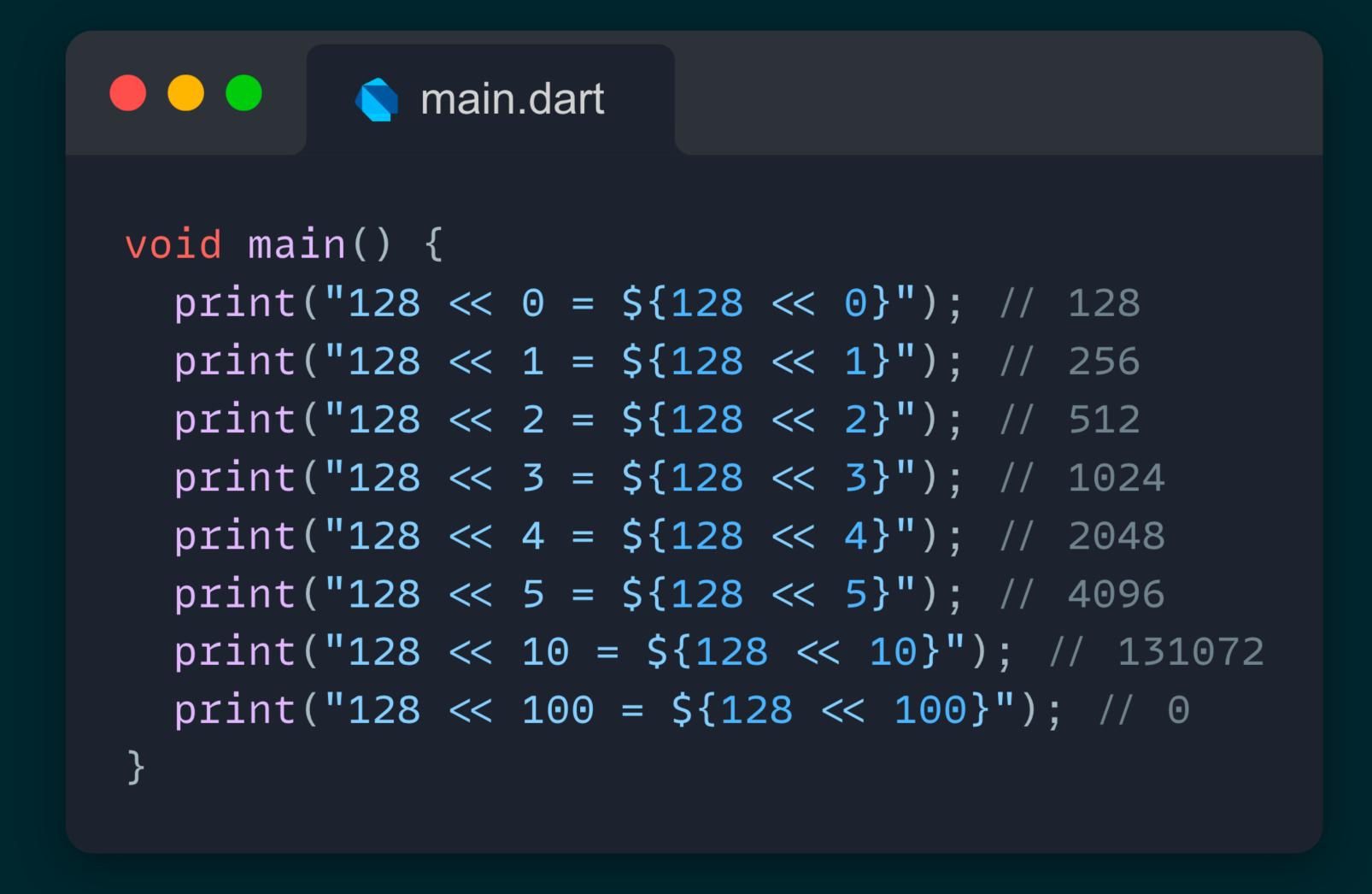
```
void main() {
  print("~0 = ${~0}"); // -1
  print("~1 = ${~1}"); // -2
  print("~2 = ${~2}"); // -3
  print("~3 = ${~3}"); // -4
  print("~4 = ${~4}"); // -5
  print("~5 = ${~5}"); // -6
  print("~10 = ${~10}"); // -11
  print("~100 = ${~100}"); // -101
}
```



main.dart

```
void main() {
  print("~(-0) = ${~(-0)}"); // -1
  print("~(-1) = ${~(-1)}"); // 0
  print("~(-2) = ${~(-2)}"); // 1
  print("~(-3) = ${~(-3)}"); // 2
  print("~(-4) = ${~(-4)}"); // 3
  print("~(-5) = ${~(-5)}"); // 4
  print("~(-10) = ${~(-10)}"); // 9
  print("~(-100) = ${~(-100)}"); // 99
}
```

Shift left







```
void main() {
 print("(-128) << 0 = ${(-128)} << 0}"); // -128
 print("(-128) << 1 = ${(-128) << 1}"); // -256
 print("(-128) << 2 = ${(-128) << 2}"); // -512
 print("(-128) \ll 3 = \$\{(-128) \ll 3\}"); // -1024
 print("(-128) << 4 = ${(-128) << 4}"); // -2048
 print("(-128) << 5 = ${(-128) << 5}"); // -4096
 print("(-128) << 10 = ${(-128) << 10}"); // -131072
 print("(-128) << 100 = ${(-128) << 100}"); // 0
```

Shift right

```
main.dart
void main() {
  print("128 >> 0 = $\{128 >> 0\}"); // 128
  print("128 >> 1 = \{\{128 >> 1\}"\}; // 64
  print("128 >> 2 = $\{128 >> 2\}"); // 32
  print("128 >> 3 = \{\{128 >> 3\}"\}; // 16
  print("128 >> 4 = \{\{128 >> 4\}"\}; // 8
  print("128 >> 5 = \{\{128 >> 5\}\}"); // 4
  print("128 \gg 10 = ${128 \gg 10}"); // 0
  print("128 >> 100 = \{\{128 >> 100\}"\}; // 0
```





```
void main() {
 print("(-128) >> 0 = ${(-128) >> 0}"); // -128
 print("(-128) >> 1 = ${(-128) >> 1}"); // -64
 print("(-128) >> 2 = ${(-128) >> 2}"); // -32
 print("(-128) \gg 3 = ${(-128) \gg 3}"); // -16
 print("(-128) >> 4 = ${(-128) >> 4}"); // -8
 print("(-128) >> 5 = ${(-128) >> 5}"); // -4
 print("(-128) >> 10 = ${(-128) >> 10}"); // -1
  print("(-128) \gg 100 = ${(-128) \gg 100}"); // -1
```

Exercise

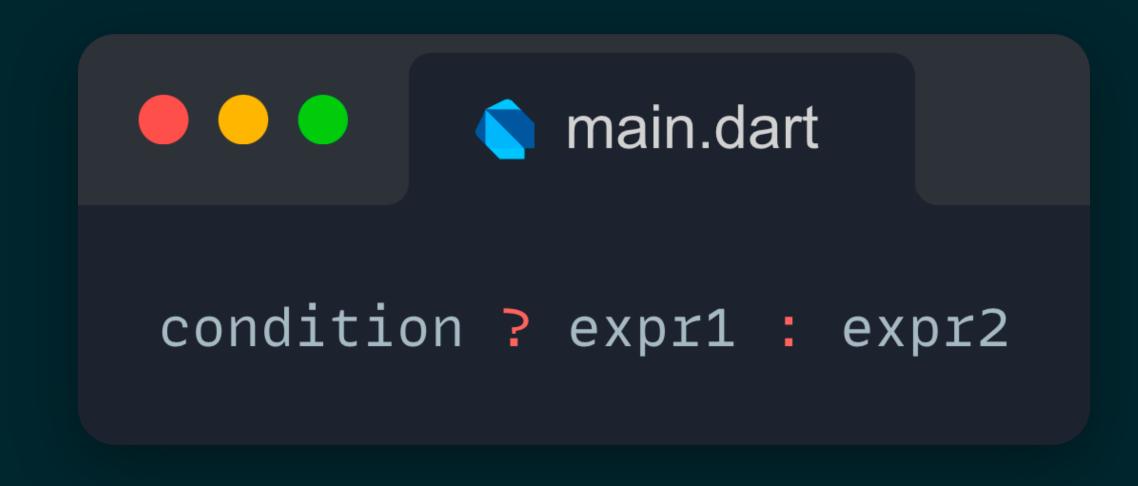
- Ikkining n chi darajasini ko'paytirish va bo'lish: Ikkining darajasiga mos ravishda shift left va shift right operatorlaridan foydalanib, butun sonni ko'paytiradigan va bo'ladigan ikkita funksiya yozing.
- Masalan:
- 2 ning darajasi 3 ga 10 ni ko'paytirganimdagi javob 80 chiqishi kerak
- 32 sonini 2 ning darajasi 2 yani 4 ga bo'lganimdagi javobi 8 chiqishi kerak

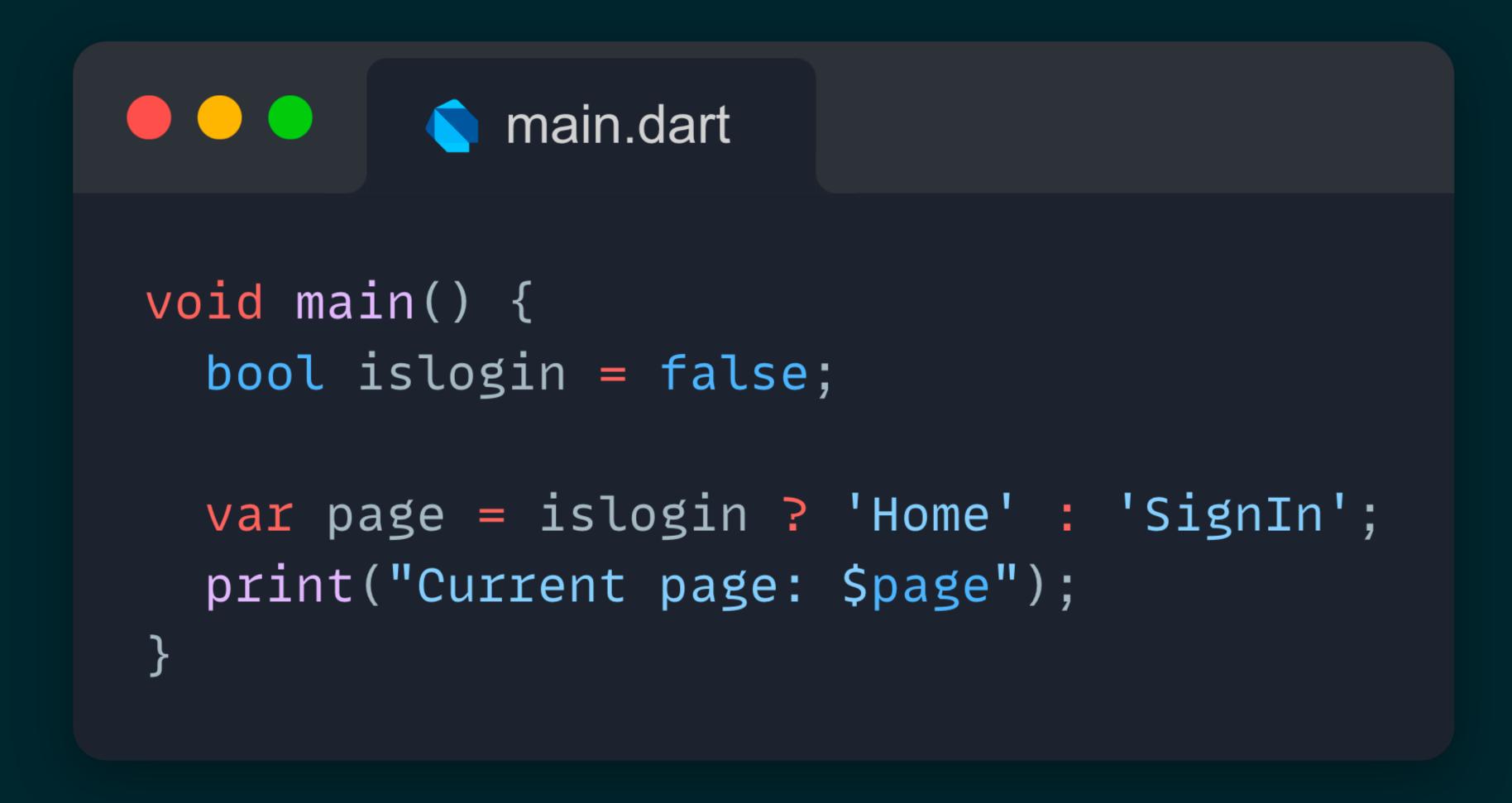
Solution



Conditional expressions

- Ternary operatori.
- Agar shart rost bo'lsa, expr1 ni baholaydi (va uning qiymatini qaytaradi); aks holda, expr2 qiymatini baholaydi va qaytaradi.

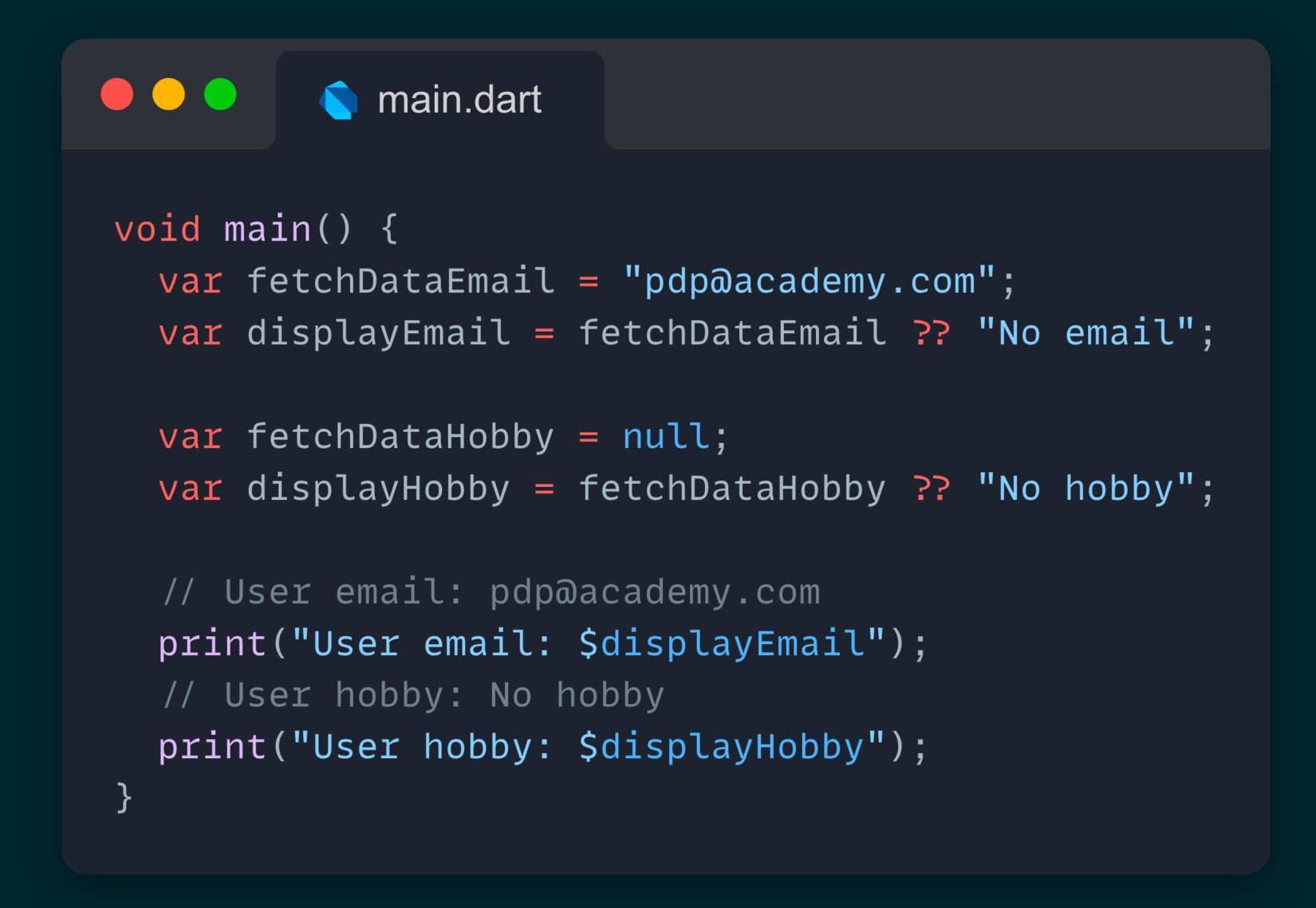




Exercise

- Agar yosh 18 dan kam bo'lsa 'Bola', 18 dan 65 gacha bo'lsa 'Katta', va 65 dan oshgan bo'lsa 'Keksa' deb qaytarasin. Bunda ternar operatorlardan foydalaning.
- Bir satrni olib, uning uzunligi 10 dan katta yoki yo'qligini tekshiradigan funksiya yozing. Agar uzunligi 10 dan katta bo'lsa, 'Uzun Satr', aks holda 'Qisqa Satr'ni qaytaring. Bunda ternar operatoridan foydalaning.

If null



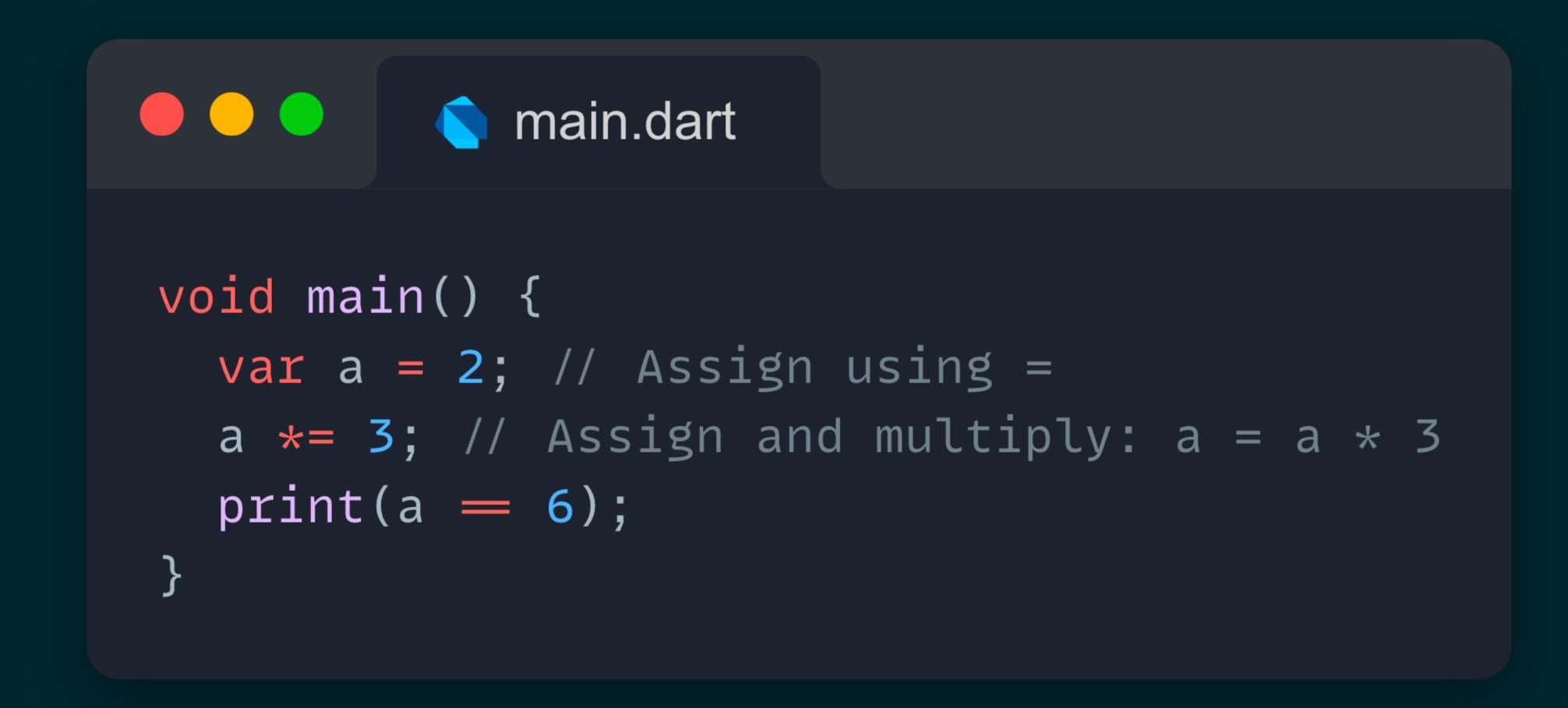
Assignment Operators

- Ko'rib turganingizdek, siz = operatori yordamida qiymatlarni tayinlashingiz mumkin yani qiymat o'zlashtirishingiz mumkin!
- += kabi murakkab assignmet operatorlari

	*=	% =	>>=	^=
+=	/=	<<=		&=
	~/=			

	Compound assignment	Equivalent expression
For an operator op:	a <i>op</i> = b	a = a <i>op</i> b
Example:	a += b	a = a + b

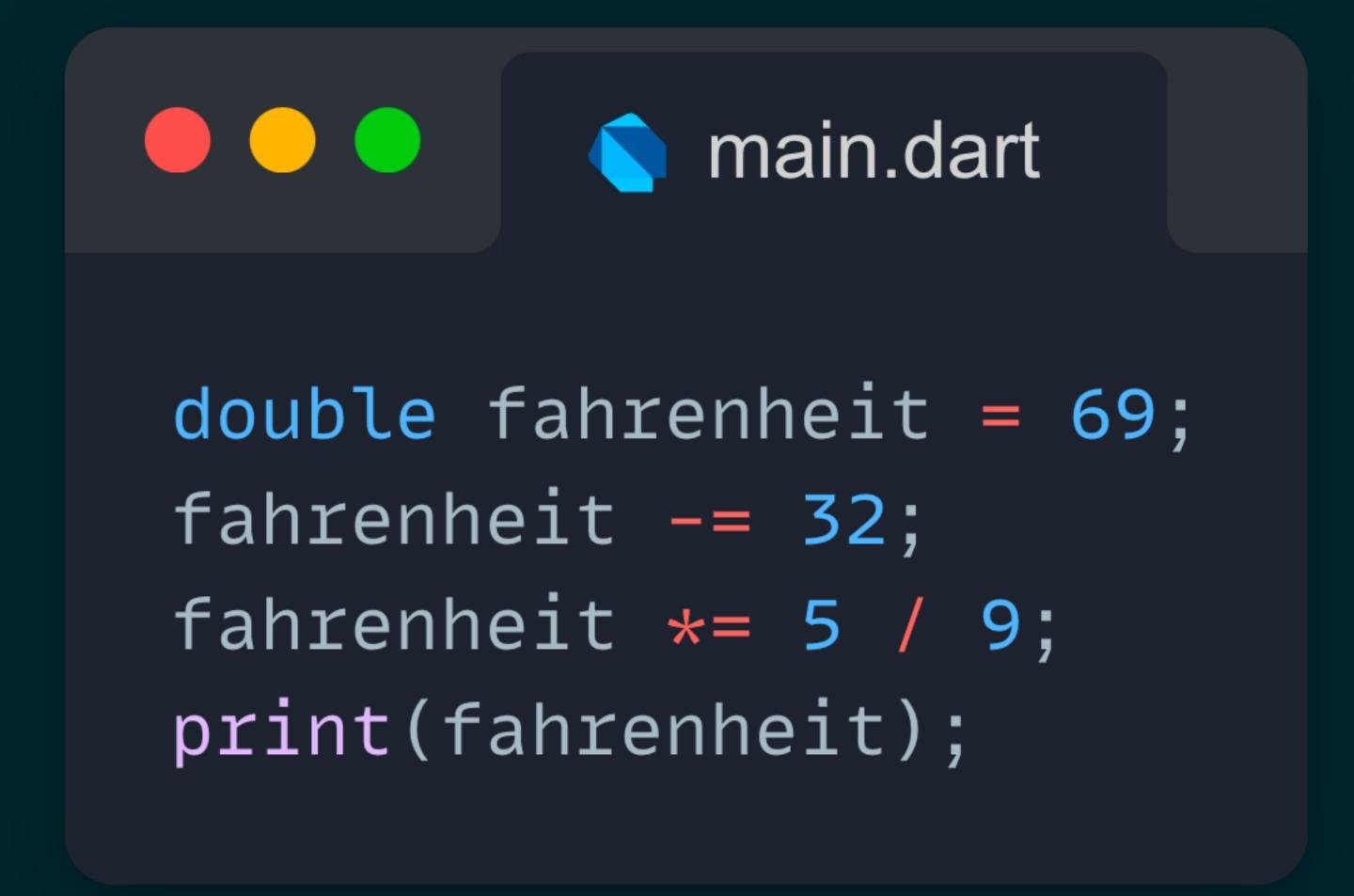
Example



Exercise

 Fahrenheitdan Selsiyga Aylantirish: Haroratni Fahrenheitdan Selsiyga aylantiradigan Formula C=(F-32)×5/9 ni yechish uchun -= va /= operatorlaridan foydalaning.

Solution



Summary

Interview Questions

- Operator nima?
- Arifmetik operatorlardan bir nechtasi bir ifoda(expression) da kelganida qanday taribda amal bajariladi?
- increment qanday operator?
- decrement qanday operator?
- Type test operatorlari qaysilar va ularning vazifasi nima?
- Turni tekshirish(type check) operatori qaysi va u qanday vazifani bajaradi?
- Type cast operatori qaysi va u qanday vazifani bajaradi?

- Mantiqiy va munosabat operatorlardan bir nechtasi bir ifoda(expression) da kelganida qanday taribda amal bajariladi? (1 - !, 2 - >=, >, <, <=, 3 - ==, !=, 4 -&&, 5 - ||)
- Bitwise operatorlari qaysilar va ular qanday vazifani bajaradi?
- Ternary operatori qaysi va u qanday vazifani bajaradi?
- If null operatori(??) qaysi va u qanday vazifani bajaradi?

Hometask

- 1. Ikki xonali son berilgan. Uning raqamlari yig'indisini hisoblovchi dastur tuzing.
- 2. Ikki xonali son berilgan. Uning raqamlari o'rnini almashtirishdan hosil bo'lgan sonni topib, ekranga chiqaruvchi dastur tuzing.
- 3. Uch xonali son berilgan uning o'nliklar xonasidagi raqam bilan yuzliklar xonasidagi raqamni almashtirishdan hosil bo'lgan sonni aniqlovchi dastur tuzing. Masalan: son=123 -> natija=213.
- 4. Uch xonali son berilgan uning chapdan birinchi raqamini o'chirib o'ng tarafiga yozishdan hosil bo'lgan sonni aniqlovchi dastur tuzing. Masalan: son=123 -> natija=231.
- 5. 99 dan katta bo'lgan natural son berilgan. Berilgan sonning yuzliklar xonasidagi raqamni aniqlovchi dastur tuzing.

- 6. Kvadratning tomoni a berilgan. Uning perimetri va yuzasi aniqlansin. P = 4 * a; S = a * a
- 7. Nolga teng bo'lmagan ikkita son berilgan ularning yig'indisi, ayirmasi, ko'paytmasi, har birining kvadratlari topilsin.
- 8. 5 kg konfet 100 000 tursa, 2 kg konfet qancha turishini aniqlovchi dastur tuzing.
- 9. X kg konfet A so'm tursa, Y kg konfet qancha turishini aniqlovchi dastur tuzing.
- 10. Ushbu 12, 5, 4, 2 sonlarining o`rtacha qiymatini 3 ga bo`lgandagi natijaning butun qismini va qoldiq qismlarini toping.

- 11.lkkita 2 xonali musbat son berilgan. Ular bir xil raqamlardan tuzilganligi yoki unday emasligini aniqlang.
- 12.Masalan: 1) a=21, b=12 => natija: true; 2) a=56, b=66 => natija: false
- 13. Bitta 2 xonali, bitta 3 xonali musbat son berilgan. Ularning raqamlari yig'indisi teng yoki teng emasligini aniqlang.
- 14. Masalan: 1) a=23, b=104 => 2+3=1+0+4 tenglik o'rinlimi? => natija: true; 2) a=65, b=124 => 6+5=1+2+4 tenglik o'rinlimi? => natija: false
- 15. Ikkita haqiqiy son berilgan. Shu sonlardan kamida bittasi manfiy bo'lsa, true qiymat chiqaruvchi programma tuzing.
- 16. Ikkita haqiqiy son berilgan. Shu sonlar har xil ishorali bo'lsa, true qiymat chiqaruvchi programma tuzing.
- 17. Berilgan N sonini juft toqligi tekshiruvchi dastur tuzing. N soni juft bo'lsa, true natija chiqaring.

- 18. Foydalanuvchi tomonidan kiritilgan uch xonali natural sonning "chapdan o'qiganda ham, o'ngdan o'qiganda ham bir xil" ekanligini tekshiring.
- 19.Foydalanuvchi tomonidan ketma-ket kiritilgan 3 ta butun sonning o'suvchi tartibda kiritilganligini tekshiruvchi dastur tuzing. O'sish tartibida (x<y<z) bo'lsa, true qiymatini ekranga chiqaring.
- 20. Foydalanuvchi tomonidan kiritilgan 2 ta butun (x va y) sonlar uchun quyidagi mulohazani rostlikka tekshiruvchi dastur tuzing: "x va y sonlari toq sonlar".
- 21. Foydalanuvchi tomonidan kiritilgan natural sonning "uch xonali juft son" ekanligini tekshiruvchi dastur tuzing.
- 22. Foydalanuvchi tomonidan kiritilgan 3 ta butun (x, y, z) sonlar uchun quyidagi mulohazani rostlikka tekshiruvchi dastur tuzing: "x, y, z sonlaridan istalgan bittasi qolgan ikkitasining yig'indisidan kichik".

- 23.condition? expr1: expr2 dan foydalanib 2 ta sonning minimum ni topish kodini yozing.
- 24. Berilgan son musbat bo`lsa Ismingizni, manfiy bo`lsa Familiyangizni chop qiladigan kod yozing.
- 25.A va B sonlari berilgan (A > B). Qoldiqli bo'lish operatorini ishlatmasdan A ni B ga bo'lgandagi qoldiqni toping.
- 26. Uchta son berilgan. Shu sonlarning kichigini aniqlovchi programma tuzilsin.
- 27.3 ta sonni qiymatini bir biri bilan almashtiring. Qo'shimcha o'zgaruvchisiz.
- 28.5 ta butun son berilgan. Shu sonlar orasida nechta musbat va nechta manfiy, nechta nol raqami borligini aniqlovchi hamda 5 ta sondan kattasini topuvchi dastur tuzing.

Thank you for your time!