Here are the questions with their options and the correct answers:

1. **Which of the following is true about let and const in terms of scope?**
   - a) Both are globally scoped.
   - b) Both are function-scoped.
   - c) Both are block-scoped. **(Correct Answer)**
   - d) let is block-scoped and const is function-scoped.

2. **Which npm command installs both dependencies and dev dependencies?**
   - a) npm install --only=prod
   - b) npm install --only=dev
   - c) npm install **(Correct Answer)**
   - d) npm install --save-dev

3. **What will the following TypeScript code output?**
   ```typescript
   let sum = 0;
   let n = 5;
   while (n > 0) {
      sum += n;
      n--;
   }
   console.log(sum);
   ```
   - a) 15 **(Correct Answer)**
   - b) 10
   - c) 5
   - d) 0

4. **What does the following TypeScript code output?**
   ```typescript
   let obj = {x: 10, y: 20};
   ```

```
for (let key in obj) {
    console.log(obj[key]);
}
```

- a) x y
- b) 10 20 **(Correct Answer)**
- c) undefined undefined
- d) x 10 y 20

5. **Which of the following statements correctly imports a default export in TypeScript?**
   - a) import { default } from './module';
   - b) import default from './module';
   - c) import (module) from './module';
   - d) import myModule from './module'; **(Correct Answer)**

6. **Consider the following type alias:**

```typescript
type Point = { x: number; y: number; };
```

   Which of the following is correct?
   - a) let p: Point = { x: ‘10’, y: 20 };
   - b) let p: Point = { x = 10, y = 20};
   - c) let p: Point = { x: 10, y: 20 }; **(Correct Answer)**
   - d) let p: Point = { x = ‘10’, y = 20 };

7. **In TypeScript, which type system is used by default?**
   - a) Nominal typing
   - b) Structural typing **(Correct Answer)**
   - c) Hybrid typing
   - d) Literal typing

8. **What will be the output of the following TypeScript code?**

```typescript
function myFunc(data1: number, data2: string): number {
    const num: number = data2 as unknown as number;
    const result: number = data1 + num;
    return result;
}
const myAnswer: number = myFunc(10, "5");
console.log(myAnswer);
```

- a) Type Error
- b) 15 **(Correct Answer)**
- c) undefined
- d) 105

9. **What will be the output of the following TypeScript code?**

```typescript
const myName = (fName: string, lName?: string): string => {
    const myFullName: string = lName ? fName + " " + lName : fName;
    return myFullName;
}
const myAnswer1: string = myName("Muhammad");
const myAnswer2: string = myName("Muhammad", "Fasih");
console.log(myAnswer2);
console.log(myAnswer1);
```

- a) Muhammad, Muhammad Fasih
- b) undefined, Muhammad Fasih
- c) Muhammad, undefined
- d) Muhammad Fasih, Muhammad **(Correct Answer)**

10. **Which of the following is true about the unknown type in TypeScript?**

- a) unknown can be assigned to any type without type-checking.

- b) unknown is more specific than any and requires type-checking before use. **(Correct Answer)**
- c) unknown and any are interchangeable.
- d) unknown represents the type of values that never occur.

11. **Enums and Const Enums: What is the main advantage of using const enum over enum in TypeScript?**
- a) const enum allows for runtime changes to the enum values.
- b) const enum can be used only with numeric values
- c) const enum can store string values.
- d) const enum is more memory-efficient because it is inlined at compile time. **(Correct Answer)**

12. **Which of the following is NOT a characteristic of asynchronous programming in JavaScript?**
- a) It allows for non-blocking code execution.
- b) It executes code sequentially in the order it appears. **(Correct Answer)**
- c) It uses callbacks, promises, and async/await to handle asynchronous operations.
- d) It can improve performance by preventing the blocking of the main thread.

13. **What is the primary function of the call stack in JavaScript?**
- a) To manage asynchronous operations.
- b) To keep track of function calls and their execution context. **(Correct Answer)**
- c) To handle memory allocation for variables.
- d) To execute code in parallel.

14. **What will be the output of the following code?**

```javascript
console.log("One");

setTimeout(function(){
    console.log("I'am a programmer");
}, 2000)

console.log("Two");
console.log("Three");
```

```

- a) One , Two , Three **(Correct Answer)**
- b) One , Two , I am a programmer , Three
- c) I am a programmer
- d) One , Two , Three , I' am a programmer

15. **What will be the output of the following code?**

```javascript
const promise = new Promise((resolve, reject) => {
    reject("Failure!!!");
});
promise.catch((error) => {
    console.log(error);
});
```

- a) Error
- b) Failure!!! **(Correct Answer)**
- c) error
- d) Failure!!!! Error

16. **Which of the following principles is NOT part of Object-Oriented Programming (OOP)?**

- a) Encapsulation
- b) Inheritance
- c) Polymorphism
- d) Compilation **(Correct Answer)**

17. **What will be the output of the following TypeScript code?**

```typescript
class Animal {
  name: string;
  constructor(name: string) {
    this.name = name;
```
```

```
  }
  makeSound() {
    console.log(`${this.name} makes a sound`);
  }
}
class Dog extends Animal {
  makeSound() {
    console.log(`${this.name} barks`);
  }
}
const myDog = new Dog('Rex');
myDog.makeSound();
```

- a) Rex makes a sound
- b) Rex barks **(Correct Answer)**
- c) Error: makeSound method not defined
- d) Error: constructor not defined

18. **What will be the output of the following TypeScript code?**

```typescript
function categorizeAge(age: number): string {
    if (age < 13) {
        return "Child";
    } else if (age >= 13 && age <= 19) {
        return "Teenager";
    } else {
        return "Adult";
    }
}
let x = categorizeAge(16);
console.log(x);
```

- a) Child
- b) Teenager **(Correct Answer)**
- c) Adult
- d) Undefined

19. **What will be the output of the following TypeScript code?**

```typescript
function calculateDiscount(quantity: number): number {
    let discount = 0;
    if (quantity > 10) {
        discount = 20;
    } else if (quantity >= 5) {
        discount = 10;
    } else {
        discount = 0;
    }
    return discount;
}
let x = calculateDiscount(10);
console.log(x);
```

- a) 0
- b) 10 **(Correct Answer)**
- c) 20
- d) 5

20. **Which npm command would you use to install a package as a dev dependency?**

- a) npm install <package> --save
- b) npm install <package> --global
- c) npm install <package> --save-dev **(Correct Answer)**
- d) npm install <package> --only=dev

21. **What happens if you try to declare a const variable without initializing it?**

- a) It will be automatically assigned undefined.
- b) It will throw a syntax error. **(Correct Answer)**
- c) It will be treated as a let variable.
- d) It will be ignored by the JavaScript engine.

22. **How do you typecast a variable x to type string in TypeScript?**

- a) let y: string = <string>x;
- b) let y: string = x as string;
- c) Both a and b

(Correct Answer)

- d) let y: string = x.toString();

23. **Which of the following is the correct syntax for a function with a default parameter in TypeScript?**

- a) function foo(x: number, y: number = 10): void { }
- b) function foo(x: number, y: 10 = number): void { }
- c) function foo(x: number, y = 10): number { }
- d) function foo(x: number, y: number): void { y = 10; } **(Correct Answer)**

24. **What will be the result of the following TypeScript code?**

```typescript
class Car {
  private brand: string;

  constructor(brand: string) {
    this.brand = brand;
  }

  getBrand() {
    return this.brand;
  }
```

```
}

const myCar = new Car('Toyota');
console.log(myCar.getBrand());
```

- a) Car
- b) Toyota **(Correct Answer)**
- c) undefined
- d) Error: brand is private

25. **In what order does JavaScript execute code by default?**
    - a) Bottom to top
    - b) Left to right
    - c) Top to bottom **(Correct Answer)**
    - d) Right to left

26. **What will be the output of the following code?**

```javascript
console.log('A');
setTimeout(() => {
  console.log('B');
}, 0);
console.log('C');
```

- a) A C B **(Correct Answer)**
- b) A B C
- c) B A C
- d) C B A

27. **What will be the output of the following code?**

```typescript
const arr: number[] = [1, 2, 3, 4, 5, 6, 7];
```

```
const result = arr.fill(5, 1, 4);
console.log(result);
```

- a) [1, 5, 5, 5, 5, 6, 7] **(Correct Answer)**
- b) [5, 5, 5, 5, 5, 6, 7]
- c) [1, 5, 5, 5, 5, 5, 5]
- d) [1, 5, 5, 5, 6, 7]

28. **What will be the output of the following code?**

```typescript
let array: number[] = [1, 2, 3, 4, 5, 6, 7, 8];
const numGreater: number[] = array.filter((CurrentEle: number) => CurrentEle > 4);
console.log(numGreater);
```

- a) [1, 2, 3, 4]
- b) [5, 6, 7, 8] **(Correct Answer)**
- c) [4, 5, 6, 7, 8]
- d) [5, 6, 7, 8, 9]

29. **What is the output of the following code?**

```typescript
async function foo() {
  console.log('Start');
  await setTimeout(() => {
    console.log('Middle');
  }, 1000);
  console.log('End');
}

foo();
```

- a) Start, End, Middle **(Correct Answer)**

- b) Start, Middle, End

- c) End, Start, Middle

- d) Middle, Start, End

30. **Given the following module `math.ts`, which statement correctly imports both the default export and a named export?**

```typescript
export default class Calculator {}

export const PI = 3.14;
```

- a) import Calculator, PI from './math'

- b) import { Calculator, PI } from './math'

- c) import Calculator, { PI } from './math' **(Correct Answer)**

- d) import { default as Calculator, PI } from './math'

31. **Given the following type alias:**

```typescript
type Callback = (data: string) => void;
```

Which function signature correctly matches the alias?

- a) function cb(data: string): void {} **(Correct Answer)**

- b) function cb(data: number): void {}

- c) function cb(data: string): any {}

- d) function cb(data: string): string {}

32. **What will be the output of the following TypeScript code?**

```typescript
function checkCondition(x: boolean, y: boolean): boolean {
    return !x || y;
}

let result = checkCondition(true, false);
```

```
console.log(result);
```

- a) true
- b) false **(Correct Answer)**
- c) undefined
- d) null

33. **If a variable declared with `let` inside a block is then used outside that block, what will happen?**
- a) It will be accessible outside the block.
- b) It will throw a reference error. **(Correct Answer)**
- c) It will be automatically hoisted to the top of the function.
- d) It will be undefined outside the block.

34. **What will be the output of the following code?**

```typescript
const student = {
  name: "Muhammad Fasih",
  age: 20,
  isStudent: true,
};
const { name, age, isStudent } = student;
const myKey: keyof typeof student = age === 21 ? "name" : "age";
student["name"] = "Salman Shahid";
console.log(student[myKey]);
console.log(name);
```

- a) Salman Shahid, Muhammad Fasih
- b) Salman Shahid, Salman Shahid
- c) Muhammad Fasih, Muhammad Fasih
- d) Salman Shahid, Salman Shahid **(Correct Answer)**

Here are the answers to the additional questions:

35. **What will be the output of the following TypeScript code?**

```typescript
type A = {
    name: string;
    age: number;
}
type B = {
    name: string;
    rollNum: number;
}
let myObj1: A = {
    name: "Muhammad Fasih",
    age: 20,
}
let myObj2: B = {
    name: "Salman Shahid",
    rollNum: 1234,
}
myObj1 = myObj2 as unknown as A;
console.log(myObj1.name === myObj2.name);
console.log(myObj1.age);
```

- a) false, 20
- b) true, 20
- c) true, undefined **(Correct Answer)**
- d) Error

36. **What is the role of the event loop in JavaScript?**

- a) To execute synchronous code.
- b) To push functions onto the Web API

- c) To manage and coordinate asynchronous tasks and their callbacks. **(Correct Answer)**
- d) To manage variable scopes.

37. **What is the output of the following TypeScript code?**

```typescript
let arr = [1, 2, 3, 4];
for (let i = 0; i < arr.length; i++) {
    if (i === 2) continue;
    console.log(arr[i]);
}
```

- a) 1 2 3 4
- b) 1 3 4
- c) 1 2 4 **(Correct Answer)**
- d) 1 2 4 3

38. **What will be the output of the following TypeScript code?**

```typescript
let array = [10, 20, 30];
for (let value of array) {
    console.log(value);
}
```

- a) 0 1 2
- b) 10 20 30 **(Correct Answer)**
- c) value
- d) [10, 20, 30]

39. **What will be the output of the following TypeScript code?**

```typescript
class Person {
  name: string;
```

```
  age: number;

  constructor(name: string, age: number) {
    this.name = name;
    this.age = age;
  }
  greet() {
    console.log(`Hello, my name is ${this.name} and I am ${this.age} years old.`);
  }
}
const john = new Person('John', 30);
john.greet();
```

- a) Hello, my name is John and I am 30 years old. **(Correct Answer)**
- b) Hello, my name is undefined and I am undefined years old.
- c) Error: constructor not defined
- d) Error: greet method not defined

40. **What will be the output of the following TypeScript code?**

```typescript
function sum(data1: number, data2?: number) {
    if(data2){
        const data3: number = 10;
        return data1 + data2 + data3;
    }
    else {
        return data1 + data3;
    }
}
const myAnswer1: number = sum(5);
const myAnswer2: number = sum(10,15);
console.log(myAnswer2);
```

```
console.log(myAnswer1);
```

- a) 15, 35
- b) 35, 15 **(Correct Answer)**
- c) 25, 5
- d) Error

41. **What will be the output of the following TypeScript code?**

```typescript
let x = 10;
let y = 5;
let z = 0;

if (x > y && y > z) {
    console.log("Condition met");
} else {
    console.log("Condition not met");
}
```

- a) Condition met **(Correct Answer)**
- b) Condition not met
- c) Error
- d) Infinite loop

42. **What will be the output of the following TypeScript code?**

```typescript
function checkConditions(a: boolean, b: boolean): boolean {
    return !a || b && a;
}
let result = checkConditions(false, true);
console.log(result);
```

- a) true **(Correct Answer)**
- b) false
- c) Error
- d) undefined

43. **What will be the output of the following TypeScript code?**

```typescript
class Shape {
  public area(): number {
    return 0;
  }
}

class Circle extends Shape {
  radius: number;

  constructor(radius: number) {
    super();
    this.radius = radius;
  }
  public area(): number {
    return Math.PI * this.radius * this.radius;
  }
}
const circle = new Circle(5);
console.log(circle.area());
```

- a) 25
- b) 78.53981633974483 **(Correct Answer)**
- c) 0
- d) Error: area method not defined

44. **What happens if you try to import a named export that doesn't exist in the module?**
    - a) The import statement will be ignored
    - b) TypeScript will throw a compile-time error **(Correct Answer)**
    - c) JavaScript will throw a runtime error
    - d) The import will be silently ignored

45. **Consider the following two interfaces:**
    ```typescript
    interface Dog {
      bark(): void;
    }

    interface Cat {
      bark(): void;
    }
    ```
    Which of the following statements is true in TypeScript?
    - a) let pet: Dog = new Cat(); is valid due to structural typing
    - b) let pet: Dog = new Cat(); is invalid due to nominal typing
    - c) Dog and Cat are incompatible because they have different names
    - d) Dog and Cat are compatible only if they are in the same file. **(Correct Answer)**

46. **How can you import all exports from a module as a single object in TypeScript?**
    - a) import all from './module'
    - b) import * from './module'
    - c) import * as module from './module' **(Correct Answer)**
    - d) import { all } from './module'

47. **What will be the output of the following TypeScript code?**
    ```typescript
    let i = 0;
    do {
    ```

```
    i++;
} while (i < 3);
console.log(i);
```

- a) 0
- b) 1
- c) 2
- d) 3 **(Correct Answer)**

48. **Given the following type aliases:**

```typescript
type Employee = { id: number; name: string; };
type Person = { id: number; name: string; };
```

Which of the following assignments is valid in TypeScript?

- a) let emp: Employee = { id: 1, name: 'Alice' }; let p: Person = emp;
- b) let emp: Employee = { id: 1, name: 'Alice' }; let p: Person = { id: 2, name: 'Bob' }; emp = p; **(Correct Answer)**
- c) Both a and b
- d) Neither a nor b

49. **How would you import multiple named exports from a module?** //File name module.ts

```typescript
export const a = 1;
export const b = 2;
export const c = 3;
```

- a) import { a, b, c } from './module'; **(Correct Answer)**
- b) import a, b, c from './module';
- c) import * as abc from './module';
- d) import { default as abc } from './module';

50. **How do you create an instance of a TypeScript class?**

- a) new MyClass() **(Correct Answer)**
- b) MyClass.new()
- c) MyClass.create()
- d) instance MyClass()