

a)

1. **Define the Parameters:**

- Let μ be the mean frame rate of the game on the YBox.

2. **State the Hypotheses:**

- Null hypothesis (H_0): $\mu = 120$
- Alternative hypothesis (H_1): $\mu < 120$

3. **Conduct the Hypothesis Test Using R:** Use the `t.test` function to test the hypothesis.

Code:

```
frame_rates <- c(97, 135, 114, 111, 119, 118, 114, 114, 97, 135, 96, 113,
128, 115, 117, 115, 103, 106, 131, 123, 129, 99, 119, 113, 93, 116, 115,
104)
t_test_result <- t.test(frame_rates, mu = 120, alternative = "less")
t_test_result
```

Output:

```
One Sample t-test
data: frame_rates
t = -2.7914, df = 27, p-value = 0.004759
alternative hypothesis: true mean is less than 120
95 percent confidence interval:
 -Inf 117.6194
sample estimates:
mean of x
113.8929
```

b)

- Test statistic: -2.7914
- Degrees of freedom: 27
- P-value: 0.004759

The strength of the evidence against H_0 is strong since the p-value is less than 0.05, indicating significant evidence to reject the null hypothesis.

c)

Based on the hypothesis test, there is strong evidence to suggest that the mean frame rate of the game on the YBox is less than 120 FPS.

d)

99% Confidence Interval Code:

```
ci_result <- t.test(frame_rates, conf.level = 0.99)
ci_result
```

Full Output:

```
      One Sample t-test
data:  frame_rates
t = 52.057, df = 27, p-value < 2.2e-16
alternative hypothesis: true mean is not equal to 0
99 percent confidence interval:
 107.8311 119.9546
sample estimates:
mean of x
 113.8929
```

We only need the confidence interval so we can ignore the rest:

```
99 percent confidence interval:
107.8311 119.9546
```

e)

Based on the confidence interval (107.8311,119.9546), it is reasonable to assume that the mean frame rate could be 110 FPS, as 110 FPS falls within this interval.