GRADE 7 · UNIT 13 · LESSON 7

Representing Real-World Contexts With Graphs

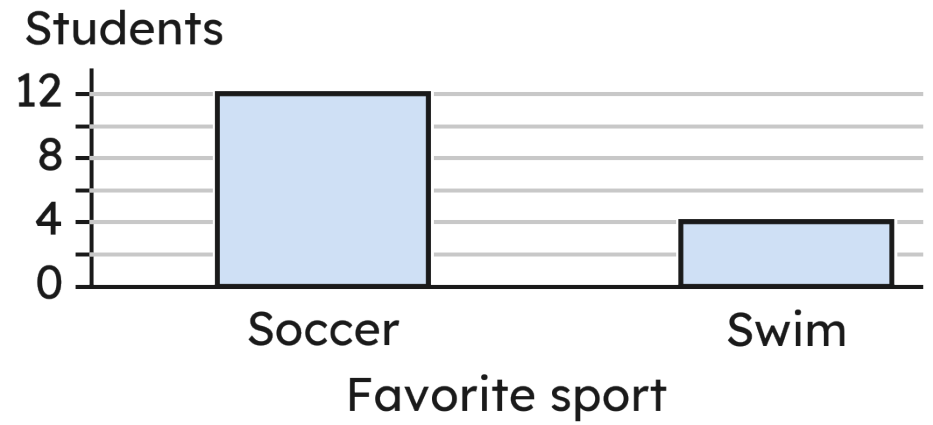
MA.7.DP.1.5

I can tell categorical data from numerical data and choose a display that fits the data and the question, saying what it shows and what it hides.

Warm-Up

1. Left side 8 4 1 | 3, where 1 | 3 means 31. Find the median.
2. Box A: Q1 = 14, Q3 = 26. Box B: Q1 = 15, Q3 = 22. Greater IQR?
3. Solve: $4x - 9 = 27$
4. How many more students chose soccer than swim?

4.



Warm-Up

1. Left side 8 4 1 | 3, where 1 | 3 means 31. Find the median.

   34

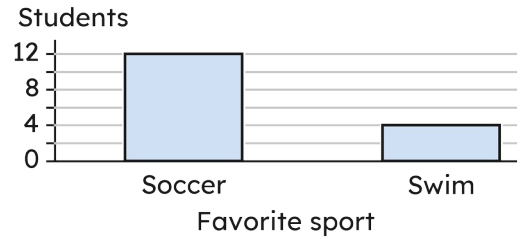
2. Box A: Q1 = 14, Q3 = 26. Box B: Q1 = 15, Q3 = 22. Greater IQR?

   A: 12 against 7

3. Solve: $4x - 9 = 27$ $x = 9$

4. How many more students chose soccer than swim? **8**

4.



Vocabulary

categorical data

data that are names or labels: a color, a sport, a kind of pet

numerical data

data that are numbers that measure or count: a height, a score, a number of siblings

bar chart

a display of categorical data: one bar for each category, the bars apart, each bar as tall as its count (also called a bar graph)

histogram

a display of numerical data in equal intervals: the bars touch, each bar as tall as the count in its interval

circle graph

a circle cut into parts of one whole, one part for each category

Notes

I. Two kinds of data

Categorical data — each answer is a name or a label.

Favorite sport: soccer, track, chess.

Numerical data — each answer is a number that measures or counts.

Height in inches: 58, 61, 63.

The test: is each answer a word or label, or a number that measures or counts?

A number used as a name — a locker number, a bus number — is a label.

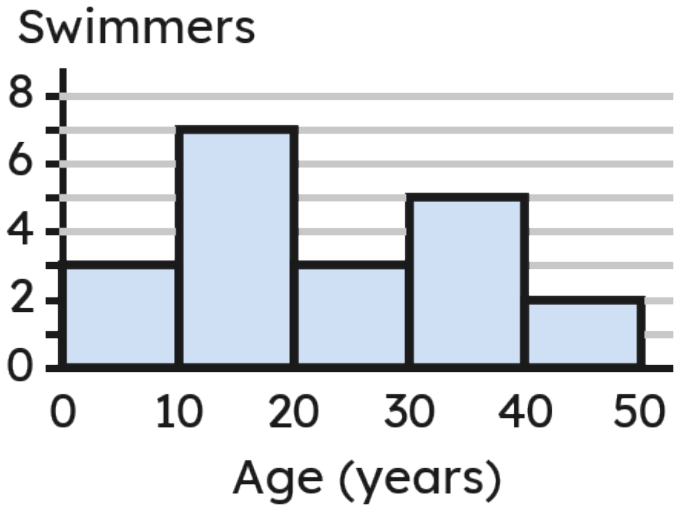
Notes

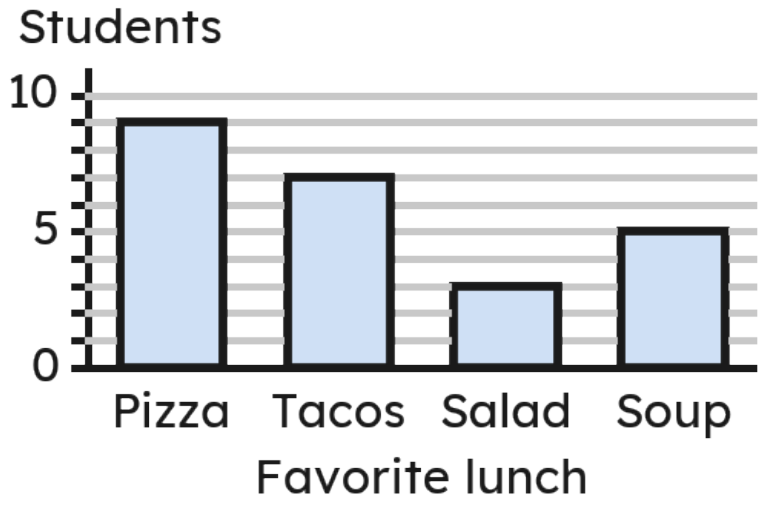
II. Six displays, and what each is for

Display	Data	What it is for
Bar chart	categorical	comparing the count in each category
Circle graph	categorical	parts of one whole, few categories
Line plot	numerical	a small set: every value shown
Stem-and-leaf plot	numerical	a small or medium set: every value shown
Histogram	numerical	a large set in intervals: shape, no single values
Box plot	numerical	a large set: median, quartiles, extremes only

Notes

III. Histogram or bar chart?





Histogram: numbers in intervals, so the bars touch.

Bar chart: categories, so the bars stand apart.

Example 1

Choose a display for each data set, and give one reason.

a. the salaries of the 250 workers at a hospital

b. the colors of the 60 candies in one bag

Example 1

a. Numbers, and 250 of them: too many to show one by one.

A histogram shows their shape.

A box plot shows the median and the quartiles.

Answer: a. a histogram or a box plot

Example 1

b. Colors are names: categorical data.

A bar chart compares the count of each color.

A few parts of one bag: a circle graph works too.

Answer: b. a bar chart or a circle graph

Your Turn

Choose a display for each data set, and give one reason.

a. the salaries of the 320 workers at a factory

b. the flavors of the 50 ice-cream cones sold at a stand

Your Turn

Choose a display for each data set, and give one reason.

a. the salaries of the 320 workers at a factory

b. the flavors of the 50 ice-cream cones sold at a stand

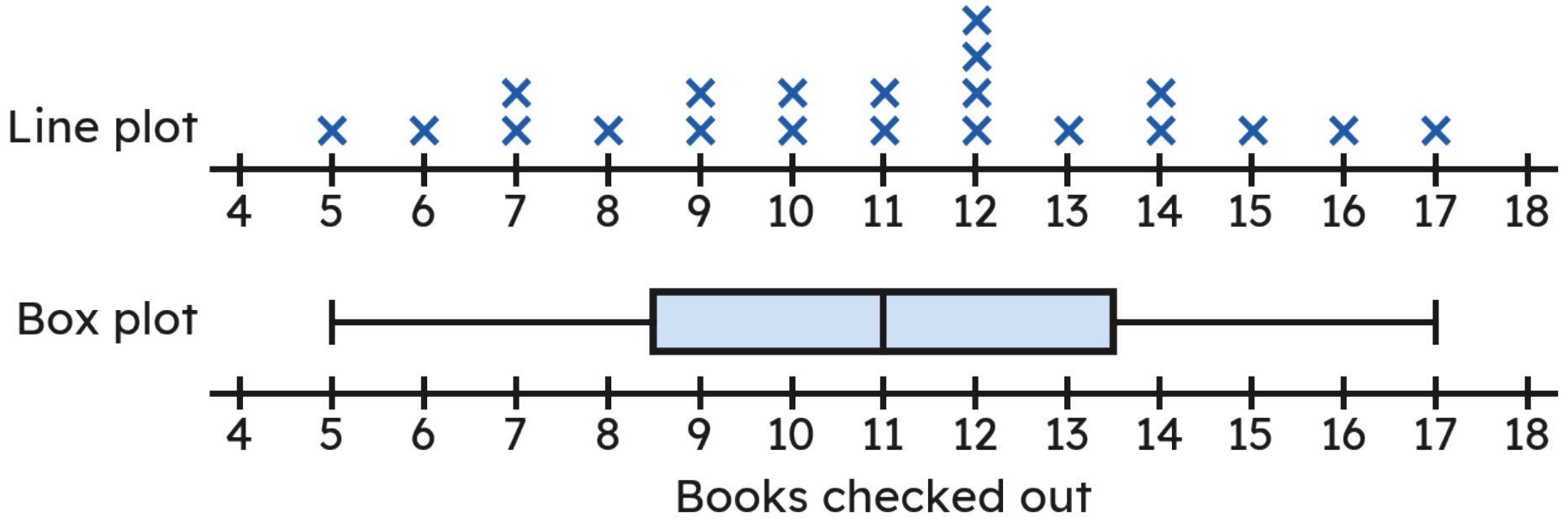
a. 320 numbers: too many to show one by one.

b. Flavors are names: one bar for each flavor.

Answer: a. histogram or box plot b. bar chart

Example 2

Both show the books each of 21 students checked out this month.



Which shows the median at a glance? Which counts the 12s?

Example 2

Box plot: the line inside the box is the median, 11.

Line plot: there are 4 X's above 12.

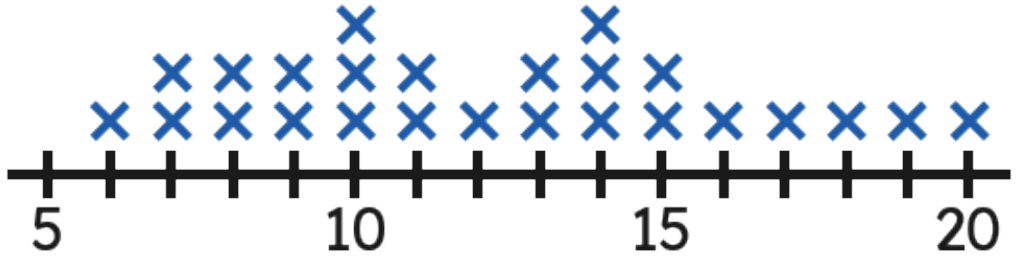
The box plot keeps five numbers, so it cannot show how many were 12.

Answer: Median: box plot, 11. 12s: line plot, 4.

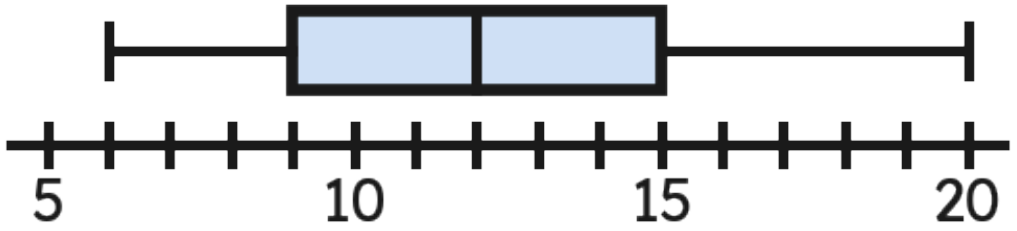
Your Turn

Both show the points each of 25 players scored.

Which display shows the median? Which counts the 10s? Give both numbers.



Line plot: points scored

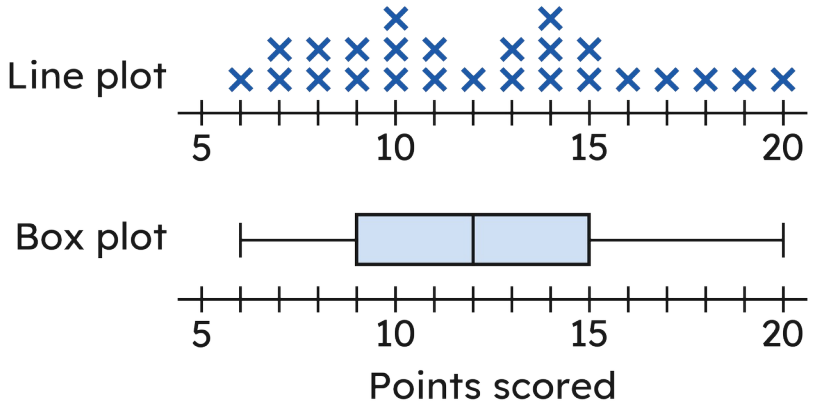


Box plot: points scored

Your Turn

Both show the points each of 25 players scored.

Which display shows the median? Which counts the 10s? Give both numbers.



Box plot: the middle of its five numbers is the median, 12.

Line plot: one X for each player, so 3 scored 10.

Answer: Median: box plot, 12. 10s: line plot, 3.

Whiteboards · Question 1 of 9

Which survey questions have categorical answers? Select all.

A. How many books did you read this month?

B. What is your favorite subject?

C. What is your zip code?

D. How tall are you, in centimeters?

E. What color is your backpack?

Answer it.

Whiteboards · Question 1 of 9

Which survey questions have categorical answers? Select all.

Words or labels: a subject, a zip code, a color.

Numbers that count or measure: books read, height.

Answer: B, C and E

Whiteboards · Question 2 of 9

Which survey question has numerical data for its answers?

A. What is your house number?

B. Do you have a pet, yes or no?

C. What kind of pet would you like?

D. How many pets do you have?

Answer it.

Whiteboards · Question 2 of 9

Which survey question has numerical data for its answers?

Each answer to “How many pets?” is a count: 0, 1, 2, 3.

A number that counts: numerical.

Answer: D — How many pets do you have?

Whiteboards · Question 3 of 9

30 students each name their favorite pizza topping.

Which display best compares how many chose each topping?

A. Bar chart

B. Histogram

C. Line plot

D. Box plot

Answer it.

Whiteboards · Question 3 of 9

30 students each name their favorite pizza topping.

Which display best compares how many chose each topping?

Toppings are names: categorical data.

One bar for each topping, as tall as its count.

Answer: A — Bar chart

Whiteboards · Question 4 of 9

A school measures its 300 students' heights to the nearest centimeter.

Which display best shows the shape of all 300 heights?

A. Line plot

B. Circle graph

C. Histogram

D. Bar chart

Answer it.

Whiteboards · Question 4 of 9

A school measures its 300 students' heights to the nearest centimeter.

Which display best shows the shape of all 300 heights?

Heights are numbers: numerical data.

300 values: too many to show one by one.

Equal intervals of height: the bars show the shape.

Answer: C — Histogram

Whiteboards · Question 5 of 9

A town chess club lists the ages of its 18 members.

Which display lets you read every member's age?

A. Histogram

B. Box plot

C. Circle graph

D. Stem-and-leaf plot

Answer it.

Whiteboards · Question 5 of 9

A town chess club lists the ages of its 18 members.

Which display lets you read every member's age?

18 ages: a small set of numbers.

Every age must be read: the display must keep each value.

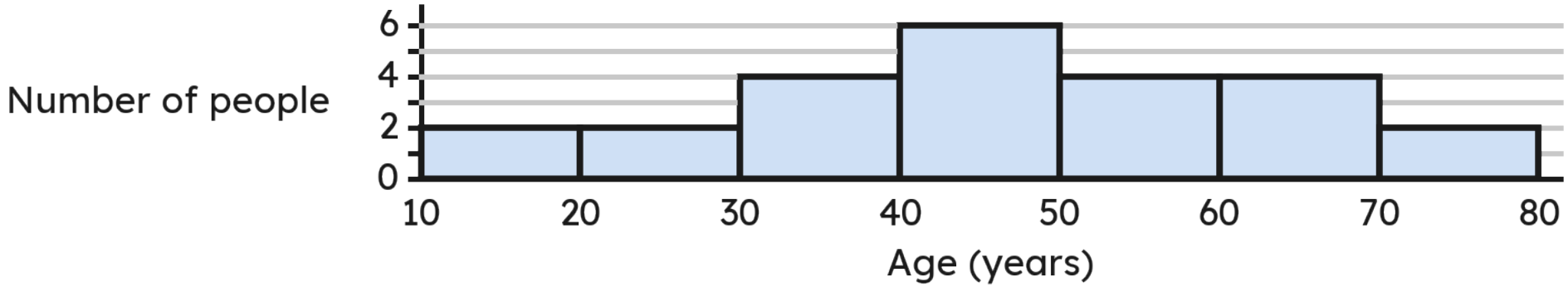
A stem-and-leaf plot keeps each value.

Answer: D — Stem-and-leaf plot

Whiteboards · Question 6 of 9

The display shows the ages of the people at a town meeting.

What display is it, and what kind of data does it show?

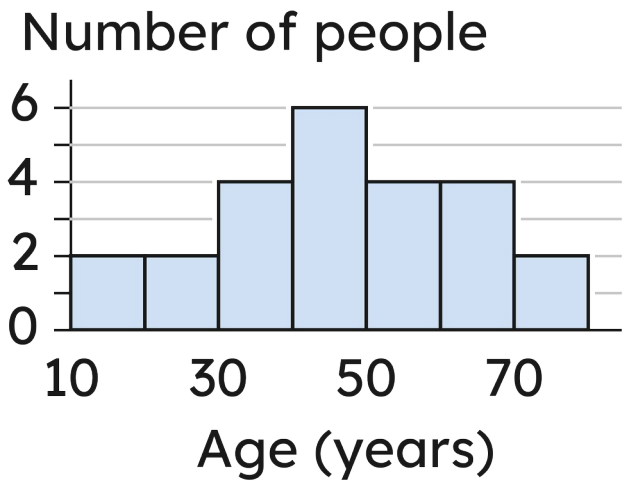


Answer it.

Whiteboards · Question 6 of 9

The display shows the ages of the people at a town meeting.

What display is it, and what kind of data does it show?



The bars touch over intervals of age.

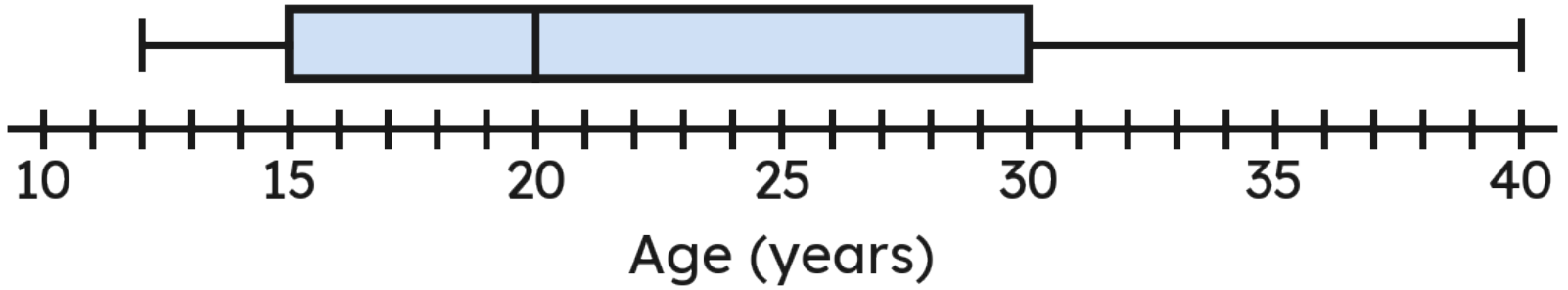
Ages are numbers: numerical data.

Answer: A histogram of numerical data

Whiteboards · Question 7 of 9

The box plot shows the ages of the volunteers at a park cleanup.

Name one thing the box plot cannot tell you.

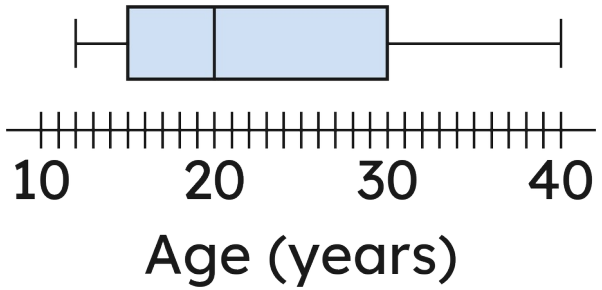


Answer it.

Whiteboards · Question 7 of 9

The box plot shows the ages of the volunteers at a park cleanup.

Name one thing the box plot cannot tell you.



7 ages: 12, 15, 16, 20, 21, 30, 40

9 ages: 12, 14, 16, 17, 20, 28, 30, 30, 40

Both lists make this box plot.

Means: $154 \div 7 = 22$ and $207 \div 9 = 23$

Answer: Count, mean, or an unmarked age

Whiteboards · Question 8 of 9

A library that opened in 1998 records the page count of each of its 2,400 books.

Which display shows the median and the middle half at a glance?

A. Line plot

B. Box plot

C. Bar chart

D. Histogram

Answer it.

Whiteboards · Question 8 of 9

A library that opened in 1998 records the page count of each of its 2,400 books.

Which display shows the median and the middle half at a glance?

Page counts are numbers, and 2,400 of them: a large set.

The median and the middle half: the line in the box, and the box.

Answer: B — Box plot

Whiteboards · Question 9 of 9

Dev made a histogram of his class's favorite colors.

What is wrong with his choice? What should he use?

Write your answer in sentences.

Whiteboards · Question 9 of 9

Dev made a histogram of his class's favorite colors.

What is wrong with his choice? What should he use?

Colors are names: categorical data.

A histogram's bars stand over intervals of numbers.

One bar for each color, the bars apart: a bar chart.

Answer: A bar chart: colors are names.

Independent Practice

1. Is the number of goals each player scored categorical or numerical?
2. Is each student's homeroom number categorical or numerical?
3. 25 students name their favorite sport. Choose a display to compare the sports. Why?

4. Choose a display that shows each of the weights of 20 dogs at a shelter. Why?
5. Choose a display for the shape of 600 runners' race times. Why?
6. Name one thing a histogram does not show.

Before You Go

Names and labels, or numbers that measure or count: that is the kind of data.

How many values, and what must be seen: that is the display.

Wednesday: we make the displays.

IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 60. Due by the Unit 13 test.

Today's skills — all required

Choose the best type of graph (VP6)