Box Plots and Interquartile Range

Name: _____	Date: _____	Score: _____ / 30

Quick Review and Helpful Hints

A *box plot* shows five numbers: minimum, first quartile Q_1, median, third quartile Q_3, and maximum. The *interquartile range* is $IQR = Q_3 - Q_1$, the spread of the middle half of the data. The *range* is maximum $-$ minimum.

▷ **Example:** A data set has $Q_1 = 4$ and $Q_3 = 10$. Find the IQR.
Work: $IQR = Q_3 - Q_1 = 10 - 4$.
★ **Answer:** 6

IQR $= Q_3 - Q_1$.

Practice Problems

Find the requested value.

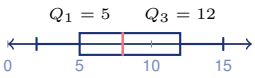
1. IQR when $Q_1 = 3$, $Q_3 = 9$ _____
2. IQR when $Q_1 = 10$, $Q_3 = 25$ _____
3. Median of $2, 4, 6, 8, 10$ _____
4. Median of $1, 3, 5, 7$ _____
5. Min of $5, 8, 2, 10, 7$ _____
6. Max of $5, 8, 2, 10, 7$ _____
7. Range of $4, 9, 15$ _____
8. IQR when $Q_1 = 12$, $Q_3 = 20$ _____
9. Median of $3, 3, 4, 8, 9$ _____
10. IQR when $Q_1 = 0$, $Q_3 = 10$ _____
11. Median of $10, 20, 30, 40, 50$ _____
12. Range from 6 to 31 _____
13. IQR when $Q_1 = 5$, $Q_3 = 5$ _____
14. Median of $2, 4, 4, 6$ _____

Word Problems

15. A data set has $Q_1 = 15$ and $Q_3 = 35$. Find the IQR. _____
16. Test scores run from a minimum of 60 to a maximum of 100. Find the range. _____
17. The middle 50% of data spans $Q_1 = 20$ to $Q_3 = 28$. Find the IQR. _____
18. A counselor records five GED practice times: $5, 10, 15, 20, 25$ minutes. What is the median practice time? _____

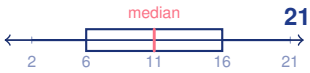
Illustrated Practice

Use each picture. Read the five-number summary, box plot, or dot plot carefully.



19. Find the IQR. _____

20. Find the range. _____



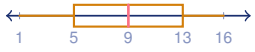
21. Find the median. _____

min	Q_1	med	Q_3	max
3	7	10	14	20

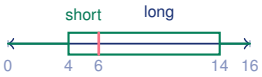
22. Find Q_1. _____

min	Q_1	med	Q_3	max
6	9	12	18	22

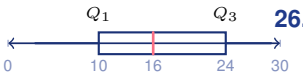
23. Find Q_3. _____



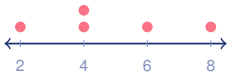
24. Find the range. _____



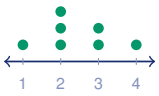
25. Which half has the larger spread? _____



26. Find the IQR. _____



27. Find the median. _____



28. Find the mode. _____

min	Q_1	med	Q_3	max
12	18	24	30	36

29. Find the maximum. _____

min	Q_1	med	Q_3	max
52	61	70	81	88

30. Find the range. _____

Answer Keys

1. 6	**11.** 30	**21.** 11
2. 15	**12.** 25	**22.** 7
3. 6	**13.** 0	**23.** 18
4. 4	**14.** 4	**24.** 15
5. 2	**15.** 20	**25.** upper half
6. 10	**16.** 40	**26.** 14
7. 11	**17.** 8	**27.** 4
8. 8	**18.** 15	**28.** 2
9. 4	**19.** 7	**29.** 36
10. 10	**20.** 14	**30.** 36

Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $9 - 3 = 6$. So the final answer is 6.

2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $25 - 10 = 15$. So the final answer is 15.

3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The middle value is 6. So the final answer is 6.

4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Average the middle two: $\frac{3+5}{2} = 4$. So the final answer is 4.

5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The smallest value is 2. So the final answer is 2.

6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The largest value is 10. So the final answer is 10.

7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $15 - 4 = 11$. So the final answer is 11.

8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $20 - 12 = 8$. So the final answer is 8.

9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is In order $3, 3, 4, 8, 9$, the middle is 4. So the final answer is 4.

10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $10 - 0 = 10$. So the final answer is 10.

11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The middle value is 30. So the final answer is 30.

12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $31 - 6 = 25$. So the final answer is 25.

13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $5 - 5 = 0$. So the final answer is 0.

14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Average the middle two: $\frac{4+4}{2} = 4$. So the final answer is 4.

15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $IQR = 35 - 15 = 20$. So the final answer is 20.

16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $100 - 60 = 40$. So the final answer is 40.

17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $28 - 20 = 8$. So the final answer is 8.

18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The middle value is 15. So the final answer is 15.

19. The picture gives $Q_1 = 5$ and $Q_3 = 12$. The IQR measures the middle half of the data, so subtract the quartiles: $12 - 5 = 7$.

20. For range, use only the smallest and largest values on the whiskers. The minimum is 4 and the maximum is 18, so $18 - 4 = 14$.

21. The median is the line inside the box. In this box plot, that line is at 11, so the median is 11.

22. Read the labeled five-number summary from left to right. The value under Q_1 is 7, so the first quartile is 7.

23. In a five-number summary, Q_3 is the fourth value shown. The card under Q_3 shows 18, so $Q_3 = 18$.

24. Range is maximum minus minimum. The whiskers run from 1 to 16, and $16 - 1 = 15$.

25. Compare the two sides of the box around the median. The lower half goes from 4 to 6 (spread 2), while the upper half goes from 6 to 14 (spread 8), so the upper half is larger.

26. Use the same IQR rule: $Q_3 - Q_1$. The box starts at 10 and ends at 24, so $24 - 10 = 14$.

27. The dot plot shows the data values $2, 4, 4, 6, 8$. The middle value in order is 4, so the median is 4.

28. The mode is the value that appears most often. The tallest stack of dots is over 2, so the mode is 2.

29. The maximum is the last value in the five-number summary. The last card is 36, so the maximum is 36.

30. Use maximum minus minimum. The smallest value is 52 and the largest is 88, so $88 - 52 = 36$.

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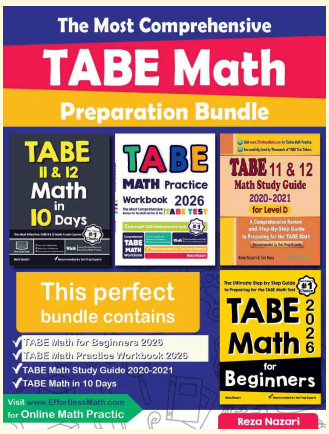

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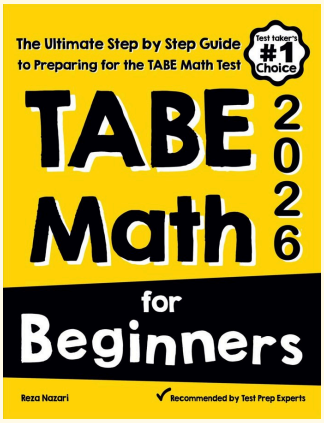

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