Chapter 13. Statistics

Ex. 13.3

Answer 1CU.

A histogram is a bar graph in which the data are organized into equal intervals. The horizontal axis shows the range of the data values separated into measurement classes, and the vertical axis shows the number of values, or the frequency, in each class.
To describe how to create a histogram, consider an example of scores for a 50 point mathematics test.

40	34	23	41	39	38	39	34	43	32
44	41	39	22	47	36	25	41	30	28

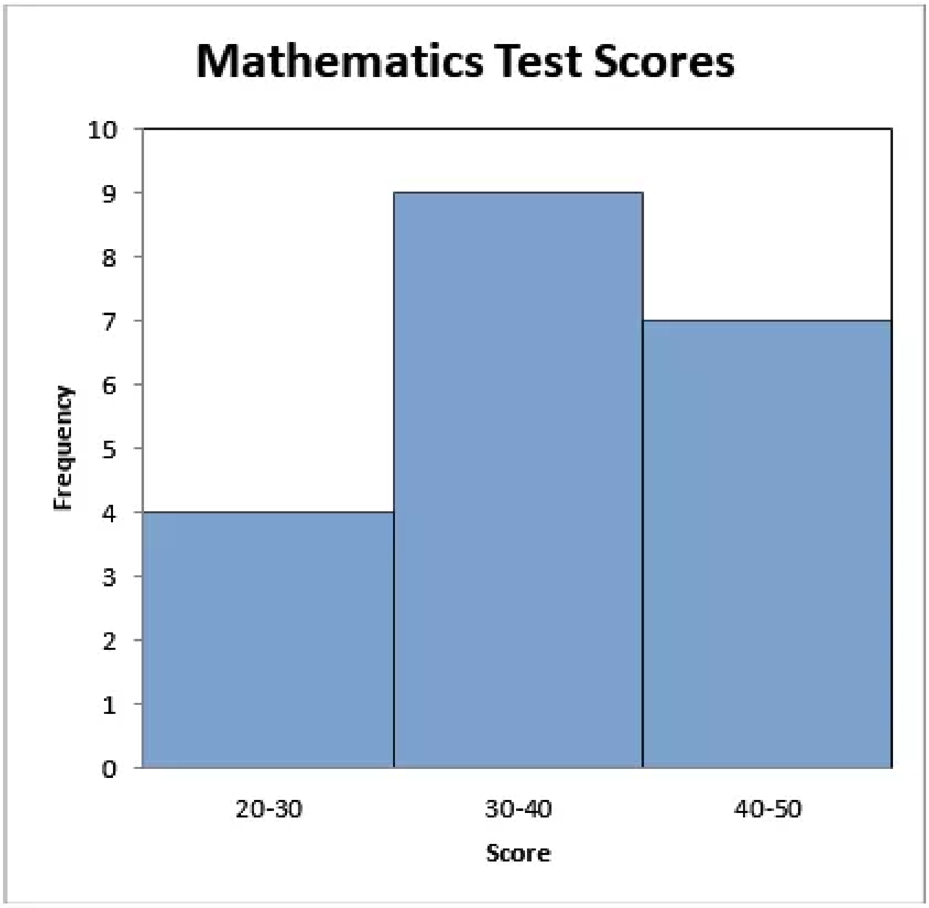
Step I: Identify the greatest and least values in the data set.
The test scores range from 22 to 47 points.

Step II: Create measurement classes of equal width.
Consider 10 point interval for each class from 20 to 50.

Step III: Create a frequency table using the measurement classes.

Score Intervals	Tally	Frequency
$20 \le s < 30$	IIII	4
$30 \le s < 40$	IIIIIIIII	9
$40 \le s < 50$	IIIIIII	7

Step IV: Draw the histogram.



Answer 2CU.

In a histogram, a measurement class $a-b$ contains all values v such that $a \leq v < b$.

Therefore the compound inequality to represent all the values v included in a $50-60$ measurement class is $\boxed{50 \leq v < 60}$.

Answer 3CU.

For a data set, if a histogram shows the height decreases then the distribution is skewed to the right or skewed in the direction of the tail. The majority of the data set cluster at the lower end of the distribution; the tail is to the right.

Consider an example of scores for a 50 point mathematics test.

29	23	23	21	29	28	39	34	43	32
24	41	39	22	47	36	25	41	30	28

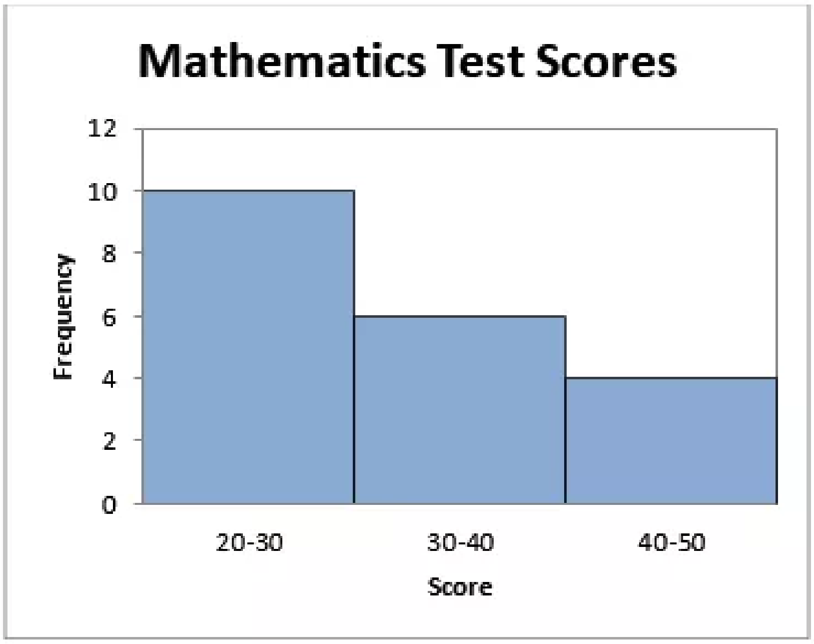
Step I: Identify the greatest and least values in the data set.
The test scores range from 21 to 47 points.

Step II: Create measurement classes of equal width.
Consider 10 point interval for each class from 20 to 50.

Step III: Create a frequency table using the measurement classes.

Score Intervals	Tally	Frequency
$20 \leq s < 30$	IIIIIIIIII	10
$30 \leq s < 40$	IIIIII	6
$40 \leq s < 50$	IIII	4

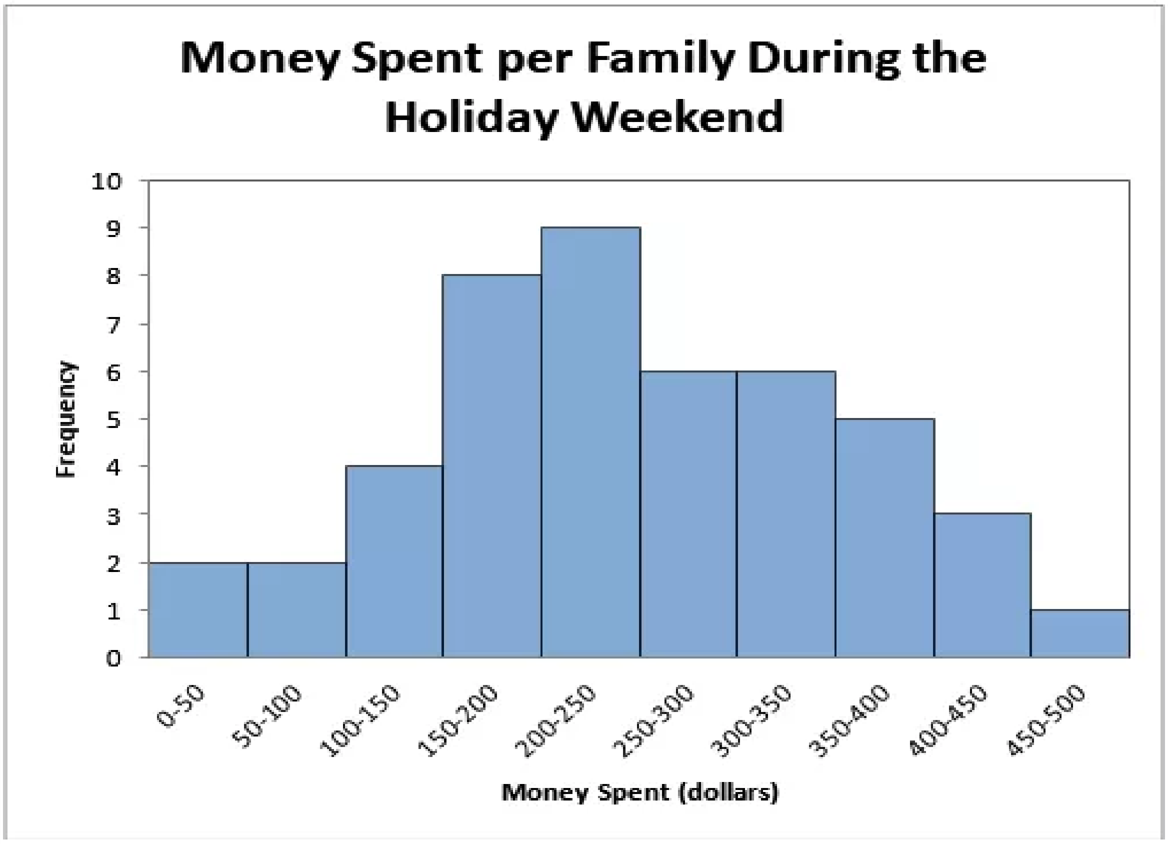
Step IV: Draw the histogram.



Here heights are decreases to the right. Therefore the histogram is skewed to the right.

Answer 4CU.

Consider the histogram



Create a frequency table from the histogram.

Intervals	Frequency
0-50	2
50-100	2
100-150	4
150-200	8
200-250	9
250-300	6
300-350	6
350-400	5
400-450	3
450-500	1

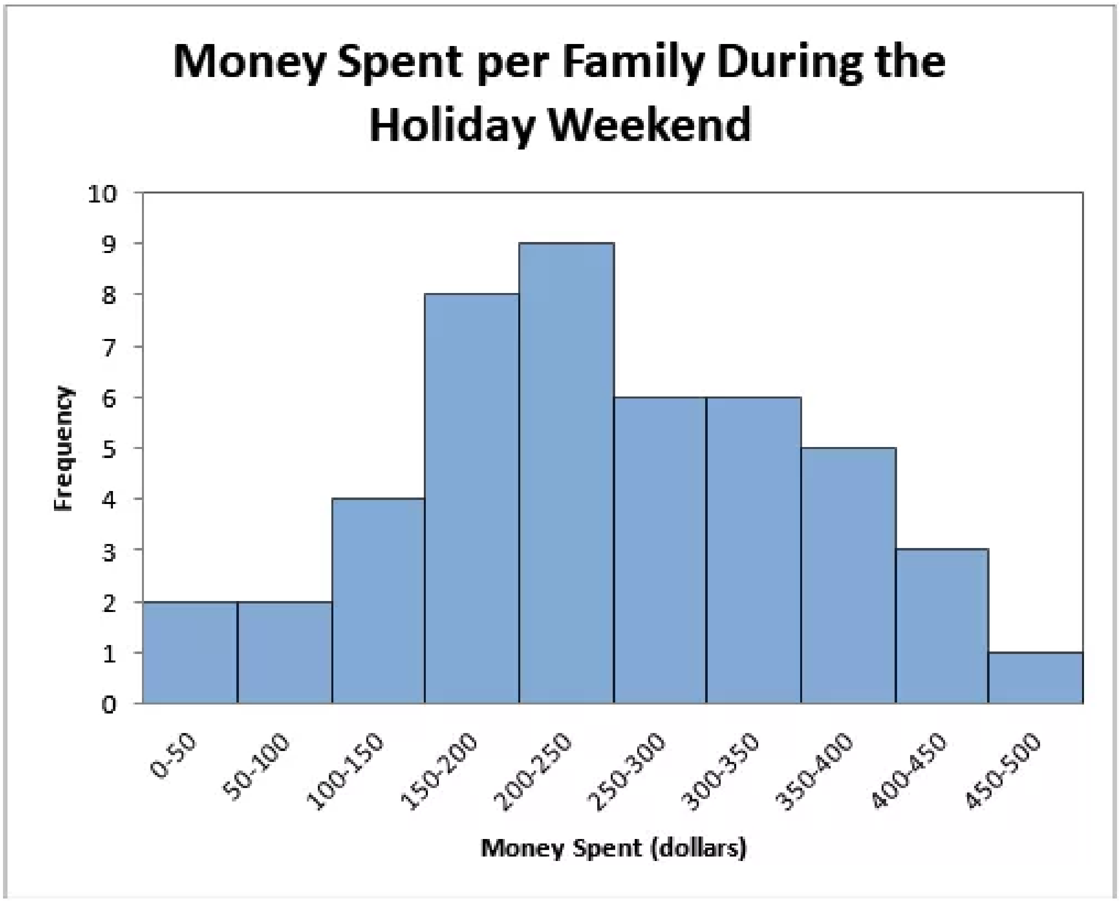
Add the frequencies to determine the number of families.

$$2+2+4+8+9+6+6+5+3+1=46$$

There are 46 families; therefore the middle value is between 23^{rd} and 24^{th} data values. Both the data values are located in the 200-250 measurement class. Therefore the median occurs in the 200-250 measurement class.

Answer 5CU.

Consider the histogram



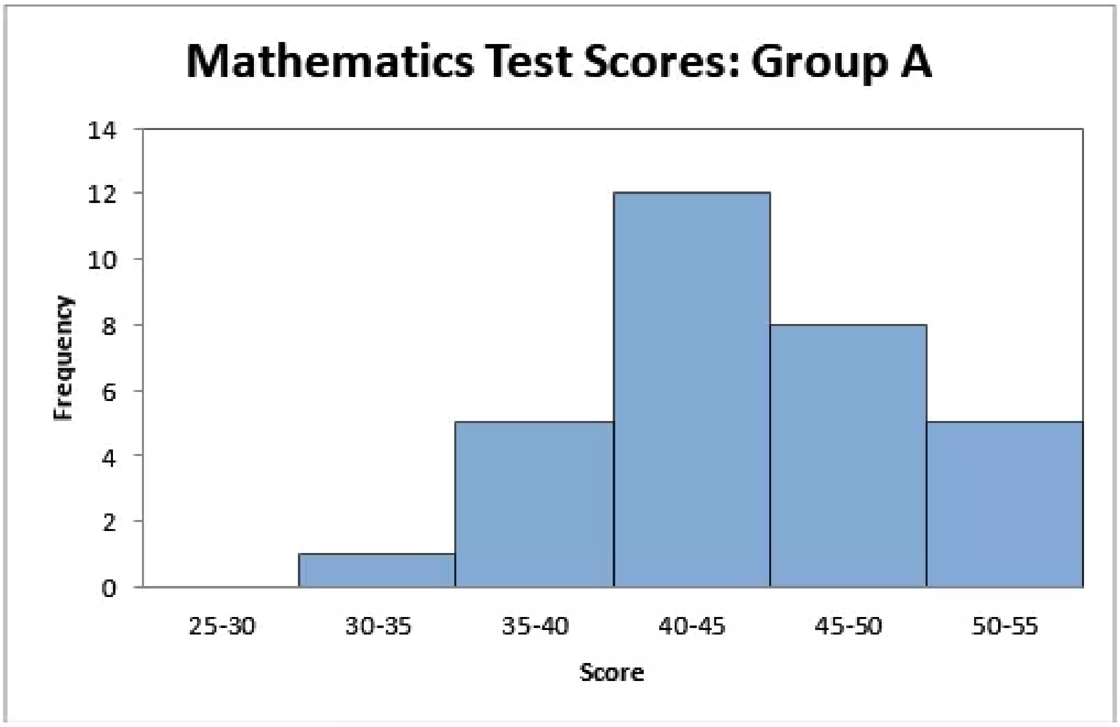
Create a frequency table from the histogram.

Intervals	Frequency
0-50	2
50-100	2
100-150	4
150-200	8
200-250	9
250-300	6
300-350	6
350-400	5
400-450	3
450-500	1

1. Only one family spent above 250 dollars. It is likely that one family spent the highest dollars.
2. Histogram is symmetrical in shape. Most of the family spent 150-400 dollars in the weekend.
3. There is no gap.

Answer 6CU.

Consider the histograms of Mathematical Test Scores for Group A.



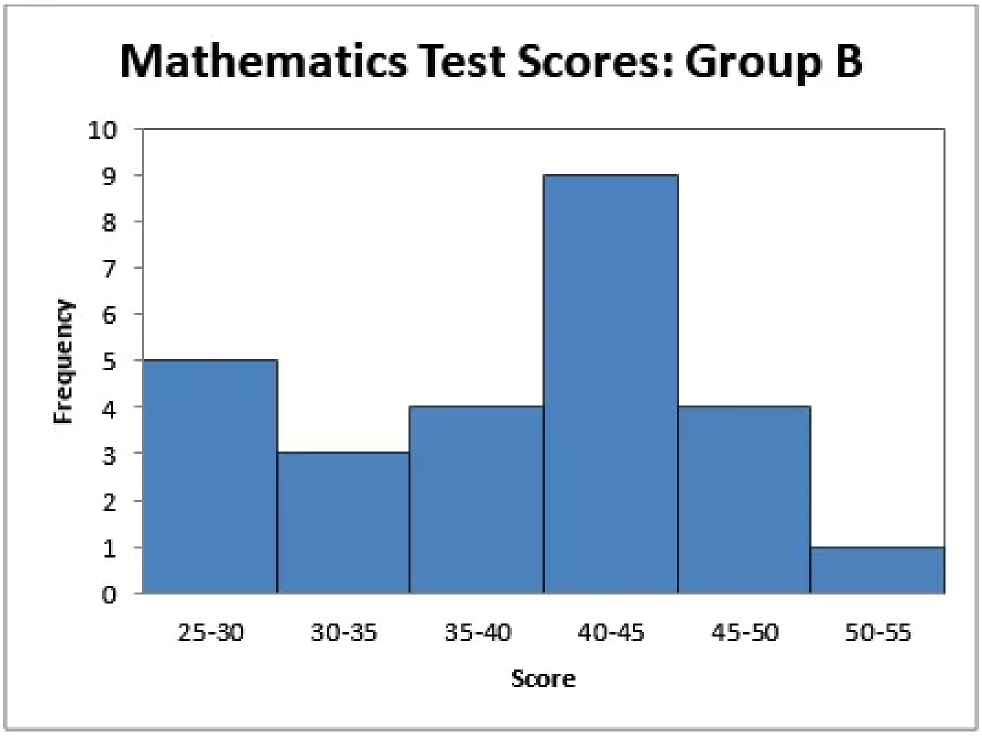
Add the frequencies to determine the number of students.

$$0+1+5+12+8+5=31$$

There are 31 students; therefore the middle value is 16^{th} data value.

The data value is located in the 40-45 measurement class. Therefore the median occurs in the 40-45 measurement class.

Consider the histograms of Mathematical Test Scores for Group B.



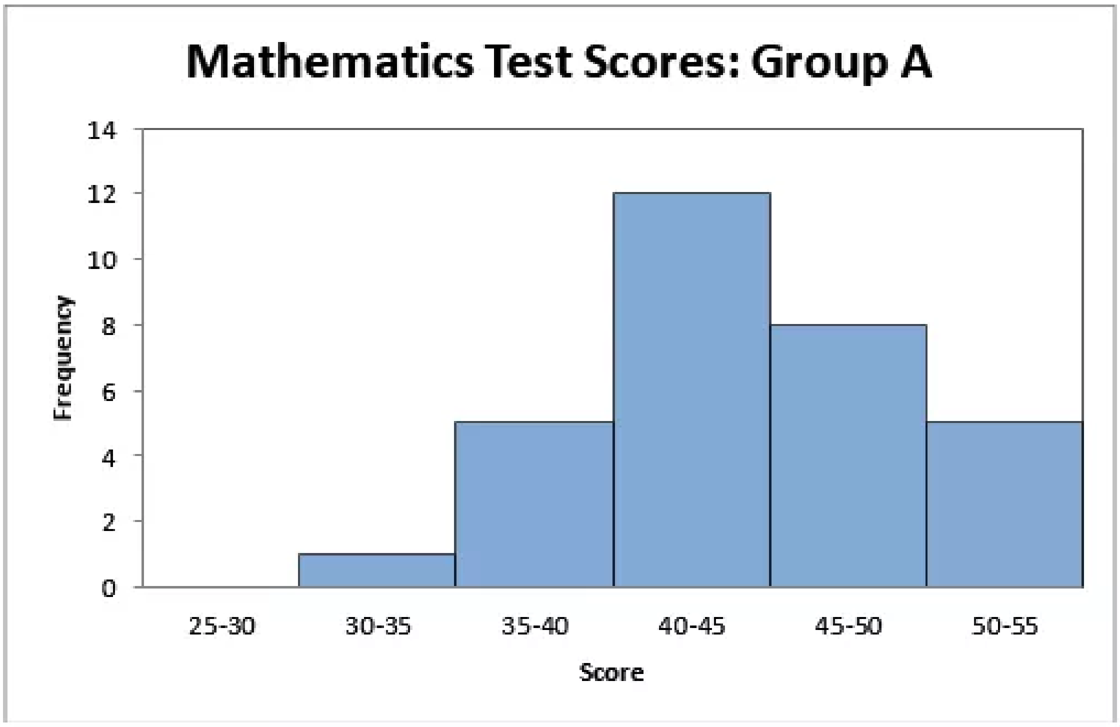
Add the frequencies to determine the number of students.

$$5+3+4+9+4+1=26$$

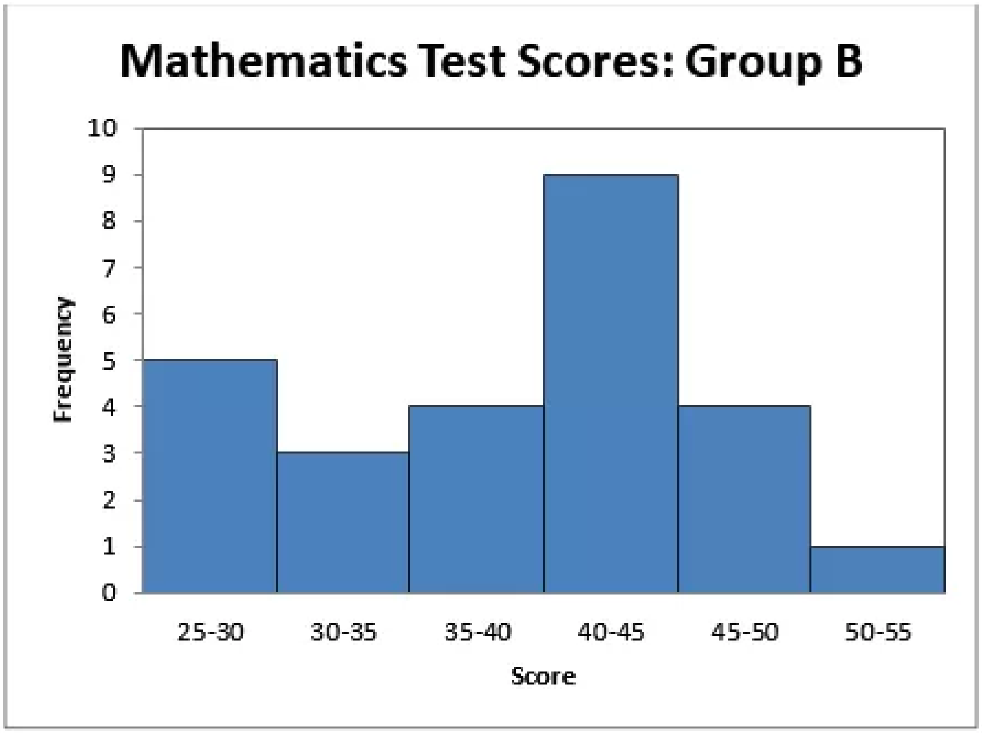
There are 26 students; therefore the middle value is between 13^{th} and 14^{th} data values. Both the data values are located in the 40-45 measurement class. Therefore the median occurs in the 40-45 measurement class.

Answer 7CU.

Consider the histograms of Mathematical Test Scores for Group A.



Consider the histograms of Mathematical Test Scores for Group B.



1. The Group A test scores are somewhat more symmetrical in appearance than the group B test scores.
2. There are 25 of 31 scores in group A that are 40 or greater while only 14 of 26 scores in Group B that are 40 or greater.
3. In Group A, there are no scores less than 30 while in Group B; there are 5 scores less than 30.

Therefore Group A performed better overall on the test.

Answer 8CU.

Step 1: The greatest and the least values in the data set is identified.

The number of passengers ranges from 33 millions to 80 millions.

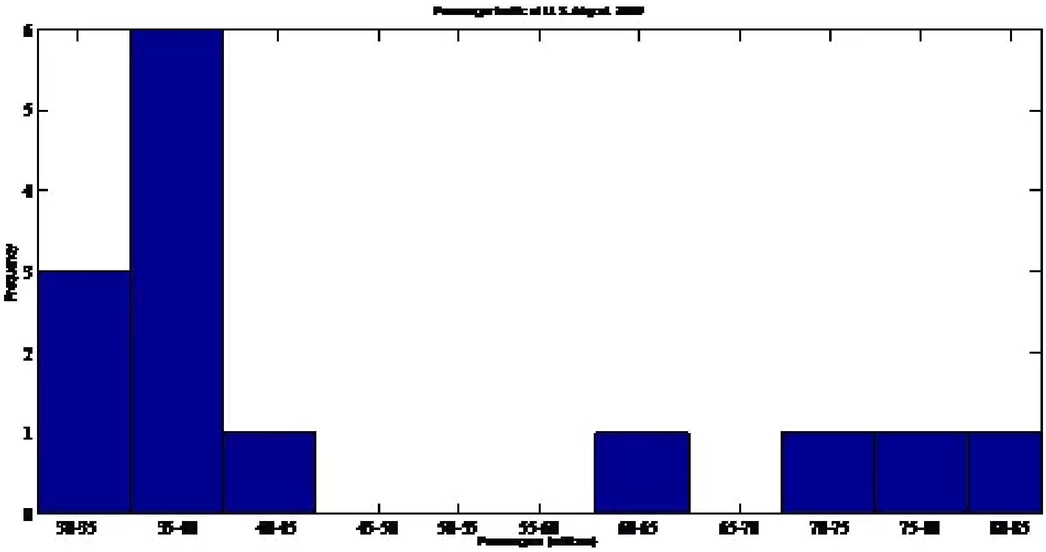
Step 2: Measurement classes of equal width are created.

For these data, measurement classes from 30 to 80 with a 5-point interval are used.

Step 3: A frequency table using the measurement classes is created.

Intervals	Tally	Frequency
$30 \leq s < 35$	|||	3
$35 \leq s < 40$	~~||||~~ |	6
$40 \leq s < 45$	|	1
$45 \leq s < 50$		0
$50 \leq s < 55$		0
$55 \leq s < 60$		0
$60 \leq s < 65$	|	1
$65 \leq s < 70$	|	1
$70 \leq s < 75$	|	1
$75 \leq s < 80$		0
$80 \leq s < 85$	|	1

The measurement classes are used to determine the scale for the horizontal axis and the frequency values to determine the scale for the vertical axis. For each measurement class, a rectangle is drawn as wide as the measurement class and as tall as the frequency for the class. The axes are labelled and a descriptive title for the histogram is included.



Answer 9CU.

The histogram shows decrease in the number of employees with increase in salary. The bulk of the data values gather at the lower end of the distribution. Thus, the distribution is skewed to the right or skewed in the direction of the tail. Hence, the statement (A) is correct.

The frequencies are first added to determine the number of employees.

$$20+8+4=32$$

There are 32 employees, so the middle data value is between the 16th and 17th data values. Both the 16th and 17th data values are located in the 30-40 thousand measurement class. Therefore, the median occurs in the 30-40 thousand measurement class. Hence, the statement (B) is not correct.

As the frequency add up to 32, this implies that the graph represent 32 employees. Hence, the statement (C) is correct.

The intervals are 30-40, 40-50 and 50-60. Thus, the width of each measurement class is $10 thousand. Hence, the statement (D) is correct.

Answer 10PA.

The frequencies are first added to determine the number of newspapers.

$$13+3+2+0+0+2=20$$

There are 20 newspapers, so the middle data value is between the 10th and 11th data values. Both the 10th and 11th data values are located in the 350-600 thousands measurement class. Therefore, the median occurs in the 350-600 thousands measurement class.

The description of the distribution of the data is as given below.

• The daily circulation of only two newspapers is above 1600 thousands. It is likely that these newspapers are the most popular.

• There are gaps in the 1100-1350 and 1350-1600 thousands measurement classes.

• The daily circulation of the most newspapers is below 600 thousands.

• The histogram shows decrease in the number of newspaper with increase in daily circulation. The bulk of the data values gather at the lower end of the distribution. Thus, the distribution is skewed to the right or skewed in the direction of the tail.

Answer 11PA.

The frequencies are first added to determine the number of teams.

$$8+5+3+5+3+1=25$$

There are 25 teams, so the middle data value is 13th data value. The 13th data value is located in the 3400-3800 measurement class. Therefore, the median occurs in the 3400-3800 measurement class.

The description of the distribution of the data is as given below.

• The Championship point of only one team is above 5000. It is likely that this team is the leading team.

• The Championship point of the most teams is below 4600.

• The histogram shows decrease in the number of teams with increase in Championship points. The bulk of the data values gather at the lower end of the distribution. Thus, the distribution is skewed to the right or skewed in the direction of the tail.

Answer 12PA.

Men's College Basketball Leading Rebounds, 2001

The frequencies are first added to determine the number of rebounds.

$$5+6+4+2+0+0=17$$

There are 17 rebounds, so the middle data value is 9th data value. The 9th data value is located in the 220-240 measurement class. Therefore, the median occurs in the 220-240 measurement class.

Women's College Basketball Leading Rebounds, 2001

The frequencies are first added to determine the number of rebounds.

$$1+2+5+5+1+1=15$$

There are 15 rebounds, so the middle data value is 8th data value. The 8th data value is located in the 240-260 measurement class. Therefore, the median occurs in the 240-260 measurement class.

Hence, the histogram of Women's College Basketball Leading Rebounds, 2001 has the greater median height compared to the histogram of Men's College Basketball Leading Rebounds, 2001.

Answer 13PA.

U. S. Presidents Age at inauguration

The frequencies are first added to determine the number of Presidents.

$$8+24+10+0+0+0=42$$

There are 42 Presidents, so the middle data value is between 21st and 22nd data value. Both the 21st and 22nd data values are located in the 50-60 measurement class. Therefore, the median occurs in the 50-60 measurement class.

U. S. Presidents Age at death

The frequencies are first added to determine the number of Presidents.

$$2+5+12+11+5+2=37$$

There are 37 Presidents, so the middle data value is the 19th data value. The 19th data value is located in the 60-70 measurement class. Therefore, the median occurs in the 60-70 measurement class.

Hence, the histogram of U. S. Presidents Age at inauguration has the greater median height compared to the histogram of U. S. Presidents Age at death.

Answer 14PA.

Step 1: The greatest and the least values in the data set is identified.

The Students' semester averages in a mathematics class ranges from 96.53 to 73.83.

Step 2: Measurement classes of equal width are created.

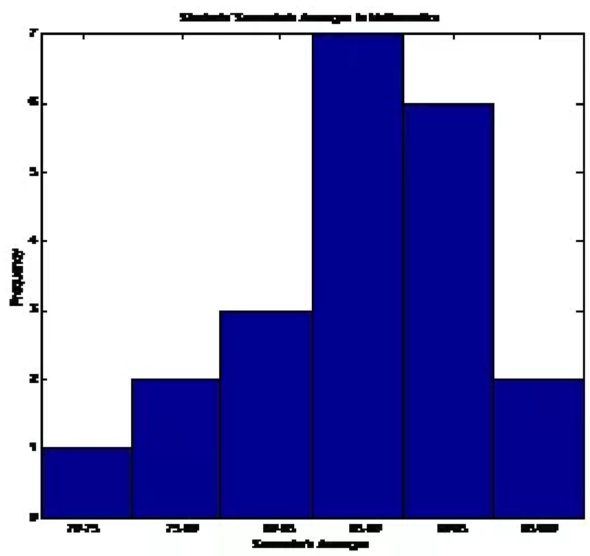
For these data, measurement classes from 70 to 100 with a 5-point interval are used.

Step 3: A frequency table using the measurement classes is created.

Intervals	Tally	Frequency
$70 \le s < 75$	|	1
$75 \le s < 80$	||	2
$80 \le s < 85$	|||	3
$85 \le s < 90$	~~||||~~ ||	7
$90 \le s < 95$	~~||||~~ |	6
$95 \le s < 100$	||	2

Step 4: Drawing the histogram.

The measurement classes are used to determine the scale for the horizontal axis and the frequency values to determine the scale for the vertical axis. For each measurement class, a rectangle is drawn as wide as the measurement class and as tall as the frequency for the class. The axes are labelled and a descriptive title for the histogram is included.



Answer 15PA.

Step 1: The greatest and the least values in the data set is identified.

The number of raisins found in snack-size box ranges from 53 to 109.

Step 2: Measurement classes of equal width are created.

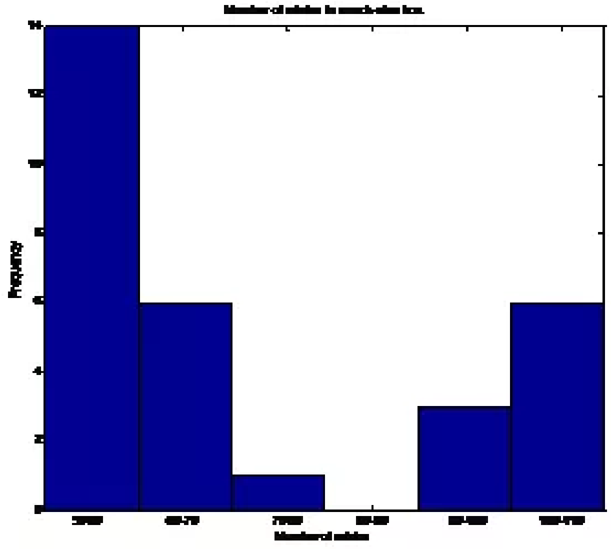
For these data, measurement classes from 50 to 110 with a 10-point interval are used.

Step 3: A frequency table using the measurement classes is created.

Intervals	Tally	Frequency
$50 \le s < 60$	~~||||~~ ~~||||~~ ||||	14
$60 \le s < 70$	~~||||~~		6
$70 \le s < 80$			1
$80 \le s < 90$		0
$90 \le s < 100$	|||	3
$100 \le s < 110$	~~||||~~		6

Step 4: Drawing the histogram.

The measurement classes are used to determine the scale for the horizontal axis and the frequency values to determine the scale for the vertical axis. For each measurement class, a rectangle is drawn as wide as the measurement class and as tall as the frequency for the class. The axes are labelled and a descriptive title for the histogram is included.



Answer 16PA.

Step 1: The greatest and the least values in the data set is identified.

The Payrolls for major league baseball teams ranges from $15 to $112.

Step 2: Measurement classes of equal width are created.

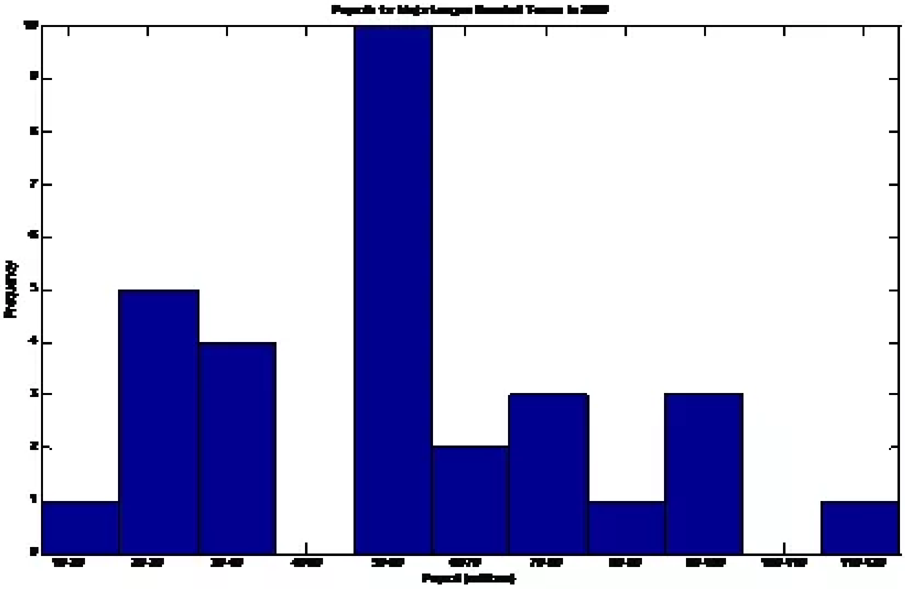
For these data, measurement classes from 10 to 120 with a 10-point interval are used.

Step 3: A frequency table using the measurement classes is created.

Intervals	Tally	Frequency
$10 \le s < 20$	|	1
$20 \le s < 30$	~~||||~~	5
$30 \le s < 40$	||||	4
$40 \le s < 50$		0
$50 \le s < 60$	~~||||~~ ~~||||~~	10
$60 \le s < 70$	||	2
$70 \le s < 80$	|||	3
$80 \le s < 90$	|	1
$90 \le s < 100$	|||	3
$100 \le s < 110$		0
$110 \le s < 120$	|	1

Step 4: Drawing the histogram.

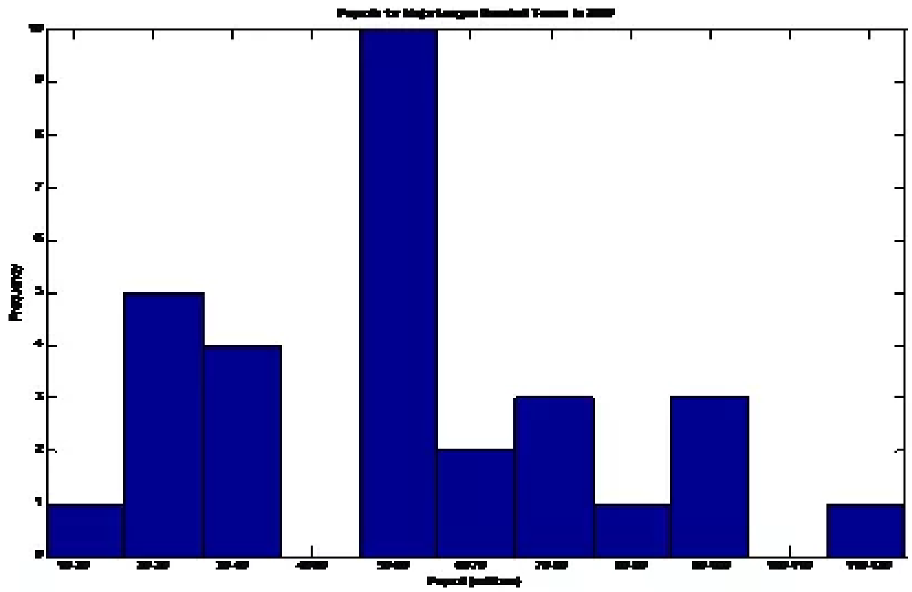
The measurement classes are used to determine the scale for the horizontal axis and the frequency values to determine the scale for the vertical axis. For each measurement class, a rectangle is drawn as wide as the measurement class and as tall as the frequency for the class. The axes are labelled and a descriptive title for the histogram is included.



Answer 17PA.

The frequency table and the histogram of the Payrolls for major League Baseball Teams in 2000 are as given below.

Intervals	Tally	Frequency
$10 \le s < 20$	|	1
$20 \le s < 30$	~~||||~~	5
$30 \le s < 40$	||||	4
$40 \le s < 50$		0
$50 \le s < 60$	~~||||~~ ~~||||~~	10
$60 \le s < 70$	||	2
$70 \le s < 80$	|||	3
$80 \le s < 90$	|	1
$90 \le s < 100$	|||	3
$100 \le s < 110$		0
$110 \le s < 120$	|	1



The frequencies are first added to determine the number of teams.

$$1+5+4+0+10+2+3+1+3+0+1=30$$

There are 30 teams, so the middle data value is between the 15th and 16th data values. Both the 15th and 16th data values are located in the 50-60 measurement class. Therefore, the median occurs in the 50-60 measurement class.

Answer 18PA.

The frequency table of the percent of eligible voters who voted in the 2000 Presidential Election are as given below.

Intervals	Tally	Frequency
$40 \le s < 45$	~~IIII~~ I	6
$45 \le s < 50$	~~IIII~~ ~~IIII~~	10
$50 \le s < 55$	~~IIII~~ ~~IIII~~ III	13
$55 \le s < 60$	~~IIII~~ ~~IIII~~ I	11
$60 \le s < 65$	~~IIII~~ I	6
$65 \le s < 70$	IIII	4

The frequencies are first added to determine the number of states.

$$6+10+13+11+6+4=50$$

There are 50 states, so the middle data value is between the 25th and 26th data values. Both the 25th and 26th data values are located in the 50-55 measurement class. Therefore, the median occurs in the 50-55 measurement class.

Answer 19PA.

Step 1: The greatest and the least values in the data set is identified.

The percent of eligible voters who voted in the 2000 Presidential Election ranges from 40.48 to 68.75.

Step 2: Measurement classes of equal width are created.

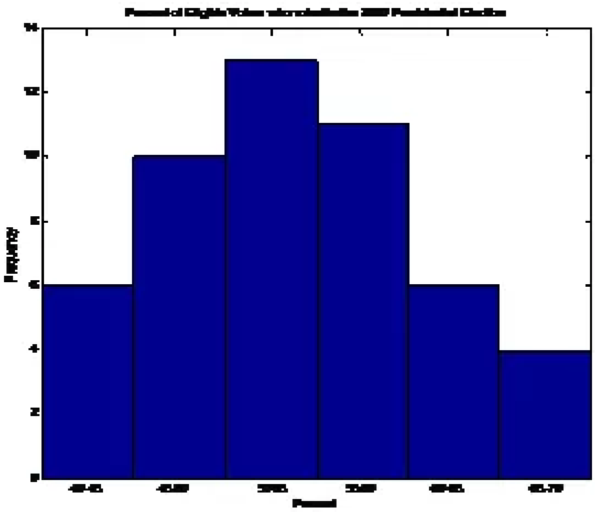
For these data, measurement classes from 40 to 70 with a 5-point interval are used.

Step 3: A frequency table using the measurement classes is created.

Intervals	Tally	Frequency
$40 \le s < 45$	卌 |	6
$45 \le s < 50$	卌 卌	10
$50 \le s < 55$	卌 卌 |||	13
$55 \le s < 60$	卌 卌 |	11
$60 \le s < 65$	卌 |	6
$65 \le s < 70$	||||	4

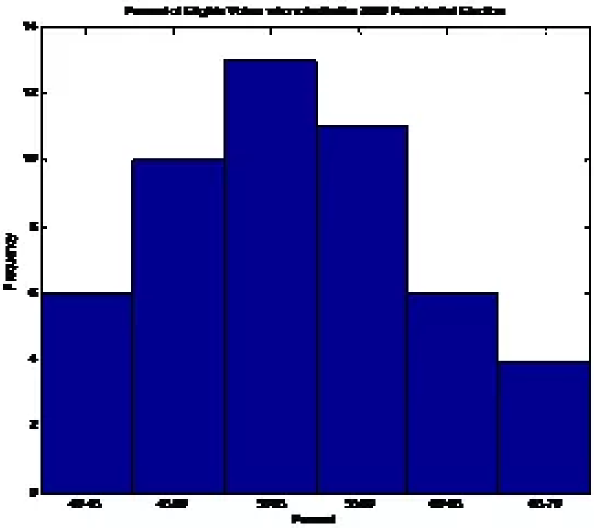
Step 4: Drawing the histogram.

The measurement classes are used to determine the scale for the horizontal axis and the frequency values to determine the scale for the vertical axis. For each measurement class, a rectangle is drawn as wide as the measurement class and as tall as the frequency for the class. The axes are labelled and a descriptive title for the histogram is included.



Answer 20PA.

The histogram of the percent of eligible voters who voted in the 2000 Presidential Election is as given below.



The distribution of the histogram is somewhat symmetrical in shape. The median is between the 25th and 26th data values and thus, the median is in the 50-55 measurement class.

Answer 24PA.

To find the number of employees, a frequency table using the measurement classes is created.

Intervals	Frequency
$0 \le s < 2$	9
$2 \le s < 4$	12
$4 \le s < 6$	11
$6 \le s < 8$	6
$8 \le s < 10$	6
$10 \le s < 12$	2

The frequencies are added to determine the number of newspapers.

$$9+12+11+6+6+2=46$$

Hence, there are $\boxed{\text{46 employees}}$ represented in the graph.

Answer 25PA.

To find the number of employees, a frequency table using the measurement classes is created.

Intervals	Frequency
$0 \le s < 2$	9
$2 \le s < 4$	12
$4 \le s < 6$	11
$6 \le s < 8$	6
$8 \le s < 10$	6
$10 \le s < 12$	2

The frequencies are added to determine the number of newspapers.

$$9+12+11+6+6+2=46$$

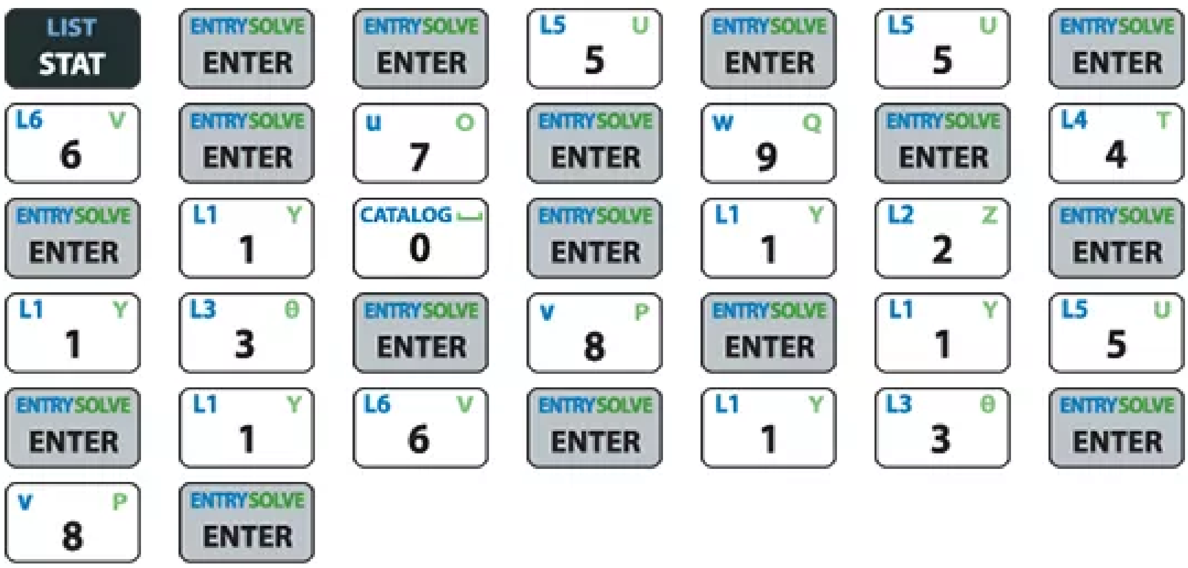
There are 46 employees, so the middle data value is between the 23rd and 24th data values. Both the 23rd and 24th data values are located in the 4-6 measurement class. Therefore, the median occurs in the $\boxed{\text{4-6}}$ measurement class.

Answer 26PA.

The histogram is to be created using graphing calculator for the following data.

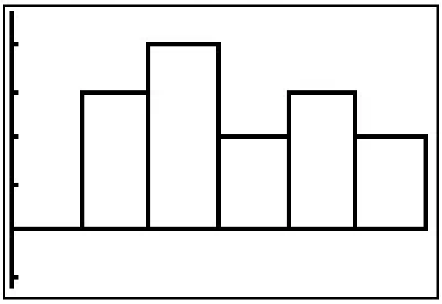
5, 5, 6, 7, 9, 4, 10, 12, 13, 8, 15, 16, 13, 8

The data values are entered by the following steps.



The histogram is plotted using the steps given below.

The histogram is as shown below.



Answer 27PA.

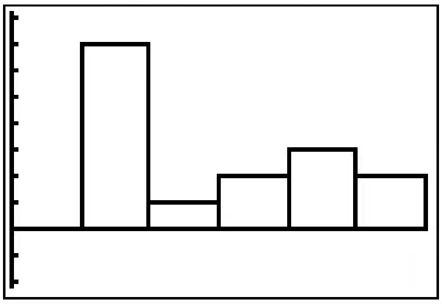
The histogram is to be created using graphing calculator for the following data.

12, 14, 25, 30, 11, 35, 41, 47, 13, 18, 58, 59, 42, 13, 18

The data values are entered by the following steps.

The histogram is plotted using the steps given below.

The histogram is as shown below.



Answer 28PA.

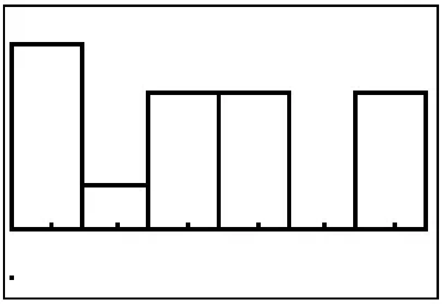
The histogram is to be created using graphing calculator for the following data.

124, 83, 81, 130, 111, 92, 178, 179, 134, 92, 133, 145, 180, 144

The data values are entered by the following steps.

The histogram is plotted using the steps given below.

The histogram is as shown below.



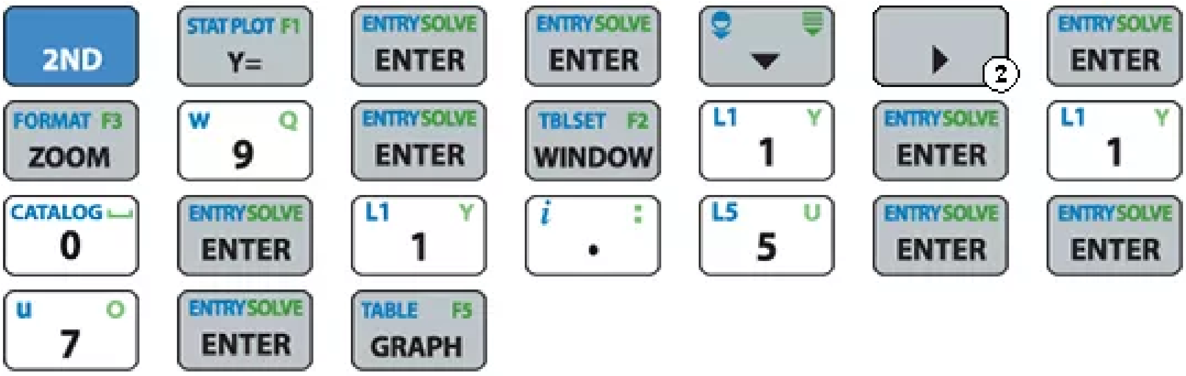
Answer 29PA.

The histogram is to be created using graphing calculator for the following data.

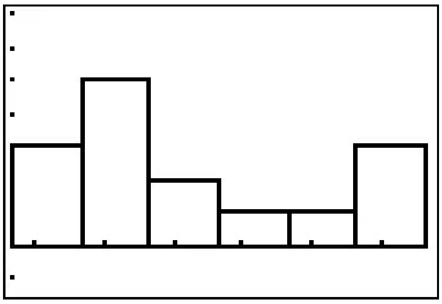
2.2, 2.4, 7.5, 9.1, 3.4, 5.1, 6.3, 1.8, 2.8, 3.7, 8.6, 9.5, 3.6, 3.7, 5.0

The data values are entered by the following steps.

The histogram is plotted using the steps given below.



The histogram is as shown below.



Answer 30MYS.

Consider the matrices

$$A = \begin{bmatrix} -2 & 3 & 7 \\ 0 & -4 & 6 \\ 1 & -5 & 4 \end{bmatrix},\ B = \begin{bmatrix} -8 & 1 & -1 \\ 2 & 3 & -7 \end{bmatrix},\ C = \begin{bmatrix} 7 & -5 & 2 \\ 0 & 0 & 3 \\ -1 & 4 & 6 \end{bmatrix}$$

The size of *A* is 3×3.

The size of *B* is 2×3.

The size of *C* is 3×3.

Since the size of *A* and *B* are not same, therefore $A + B$ does not exist.

Thus $A + B$ is impossible.

Answer 31MYS.

Consider the matrices

$$A = \begin{bmatrix} -2 & 3 & 7 \\ 0 & -4 & 6 \\ 1 & -5 & 4 \end{bmatrix},\ B = \begin{bmatrix} -8 & 1 & -1 \\ 2 & 3 & -7 \end{bmatrix},\ C = \begin{bmatrix} 7 & -5 & 2 \\ 0 & 0 & 3 \\ -1 & 4 & 6 \end{bmatrix}$$

The size of *A* is 3×3.

The size of *B* is 2×3.

The size of *C* is 3×3.

Since the size of *A* and *C* are same, therefore $C - A$ exists.

Let $A=\left[a_{ij}\right], C=\left[c_{ij}\right]$. The sum of two matrices *A* and *C* of same size is defines as follows:

$$A \pm C=\left[a_{ij} \pm c_{ij}\right]$$

Therefore

$$C-A=\begin{bmatrix}7 & -5 & 2\\ 0 & 0 & 3\\ -1 & 4 & 6\end{bmatrix}-\begin{bmatrix}-2 & 3 & 7\\ 0 & -4 & 6\\ 1 & -5 & 4\end{bmatrix}$$

$$=\begin{bmatrix}7-(-2) & -5-3 & 2-7\\ 0-0 & 0-(-4) & 3-6\\ -1-1 & 4-(-5) & 6-4\end{bmatrix}$$

$$=\begin{bmatrix}7+2 & -5-3 & 2-7\\ 0-0 & 0+4 & 3-6\\ -1-1 & 4+5 & 6-4\end{bmatrix}$$

$$=\begin{bmatrix}9 & -8 & -5\\ 0 & 4 & -3\\ -2 & 9 & 2\end{bmatrix}$$

Therefore

$$\boxed{C-A=\begin{bmatrix}9 & -8 & -5\\ 0 & 4 & -3\\ -2 & 9 & 2\end{bmatrix}}$$

Answer 32MYS.

Consider the matrices

$$A=\begin{bmatrix}-2 & 3 & 7\\ 0 & -4 & 6\\ 1 & -5 & 4\end{bmatrix},\quad B=\begin{bmatrix}-8 & 1 & -1\\ 2 & 3 & -7\end{bmatrix},\quad C=\begin{bmatrix}7 & -5 & 2\\ 0 & 0 & 3\\ -1 & 4 & 6\end{bmatrix}$$

Multiply a number *k* with a matrix *A* is as follows: $kA=\left[ka_{ij}\right]$ where $A=\left[a_{ij}\right]$

Therefore

$$2B=2\begin{bmatrix}-8 & 1 & -1\\ 2 & 3 & -7\end{bmatrix}$$

$$=\begin{bmatrix}2(-8) & 2\cdot 1 & 2(-1)\\ 2\cdot 2 & 2\cdot 3 & 2(-7)\end{bmatrix}$$

$$=\begin{bmatrix}-16 & 2 & -2\\ 4 & 6 & -14\end{bmatrix}$$

Thus $\boxed{2B=\begin{bmatrix}-16 & 2 & -2\\ 4 & 6 & -14\end{bmatrix}}$

Answer 33MYS.

Consider the matrices

$$A=\begin{bmatrix}-2 & 3 & 7\\ 0 & -4 & 6\\ 1 & -5 & 4\end{bmatrix},\ B=\begin{bmatrix}-8 & 1 & -1\\ 2 & 3 & -7\end{bmatrix},\ C=\begin{bmatrix}7 & -5 & 2\\ 0 & 0 & 3\\ -1 & 4 & 6\end{bmatrix}$$

Multiply a number k with a matrix A is as follows: $kA=\left[ka_{ij}\right]$ where $A=\left[a_{ij}\right]$

Therefore

$$-5A=-5\begin{bmatrix}-2 & 3 & 7\\ 0 & -4 & 6\\ 1 & -5 & 4\end{bmatrix}$$

$$=\begin{bmatrix}(-5)(-2) & (-5)\cdot 3 & (-5)\cdot 7\\ (-5)\cdot 0 & (-5)(-4) & (-5)\cdot 6\\ (-5)\cdot 1 & (-5)(-5) & (-5)\cdot 4\end{bmatrix}$$

$$=\begin{bmatrix}10 & -15 & -35\\ 0 & 20 & -30\\ -5 & 25 & -20\end{bmatrix}$$

Thus $\boxed{-5A=\begin{bmatrix}10 & -15 & -35\\ 0 & 20 & -30\\ -5 & 25 & -20\end{bmatrix}}$

Answer 34MYS.

Every 15 minutes, a CD player is taken off the assembly line and tested.

This is a random sample. Therefore it is $\boxed{\text{unbiased}}$.

Since a CD player is taken off the assembly line according to a specific time interval 15 minutes, therefore it is a $\boxed{\text{Systematic Random Sample}}$.

Answer 35MYS.

The division of two fractions can be converting to a multiplication of two fractions.

$$\frac{a}{b}\div\frac{c}{d}=\frac{a}{b}\times\frac{d}{c}$$

Therefore

$$\frac{s}{s+7}\div\frac{s-5}{s+7}=\frac{s}{\cancel{s+7}}\times\frac{\cancel{s+7}}{s-5}$$

$$=\boxed{\frac{s}{s-5}}$$

Answer 36MYS.

The division of two fractions can be converting to a multiplication of two fractions.

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Therefore

$$\frac{2m^2+7m-15}{m+2} \div \frac{2m-3}{m^2+5m+6} = \frac{2m^2+7m-15}{m+2} \times \frac{m^2+5m+6}{2m-3}$$

Factor each expression

$$\begin{aligned}\frac{2m^2+7m-15}{m+2} \div \frac{2m-3}{m^2+5m+6} &= \frac{2m^2+7m-15}{m+2} \times \frac{m^2+5m+6}{2m-3} \\ &= \frac{2m^2+10m-3m-15}{m+2} \times \frac{m^2+2m+3m+6}{2m-3} \\ &= \frac{2m(m+5)-3(m+5)}{m+2} \times \frac{m(m+2)+3(m+2)}{2m-3} \\ &= \frac{(2m-3)(m+5)}{m+2} \times \frac{(m+3)(m+2)}{2m-3}\end{aligned}$$

Answer 37MYS.

Consider the equation

$$\sqrt{y+3}+5=9$$

To solve the equation, isolate the radical by adding -5 in both sides.

$$\begin{aligned}\sqrt{y+3}+5-5 &= 9-5 \\ \sqrt{y+3} &= 4 \\ y+3 &= 4^2 \quad \text{[Squaring both sides]} \\ y+3 &= 16\end{aligned}$$

$$\begin{aligned}y &= 16-3 \quad \text{[Subtract 3 from both sides]} \\ &= 13\end{aligned}$$

Therefore the solution is $\boxed{\{13\}}$

Answer 38MYS.

Consider the equation

$$\sqrt{x-2} = x-4$$

To solve the equation, remove the radical by squaring both sides.

$$\left(\sqrt{x-2}\right)^2 = (x-4)^2$$
$$x-2 = x^2 - 2\cdot x\cdot 4 + 4^2$$
$$x-2 = x^2 - 8x + 16$$
$$x^2 - 8x + 16 = x-2$$
$$x^2 - 8x + 16 - x + 2 = x - 2 - x + 2$$
$$x^2 - 9x + 18 = 0$$
$$x^2 - 6x - 3x + 18 = 0$$
$$x(x-6) - 3(x-6) = 0$$
$$(x-6)(x-3) = 0$$

Either $x-6=0$ or $x-3=0$

$x=6$ or $x=3$

Therefore the solution set is $\boxed{\{3,6\}}$

Answer 39MYS.

Consider the equation

$$13 = \sqrt{2w-5}$$

To solve the equation, remove the radical by squaring both sides.

$$(13)^2 = \left(\sqrt{2w-5}\right)^2$$
$$169 = 2w-5$$
$$169+5 = 2w$$
$$174 = 2w$$
$$\frac{174}{2} = w$$
$$w = 87$$

Therefore the solution set is $\boxed{\{87\}}$

Answer 40MYS.

Consider the data set 2, 4, 7, 9, 12, 15.

The data set is already arranged from smallest to largest.

Total number of data is 6. Therefore the median is the mean of 3rd and 4th data.

Therefore the median is

$$\frac{7+9}{2}=\boxed{8}$$

Answer 41MYS.

Consider the data set 10, 3, 17, 1, 8, 6, 12, 15.

Arrange the data from smallest to largest.

1, 3, 6, 8, 10, 12, 15, 17

Total number of data is 8. Therefore the median is the mean of 4th and 5th data.

Therefore the median is

$$\frac{8+10}{2}=\boxed{9}$$

Answer 42MYS.

Consider the data set 7, 19, 9, 4, 7, 2.

Arrange the data from smallest to largest.

2, 4, 7, 7, 9, 19

Total number of data is 6. Therefore the median is the mean of 3rd and 4th data.

Therefore the median is

$$\frac{7+7}{2}=\boxed{7}$$

Answer 43MYS.

Consider the data set 2.1, 7.4, 13.9, 1.6, 5.21, 3.901.

Arrange the data from smallest to largest.

1.6, 2.1, 3.901, 5.21, 7.4, 13.9

Total number of data is 6. Therefore the median is the mean of 3rd and 4th data.

Therefore the median is

$$\frac{3.901+5.21}{2}=\boxed{4.5555}$$