

Skill 9.1: Bar graphs and frequency polygons

This method of displaying information is based around the drawing of vertical rectangles for each category.

Example: Construct a bar graph for the following data and use it to represent its frequency polygon.

Test score data:

{3, 15, 17, 50, 39, 22, 23, 26, 28, 11, 25, 21, 23, 42, 48, 36, 34, 18, 17, 45, 14, 29, 27, 36, 35}

Since there are so many different scores, and the data is spread over a wide range, it is easier to group the numbers into score ranges of ten.

Step 1

Group the scores into manageable ranges.

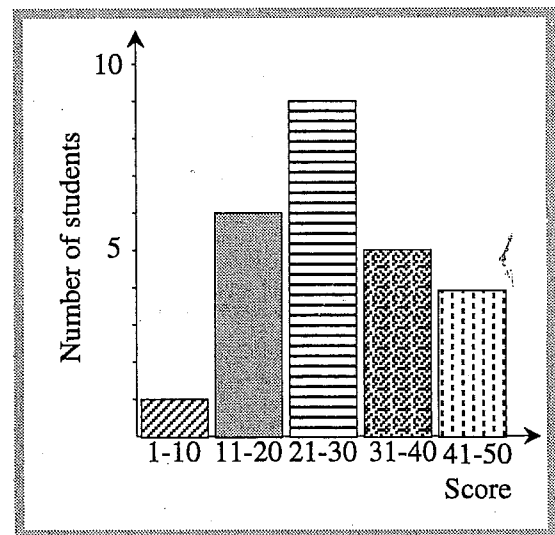
Step 2

Tally the data and record the frequencies.

Scores	Tally	Frequency
1 to 10		1
11 to 20		6
21 to 30		9
31 to 40		5
41 to 50		4

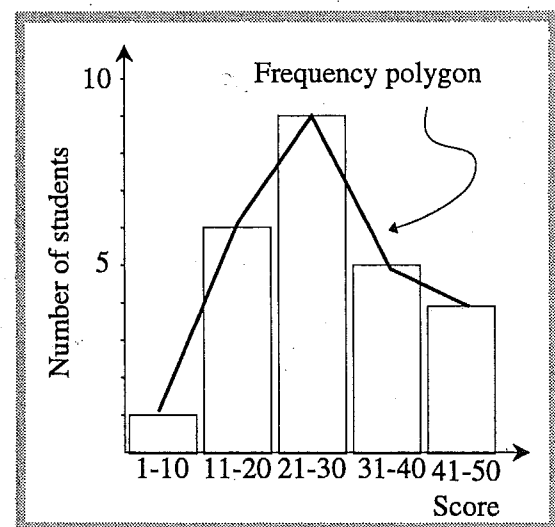
Step 3

Draw up a bar graph.



Step 4

Join the midpoints at the top of the columns to form the frequency polygon.



Skill 9.2: Pie graphs

This method of displaying information is based on the drawing of vertical rectangles for each category.

Example: Construct a pie graph to show how Sam's pocket money was spent during the year. She gets \$10 per week plus \$20 for X-mas (\$540 per year). †

Preliminary calculations (displayed in the table)

Step 1

Find the fraction of each different type.

Step 2

Find the fraction of the circle in degrees by multiplying each fraction by 360° .

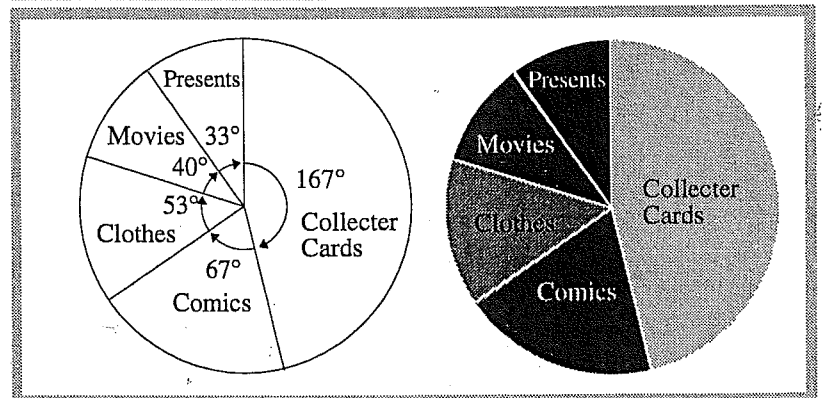
Step 3

Divide the circle up in the angles as above. The normal rule is to start from 12 o'clock and go round clockwise, biggest to smallest.

Step 4

Label each of the segments with the different colours.

Money spent	Amount	Fraction of circle	Angle
Collector cards	\$250	$\frac{250}{540} \times 360^\circ$	167°
Comics	\$100	$\frac{100}{540} \times 360^\circ$	67°
Movies	\$60	$\frac{60}{540} \times 360^\circ$	40°
Clothes	\$80	$\frac{80}{540} \times 360^\circ$	53°
Presents	\$50	$\frac{50}{540} \times 360^\circ$	33°
Total			360°



Skill 9.3: Stem and leaf plots

The stem and leaf plot is a shorthand way of showing data. Here, the number 52 is shown with the tens part as the stem and the unit part as the leaf.

Example: Set up a stem and leaf plot for the following data set and use it to identify the most popular group:

{41, 45, 41, 42, 41, 45, 48, 45, 42, 40, 36, 35, 39, 55, 56, 52, 64, 66, 64, 69, 51, 45, 55, 65, 68, 64, 44, 42, 41, 48, 49, 50, 71, 50, 52, 51} †

The most popular group of figures are those in the 40s.

STEM	LEAF
3	5, 6, 9
4	0, 1, 1, 1, 1, 2, 2, 2, 4, 5, 5, 5, 5, 8, 8, 9
5	0, 0, 1, 1, 2, 2, 5, 5, 6
6	4, 4, 4, 5, 6, 8, 9
7	1

Chance and data practice

Skill 9.1 Bar graphs and frequency polygons

These numbers are my team's goal scores for the competition:
 {28, 31, 49, 58, 62, 84, 21, 22, 23, 25, 31, 32, 30, 42, 41, 68, 81, 82, 58, 59, 27, 38, 40, 41, 58, 57, 48, 29}

- 1 Divide the data into the following whole number groups:
 (1 to 9), (10 to 19), (20 to 29), (30 to 39), (40 to 49), (50 to 59), (60 to 69), (70 to 79), (80 to 89)
- 2 Draw a bar graph and mark on the frequency polygon.

Skill 9.2 Pie graphs

Joanne has an extensive orchid collection. Make a pie graph to display this information about the collection:

Orchid colour	Number
Red	12
Yellow	12
Brown	6
Green	8
White	10

Skill 9.3 Stem and leaf plots

Set up a stem and leaf plot for this information and use it to find the median value of the data set:
 {29, 33, 33, 69, 69, 41, 74, 79, 20, 21, 56, 58, 60, 62, 76, 78, 48, 48, 22, 27, 40, 72, 57, 39, 35, 25, 20, 48, 59}

Skill 9.4 Measures of central tendency

From the data set determine:

- 1 Mean
 - 2 Median
 - 3 Mode
- {1, 18, 20, 2, 4, 2, 2, 5, 8, 5, 5, 1, 1, 16, 1, 5, 1, 5, 19, 19}

Skill 9.5 Measures of spread

From the data set determine the:

- 1 Mean
 - 2 Range
 - 3 Standard deviation
- Data set: {6, 7, 8, 9, 10, 5, 11}

Skill 9.6 Interquartile range

Find the median and interquartile range these two data sets:

- 1 {1, 2, 6, 7, 9, 10, 12, 17}
- 2 {2, 8, 9, 10, 12, 13, 17, 18, 21}

Skill 9.7 Displaying continuous data

These are the measurements, in metres, of young pine trees in a plantation.
 {1.2, 1.1, 1.7, 3.8, 2.1, 2.2, 1.8, 1.7, 1.4, 1.4, 1.3, 2.8, 2.7, 3.1, 3, 1.3, 1.2, 1.1, 1.6, 1.7, 2.1, 2.4, 2.6, 2.7, 1.3, 1.4, 1.7, 2.3, 2, 2.1, 1.6, 1.7}

- 1 Divide the data into the following groups:
 (1 to <1.5), (1.5 to <2), (2 to <2.5), (2.5 to <3), (3 to <3.5), (3.5 to <4)
- 2 Draw a bar graph.

Skill 9.8 Working with continuous data

- 1 Divide the data into the following groups:
 (1 to <2), (2 to <3), (3 to <4), (4 to <5)

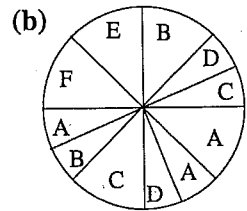
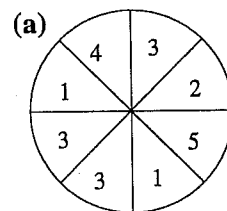
Data set:

{2.04, 2.11, 1.78, 1.001, 4.02, 4.13, 3.007, 3.7094, 2.6, 2.083, 1.79, 1.832, 2.043, 3.098, 3.110, 3.1897, 4.72, 4.083, 1.093, 1.928, 1.853, 3.33, 3.218, 4.6789, 1.198, 1.2, 3.8765, 4, 4.0938, 1.2}

- 2 Use the continuous data procedure to find the mean.

Skill 9.9 Probability of single and complementary events

- 1 List the probability distributions for the following spinners:



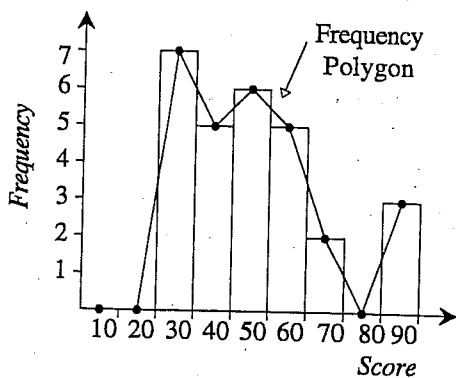
- 2 Joan has a bag of tokens with the following numbers on them:
 {1, 2, 1, 3, 1, 4, 5, 8, 9, 10, 3, 4}
- (a) Find the probability of choosing a token with a number less than 5
 - (b) Describe the event which is complementary to this and find its probability.

Answers

9 Chance and data

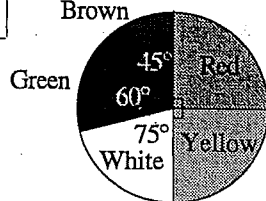
Skill 9.1

Score Range	Tally	Frequency
1 to 9		0
10 to 19		0
20 to 29	### II	7
30 to 39	###	5
40 to 49	### I	6
50 to 59	###	5
60 to 69	II	2
70 to 79		0
80 to 89	III	3



Skill 9.2

Colour	Number	Angle
Red	12	$\frac{12}{48} \times 360^\circ = 90^\circ$
Yellow	12	$\frac{12}{48} \times 360^\circ = 90^\circ$
Brown	6	$\frac{6}{48} \times 360^\circ = 45^\circ$
Green	8	$\frac{8}{48} \times 360^\circ = 60^\circ$
White	10	$\frac{10}{48} \times 360^\circ = 75^\circ$
Total	48	



Skill 9.3

Stem	Leaf
2	0, 0, 1, 2, 5, 7, 9
3	3, 3, 5, 9
4	0, 1, 8, 8
5	6, 7, 8, 9
6	0, 2, 9, 9
7	2, 4, 6, 8, 9

Median = 48

Skill 9.4

- Mean = 7
- Median = 5
- Mode = 1, 5

Skill 9.5

- Mean = 8
- Range = 6
- Standard Deviation = 2.16

Skill 9.6

(a) {1, 2, 6, 7, 9, 10, 12, 17}

4 11

Median = 8,
IQ = 11 - 4 = 7

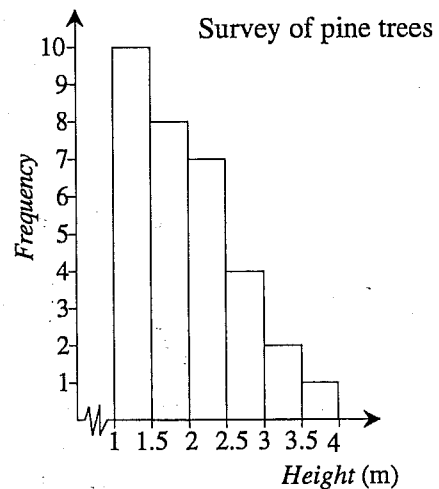
(b) {2, 8, 9, 10, 12, 13, 17, 18, 21}

8.5 17.5

Median = 12
IQ = 17.5 - 8.5 = 9

Skill 9.7

Data Range	Tally	Frequency
1 to <1.5	### ###	10
1.5 to <2	### III	8
2 to <2.5	### II	7
2.5 to <3	IIII	4
3 to <3.5	II	2
3.5 to <4	I	1



Skill 9.8

Group Range	Tally	Frequency	Middle of group	Freq. × Middle of group
1 to <2	### ###	10	1.5	15
2 to <3	###	5	2.5	12.5
3 to <4	### III	8	3.5	28
4 to <5	### II	7	4.5	31.5
Total		30	Total	87

Mean = $87 \div 30 = 2.9$

Answers

Skill 9.9

1 (a)

Number	Probability
1	$\frac{1}{4}$
2	$\frac{1}{8}$
3	$\frac{3}{8}$
4	$\frac{1}{8}$
5	$\frac{1}{8}$

(b)

Letter	Probability
A	$\frac{1}{4}$
B	$\frac{3}{16}$
C	$\frac{3}{16}$
D	$\frac{1}{8}$
E	$\frac{1}{8}$
F	$\frac{1}{8}$

2 (a) $\frac{8}{12} = \frac{2}{3}$

(b) Choosing a token greater than or equal to five

$$\frac{4}{12} = \frac{1}{3}$$